Lizards of Brazilian Amazonia (Reptilia: Squamata)

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Key words: Reptilia; Squamata; lizards; Amazonia; Brazil; zoogeography; key.
Eighty-nine species of lizards, six of which polytypic (forming a total of 97 taxa), are presently known from Brazilian Amazonia. This number includes six species and one subspecies described as new to science in this paper: *Stenocercus fimbriatus, Lepidoblepharis hoogmoedi, Leposoma osvaldoi, L. snethlageae, Tretioscincus oriximinensis, Tupinambis longilineus*, and *Anolis nitens tandai*. *Stenocercus dumerilii* is resurrected from the synonymy of *S. tricristatus*. *Bachia cophias* is considered a junior synonym of *B. flavescens*. *B. peruana* is a new record from Brazil. *Anolis nitens* has priority over *A. chrysolepis*. The Amazonian *Tupinambis* is shown to be *T. teguixin* (of which *T. nigropunctatus* is a junior synonym). The name *T. merianae* should be used for *T. teguixin* sensu Boulenger (1885b). *Mabuya ficta* is a junior synonym of *M. bistriata*, while the name *M. nigropunctata* should be used for *M. bistriata* sensu Vanzolini & Williams (1980). Of all species extensive descriptions and ecological data, if available, are presented. A zoogeographical analysis based on the combined distribution maps of the various species shows a main division in Amazonia of a western and an eastern fauna. A southwestern group is also recognised and, although defined by a smaller number of species, a Guianan group. The lizard fauna from Rondônia shows multiple affinities. The distribution of lizards in enclaves of open formations in Amazonia does not support the idea of continuous areas of savannas throughout Amazonia in relatively recent times.

Palavras-chave: Reptilia; Squamata; lagartos; Amazônia; Brasil; zoogeografia; chave de identificação.
Oitenta e nove espécies de lagartos, seis das quais politípicas (totalizando 97 taxa), ocorrem na Amazônia brasileira. Esse número inclui seis espécies e uma subespécie descritas neste estudo como novas para a ciência: *Stenocercus fimbriatus, Lepidoblepharis hoogmoedi, Leposoma osvaldoi, L. snethlageae, Tretioscincus oriximinensis, Tupinambis longilineus* e *Anolis nitens tandai*. *Stenocercus dumerilii* é revalidada da sinonímia de *S. tricristatus*. *Bachia cophias* é considerada sinônimo júnior de *B. flavescens*, e *B. peruana* é registrada para o Brasil. *Anolis nitens* tem prioridade sobre *A. chrysolepis*. Mostra-se que o *Tupinambis* amazônico é *T. teguixin* (do qual *T. nigropunctatus* é um sinônimo júnior). O nome *T. merianae* deve ser usado para *T. teguixin* sensu Boulenger (1885b). *Mabuya ficta* é um sinônimo júnior de *M. bistriata*, enquanto o nome *M. nigropunctata* deve ser usado para *M. bistriata* sensu Vanzolini & Williams (1980). Para cada espécie uma extensa descrição é feita, e dados ecológicos, quando disponíveis, são apresentados. Uma análise zoogeográfica baseada em mapas onde se agrupam a distribuição das várias espécies revela uma divisão na Amazônia entre a fauna de oeste e a fauna de leste. Um grupo do sudoeste também é reconhecido e, embora definido por um número menor de espécies, um grupo Guiano. A fauna de lagartos de Rondônia mostra afinidades múltiplas. A distribuição de lagartos em enclaves de vegetação aberta na Amazônia não corrobora a idéia de uma distribuição contínua de savanas na Amazônia, em um passado relativamente recente.

Palabras-clave: Reptilia; Squamata; lagartos; Amazonía; Brasil; zoogeografía, clave de identificación.
Ochenta y nueve especies de lagartos, seis de las cuales politípicas (totalizando 97 taxa), se encuentran en la Amazonía brasileña. Este número incluye seis especies y una subespecie descritas en este estudio como nuevas para la ciencia: *Stenocercus fimbriatus, Lepidoblepharis hoogmoedi, Leposoma osvaldoi, L. snethlageae, Tretioscincus oriximinensis, Tupinambis longilineus*, and *Anolis nitens tandai*. *Stenocercus dumerilii* es revalidada de la sinonimia de *S. tricristatus*. *Bachia cophias* es considerada sinónima de *B.*

flavescens, y *B. peruana* es registrada para Brazil. *Anolis nitens* tiene prioridad sobre *A. chrysolepis*. Se demuestra que el *Tupinambis* amazonico es *T. teguixin* (de la cual *T. nigropunctatus* es un sinónimo). El nombre *T. merianae* debe ser usado para *T. teguixin* sensu Boulenger (1885b). *Mabuya ficta* es un sinónimo de *M. bistriata* , mientras el nombre *M. nigropunctata* debe ser usado para *M. bistriata* sensu Vanzolini & Williams (1980). Para cada especie se da una extensa descripción y se presentan datos ecologicos, cuando disponibles. Un análisis zoogeografico basado en mapas donde se muestra la distribución de las varias especies revela una división en la Amazonia entre la fauna del oeste y la fauna del este. También es reconocido un grupo del sudoeste, y aunque definido por un numero menor de especies, un grupo Guyanés. La fauna de lagartos de Rondonia muestra afinidades multiples. La distribución de lagartos en enclaves de vegetación abierta en la Amazonía no corrobora la idea de una distribución contínua de savanas en la Amazonía, en un pasado relativamente reciente.

Contents

Introduction

Although lizards are considered the best known reptiles occurring in Amazonia, our knowledge concerning these animals is still far from ideal. Discovering new species is not uncommon (six species and one subspecies are described here as new), and the distribution of most taxa is only known in general terms. For the majority of the taxa only fragmentary ecological observations exist. In the last twenty years some detailed studies on the herpetofauna of Amazonian sites have been published (e.g., Hoogmoed, 1973; Dixon & Soini, 1975, 1986; Duellman, 1978), but most of these refer to places outside Brazil. Data on lizards from Brazilian Amazonia, an area which constitutes more than half of the entire Amazonian Region, are scattered through a number of publications, either dealing with local faunas, or with single taxonomic units. Goeldi (1902) made the first compilation of lizards from Brazil, also including those occurring in Amazonia. Cunha (1961) attempted the only general study on Brazilian Amazonian lizards so far. His work, however, was nearly exclusively based on material in the MPEG collection, and therefore suffers from a deficient data base. Moreover, much additional data have been accumulated since Cunha's (1961) publication.

The main objective of the present study is to give a review of the Brazilian Amazonian lizard fauna, based on the study of the main collections which contain Amazonian specimens (except that of Museu de Zoologia da Universidade de São Paulo-MZUSP, to which access was denied) and on personally collected material and data. I hope that this paper will stimulate the research on Amazonian lizards, and that it will help those who work in other disciplines but need data on lizards.

During the present study, various taxonomic and nomenclatural problems were encountered and are dealt with. In a number of cases geographic variation was noticed, but within the scope of this paper no thorough analysis was attempted (this was also frequently hampered by insufficient sampling). Taxa under study by other specialists are dealt with less extensively, with reference to the studies in progress. In general, I tried to assemble all available data on the less well known species, whereas for some of the most common species (e.g., *Ameiva ameiva*) and some species mainly known from outside Amazonia (e.g., *Tropidurus oreadicus* and *T. hispidus*) only a number of selected, most relevant references is given.

The distribution data were used to discuss the various hypotheses on Amazonian zoogeography. A better understanding of the evolution of the speciose Amazonian fauna is an important issue at present, now that the region is increasingly submitted to deforestation and other environmental impacts (mining, construction of hydroelectric plants, colonisation programs, etc.). Many more faunistic surveys in Amazonia are necessary to achieve a satisfactory data base for zoogeographical studies. Additional data from biosciences and from geosciences are also needed before we can really understand how evolution took place in Amazonia. If this study would stimulate more investigations on Amazonian lizards and Amazonian ecosystems, one of its main goals would be achieved.

Material and Methods

Specimens from the following collections have been studied (museum acronyms as they have been used throughout this paper in parenthesis):

Academy of Natural Sciences, Philadelphia (ANSP)
American Museum of Natural History, New York (AMNH)
California Academy of Sciences, San Francisco (CAS)
Carnegie Museum, Department of Herpetology, Pittsburgh (CM)
Field Museum of Natural History, Chicago (FMNH)
Instituto Nacional de Pesquisas da Amazônia, Manaus (INPA; 'INPA/Ecol.' refers to specimens kept by Dr W.E. Magnusson and collaborators).
Göteborg Naturhistoriska Museum (GNM)
Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel (KBIN)
Louisiana State University, Museum of Natural Science (LSUMZ)
Museo Civico di Storia Naturale "Giacomo Doria", Genova (MSNG)
Museum of Comparative Zoology, Harvard University, Cambridge (MCZ)
Museum d'Histoire Naturelle, Genève (MHNG; a collection from Ecuador, from which only field numbers were available, is referred to as 'MHNG f.n.').
Museum National d'Histoire Naturelle, Paris (MHNP)
Museu Nacional do Rio de Janeiro (MNRJ)
Museu Paraense Emilio Goeldi, Belém (MPEG)
National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM)

Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden (RMNH; MSH refers to field number of M.S. Hoogmoed)
Natural History Museum (formerly British Museum of Natural History), London (BM)
Naturhistorisches Museum Bern (NHM)
Naturhistorisches Museum Wien (NMW)
Natur-Museum Senckenberg, Frankfurt am Main (SMF)
Swedish Museum of Natural History, Stockholm (NRM)
Texas Cooperative Wildlife Collection, Texas A & M University (TCWC)
Universidade Católica de Goiás, Centro de Estudos e Pesquisas Biológicas (CEPB)
Universidade Estadual de Campinas, Departamento de Zoologia (ZUEC)
Università di Torino, Dipartimento di Biologia Animale, Museo di Zoologia (MZCT)
University of Kansas, Museum of Natural History (KU)
University of Illinois at Urbana-Champaign, Museum of Natural History, Urbana (UIMNH)
University of Michigan, Museum of Zoology, Ann Arbor (UMMZ)
University of Texas at Arlington, Collection of Vertebrates (UTACV)
Uppsala University Zoological Museum (UUZM)
Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn (ZFMK)
Zoologisches Museum Berlin (ZMB)
Zoologische Staatssammlung, München (ZSMH)
Zoologisk Museum, Copenhagen (ZMUC)

In addition, a collection made by M. O'Shea during the 'Projeto Maracá-INPA/RGS/SEMA', which received the acronym 'MR', was also studied. This collection will be deposited in part in the British Museum, in part in a Brazilian collection.

Unfortunately, the collection of the Museu de Zoologia da Universidade de São Paulo, which contains many Amazonian specimens, was not made available for study.

The area considered in this study agrees largely with "Amazônia" as described by Pires (1973), which coincides with the area where Tropical Rain Forest occurs in northern South America (fig. 1). The largest part of the area forms the "Morphoclimatic Domain of the Hylaea" (Ab'Saber, 1977). However, lizard distributions frequently extend beyond this domain into the contiguous inter-domain zones. The species studied were those known to occur within the Brazilian borders. This region is mostly covered by tropical rainforest, but it also includes a number of distinct forest types and enclaves of open formations, whose fauna was studied as well. Not considered Amazonian, however, are some species reported by Vanzolini (1986a) and Vitt & Caldwell (1993) from Rondônia, in extensions of cerrado continuous with those in Central Brazil, viz. *Anolis meridionalis*, *Cnemidophorus* spec. and *Kentropyx vanzoi*. For general descriptions of the Amazonian flora, I refer to Hueck (1972), Pires (1973), and Pires & Prance (1985). Throughout this paper both the terms 'open vegetation' and 'savannas' indicate any kind of open formations.

The genera are described in alphabetical order within their families (or other categories of the family-group). Species are arranged alphabetically within the genera. In the presentation of the families Estes et al. (1988) and Frost & Etheridge (1989)

Fig. 1. Delimitation of Amazonian region according to Pires (1973). The map is a simplification of that shown by this author, which should be consulted for more details about his concept of the area and the several vegetational types included.

have been followed. Reference is made to the classification within each family, and a general view of its contents is given. For each genus a diagnosis (see below) and a review of its distribution are presented. The main emphasis is on the species, for which the following data are given:

— Synonyms and references. I tried to be as complete as possible for references which concern Brazilian Amazonia. Besides, some basic references, as Boulenger (1885a,b, 1887a), Peters & Donoso-Barros (1970) and its addenda by Vanzolini (1986), are included, as well as general taxonomic revisions of the taxon under study.

— Material. Data given are: locality, number of specimens, register number(s), date, and collector(s). Specimens are grouped by locality.

— Diagnosis. Both generic and specific diagnoses are intended to distinguish between taxa known from Brazilian Amazonia. In most cases I tried to make them applicable to each genus as a whole. For widespread genera with many species outside the area of study (e.g., *Mabuya, Hemidactylus, Anolis, Stenocercus*) this was impossible, however. Only external characteristics were studied. No phylogenetic analysis is attempted and I do not distinguish between primitive and derived characters.

— Description. Detailed descriptions of the material studied are given. Measurements and scale counts are usually presented as minimum-maximum (mean ± standard deviation, n = total number of specimens studied for the character). In the case of subdigital lamellae, counts were made on both sides, n = total number of counts, which is followed by total number of specimens studied. In cases where it was observed that body proportions vary with size, no mean and standard deviation are given. When only up to four specimens were studied these values are also not given.

When possible, measurements and scale counts have been made for at least twenty specimens, but not necessarily with all specimens listed under 'material'.

The following measurements have been made:

SVL (snout-vent length) - from tip of snout to cloaca;

tail length - from cloaca to tip of tail;

head length - from tip of rostral to anterior margin of ear-opening (the anterior, rather than the posterior, margin of ear-opening was selected following Vanzolini & Williams, 1970); in *Bachia* the posterior limit was defined by the small scales that delimit the head;

head width - measured on the widest part of head;

head depth - measured on the highest part of head (usually at level of parietals); expansions formed by spines, gular fan, etc., not considered;

length of forelimb - from axil to tip of claw (or of ungual sheath in some Gekkonidae and in Anguidae) of longest finger;

length of hind limb - from groin to tip of claw (or as above) of longest toe.

Head measurements were made with a calliper, other measurements with a common rule. Whenever available, measurements prior to fixation were used. Especially for length of fore- and hind limbs, part of the variation in measurements are due to differences in the hardness of fixed material. When specimens were too hard, these measurements have not been taken.

Scale counts usually comprised:

supralabials - they may be limited to the area of the distinctly enlarged scales along the upper jaw, or they may extend up to the commissure (= angle) of the mouth; in Gymnophthalmids the posterior segment may show distinct scales which were named post-supralabials.

infralabials - same as for supralabials, but on lower jaw.

dorsals in a longitudinal row - except when otherwise noted, counted from nape (occiput) to posterior margin of hind limbs; when a vertebral crest exists, counting is along the crest and, in some cases, the number of scales along a paravertebral line is also obtained.

dorsals in a transverse row - only given when there is a sharp distinction between dorsals and scales on flanks.

ventrals in a longitudinal row (or transverse rows of ventrals) - counted along a midventral line, from gular fold (when present) or from anterior margin of forelimbs, to anterior margin of hind limbs.

ventrals in a transverse row - counted midway between fore- and hind limbs, in cases where ventrals and scales on flanks can be distinguished.

scales around midbody - total number of scales around body, counted midway between fore- and hind limbs;

transverse rows of gulars (especially Gymnophthalmids) - counts include posterior (collar) row.

collar (especially Gymnophthalmids) - total number of scales which form the collar, when this is distinct.

subdigital lamellae under fourth finger and under fourth toe - except when stated otherwise, counts made between base of digit articulation and ungual scale.

For the fold nomenclature in Iguania, Frost (1992) is followed. A corresponding nomenclature was also used for other lizards, taking into consideration the position of the folds (without necessarily implying homologies).

For colour descriptions of live animals, Smithe's (1981) colour guide was used whenever possible. In these cases, colour names are followed by their correspondent code numbers.

Drawings made with a drawing mirror and photographs, most of live animals, accompany the description. All scale bars shown in the drawings represent 1 mm. In the legends of some figures, Brazilian states were referred to by their acronyms, which are: AC = Acre; AP = Amapá; AM = Amazonas; MA = Maranhão; MT = Mato Grosso; PA = Pará; RO = Rondônia; RR = Roraima.

— Habitat and Notes on natural history. Whenever data on this topic exist, they are presented as separate items. They include my own observations, as well as data from the literature.

— Distribution. The geographic distribution of species or subspecies as known at present. Maps of distribution complement the information. They give a general overview of the distribution of each species. One dot may represent more than a single locality. Data both from specimens examined and those taken from the literature were used to construct the maps, but these two sorts of data are represented by different symbols. Most localities from eastern Pará can be found in more detailed maps in Cunha & Nascimento (1978, 1994); a number of localities from southern Pará and western Maranhão in Cunha & Nascimento (1982), and from Amapá in Novaes (1974).

— Remarks. Taxonomic and/or nomenclatural remarks, analyses of variation, and any other remarks considered relevant, are included under this heading.

In the zoogeographical analysis *Anolis philopunctatus* (doubtful status), *Hemidactylus mabouia* (introduced), both *Prionodactylus argulus* and *P. oshaughnessyi* (unclear distributions) were not considered. The *Cnemidophorus lemniscatus* species complex and *Gymnophthalmus underwoodi* species complex were analysed each as a single taxon. The analysis took as basis the individual distribution maps. By circling the total area of distribution of each taxon (species and subspecies), general maps of congruent distributions were made, which permitted to recognise some main patterns of lizard distribution within Amazonia.

Relationships between areas were analysed using the method of Parsimony Analysis of Endemicity (PAE). This method was developed by Rosen (1985) and Rosen & Smith (1988). I refer to Rosen (1990) for a general overview of its principles and methodology, further discussed by Rosen (1992). In the PAE, an analogy of localities as taxa (or specimens of taxa) is accepted, and the species present in the localities under study are used as characters. Presence of a taxon at a given locality is considered a derived character (coded as '1'), its absence a primitive character (coded as '0'). A priori all species and subspecies were considered, and all taxa were analysed irrespective of their habitats (e.g., forest and open vegetation forms were analysed together). After the construction of a preliminary data matrix, those species that occurred in all areas studied and those which occurred in only one area were excluded from the analysis. A hypothetical area with no species was used as outgroup. To obtain the most parsimonious tree(s) the program 'Hennig86', command ie*, was used.

Two PAE analyses were made, one using broad, complementary areas defined on the basis of main patterns of distribution obtained, and a second one using localities selected on the basis of the degree of knowledge concerning their lizard fauna. In the latter case, all species that were reported from the selected areas were included, even when not present in Brazil. On the other hand, some species known from Brazil did not occur in any of these areas, and therefore they were not included in the analyses. In general (except for species not known from Brazil), data on presence of specimens at the selected localities were based on the maps of distribution presented here, which in turn were based on material studied and on data in the literature (presented individually for each species). The main sources of data for these localities were:

AP (Amapá state) - MPEG collection.

SR (Suriname) - Hoogmoed studies, especially Hoogmoed (1973), and RMNH collection.

MN (includes surroundings of Manaus, Ducke Reserve, WWF Reserves, and Balbina) - Zimmerman & Rodrigues (1990), Martins (1991), INPA and MPEG collections.

BC (includes localities Benjamin Constant, Tabatinga, Igarapé Belém, Leticia) - collections, mainly MPEG, RMNH, AMNH (B. Malkin).

SC (general region of Santa Cecilia and surroundings) - Duellman (1978) and material from several collections.

IQ (region of Iquitos) - Dixon & Soini (1986).

MP (meso-Peru; includes Tingo Maria and Panguana) - Meede (1984), Henzl (1991), collections.

SP (southern Peru; includes Cocha Cashu, Puerto Maldonado, Cuzco Amazonico) - Rodriguez & Cadle (1990), Duellman & Salas (1991), collections (especially USNM), and other literature.

RO (Rondônia state) - MPEG and UCG collections, Vanzolini (1986a), Nascimento et al. (1988).

CJ (area of Carajás) - Cunha et al. (1985), Nascimento et al. (1987), and MPEG collection.

EP (eastern Pará) - O.R. Cunha (several publications) and MPEG collection.

Systematic Part

Within Squamata, the following taxa (exclusive Serpentes and Amphisbaenia) are represented in Brazilian Amazonia:

IGUANIA Cope, 1864
- Hoplocercidae Frost & Etheridge, 1989
  - *Enyalioides laticeps* (Guichenot, 1855)
  - *Enyalioides palpebralis* (Boulenger, 1883)
  - *Hoplocercus spinosus* Fitzinger, 1843
- Iguanidae Oppel, 1811
  - *Iguana iguana* (Linnaeus, 1758)
- Polychrotidae Fitzinger, 1843
  - *Anolis auratus* Daudin, 1802
  - *Anolis bombiceps* Cope, 1876
  - *Anolis fuscoauratus* Duméril & Bibron, 1837
  - *Anolis nitens* (Wagler, 1830)
    - *Anolis nitens nitens* (Wagler, 1830)
    - *Anolis nitens brasiliensis* Vanzolini & Williams, 1970
    - *Anolis nitens chrysolepis* Duméril & Bibron, 1837
    - *Anolis nitens scypheus* Cope, 1864
    - *Anolis nitens tandai* **subspec. nov.**
  - *Anolis ortonii* Cope, 1869
  - *Anolis philopunctatus* Rodrigues, 1988
  - *Anolis phyllorhinus* Myers & Carvalho, 1945
  - *Anolis punctatus* Daudin, 1802
  - *Anolis trachyderma* Cope, 1876
  - *Anolis transversalis* Duméril, 1851
  - *Enyalius leechii* (Boulenger,1885)
  - *Polychrus acutirostris* Spix, 1825
  - *Polychrus liogaster* Boulenger, 1908
  - *Polychrus marmoratus* (Linnaeus, 1758)
- Tropiduridae Bell, 1843
  - Tropidurinae Bell, 1843
    - Stenocercini Frost, 1992
      - *Stenocercus dumerilii* (Steindachner, 1867)
      - *Stenocercus fimbriatus* **spec. nov.**
      - *Stenocercus roseiventris* Duméril & Bibron, 1837
    - Tropidurini Bell, 1843
      - *Plica plica* (Linnaeus, 1758)
      - *Plica umbra* (Linnaeus, 1758)
        - *Plica umbra umbra* (Linnaeus, 1758)
        - *Plica umbra ochrocollaris* (Spix, 1825)
      - *Tropidurus hispidus* (Spix, 1825)
      - *Tropidurus insulanus* Rodrigues, 1987
      - *Tropidurus oreadicus* Rodrigues,1987
      - *Uracentron azureum* (Linnaeus, 1758)

Uracentron azureum azureum (Linnaeus, 1758)
Uracentron azureum guentheri Boulenger, 1894
Uracentron azureum werneri Mertens, 1925
Uracentron flaviceps (Guichenot, 1855)
Uranoscodon superciliosus (Linnaeus, 1758)

SCLEROGLOSSA Estes, Queiroz & Gauttner, 1988
GEKKOTA Cuvier, 1817
Gekkonidae Gray, 1825
Gekkoninae Gray, 1825
Hemidactylus mabouia (Moreau de Jonnès, 1818)
Hemidactylus palaichthus Kluge, 1969
Thecadactylus rapicauda (Houttuyn, 1782)
Sphaerodactylinae Underwood, 1954
Coleodactylus amazonicus (Andersson, 1918)
Coleodactylus septentrionalis Vanzolini, 1980
Gonatodes annularis Boulenger, 1887
Gonatodes eladioi Nascimento, Cunha & Avila-Pires, 1987
Gonatodes hasemani Griffin, 1917
Gonatodes humeralis (Guichenot, 1855)
Gonatodes tapajonicus Rodrigues, 1980
Lepidoblepharis heyerorum Vanzolini, 1978
Lepidoblepharis hoogmoedi **spec. nov.**
Pseudogonatodes guianensis Parker, 1935

AUTHARCHOGLOSSA Wagler, 1830
SCINCOMORPHA Camp, 1923
LACERTOIDEA Camp, 1923
Gymnophthalmidae Merrem, 1820
Alopoglossus angulatus (Linnaeus, 1758)
Alopoglossus atriventris Duellman,1973
Alopoglossus buckleyi (O'Shaughnessy, 1881)
Amapasaurus tetradactylus Cunha, 1970
Arthrosaura kockii (van Lidth de Jeude, 1904)
Arthrosaura reticulata (O'Shaughnessy, 1881)
Bachia dorbignyi (Duméril & Bibron, 1839)
Bachia flavescens (Bonnaterre, 1789)
Bachia panoplia Thomas, 1965
Bachia peruana (Werner, 1901)
Cercosaura ocellata Wagler, 1830
Cercosaura ocellata ocellata Wagler, 1830
Cercosaura ocellata bassleri Ruibal,1952
Colobosaura modesta (Reinhardt & Lütken, 1862)
Gymnophthalmus underwoodi species complex
Gymnophthalmus leucomystax Vanzolini & Carvalho, 1991
Gymnophthalmus ?speciosus (Hallowell, 1861)
Gymnophthalmus underwoodi Grant, 1958

Iphisa elegans Gray, 1851
Iphisa elegans elegans Gray, 1851
Leposoma guianense Ruibal, 1952
Leposoma osvaldoi **spec. nov.**
Leposoma percarinatum (Müller, 1923)
Leposoma cf. *percarinatum* (Müller, 1923)
Leposoma snethlageae **spec. nov.**
Micrablepharus maximiliani (Reinhardt & Lütken, 1862)
Neusticurus bicarinatus (Linnaeus,1758)
Neusticurus ecpleopus Cope, 1875
Neusticurus racenisi Roze, 1958
Neusticurus rudis Boulenger, 1900
Pantodactylus schreibersii Wiegmann, 1834
Pantodactylus schreibersii parkeri Ruibal, 1952
Prionodactylus argulus (Peters, 1863)
Prionodactylus eigenmani Griffin, 1917
Prionodactylus oshaughnessyi Boulenger, 1885
Ptychoglossus brevifrontalis Boulenger, 1912
Tretioscincus agilis (Ruthven, 1916)
Tretioscincus oriximinensis **spec. nov.**
Teiidae Gray, 1827
Teiinae Merrem, 1820
Ameiva ameiva (Linnaeus, 1758)
Cnemidophorus lemniscatus species complex
Cnemidophorus cryptus Cole & Dessauer, 1993
Cnemidophorus ?gramivagus McCrystal & Dixon, 1987
Cnemidophorus lemniscatus (Linnaeus, 1758)
Kentropyx altamazonica Cope, 1876
Kentropyx calcarata Spix, 1825
Kentropyx pelviceps Cope,1868
Kentropyx striata (Daudin, 1802)
Tupinambinae Daudin, 1802
Crocodilurus lacertinus (Daudin, 1802)
Dracaena guianensis Daudin, 1802
Tupinambis longilineus **spec. nov.**
Tupinambis merianae (Duméril & Bibron, 1839)
Tupinambis teguixin (Linnaeus, 1758)
SCINCOIDEA Oppel, 1811
Scincidae Gray, 1825
Mabuya bistriata (Spix, 1825)
Mabuya carvalhoi Rebouças-Spieker & Vanzolini, 1990
Mabuya guaporicola Dunn, 1936
Mabuya nigropalmata Andersson, 1918
Mabuya nigropunctata (Spix, 1825)
ANGUIMORPHA Fürbringer, 1900
Anguidae Gray, 1825
Diploglossus fasciatus (Gray, 1831)

From the above list, presence of *Anolis bombiceps* and *Alopoglossus buckleyi* in Brazil needs confirmation, and validity of *Anolis philopunctatus* is considered questionable. Besides these species, the identification key includes *Leposoma parietale* and *Tretioscincus bifasciatus*, which do not occur in Brazil, in order to permit their distinction from newly described relatives.

Key to Species of Brazilian Amazonian Lizards

1. Top of head covered with small, granular (or nearly so) scales; true eyelids absent, fused into a brille; tongue fleshy, only slightly extensible 2
- Top of head covered with at least some large scales, mostly not granular; eyelids usually present, movable; tongue fleshy, or narrow and anteriorly bifid 14
2. Pupil vertical with lobed margins; digits strongly dilated at least proximally; escutcheon scales absent; pores present or absent 3
- Pupil round; digits not, or only slightly, dilated proximally; escutcheon scales present or absent; pores absent 5
3. Digits dilated throughout their length, connected by basal web; dorsal scales small, homogeneous .... ***Thecadactylus rapicauda***
- Digits dilated basally, not connected by basal web; dorsal scales heterogeneous, with tubercles dispersed among granules 4
4. Subdigital lamellae not beginning at base of fourth toe; fourth and fifth toes form a right angle; distance between dorsal tubercles greater than width of tubercles ... . ***Hemidactylus mabouia***
- Subdigital lamellae beginning at base of fourth toe; fourth and fifth toes form an acute angle; distance between dorsal tubercles equal to or less than width of tubercles .... ***Hemidactylus palaichthus***
5. Claws free, projecting from two or four basal scales; dorsal scales granular; males with escutcheon scales on belly and ventral surfaces of thighs 6
- Claws enclosed in ungual sheath; dorsal scales granular, or flat and imbricate; males with escutcheon scales on belly, or escutcheon scales completely absent 10
6. Scales under tail not enlarged; supraciliary flap with elongate spine; groups of enlarged, spinelike scales on neck and dorsum, associated with white spots .... ***Gonatodes hasemani***
- Scales under tail larger than those on lateral and dorsal surfaces of tail; supraciliary flap with small spines; no groups of enlarged scales on dorsum 7
7. Proximal subdigital lamellae narrower than digit; 24-30 lamellae under fourth toe; 3 or 4 rows of scales laterally on distal parts of digits; 90-99 scales around midbody; 41-49 ventrals (along a midventral line); midventral scales under tail moderately enlarged, about as wide as long; tail sequence at least in part 1'1'2" (fig. 2), otherwise irregular .... ***Gonatodes annularis***
- Proximal subdigital lamellae as wide as digit; 14-23 lamellae under fourth toe; 2 or 3 rows of scales laterally on distal part of digits; when 3, scales around midbody > 110, ventrals > 50; midventral scales under tail distinctly wider than long; tail sequence variable 8
8. Males with conspicuous light vertebral stripe from snout to base of tail; scales around midbody 84-97; ventrals 43-48; tail sequence 1'1" (fig. 2) .... ***Gonatodes eladioi***

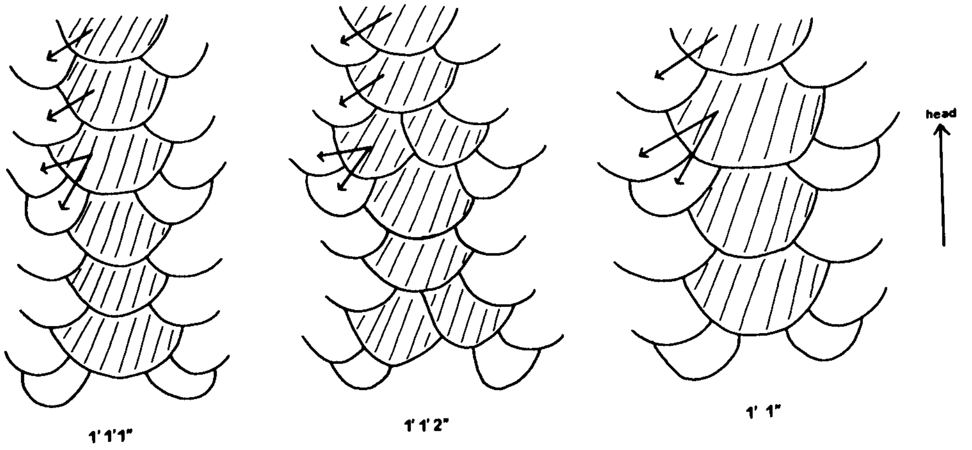


Fig. 2. Tail sequence codification in *Gonatodes* (schematic representation; modified from Rivero-Blanco, 1979): 1 = single midventral scale; 2 = paired midventral scale; ' = midventral scale bordered laterodistally by one scale; " = midventral scale bordered laterodistally by two scales. The code represents one repetitive sequence, in a proximal-distal direction.

- Males lack pale vertebral stripe; scales around midbody > 100; ventrals ± 48; tail sequence 1'1'1" or partially 1'1'2" (fig. 2) 9
9. Two lateral scales distally on digits; 12-18 lamellae under fourth finger, 15-21 under fourth toe; white (in preservative) antehumeral bar preceded by black spot .... ***Gonatodes humeralis***
- Three lateral scales distally on digits; 19-22 lamellae under fourth finger, 18-23 under fourth toe; large white spot with black margins in area behind insertion of forelimbs .... ***Gonatodes tapajonicus***
10. Ungual sheath not compressed, composed of 4 or 5 assymetrical scales; dorsals flat, imbricate; escutcheon scales absent 11
- Ungual sheath compressed, composed of 5 or 6 symmetrical scales; dorsals granular; escutcheon scales present of absent 12
11. Dorsal scales keeled; ungual sheath composed of 4 scales; mental distinctly wider than length of first infralabial, with posterior median cleft; 4-8 postmentals .... ***Coleodactylus amazonicus***
- Dorsal scales smooth; ungual sheath composed of 5 scales; mental distinctly narrower than length of first infralabial, without median cleft; 2-4 postmentals .... ***Coleodactylus septentrionalis***
12. Ungual sheath with 5 scales (suture between superolateral scales exposed); escutcheon area absent .... ***Pseudogonatodes guianensis***
- Ungual sheath with 6 scales (middorsal scale over suture between superolateral scales); males with escutcheon area on belly 13
13. Maximum SVL 35 mm; body slender; males dark brown with yellow spots on head and body; pale dorsolateral stripe at level of hind limbs and on base of tail .. .. ***Lepidoblepharis heyerorum***
- Maximum SVL 38 mm; body robust; males brown with dark brown spots; a dis-

tinct, pearl-grey arch on posterior part of head, and a dorsolateral stripe on neck and at the level of the hind limbs of the same colour .... *Lepidoblepharis hoogmoedi* spec. nov.

14. Dorsal head scales usually numerous, irregular; scales never cycloid; tongue fleshy, wide 15
- All or most dorsal head scales arranged in regular plates, relatively few in number; ventrals plate-like or cycloid; if body scales not cycloid, tongue narrow and anteriorly bifid 42
15. A large, pendulous gular fan, bordered anteriorly by a series of spikes; vertebral crest present; a large, flat, round scale below ear-opening .... *Iguana iguana*
- Not as above 16
16. Vertebral crest absent; interparietal absent or small; tail long, slender 17
- Vertebral crest present or absent; if absent, tail short, spinose, and/or interparietal several times larger than adjacent scales 29
17. An extendable, flat gular fan; digits flat, subdigital lamellae smooth, transversely enlarged under phalanges II and III 18
- Gular fan absent or sac-like; digits cylyndrical or compressed, subdigital lamellae keeled 26
18. Ventrals large, keeled, imbricate; subdigital lamellae relatively narrow, distal border of phalanx II not or only slightly prominent 19
- Ventrals relatively small, smooth or keeled, subimbricate; subdigital lamellae (phalanges II and III) distinctly widened, forming a prominent border at base of distal phalanx 20
19. Eight-13 longitudinal rows of enlarged, keeled, imbricate dorsals, sharply demarcated from granular scales on flanks; 60-90 scales around midbody; subdigital lamellae continuous from base to tip, not forming a prominent border between phalanges I and II .... *Anolis auratus*
- Two or more rows of slightly to distinctly enlarged dorsals, which grade into scales on flanks; 103-175 scales around midbody; lamellae under phalanx II forming a slightly prominent border at base of phalanx I .... *Anolis nitens/bombiceps*
20. Relatively small (maximum SVL 50-60 mm), brownish/greyish anoles; body (sub)cylindrical, tail round in cross section; mental short; sublabials, if present, not forming a conspicuous row 21
- Relatively large (maximum SVL > 70 mm), green anoles; body and tail slightly to moderately compressed; mental large; a distinct row of sublabials at each side, with scales much larger than median scales on chin 23
21. Scales on posterior part of snout moderately large, smooth and flat; supraorbital semicircles separated by 0-1 scales; expanded lamellae under fourth toe about three times as wide as distal phalanx; tibia length 0.18-0.22 times SVL .... *Anolis ortonii*
- Scales on posterior part of snout relatively small or heterogeneous in size, uni- or multicarinate; supraorbital semicircles separated by 1-3 scales; expanded lamellae under fourth toe about twice as wide as distal phalanx; tibia length ± 0.21 times SVL 22
22. One to four suboculars in contact with supralabials; tibia length 0.21-0.25 times SVL; no narrow light stripes across chin and limbs .... *Anolis fuscoauratus*
- Suboculars mostly separated from supralabials by one row of scales; tibia length

0.27-0.33 times SVL; one or more narrow, light stripes across anterior part of chin; narrow, slightly oblique light stripes across limbs .... *Anolis trachyderma*

23. Males with a proboscis about as long as head, compressed, flat, flexible and covered with small scales, originating above rostral (females unknown) .... *Anolis phyllorhinus*
- Not as above 24

24. Body with a distinct pattern of transverse dark lines or bands, sexually dimorphic: in males forming oblique rows of dashed and/or dotted lines, in females forming wider bands, separated by dotted lines or not; female dewlap relatively large .... *Anolis transversalis*
- Body pattern not as above; female dewlap small 25

25. Dewlap yellow to deep orange, without large black spots .... *Anolis punctatus*
- Dewlap in males orange with large black spots .... *Anolis philopunctatus*

26. No gular fan; eyelids not fused; a double row of vertebral scales present; femoral pores absent; fourth toe longest .... *Enyalius leechii*
- An extendable, sac-like gular fan; eyelids partially fused; no vertebral row of scales; femoral pores present; third and fourth toes subequal 27

27. Snout pointed; nasal in contact with second and third, third, or third and fourth supralabials; parietal eye present; gular crest absent .... *Polychrus acutirostris*
- Snout round; nasal mainly in contact with second supralabial; parietal eye absent; gular crest present 28

28. Ventrals keeled; scales on sides of neck from slightly smaller than, to as large as those on nape; two or three black lines radiating from each eye, none reaching neck; enlarged scales of gular crest compressed, pointed ... *Polychrus marmoratus*
- Ventrals smooth, or only slightly keeled on posterior part of belly; scales on sides of neck slightly larger than those on nape; three black lines radiating from each eye, two of which reach level of forelimbs (occasionally segments on neck separated from those on head); enlarged scales of gular crest low and wide .... *Polychrus liogaster*

29. Supraciliaries not elongate, tending to be squarish, juxtaposed or shortly imbricate; femoral pores usually present (may be absent) 30
- Supraciliaries elongate, overlapping; femoral pores absent 32

30. Vertebral crest absent; tail depressed, with transverse rows of spines on dorsal surface, larger at the sides; tail length 0.3-0.5 times the SVL .... *Hoplocercus spinosus*
- Vertebral crest present; tail compressed, not spinose; tail length at least as long as SVL 31

31. Vertebral crest divided into a nuchal and a body segment; supraciliary border greatly expanded laterally; a distinct dorsolateral row of enlarged scales; dorsal and lateral scales heterogeneous in size; tail divided into conspicuous verticils .... *Enyalioides palpebralis*
- Vertebral crest continuous (relatively low posteriorly); supraciliaries not expanded laterally; dorsolateral row of enlarged scales barely developed; dorsal and lateral scales homogeneous in size; verticils on tail almost indistinct ... *Enyalioides laticeps*

32. Interparietal small or absent 33
- Interparietal several times larger than adjacent scales 35

33. Canthal and supraciliaries form a pronounced crest which ends in an enlarged,

pointed post-supraciliary; supraocular region not well delimited .... *Stenocercus dumerilii*
- No prominent crest as above; supraocular region well delimited 34

34. No dorsolateral crest; scales on sides of neck small; tail with relatively large, spinose scales .... *Stenocercus roseiventris*
- A dorsolateral crest at each side; scales on sides of neck about as large as dorsals; tail not spinose .... *Stenocercus fimbriatus* spec. nov.

35. Dorsal head scales, except on parietal region, small, subequal; vertebral crest from nape to tip of tail; third and fourth fingers subequal in size .... *Uranoscodon superciliosus*
- Dorsal head scales of variable size, supraorbital semicircle and supraoculars distinct; vertebral crest, if present, not extending beyond anterior part of tail; fourth finger longer than third 36

36. Vertebral crest present; no much enlarged subocular 37
- Vertebral crest absent; posterior subocular much larger than the others 38

37. Body distinctly depressed; several tufts of spinose scales on neck; scales around midbody 121-162 .... *Plica plica*
- Body roughly cylindrical; no tufts of spinose scales on neck, scales around midbody 43-69 .... *Plica umbra*

38. Tail shorter than SVL, depressed, spinose 39
- Tail longer than SVL, not spinose 40

39. More than 86 scales around midbody, and more than 110 scales along a middorsal line (from nape to posterior margin of hind limbs); tail moderately depressed; less than 25 dorsal rows of caudal scales from base to tip of tail .... *Uracentron azureum*
- Less than 86 scales around midbody, and less than 100 scales along a middorsal line; tail strongly depressed; more than 30 dorsal rows of caudal scales from base to tip of tail .... *Uracentron flaviceps*

40. No mite pocket under axil .... *Tropidurus oreadicus*
- Mite pocket under axil present 41

41. Mite pocket under axil close to it and bordered anteriorly and posteriorly by distinctly larger scales .... *Tropidurus hispidus*
- Mite pocket under axil a short distance from it and with scales anterior to pocket distinctly smaller than those posterior to it .... *Tropidurus insulanus*

42. Body scales cycloid, underlain by bony plates; internasals present; dorsal head scales slightly imbricate 43
- Body scales not underlain by bony plates, and mostly not cycloid; internasals absent; dorsal head scales juxtaposed 48

43. Two pairs of internasals; claws enclosed in an ungual sheath .... *Diploglossus fasciatus*
- One pair of internasals only; no ungual sheath 44

44. Prefrontals and/or frontoparietals fused; more than one pair of nuchals; scales on tail (at least in part) enlarged 45
- Prefrontals and frontoparietals paired; only one pair of nuchals; scales on tail not enlarged 46

45. Only frontoparietals fused; palms and soles covered with minute and relatively

high scales (under small magnification resembling a pilose surface); 14-18 lamellae under fourth finger, 19-22 under fourth toe .... *Mabuya nigropalmata*
- Prefrontals and frontoparietals fused; palms and soles covered with conical, relatively large granules; 11-15 lamellae under fourth finger, 14-18 under fourth toe ... . *Mabuya carvalhoi*

46. Dorsals in a longitudinal row 65-68, ventrals in a longitudinal row 45-48; fore- and hind limbs distinctly separated from each other when adpressed against body; 12-13 lamellae under fourth toe; seven longitudinal dark stripes or bands on body, including a vertebral and two dorsolateral stripes .... *Mabuya guaporicola*
- Dorsals in a longitudinal row < 60, ventrals in a longitudinal row < 45; fore- and hind limbs (almost) touch each other when adpressed against body; 15-20 lamellae under fourth toe; a dark band at each side of body, back without stripes although it may show paravertebral series of dark spots 47

47. Four supraciliaries, second longest; dorsals smooth; dark lateral band bordered dorsally and ventrally by a distinct light stripe (at least anteriorly), dorsal light stripe partially bordered by a dark line; palms light, covered by moderately large, subequal granules .... *Mabuya bistriata*
- Mostly five subequal supraciliaries (occasionally four or six, with variable size); dorsals smooth to tricarinate; dark lateral band bordered by light stripes or not, the dorsal one, when present, mostly ill-defined and only rarely bordered by dark spots; palms dark, covered by granules heterogeneous in size, mostly relatively small .... *Mabuya nigropunctata*

48. Nasals in contact medially 49
- Nasals separated by frontonasal(s) 59

49. Ventrals distinctly keeled 50
- Ventrals smooth 53

50. Dorsals large, in longitudinal rows; distinctly larger than, and well demarcated from, laterals; less than 80 scales around midbody; total number of pores < 20 .... *Kentropyx striata*
- Dorsals only slightly larger than laterals, not in longitudinal rows; dorsals and laterals grading into each other; more than 100 scales around midbody; total number of pores > 20 51

51. A light vertebral band from snout to base of tail, between limbs with deeply undulating margins and widening posteriad to cover entire dorsum; lamellae under fingers heterogeneous, with some interspaced lamellae under each finger distinctly more swollen than the others; sides of toes with poorly developed denticulate fringe .... *Kentropyx pelviceps*
- A light vertebral stripe, with straight margins, from snout to middle of body (absent in large specimens); lamellae under fingers homogeneously or heterogeneously swollen; sides of toes with moderately to well developed denticulate fringe 52

52. A light stripe along body which starts at lower border of eye and rises gently to a dorsolateral position; a light stripe between limbs either absent or broken into spots; lamellae under fingers heterogeneous (similar to *K. pelviceps*); sides of toes with moderately developed denticulate fringe .... *Kentropyx calcarata*
- An upper dorsolateral light stripe which starts on nape and continues straight posteriad; a lower dorsolateral light stripe which starts at posterior corner of eye;

lamellae under fingers homogeneously swollen; sides of toes (especially of fourth toe) with well developed denticulate fringe .... *Kentropyx altamazonica*

53. Maximum of ten ventrals in a row across midbody (reduced latero-ventrals not considered) 54
- More than 15 ventrals in a row across midbody 55

54. Eight ventrals in a row across midbody ..... *Cnemidophorus lemniscatus* complex
- Ten ventrals in a row across midbody .... *Ameiva ameiva*

55. Dorsals heterogeneous in size, with 4-6 approximately longitudinal rows of large tubercles; a pair of post-nasals .... *Dracaena guianensis*
- All dorsals small; pair of post-nasals absent 56

56. Tail compressed, with a double prominent dorsal crest ... *Crocodilurus lacertinus*
- Tail round in cross section, with no crest 57

57. Two loreal scales; five or more supratemporals, only moderately larger than temporal scales; supernumerary antegular fold absent; 30-38 ventrals across midbody; 123-145 dorsals in a line between nape and posterior level of hind limbs; gular region with large black spots .... *Tupinambis merianae*
- One loreal scale; 2-4 supratemporals, much larger than temporal scales; supernumerary antegular fold present; 28 or less ventrals across midbody; 102-126 dorsals in a line between nape and posterior level of hind limbs; gular region either spotless or with small, black or grey spots 58

58. Body cylindrical; upper temporal scales distinctly smaller than lower ones; 10-17 femoral pores in total; 13-18 lamellae under fourth finger; back with transverse bands or, in large specimens, irregularly vermiculated .... *Tupinambis teguixin*
- Body rectangular in cross section; upper temporal scales only slightly smaller than lower ones; 22 femoral pores in total; 10 lamellae under fourth finger; no transverse bands on back, flanks with a wide longitudinal black band .... *Tupinambis longilineus* spec. nov.

59. Habitus worm-like; limbs very much reduced; no ear-opening 60
- Not as above 63

60. Dorsals narrow, hexagonal-lanceolate, keeled; prefrontals present; four fingers and four toes, all clawed .... *Bachia panoplia*
- Dorsals narrow, rectangular or hexagonal, smooth; prefrontals absent; three fingers, one to three toes, or toes reduced to a small tubercle; fingers and toes clawed or clawless 61

61. Dorsals rectangular; one or two supraoculars .... *Bachia flavescens*
- Dorsals hexagonal; supraoculars absent 62

62. Dorsals in 47-55 transverse rows, ventrals in 36-42 transverse rows; frontonasal present .... *Bachia dorbignyi*
- Dorsals in 53-57 transverse rows, ventrals in 41-45 transverse rows; frontonasal present or absent .... *Bachia peruana*

62. Inner finger absent or, if present, clawless 63
- All digits present, clawed 70

63. Frontonasal divided into irregular scales; ventrals keeled .... *Amapasaurus tetradactylus*
- Frontonasal single; ventrals smooth 64

64. Dorsals narrow, elongate-hexagonal; 26-29 scales around midbody .... *Colobosaura modesta*

- Dorsals as wide as, or wider than long, round or polygonal; less than 18 scales around midbody 65
65. Lower eyelids distinct, movable 66
- Lower eyelids grown over the eyes, immovable, transparent 69
66. Dorsals and ventrals in two longitudinal rows of transversely enlarged scales; 11-13, mostly 12, scales around midbody .... *Iphisa elegans*
- Dorsals, laterals and ventrals subequal, rounded; 16 scales around midbody ... 67
67. Dorsals smooth; scales on tail (except on ventral surface, distally) smooth, rounded, in 10 longitudinal rows; gulars in five continuous longitudinal rows; 25-28 dorsals; 15-19 ventrals .... *Tretioscincus agilis*
- Dorsals smooth or keeled; scales on tail distinctly keeled, polygonal, in 12 longitudinal rows; gulars in six longitudinal rows anteriorly, five posteriorly; 29-33 dorsals; 18-22 ventrals 68
68. Dorsals completely smooth, or slightly keeled on posterior part of body; dorsolateral light stripe narrow, becoming paler posteriorly, on third row of dorsals when counted from middorsal line .... *Tretioscincus oriximinensis* spec. nov.
- Dorsals keeled; dorsolateral light stripe wider, bold all along the body and proximal part of tail, on second and third rows of dorsals .... *Tretioscincus bifasciatus*
69. Prefrontals absent, frontoparietals present .... *Micrablepharus maximiliani*
- Prefrontals present, frontoparietals absent .... *Gymnophthalmus underwoodi* complex
70. Dorsals heterogeneous in size, either with distinct tubercles, or at least with some longitudinal rows of slightly enlarged scales; tail with a double dorsal crest or with transverse rows of tubercles 71
- Not as above 74
71. Tubercles along dorsal surface of tail form a continuous double row; two transverse rows of scales on underside of tail corresponds to two transverse rows on the sides 72
- Tubercles along dorsal surface of tail form a discontinuous row, with smaller scales intercalated; two transverse rows of scales on underside of tail corresponds to 3-6 transverse rows on the sides 73
72. Tympanum recessed within a deep auditory meatus; lower eyelid with semitransparent disc of 3-6 palpebrals; flanks with scales almost flat, most of them moderately large; 40-57 enlarged, flat, keeled scales in a paravertebral row; 23-28 ventrals in a longitudinal row .... *Neusticurus bicarinatus*
- Tympanum superficial; lower eyelid with an undivided semitransparent disc; flanks with prominent trihedral scales surrounded by distinctly smaller ones; 28-40 tubercles in a paravertebral row; 18-23 ventrals in a longitudinal row .... *Neusticurus ecpleopus*
73. Well developed tubercles on back and flanks; prefrontals, frontal and frontoparietals well defined .... *Neusticurus rudis*
- No tubercles on body and flanks; prefrontals, frontal and frontoparietals not recognisable, but scales arranged in two supraorbital rows .... *Neusticurus racenisi*
74. Dorsals in longitudinal rows .... *Cercosaura ocellata*
- Dorsals not in longitudinal rows 75
75. Occipitals absent 76

- Occipitals present 83
76. Interparietal and parietals form a round posterior margin; all dorsal head scales with longitudinal striations 77
- Interparietal and parietals form a straight posterior margin; at least anterior dorsal head scales smooth (posterior ones may be rugose or have lateral ridges) 81
77. Supralabials followed by a large scale (distinctly larger than adjacent temporals); interparietal very large, with diverging lateral margins; fourth pair of chinshields moderately large; dorsals 30-35 .... ***Leposoma guianense***
- Supralabials followed by a scale as large as, or only slightly larger than adjacent temporals; interparietal moderately large, lateral margins parallel or slightly diverging; fourth pair of chinshields large or reduced; dorsals 31-40 78
78. Fourth pair of chinshields reduced 79
- Fourth pair of chinshields large 80
79. Dorsals on posterior half of body hexagonal, with lateral margins approximately parallel; 32-34 dorsals; a wide dark band covers the flanks completely .... ***Leposoma osvaldoi*** spec. nov.
- Dorsals on posterior half of body from hexagonal, distinctly wider posteriorly, to rectangular (in oblique position) toward sides; dorsals 35-40; flanks with an upper dark stripe 1-3 scales wide, lower part of flanks lighter .... ***Leposoma percarinatum***
80. Supralabials followed by scale slightly larger than adjacent temporals; prefrontals and frontoparietals with relatively long medial suture; frenocular relatively large; dorsals rhomboid .... ***Leposoma parietale***
- Supralabials followed by scale as large as adjacent temporals; prefrontals with short to moderately long medial suture; suture between frontoparietals short; frenocular small; dorsals hexagonal to rectangular (in oblique position) .... ***Leposoma snethlageae*** spec. nov.
81. Scales on sides of neck, at least posteriorly, phylloid .... ***Alopoglossus angulatus***
- Scales on sides of neck tuberculate 82
82. Ventrals keeled, posterior margin sharply to bluntly pointed .... ***Alopoglossus atriventris***
- Ventrals smooth, posterior margin bluntly pointed or rounded .... ***Alopoglossus buckleyi***
83. Interparietal and parietals of approximately the same length, forming a straight posterior margin; first supraciliary does not extend dorsally 84
- Interparietal longer than parietals, extending beyond them posteriorly; first supraciliary expanded dorsally 86
84. Three pairs of chinshields; no distinctly enlarged median pairs of gulars; eight ventrals in a transverse row at midbody .... ***Ptychoglossus brevifrontalis***
- Usually four pairs of chinshields (occasionally fourth pair reduced); two or more enlarged median pairs of gulars; ten or more ventrals in a transverse row at midbody 85
85. Supraoculars four; distance between fore- and hind limbs at most 1.5 times the length of a forelimb; a white vertebral stripe .... ***Arthrosaura kockii***
- Supraoculars three; distance between fore- and hind limbs 1.5-2.5 times the length of a forelimb; no white vertebral stripe .... ***Arthrosaura reticulata***
86. Scales on flanks subequal to, or only slightly smaller than, dorsals, gradually

merging into each other .... ***Pantodactylus schreibersii***
- Scales on flanks distinctly smaller than, and sharply delimited from dorsals 87

87. Frontonasal single; subdigital lamellae with alternating single and double enlarged tubercles .... ***Prionodactylus eigenmanni***
- Frontonasal divided; subdigital lamellae not or only slightly tuberculate 88

88. Scales around midbody 27-35; males with 12-20 pores in total, females with two to six, none in preanal position; pores separated medially by four ventrals .... ***Prionodactylus argulus***
- Scales around midbody 31-45; males with 17-28 pores in total, females with 8-15 or none, one in preanal position; pores separated medially by two ventrals .... ***Prionodactylus oshaughnessyi***

Family Hoplocercidae Frost & Etheridge, 1989

This family, proposed by Frost & Etheridge (1989), corresponds in content to the "morunasaurs" of Etheridge & Queiroz (1988).

Content.— Three nominal genera (two of them paraphyletic according to Etheridge & Queiroz, 1988), of which *Enyalioides* and *Hoplocercus* occur in Brazilian Amazonia.

Enyalioides Boulenger, 1885

Diagnosis.— Nasal scale large, bulbous, directed latero-posteriorly. Dorsal head scales mostly relatively small, numerous, with an elevated (keeled or convex) surface. Supraciliaries numerous, tending to be squarish. Suboculars idem. Males with a sac-like gular pouch moderately developed, usually associated with a black pigmented area. Dorsals homogeneous or heterogeneous. Vertebral crest present. A dorsolateral row of enlarged scales usually present (barely developed in *E. laticeps*). Pores usually present (absent in *Enyalioides palpebralis*). Subdigital lamellae keeled. Tail divided into verticils, as long as SVL or longer, not spinose. Body and tail compressed.

Distribution.— NW South America, on both sides of the Andes, in Colombia, Ecuador, Peru and Brazil. To the north it reaches eastern Panama.

Contents.— Seven species recognised at present, among which *E. laticeps* and *E. palpebralis* are known to occur in the western part of Brazilian Amazonia.

Enyalioides laticeps (Guichenot, 1855)
(figs. 3, 4, 216)

Enyalius laticeps Guichenot, 1855: 20 (holotype MHNP 6821, type-locality: Fonte Boa, upper Amazon, Brazil).

Enyalius planiceps Guichenot, 1855: 21 (syntypes MHNP 6822, 6822a, type-locality: Fonte Boa, upper Amazon, Brasil).

Enyalius coerulescens Cope, 1876: 169 (holotype ANSP 11382, type-locality: middle and upper Amazon); Goeldi, 1902: 514, 526.

Enyalioides laticeps; Boulenger, 1885b: 113; Goeldi, 1902: 514, 526; Amaral, 1937a: 1735; Vanzolini, 1986a: 13.

Enyalius caerulescens; Boulenger, 1885b: 120; Burt & Burt, 1933: 25.

Enialioides Festae Peracca, 1897: 3 (2 syntypes, MSNG 36123 and unknown, type-locality: Valley of Rio Santiago, Ecuador).
Enyalioides laticeps laticeps; Burt & Burt, 1933: 24; Amaral, 1937b: 175, 1949: 109; Peters & Donoso-Barros, 1970: 115.
Enyalioides laticeps festae; Burt & Burt, 1931: 266, 1933: 24; Peters & Donoso-Barros, 1970: 115. **New synonym.**
Enyalioides l. laticeps ?; Gans & Vanzolini, 1953: 127.

Material.— **Brazil.** 1 ♂, MHNP 523, leg. Lindig. ACRE. Rio Juruá, left bank, Porongaba (8°40'S, 72°46'W): 1 ♂, INPA 610, 27.ii.1992, leg. C. Gascon.
AMAZONAS. Rio Solimões, Fonte Boa: holotype, ♀, MHNP 6821; 2 ♂♂, MHNP 6822, 6822a (syntypes *Enyalius planiceps* Guichenot); all leg. Castelnau & Deville. Rio Solimões, Benjamin Constant: 1 juv., MNRJ 3652, ii.1942, leg. A. Parko.
Colombia. META. Serrania de la Macarena, Caño Sardinata, 30 km WSW Vista Hermosa, alt. 1300 ft: 1 ♂, UTACV 2798, 15-29.iii.1971, leg. J.R. Glidewell & W.F. Pyburn; 1 ♂, UTACV 3379, 21.iii.1971, leg. W.F. Pyburn; 1 ♂, 1 ♀, UTACV 3380-81, 14-15.iii.1971, leg. J.R. Glidewell; 1 ♀, UTACV 3383, 15.iii.1971, leg. J.E. Taulman; 3 ♀♀, UTACV 3516-18, iii.1971, leg. W.F. Pyburn & J.R. Glidewell. VAUPES. Timbó: 2 ♀♀, UTACV 3707, 3781, viii.1972, leg. W.F. Pyburn. Wacará: 1 ♂, UTACV 3889, 25.viii.1973; 1 ♀, UTACV 3936, 08.ix.1973; 1 ♂, UTACV 3938, 23.viii.1973; all leg. J.K Salser Jr.
Ecuador. Oriente, Rio Colopino: 1 ♂, MNRJ 3165, leg. W. Clarke-Macintyre. NAPO. Archidona: 1 ♂, MHNG 2363.61, 14.v.1986, leg. G. Onore. Coca: 1 ♂, MHNG 2363.60, iv.1984, leg. G. Onore. Cuyabeno: 1 ♂, UIMNH 91482, 1964; 1 ♀, UIMNH 92122, 16.x.1964; both leg. C.M. Fugler. Limoncocha: 1 ♂, RMNH 26288, 16.iii.1983, leg. J. Schoorl; 1 ♂, 3 ♀♀, UIMNH 91471-474, 01-06.vii.1965; 1 ♀, UIMNH 91478, vii.1965; 1 ♀, UIMNH 92130, 08.viii.1965; all leg. C.M. Fugler. San Pablo Kantesiya: 2 ♂♂, MHNG 2239.65-66, 02.i.1986; 1 ♀, MHNG 2260.40, 13.iii.1986; 1 ♂, MHNG f.n.3698, 29.iv.1987; 1 ♂, MHNG f.n.4276, 16.ii.1988; all leg. J.M. Touzet. Santa Cecilia: 1 ♂, 1 ♀, ZFMK 44407-408; 1 ♂, UIMNH 92128, 06.viii.1965, leg. C.M. Fugler. PASTAZA. Rio Conambo: 1 ♀, GNM 3589, 23.xi.1955, leg. R. Olalla. Rio Capotazas: 1 ♂, GNM 3590, c. 23.iii.1962, leg. R. Blomberg. Rio Bobonaza, Montalvo: 1 ♂, GNM 3591, ix.1955, leg. R. Olalla. MORONA-SANTIAGO. Valle Rio Santiago: 1 ♂, MSNG 36123, leg. E. Festa (syntype *E. festae* Peracca). ZAMORA-CHINCHIPE. Macuma: 3 ♂♂, UIMNH 91463-465, x.1964, leg. Bowerman.
Peru. LORETO. Colonia, Village Bora, right margin Rio Zumun, affluent left margin Rio Yahuasyacu (Rio Ampiyacu basin): 5 ♂♂, 4 ♀♀, MHNP 1978.2177-2183, 2186-2187, leg. M.T. Rodrigues.

Diagnosis.— *Enyalioides* with continuous vertebral crest, high on nape, low on posterior half of body; dorsolateral row of enlarged scales absent or almost indistinct; dorsal and lateral scales rather homogeneous, with an elevated median keel and surface flat or rising toward the keel; supratemporal region with relatively high scales, decreasing gradually toward parietal and temporal areas; ventral scales smooth to distinctly keeled; verticils on tail almost indistinct.

Description.— Hoplocercid with maximum SVL in males of 157 mm (MHNP 6822), in females of 130 mm (Dixon & Soini, 1986). Head 0.23-0.30 (0.25 ± 0.01, n= 51) times SVL, 1.1-1.4 (1.24 ± 0.06, n= 51) times as long as wide, 1.1-1.3 (1.18 ± 0.06, n= 51) times as wide as high; approximately four-sided pyramidal in shape, with two ridges formed by the projecting canthals/supraciliaries and two by the labials. Snout (representing tip of pyramid) round. Neck narrower than head and body, body and tail compressed. Limbs well developed, forelimbs 0.4-0.6 (0.52 ± 0.03, n= 22) times SVL, hind limbs 0.8-1.0 (0.89 ± 0.06, n= 22) times, tibia 0.2-0.3 (0.26 ± 0.02, n= 51) times. Tail slightly compressed, 1.5-1.9 (1.71 ± 0.09, n= 35) times SVL.

Rostral two or three times wider than length of adjacent supralabials and two or

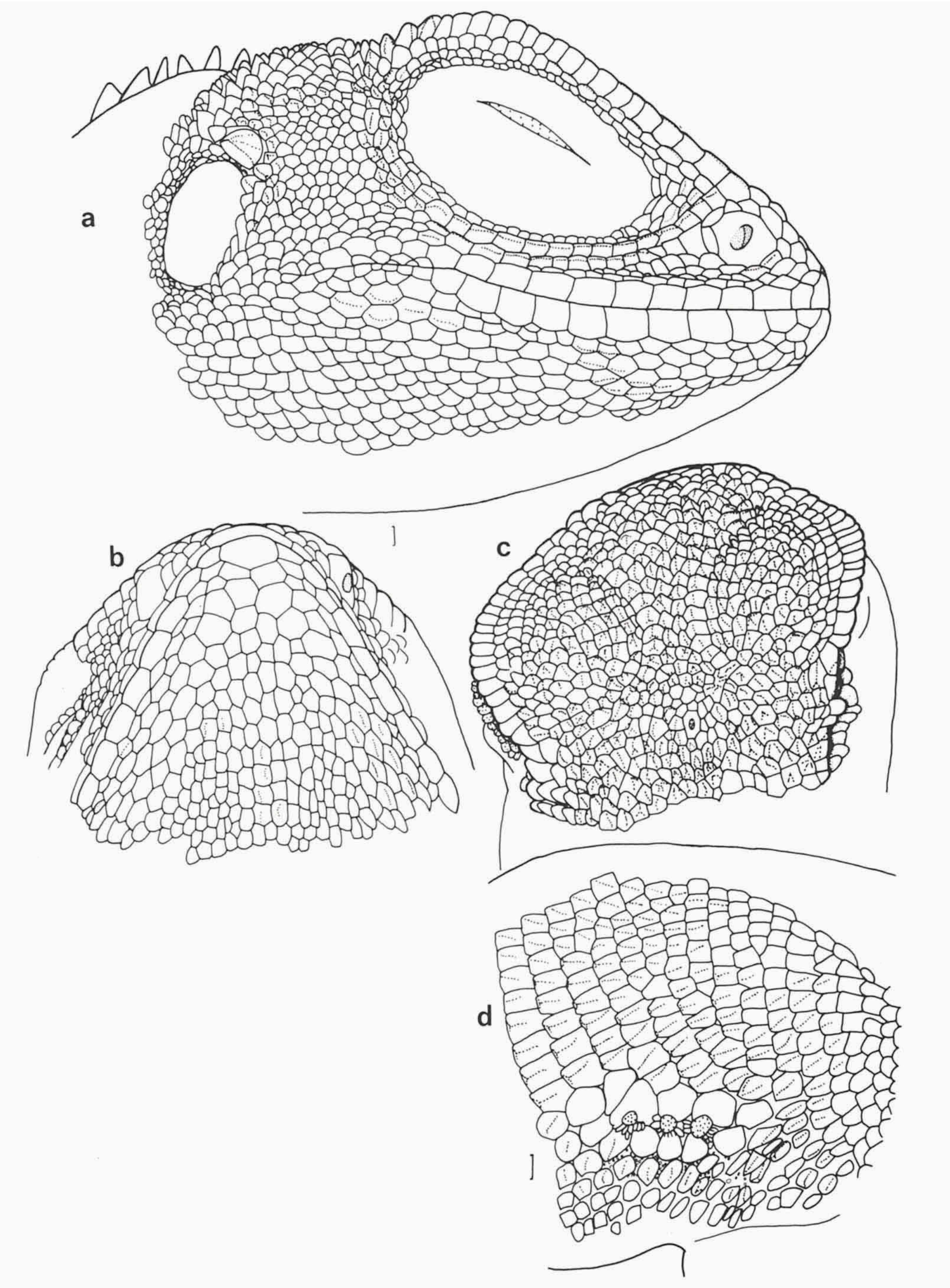


Fig. 3. *Enyalioides laticeps*, INPA 610; a, b, c: lateral, ventral, and dorsal views of head; d: base of right thigh showing femoral pores.

three times as wide as high. Postrostrals 2-5. Canthals and supraciliaries form a continuous series. Canthals 4-7 in a single or double row, mostly convex, polygonal and elongate, from slightly to distincly larger than adjacent scales on snout. Supraciliaries 13-20, mostly 15-19, smooth, quadrangular if seen from above, narrower and more angulate posteriorly; in adults followed by some spiny (supratemporal) scales not much larger than other supratemporals. Scales on dorsal surface of head mostly rather uniform in shape and size, with a polygonal base and surface elevated toward a median keel, in some specimens forming a gentle, in others a very steep slope; toward supratemporal region scales somewhat larger and spinelike. Interparietal not much larger than adjacent scales. Supraorbital semicircle at least partially conspicuous, surrounding an elevated supraorbital region. Adjacent to supraciliaries one or two parallel rows of flatter scales. Supralabials rectangular, 9-15, mostly 10-13, to below centre of eye, followed by 4-8 scales to commissure, some of the latter separated from border of mouth by small scales. Nostril directed latero-posteriorly, in the centre of a large, bulbous nasal situated medially between tip of snout and eye socket. Loreal region with 4-8 rows of relatively small, elongate and broadly keeled scales, in most specimens row adjacent to supralabials wider, while one or two of the other rows can be very narrow; a few broader scales posterior of nasal; 2-4 rows of scales between nasal and supralabials. Preoculars, suboculars and postoculars in a continuous and conspicuous row of 10-22 scales (which may reach level of posterior corner of eye, or become indistinct at a lower level); at its lowest point separated from supralabials by one, occasionally two, rows of scales. Scales on temporal region relatively small, conical or compressed-conical, limited dorsally by the higher supratemporal scales and posteriorly by scales marginating the ear-opening. These latter form a row of a few wider and higher, compressed-conical scales, uppermost one much larger than the others and in some specimens (some adults and all juveniles) the only one well developed.

Mental triangular to pentagonal, extending posteriorly, mostly distinctly wider than adjacent infralabials, but in some specimens only slightly larger. Postmentals 2-4, mostly two. Infralabials similar to, but slightly wider than, supralabials, 9-15 to below centre of eye. Followed to commissure of mouth by 3-7, mostly five, scales, which may be separated from margin of mouth by minute scales. Scales on chin approximately in longitudinal, slightly divergent rows. Near infralabials polygonal, smooth and wide anteriorly, elongate, higher and with progressively stronger, broad keel posteriorly. At the level of the commmissure of the mouth scales slightly to distinctly larger. Toward midventral line scales roughly conical to trihedral, mostly smaller than in rows nearer infralabials, except for a double row on the midventral line, which merges posteriorly into the gular pouch. Gular pouch relatively small, scales similar in size to those on central region of chin, with much sharper keel. Gular fold distinct. An antegular fold is also present, interrupted medially and without granular scales. It is continuous with a strong oblique neck fold which covers the sides of the gular fold. All scales on head juxtaposed; in some specimens the tips of scales on posterior gular region overlap.

Scales on nape transitional between those on occipital region and dorsals, slightly compressed, higher anteriorly; in one adult male (GNM 1590) very high and spinose, more similar to scales on occipital region. On sides of neck scales more conical.

Dorsals of same size as, or slightly larger than, scales on flanks, either relatively flat (depressed), with a median elevated keel, or with a sloping surface toward median keel. Toward vertebral crest keels more pronounced, in the most extreme cases scales adjacent to middorsal crest being truly laminate. Scales on flanks of approximately same shape as adjacent dorsals (more distinct in some specimens), mostly with sloping surface. Vertebral crest well developed on nape, in adult males highest spines may be larger than vertical length of ear-opening; continuous throughout the body, where it is relatively low, although well distinct; on tail turning into a double row of scales only slightly larger than adjacent ones. Vertebral crest with 56-92 (70.9 ± 7.3, n= 51) scales to posterior margin of hind limbs; 96-142 (117.7 ± 11.1, n= 46) dorsals in a paravertebral row. In most specimens (including juveniles) a dorsolateral row of scales can be distinguished, which is made more conspicuous for being located on top of a fold of skin; 14-24 (19.0 ± 2.2, n= 44) scales in a transverse line between vertebral crest and dorsolateral row. Scales around midbody 119-181 (145.3 ± 13.7, n= 50). Ventrals rhomboid and distinctly to weakly keeled on pectoral region, quadrangular and weakly keeled to smooth posteriorly; 44-64 (52.3 ± 4.0, n= 50) transverse rows of scales from collar to anterior margin of hind limbs; 29-42 (34.0 ± 3.0, n= 46) in a transverse row at midbody. Extremely minute granules between the scales in many parts of body and head.

Scales on tail roughly rectangular, with a sharp, oblique keel; forming rather inconspicuous verticils, three rows of scales on ventral surface corresponding to 6-7 rows laterally and dorsally, not or only slightly increasing in lenght distally, inside each verticil.

Scales on limbs mostly similar in size to ventrals (distinctly smaller on posterior region of thighs) and sharply keeled. Femoral pores 2-8 (4.8 ± 1.7, n= 45) in total (1-4 per side), larger in males; each pore either in posterior part of a single scale, or deeply indenting the scale and posteriorly in contact with another, much smaller scale. Digits compressed, with 17-26 (20.4 ± 1.8, n= 101, 51 specimens) keeled lamellae under fourth finger, 23-33 (28.4 ± 2.0, n= 100, 51 specimens) under fourth toe.

Colour in life described by Duellman (1978) and Dixon & Soini (1986). General dorsal colour from dull green to brown, ventral region from white to tan; some orange to red areas are present; gular region in males dark brown or black.

In preservative, general dorsal colour tan to brown, frequently with some blue areas on head and body. Specimens from Peru (MHNP 1978.2177-2183, 2186-87) with a reticulate dark brown pattern on dorsal and lateral surfaces of body, limbs and tail, which in some specimens form dorsal longitudinal series of relatively large, oval, light areas; alternate light and dark chevrons can be superimposed on this pattern. Males with a black area occupying most of ventral surface of head, gular pouch and anterior part of chest. Females and juveniles with same area grayish. Belly in the largest male (MHNP 1978.2177) predominantly salmon.

MHNP 523 has a similar reticulate dorsal pattern, but the black ventral area is approximately oval and occupies mainly the gular region, posteriorly limited by the collar. Moreover, it presents an oval black area on the belly.

Specimens from Brazil, Ecuador and Colombia either predominantly spotless, with a dull brown or bluish colour, or with alternating light and dark chevrons along back, more conspicuous anteriorly. In some cases a faint reticulation may be present

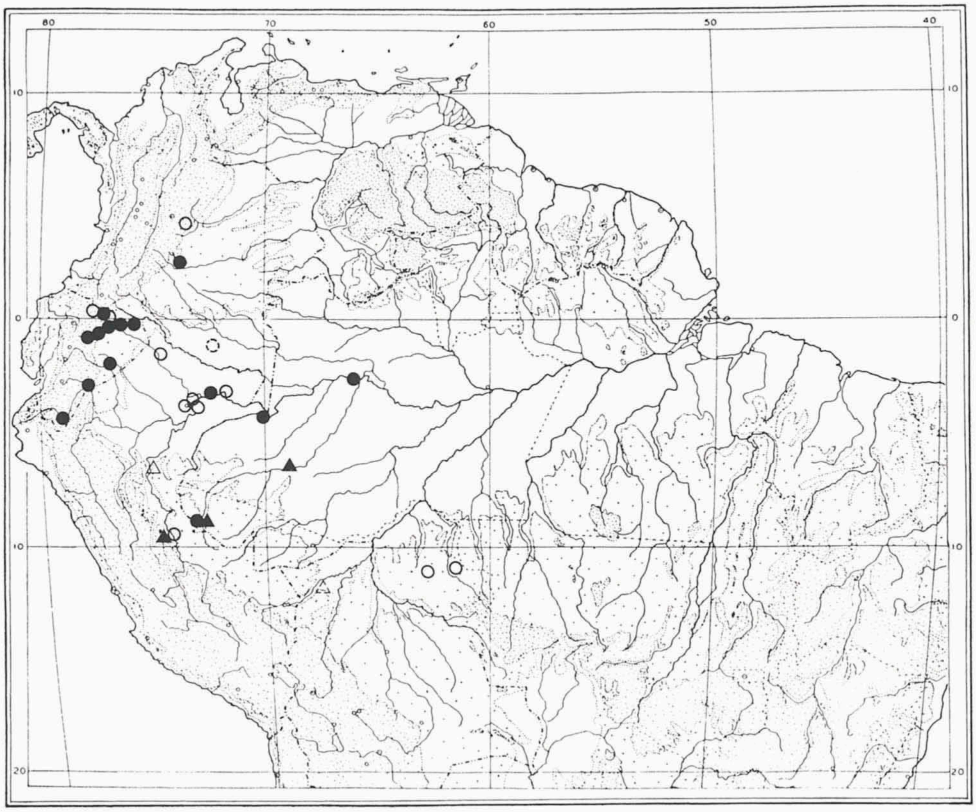


Fig. 4. Distribution of *Enyalioides laticeps* (circles) and *E. palpebralis* (triangles). Closed symbols = material studied; open symbols = data from literature (*E. laticeps*: Burt & Burt, 1931; Duellman, 1978; Dixon & Soini, 1986; Vanzolini, 1986a; Henzl, 1991. *E. palpebralis*: Boulenger, 1885b); dashed open symbols = data by Ayala (1986), for Amazonas state, Colombia, and by Meede (1984) for NW Bolivia.

(reticulation well evident, throughout dorsal and lateral surfaces of body and limbs, in INPA 610). Flanks mostly with a continuation of the chevrons, but in some specimens spotless. A light dorsolateral band from upper-posterior corner of ear-opening to level of forelimbs, where it turns toward the limb and stops, may be present. Gular region in adult males with a relatively small triangular black area (restricted to gular region properly, not extending toward chin or chest), in some specimens with an orange or reddish area on gular pouch; in females gular region light or with a light grey small central area; in juvenile males with a pattern of convergent brown lines directed to (but not reaching) mental, opposite opened side enclosing a small triangular black or dark brown area on posterior part of gular region. Ventral surface mostly cream, not or sparsely spotted.

Habitat.— The species is found in primary or (occasionally) secondary forest, relatively low on vegetation, occasionally on the ground (Duellman, 1978; Dixon & Soini, 1986; Vanzolini, 1986a; Almendáriz, 1987). Duellman (1978) reported it to sleep on vegetation (branches or palm fronds, or on trunks of saplings), usually at heights above 1.5 m from the ground. Dixon & Soini (1986) reported specimens found hidden in shallow holes in the forest floor. They suggested that the animals could also retreat there at night. INPA 610 was in varzea forest (C. Gascon field notes).

Notes on natural history.— In the stomachs of 24 specimens Duellman (1978) found a variety of invertebrates, of which 70.4% of the volume was constituted by spiders, caterpillars, and beetle grubs. This same author and Dixon & Soini (1986) gave some data on reproduction.

Medem (1969) reported a juvenile specimen in the stomach of the snake *Tripanurgos compressus* (Daudin).

Distribution (fig. 4).— Western Amazonia, in Brazil, Colombia, Ecuador, and Peru. In Brazil known from the states of Amazonas, Acre and Rondônia (the latter according to Vanzolini, 1986a). Amaral (1948) reported the species among the lizards from Pará, but it is unlikely that it occurs in this state.

Remarks.— *Enyalioides festae* Peracca was considered a subspecies of *E. laticeps* by Burt & Burt (1931), an opinion followed by several subsequent authors. The two nominal taxa were separated on the basis of differences in the ventral scales: smooth or indistinctly keeled in *laticeps*, strongly keeled in *festae* (Peters & Donoso-Barros, 1970). Since the degree of keeling is variable among specimens, separation of two groups on the basis of this character is not possible. I observed some variation in colour pattern among the material studied (see above), but such variation does not correlate with variation in degree of keeling of ventral scales. Samples from Brazil and Peru presented higher numbers of scales around midbody and of paravertebral scales than samples from Colombia and Ecuador (respectively scales around midbody 141-181, 160.2 ± 11.8, n= 14 versus 119-155, 139.5 ± 9.3, n= 36; paravertebral scales 106-142, 123.2 ± 9.8, n= 12 versus 96-133, 155.6 ± 11.1, n= 34). Number of scales in vertebral crest was lower in the sample from Ecuador (65-92, 74.8 ± 6.5, n= 25 in specimens from Brazil, Peru and Colombia; 56-79, 67.1 ± 6.0, n= 26 in specimens from Ecuador). These data do not corroborate the existence of two subspecies as proposed, although it indicates that some geographical variability occurs, especially between eastern/western populations. A more representative sample of specimens, from a larger number of localities, is necessary to reach any conclusion about the nature of such variability.

Enyalioides palpebralis (Boulenger, 1883)
(figs. 4, 5, 217)

Enyalius palpebralis Boulenger, 1883: 46 (holotype BM 1946.8.9.8, type-locality: Cashiboya, Easter Peru).

Enyalioides palpebralis; Boulenger, 1885b: 116; Burt & Burt, 1933: 24; Peters & Donoso-Barros, 1970: 115.

Material.— **Brazil.** ACRE. Rio Juruá, right bank, Porongaba (8°40'S, 72°47'W): 1 ♀, INPA 573, 18.ii.1992, leg. C. Gascon.

AMAZONAS. Rio Juruá, left bank, Rio Jainu (6°28'S, 68°46'W): 1 ♂, INPA 506, 28.x.1991, 1 ♂, INPA 527, 03.xi.1991, both leg. C. Gascon.

Peru. Cashiboya: holotype, ♂, BM 1946.8.9.8, leg. Veitch. Rio Yullapichis, Panguana, 260 m: 1 ♀, ZFMK 41835, 08.ii.1984, leg. M. Verhaag.

Diagnosis.— *Enyalioides* with a dorsolateral row of enlarged scales; vertebral crest well developed, with a nuchal segment isolated from the body segment; supraciliary border produced posteriorly into a triangular flap; dorsal and lateral scales flat, keeled, heterogeneous in size; ventral scales keeled; tail with distinct verticils.

Description.— Hoplocercid with maximum SVL in males of 116 mm (BM 1946.8.9.8, holotype), in females of 117 mm (Meede, 1984). Head 0.25-0.27 (0.26 ± 0.01, n= 5) times SVL, 1.2-1.3 (1.22 ± 0.04, n= 5) times as long as wide, 1.1-1.3 (1.17 ± 0.08, n= 5) times as wide as high; approximately four-sided pyramidal in shape, with two ridges formed by canthals and supraciliaries, which form a lateral expansion, and two by the labials. Snout rounded. Neck narrower than head and body, body and tail compressed. Limbs well developed, forelimbs 0.4-0.5 (0.47 ± 0.02, n= 4) times SVL, hindlimbs 0.6-0.7 (0.69 ± 0.04, n= 5) times, tibia 0.20-0.22 (0.21 ± 0.01, n= 5) times. Tail compressed, 1.0-1.2 (1.08 ± 0.10, n= 5) times SVL.

Rostral small, as wide as, or wider than, length of adjacent supralabials (both in holotype and in INPA 527 divided into a lower and an upper scale). Postrostrals 2-4. Canthals and supraciliaries form a continuous series, with 4-6 canthals and 11-15 supraciliaries. Canthals and anterior supraciliaries quadrangular when seen from above, triangular in cross section, slightly projecting. Posteriorly supraciliary border expands laterally into a triangular flap (with additional rows of scales), extending well out of plane of head; scales of supraciliary series progressively larger and elongate in the direction of its latero-posterior corner. Behind supraciliary expansion, and separated from it by a distinct gap, two very large, projecting scales form the beginning of a supratemporal series. Scales on snout irregularly polygonal, of several sizes, with a flat periphery and a central, conical keel. Scales on parietal region conical, variable in size; interparietal scale flat, with a small parietal eye. Supraorbital semicircle distinctly elevated and conspicuous, with 13-15 scales. Supraorbital region convex, with scales similar to those on snout, larger centrally, small in the periphery; produced laterally into the supraciliary flap. Supralabials rectangular, 10-16 to below centre of eye; followed to commissure by 5-6 rectangular to irregularly polygonal scales with an elevated longitudinal keel, which are separated from border of mouth by smaller scales. Nostril directed latero-posteriorly, in the centre of large nasal, situated nearer to tip of snout than to the eye socket. Loreal region with irregularly polygonal scales between nasal and suboculars, and small, elongate, keeled scales, in approximately longitudinal rows near supralabials. A continuous row of 14-17 preoculars, suboculars and postoculars, at its lowest point separated from supralabials by one to three rows of scales. Temporal scales polygonal, keeled, some conical, from small to distinctly larger and higher anteriorly, dorsally, and at midlevel; bordered ventrally by the higher post-supralabials and 2-3 high, conical scales between commissure of mouth and ear-opening. Ear-opening bordered by a row of conical scales, among which two much larger scales at midlevel and one at its upper margin. Supratemporal area with conical, moderately enlarged scales, which may form a regular row, bordered at both sides by smaller scales.

Mental small, pentagonal, approximately as large as adjacent infralabials. Postmentals 1-2. Infralabials squarish, posteriad becoming convex and broadly keeled; 10-14 to below centre of eye. Between them and commissure of mouth 4-7 sharply keeled, high scales, partially separated from border of mouth by smaller scales. Scales on chin anteriorly elongate, with a moderately high keel. A short medial sulcus is present, bordered at both sides by slightly larger scales. Posteriad on chin

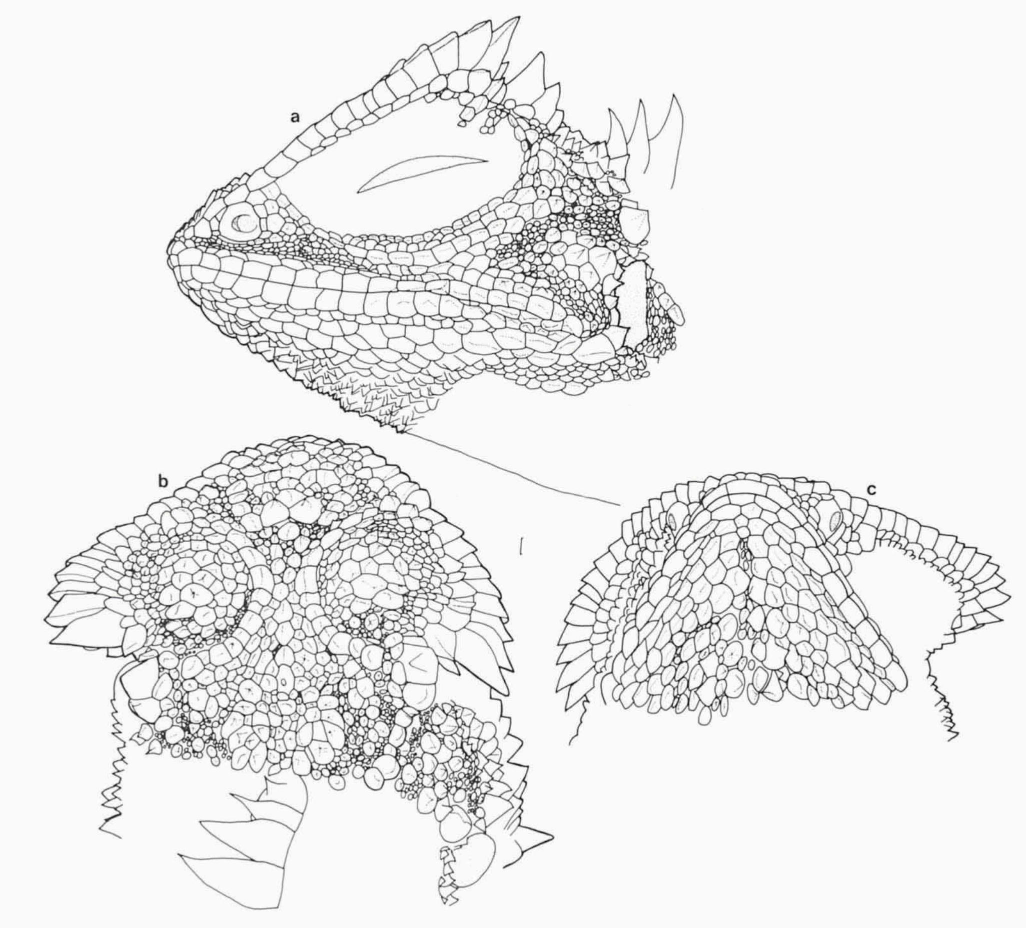


Fig. 5. *Enyalioides palpebralis*, INPA 506; a, b, c: lateral, dorsal, and ventral views of head.

scales shorter, approximately conical, gradually becoming trihedral on gular region. Some rows of larger scales close to infralabials. Gular fold distinct, with small scales, continuous with a distinct, but not very pronounced, antehumeral fold. All scales on head juxtaposed.

Scales on nape and sides of neck mostly small, with rows or groups of larger, conical scales interspersed (apparently more developed in males than in females). Oblique and longitudinal neck folds present, together with several other irregular neck folds. Folds usually coincident with rows of enlarged scales.

Vertebral crest well developed, from nape to base of tail, divided into a nuchal and a body segments. Nuchal segment of crest with 3-6 very big, compressed-conical scales, highest as long as, or longer than, vertical axis of ear-opening. Body segment with spines gradually decreasing in size, 40-50 until posterior margin of hind limbs. In total 44-55 (50.0 ± 4.5, n= 5) vertebral spines on crest. Gap between nuchal and body segments of crest variable in length, but always well demarcated. At each side a dorsolateral row of enlarged, high, acute-conical scales, from ear-opening to anterior level of hind limbs; on neck the scales are continuous and heterogeneous in size, along body they are larger than those on neck, longitudinally flat, and regularly separated from each other by small scales. Dorsal scales flat, smooth or keeled, some mucronate; larger, slightly imbricate near vertebral crest, smaller, juxtaposed or (more frequently) isolated from each other by minute granules toward dorsolateral row of enlarged scales; some larger scales may be interspersed among the smaller ones. On flanks scales predominantly small, surrounded by minute granules, with interspersed high, conical to trihedral scales, variable in size but never as high as those of dorsolateral row; enlarged scales tend to form transverse rows. Scales around midbody 124-176 (155.6 ± 19.6, n= 5; counting made in a straight line, irrespective whether scales were small or enlarged ones). Ventral scales slightly imbricate, rhomboid (on chest) to rectangular (posteriorly), with a sharp, median or oblique keel, slightly mucronate; 43-48 (45.8 ± 2.2, n= 5) transverse rows of ventrals from collar to anterior margin of hind limbs; 23-32 (25.6 ± 4.0, n= 5) ventrals in a transverse row at midbody. Extremely minute granules between the scales on several parts of body and head.

Scales on tail rectangular, with a sharp keel, mucronate, forming verticils composed of three rows of scales ventrally, three or four (mostly) pairs of dorsal scales, and four to seven vertical rows of scales laterally, the scales increasing in length distally inside each verticil.

Limbs with many enlarged scales, with sharp, elevated median keels, each scale surrounded by much smaller scales. Ventrally scales all medium sized, becoming smaller toward posterior surface of thigh. No femoral pores. Digits compressed, with keeled subdigital lamellae, 17-21 (19.0 ± 1.4, n= 10, 5 specimens) under fourth finger, 22-26 (23.8 ± 1.5, n= 10, 5 specimens) under fourth toe.

Colour in life described by Meede (1984). Dorsal surface yellow-brown to dark brown (change from one colour to the other can occur in one specimen) with black marks that form indistinct, irregular reticulate bands. Ventral surface mostly from white to brownish, throat yellow in males, brownish in females; a red spot present on sides of neck (both sexes).

In preservative the holotype displays a light tan colour, with some irregular, transversely arranged spots. Limbs and tail somewhat darker. Ventral region all light tan. INPA 506, ♂, is brown with dark brown spots on head (especially on snout, a transverse band across supraocular regions, and a wide band on the sides, across eyes), neck lighter. Back and flanks with a dark brown reticulation which delimits pale brown to cream, oval spots. Vertebral crest dark brown and cream. Limbs predominantly dark brown, with irregular lighter spots, tail predominantly light brown anteriorly, becoming darker posteriorly. Ventral region light brown, with some darker spots on hind limbs. INPA 527, another ♂, is overall lighter, with head mainly light drab and cream, partially dark brown (same areas as in INPA 506). Neck cream. Reticulation restricted to flanks, vertebral area and crest light drab. Limbs and tail as in preceding specimen. Ventral surface light drab to cream. INPA 573, ♀, with head and a dorsolateral curved band on neck light smoke-grey, otherwise predominantly glaucous, with a series of ill-defined, paler spots at both sides of vertebral crest. Vertebral crest pale neutral grey. Ventral region glaucous under head, light brown with some lighter spots on belly, limbs and tail.

Habitat.— A forest dweller. INPA 506, 527 and 573 were all in terra firme forest

(C. Gascon field notes). Meede (1984) reported two specimens deep in primary forest, other three relatively close to water, of which one on a vertical stem grown over with moss, 1.70 m above ground, another one in an empty termite nest on the ground, and one at night resting on a stem, 0.30 m above ground.

Notes on natural history.— Meede (1984) reported a grasshopper in the stomach of a halfgrown specimen, and ants in the stomach of another specimen. Some observations on behaviour and on reproduction (based on a specimen in captivity) were also presented by this author.

Distribution (fig. 4).— Brazil (Acre and SW Amazonas state), eastern Peru, and NW Bolivia (Peters & Donoso-Barros, 1970; Meede, 1984; Henzl, 1991; this paper).

Remarks.— This species is relatively rare in collections, and little is known about it. It is sympatric with *E. laticeps* in at least part of its area of distribution.

Hoplocercus Fitzinger, 1843

Diagnosis.— See diagnosis of the species.

Distribution.— Central Brazil, peripheral to, and reaching the southern limits of Amazonia.

Content.— Genus monotypic.

Hoplocercus spinosus Fitzinger, 1843
(figs. 6, 7, 218)

Hoplocercus spinosus Fitzinger, 1843: 78 (syntypes according to original description in Paris, Prague and Vienna, but at present none can be located in any of these museums [Brygoo, 1989b; Z. Rocek, J. Moravec and F. Tiedemann, *in lit.*]; type-locality: Brazil); Boulenger, 1885b: 199; Goeldi, 1902: 514, 516; Burt & Burt, 1933: 26; Amaral, 1937a: 1736, 1937b: 177; Sick, 1951: 30, 1965: 80; Peters & Donoso-Barros, 1970: 148; Vanzolini, 1986a: 14; Nascimento et al., 1988: 30; Vitt & Caldwell, 1993: 51; Vitt, 1993: 2374.

Pachycercus aculeatus A. Duméril, 1854 (type lost according to Brygoo, 1989b; type-locality: São Paulo, in error according to Vanzolini, 1977: 76).

Material.— **Brazil.** MARANHAO. Gurupi: 6 ♂♂, 5 ♀♀, MPEG 1754-64, vi.1963, leg. B. Malkin.
GOIAS. Corumbá, Santo Antônio Olhos d'Agua: 1 ex., MNRJ 3298, vii.1960, leg. D.D. Rodrigues.
MATO GROSSO. Município de Santa Terezinha, Barra do Tapirapé: 4 exs., MNRJ 1437, xi.1939-iii.1940, leg. A.L. Carvalho; 14 exs., MPEG 1709-13, 1765-73, year 1961; 17 exs., MPEG 1714-18, 1744-47, 1774-81, year 1962; 25 exs., MPEG 1719-43, year 1963; 5 ♂♂, 3 ♀♀, AMNH 90419-426, 2 ♂♂, AMNH 90542-543, 1 ex., AMNH 91654, 25-30.ix.1962; 4 exs., AMNH 93468-472, i.1964-07.ii.1964; 10 exs., AMNH 93473-482, xi.1961-15.i.1962; all leg. B. Malkin. Confluence Rio Araguaia and Tapirapé, Tapirapé Village: 7 exs., AMNH 87906-912, 20.xi.1960, leg. B. Malkin. São Luiz de Cáceres: 1 ex., MNRJ 1434, 03.vi.1941, leg. Daveron. São João da Barra: 1 ex., MNRJ 1435, leg. C.F. Hoehne. Rio Papagaio, Utiariti: 2 exs., MNRJ 1436, 1919, leg. A. Miranda Ribeiro. Rio das Mortes, Chavantina: 2 exs., MNRJ 3567, 3577, x.1946, leg. H. Sick. Upper Rio Xingu, lower Rio Culuene, Jacaré: 6 exs., MNRJ 3510, 10.xii.1948, leg. A. Pavioth; 11 exs., MNRJ 3578-3589, leg. H. Sick. Rio Xingu, confluence Rio Culuene with Lagoa do Jacaré, Posto do Xingu, Exp. Roncador: 10 exs., MNRJ 3515, vi.1947, leg. J.C. Carvalho. Jacaré Culuene, 40 km above confluence with Rio Xingu: 2 exs., MNRJ 3502, 3551, 05.vi.1950, leg. A.L. Carvalho. Upper Rio Xingu, Rio Tuatuari, Capitão Vasconcelos: 1 ex., AMNH 90276, 02.viii.1957, leg. B. Malkin. Estação Ecológica Serra das Araras, Barra do Bugres: 3 exs., MPEG 14313, 14319, 14323, 22-28.i.1986, leg. R.J.R. Moraes.
PARA. Reserva Indígena Gorotire: 2 ♀♀, MPEG 12928-929, 19.iv.1983, leg. W.L. Overal & D.A. Posey;

2 ♀♀, MPEG 12930-931, 06.v.1983, leg. W.L. Overal; 1 ♂, MPEG 14278, 21.ix.1985, leg. K.H. Redford; 1 ♂, 1 ♀, MPEG 14281-282, 17-19.x.1985; leg. W.L. Overal.

Diagnosis.— Nasal scale large, bulbous, directed latero-posteriorly. Dorsal head scales mostly relatively small, numerous, convex or broadly keeled. Supraciliaries numerous, more or less squarish. Suboculars idem. Males with a sac-like, black gular pouch moderately developed. Dorsals and laterals heterogeneous in size; 3-4 dorsolateral rows of enlarged scales at each side. Vertebral crest absent. Pores present. Subdigital lamellae keeled. Tail length 0.3-0.5 times the SVL, with transverse rows of spines on its dorsal surface, larger on the borders. Body cylindrical.

Description.— Hoplocercid with maximum SVL, among material studied, of 105 mm in males (MPEG 14281), 98 mm (MPEG 1733) in females. Head 0.24-0.29 (0.27 ± 0.01, n= 34) times SVL, 1.2-1.3 (1.26 ± 0.05, n= 34) times as long as wide, and 1.1-1.3 (1.21 ± 0.05, n= 34) times as wide as high. Snout short, blunt, high; canthus rostralis distinct; neither supraocular nor supratemporal regions prominent. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.3-0.4 (0.36 ± 0.02, n= 29) times SVL, hind limbs 0.4-0.6 (0.49 ± 0.03, n= 28) times, tibia 0.14-0.17 (0.16 ± 0.01, n= 34) times. Tail short, depressed, spinose; 0.3-0.5 (0.43 ± 0.04, n= 33) times SVL.

Tongue wide, villose, with round, nicked tip. Teeth anteriorly conical, posteriorly tricuspid; anterior maxillary teeth longest.

Rostral roughly semicircular, hardly seen from above. Postrostrals 3-7. Scales of snout variably polygonal, convex to broadly keeled, juxtaposed, slightly larger medially; 9-12 in a transverse line at level of second canthal. Canthals form a double or triple row from supraciliaries to postrostrals, among which one row may be more evident, with 6-8 scales; usually two, occasionally one, canthals between supraciliaries and posterior level of nasal. Supraorbital semicircle distinct, with 12-16 scales; those nearest supraciliaries smaller, irregular, others approximately rectangular, convex, broadly keeled, slightly larger toward the extremities; one of the posterior scales may be distinctly larger. Scales of supraocular region irregularly polygonal, convex to broadly keeled, juxtaposed, at least peripherally in approximately longitudinal rows; centrally (slightly posteriad) scales larger. Supraciliaries 13-17, relatively small, rectangular, juxtaposed. Interparietal small, although a few times larger than adjacent scales; parietal eye distinct. Parietal and occipital scales irregular, convex to broadly keeled, laterally larger. Loreal region high, with numerous small, irregularly polygonal, slightly convex scales. Nasal single, large, in upper posterior part of loreal region; nostril directed latero-posteriorly. A continuous row of 13-17 subocular scales from canthal to a variable position posteriorly of orbit; separated from supralabials by at least two or three scales. Supralabials 9-12 to below centre of eye, followed by 5-7 scales to commissure of mouth. Temporal scales small, roundish, convex, juxtaposed, slightly larger peripherally. Supratemporal scales larger, high, broadly keeled. Ear-opening large, round, with smooth margin; tympanum slightly recessed in a short auditory meatus, almost superficial. Head bordered posteriorly, between ear-openings, by a line of small scales.

Mental roughly semicircular, slightly wider and about as long as rostral. Four, occasionally five, postmentals, median pair slightly larger. Infralabials 10-13 to below

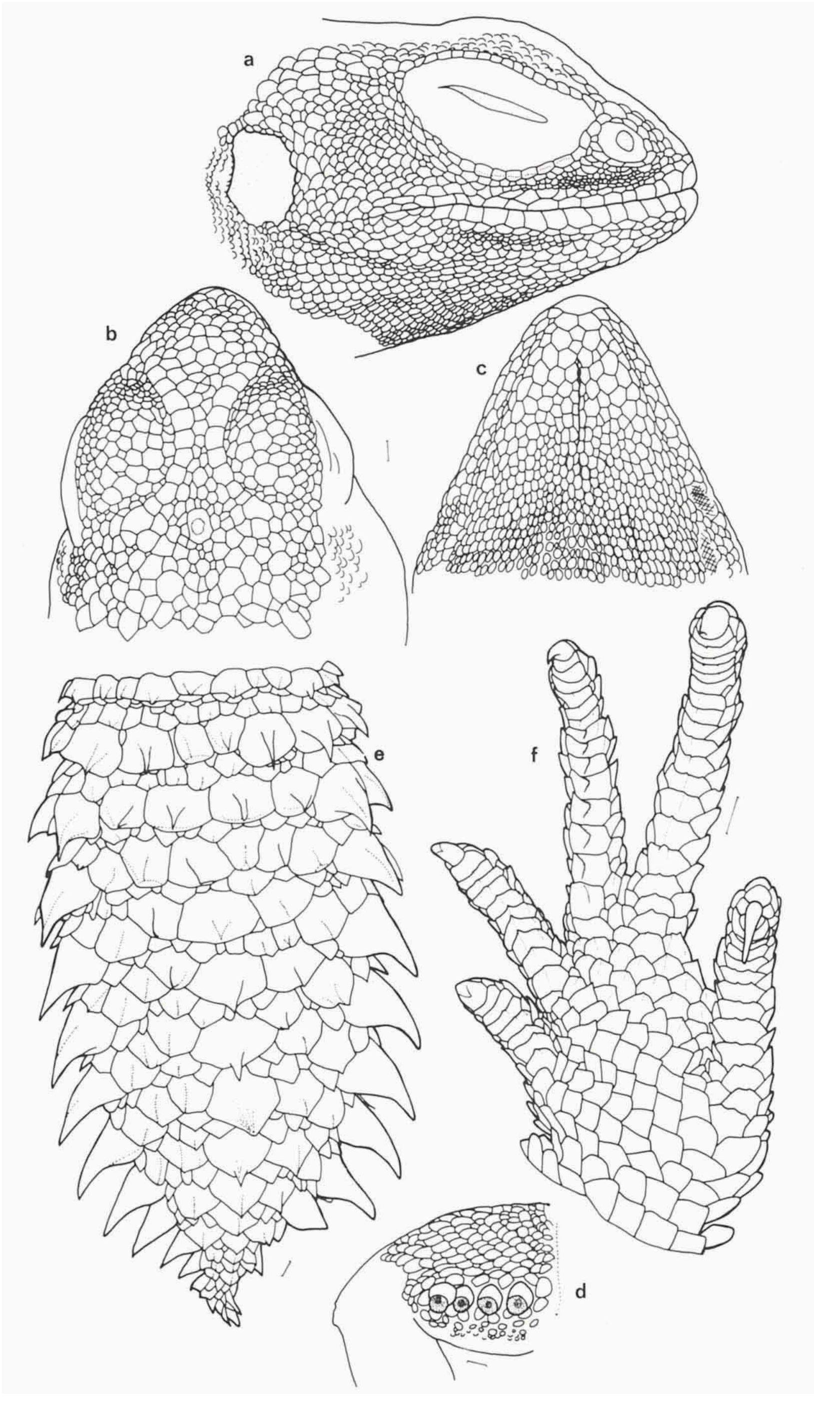


Fig. 6. *Hoplocercus spinosus*; a, b, c: lateral, dorsal, and ventral views of head; d: right thigh showing femoral pores; e: dorsal view of tail, all MPEG 14278; f: ventral view of left foot of MPEG 12929.

centre of eye, followed by small scales. Scales on chin juxtaposed, convex, in oblique rows; 2-3 rows of larger scales start from median pair of postmentals, separated from infralabials by a few rows of small, irregularly polygonal, elongate scales; medially scales round, decreasing in size posteriad. Gular scales anteriorly small, round, convex, juxtaposed; between gular folds larger, rhomboid, slightly imbricate. Gular fold well defined, with granular scales. Antegular fold, as well as an oblique gular fold, distinct but without reduced scales.

Nape with about 6-8 more or less regular, longitudinal (slightly oblique, convergent toward vertebral line) rows of large, prominent, hook-like scales, separated by distinctly smaller, but otherwise similar, scales. Sides of neck mostly with very small, round, convex scales, although some heterogeneity in size also occurs. Antehumeral, oblique and longitudinal neck folds present (former two continuous with, respectively, gular and antegular folds), as well as several other small, irregular folds.

Dorsals similar to scales on nape, with a vertebral band of medium-sized, relatively low scales, and three or four dorsolateral rows of enlarged scales at each side, regularly spaced (both between rows and between scales of a row), separated by distinctly smaller scales in poorly defined transverse rows. Flanks with small scales, in poorly defined transverse rows; some sparse, slightly larger scales may be present. A dorsolateral and a ventrolateral fold may be present, as well as several transverse, irregular folds. Ventrals quadrangular, smooth, flat, slightly to distinctly imbricate, in transverse rows: 47-53 (50.6 ± 1.8, n= 28) from anterior level of forelimbs to anterior level of hind limbs. Border of ventral and lateral regions irregular, with rows of ventrals and flank scales interdigitating, and the scales merging into each other. Scales on preanal plate smaller and blunter than ventrals. Extremely minute granules between scales in many parts of body.

Tail short, depressed, dorsally covered by large (although variable in size), strong, prominent, keeled and mucronate scales, among which a larger middorsal row; proximally the scales form distinct transverse rows, less distinct distally. At each side tail bordered by a series of 12-14 very large, hook-like spines; both these spines and the middorsal row of enlarged scales increase in size from base to about middle (= widest part) of tail, then decreasing again in size toward tip. Seven to nine large scales, including the lateral spines, across tail dorsally. Ventral surface of tail with scales similar to ventrals, larger and becoming pointed laterally, culminating in a large, flat, triangular, pointed scale at base of each lateral spine.

Scales on forelimbs mostly quadrangular, convex, slightly to distinctly smaller than ventrals, smooth ventrally, smooth to broadly keeled dorsally; smallest and roundish on ventral aspect of upper arms, and part of anterior aspect of forearms. Anterodorsal aspect of thighs and anterior aspect of lower legs with some enlarged, prominent, hook-like scales, surrounded by distinctly smaller but heterogeneously sized, broadly keeled scales, present also on dorsal aspect of lower legs; ventral aspect of thighs and ventro-posterior aspect of lower legs with rhomboid, flat, smooth scales, sharply delimited from other scales posteriorly on thighs and anteriorly on lower legs, otherwise grading into other scales; posterior aspect of thighs with small, round, convex scales, each surrounded by minute granules. Femoral pores 3-6, mostly 4-5, in males large, between two to four scales, of which the one directed anteriorly distinctly larger; in females small, at posterior side of a large

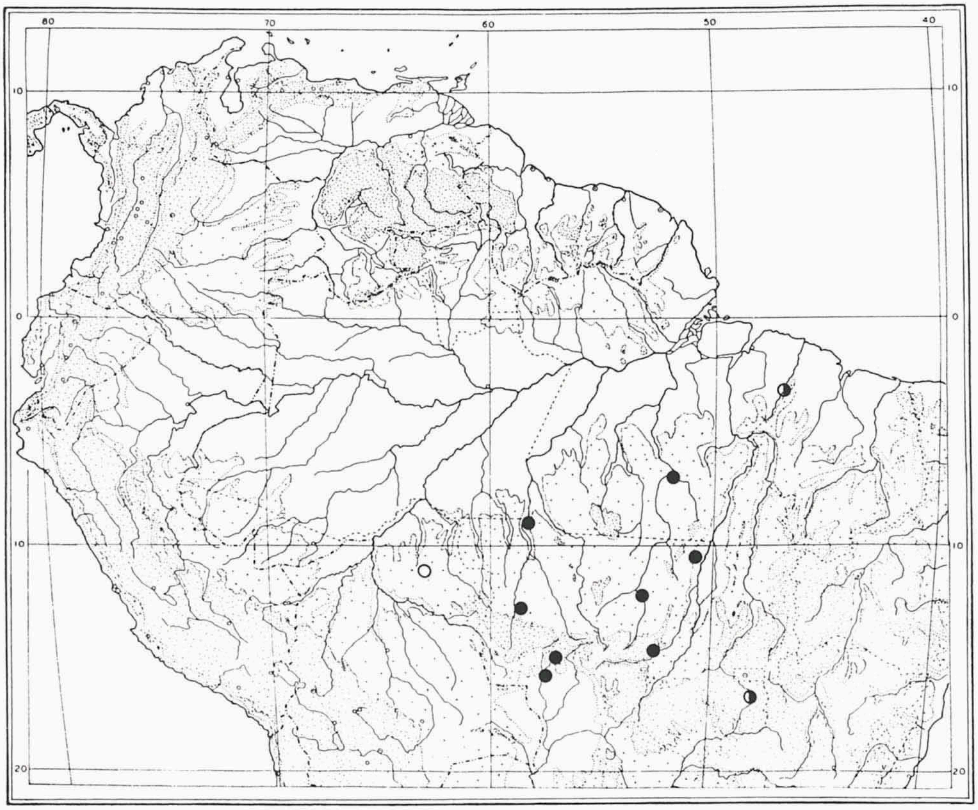


Fig. 7. Distribution of *Hoplocercus spinosus*. Closed circles = material studied. Half-open circles = Gurupi, Maranhão (MPEG 1754-64), interpreted here as a non-specified locality on Rio Gurupi; and Goiás, Corumbá, Santo Antonio Olhos d'Agua (MNRJ 3298), interpreted here as an unknown locality on Rio Corumbá. Open circle = data from Vitt & Caldwell (1993).

scale. Subdigital lamellae single, slightly keeled and mucronate on fingers, distinctly so on toes; one or two (one per side) lateral keels may be present; 11-15 (13.4 ± 0.9, n= 72, 36 specimens) under fourth finger, 14-19 (17.0 ± 1.1, n= 69, 36 specimens) under fourth toe.

Colour in life was described by Sick (1951). Male with alternating rust- to sulphur-yellow and brownish-black to black bands on back. Dark band change into spots on flanks. Belly black, throat dark rust to winered. Female with back brown, belly slightly lighter; transverse bands only indicated.

Males in preservative with head dorsally uniformly brown, sides of head with or without some irregular, narrow, oblique, whitish bands; labials transversely banded in some specimens. Nape and sides of neck posteriorly brown, with a dirty-cream antehumeral bar shortly separated from its opposite number middorsally; anteriorly, sides of neck mottled with dirty-cream and brown. Back with wide, dark brown transverse bands, which may be connected through a continuous brown vertebral area or through longitudinal bands dorsolaterally; they are separated by narrow dirty-cream bands with irregularly sinuous margins; flanks predominantly dirty-cream, with irregular dark brown spots of several sizes. Ventrally, chin dirty-cream with light brown elongate spots, more or less in oblique rows; gular with a median triangular black area which continues along neck and chest; belly, except for a narrow lateral cream area, black. Limbs predominantly brown dorsally, cream ventrally. Tail dorsally mainly uniformly dark brown, or brown mottled with dark brown, underside dirty-cream with some dark spots or with a blackish median area. In females dorsal pattern similar to that in males but distinctly less contrasting, darker areas slightly lighter, dirty-cream areas light brown; ventrally, chin and gular region dirty-cream with some slightly darker oblique stripes, belly and underside of limbs and tail cream.

Habitat.— *H. spinosus* is known from areas of cerrado and areas of complex interdigitation between cerrado and forest. Carvalho (1949) reported them living in holes 30-40 cm deep in the ground, closed end dilated, entrance 2-4 cm in diameter. Nascimento et al. (1988) reported them from gallery forest, in a region of cerrado; the lizards were in holes in the ground, under stones. Gorotire, southern Pará, from where *H. spinosus* is also known, has areas of cerrado surrounded by dense forest. Vitt & Caldwell (1993) and Vitt (1993) reported an individual from a granitic rock extrusion surrounded by a narrow band of deciduous forest, in Rondônia. The animal was in the centre of the outcrop, in sandy area covered with vegetation.

Notes on natural history.— Nascimento et al. (1988) noted that the lizard stayed in the hole with its tail toward the entrance. When it was tried to pull it out, the lizard inflated its body, pressing it against the walls of the hole. According to Sick (1951, 1965), *H. spinosus* stays in holes (which it digs) in daytime, and only comes to the surface at dusk.

Carvalho (1949) reported termites, Coleoptera, spiders, one scorpion, and a large ammount of ants in the stomach of some specimens. Sick (1951, 1965) reported termites, beetles, grasshoppers, and millipeds.

Klingelhöfer (1957) observed an individual in terrarium. Most of the time the animal remained out of light, and only rarely it sat in the sun for a few hours.

Distribution (fig. 7).— Mato Grosso, Goiás, Maranhão, southern Pará, and Rondônia, Brasil, south of Amazonia and in open enclaves close to its southern border.

Remarks.— The species is known by the Kamaiurá indians as "cuviara" (Carvalho, 1949). Sick (1965) reported also the name "jacarezinho-do-cerrado".

Family Iguanidae Oppel, 1811

Iguanidae sensu Frost & Etheridge (1989) corresponds in content to the "iguanines" of Queiroz (1987) and Etheridge & Queiroz (1988).

Content.— Eight genera, of which only *Iguana* occurs in continental South America.

Iguana Laurenti, 1768

Diagnosis.— Large scales on snout. A large, pendulous gular fan of which the edge is bordered anteriorly by a series of prominent scales. A continuous, serrate vertebral crest composed of tall (especially in large specimens), curved spikes. Posterior teeth with numerous small accessory cusps forming a serrate crown. Individuals may reach more than 300 mm SVL.

Distribution.— Mexico, Central America, a large part of South America, and the Antilles.

Content.— Two species, *I. delicatissima* Laurenti, 1768, restricted to some of the Antilles, and *I. iguana*.

Iguana iguana (Linnaeus, 1758)
(figs. 8, 9, 10, 219)

Lacerta iguana Linnaeus, 1758: 206 (2 syntypes, NRM 114 and UUZM Linnean collection no. 10; type-locality: "Indiis", restricted by Hoogmoed, 1973 to the confluence of the Cottica River and the Perica Creek, Suriname).

Iguana tuberculata Laurenti, 1768: 49 (type(s) in "Museo Illustrissimi Comitis Turriani", present whereabouts unknown; type-locality not given); Guichenot, 1855: 18; Cope, 1876: 43; Goeldi, 1897: 643, 1902: 514; Griffin, 1917a: 310; Procter, 1923: 1064.

Iguana caerulea Daudin, 1802a: 286 (2 syntypes originally in MHNP, presently lost according to Brygoo, 1989b; type-locality unknown [see Brygoo, 1989b about discussion on the other specimens referred to by Daudin in the original description]).

Iguana squamosa Spix, 1825: 5 (lectotype, according to designation by Hoogmoed & Grüber, 1983: 381, ZSMH 537/0; type-locality: 'Bahiae, Parae', restricted by Vanzolini, 1981a to Salvador and Belém).

Iguana viridis Spix, 1825: 6 (lectotype, according to designation by Hoogmoed & Grüber, 1983: 381, ZSMH 540/0; type-locality: Rio São Francisco and Rio Itapicuru).

Iguana caerulea Spix, 1825: 7 (type lost, type-locality: Rio São Francisco).

Iguana emarginata Spix, 1825: 7 (holotype ZSMH 535/0, type-locality: Rio São Francisco).

Iguana lophyroides Spix, 1825: 8 (lectotype, according to designation by Hoogmoed & Grüber, 1983: 382, ZSMH 546/0; type-locality: 'Rio de Janeiro, Bahiae', restricted by Vanzolini, 1981a to Rio de Janeiro and Salvador).

Iguana iguana; Burt & Burt, 1930: 10, 1931: 267, 1933: 26; Amaral, 1937a: 1736, 1937b: 177, 1937c: 1722, 1949: 109; Rand & Humphrey, 1968: 4; Müller, 1969: 118, 1971: 24; Crump, 1971: 19; Lazell, 1973: 7; Hoogmoed, 1979: 278; Vanzolini et al., 1980: 92; Vanzolini, 1986a: 14; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 183.

Iguana iguana iguana; Schmidt & Inger, 1951: 451; Cunha, 1961: 91, 1981a: 107; Peters & Donoso-Barros, 1970: 149; Vanzolini, 1972: 96; Hoogmoed, 1973: 148; O'Shea, 1989: 69; Nascimento et al., 1991: 33.

Material.— **Brazil.** AMAZONAS. Rio Negro, below the river Daraá: 1 ♂, MPEG 13815, 12.ii.1980, leg. M. Goulding.

MARANHAO. Município do Arari, Gancho do Arari, road BR-222: 1 ♂, MPEG 11515, ii.1978, 1 ♂, MPEG 11745, vii.1978, both leg. O.R. Cunha & F.P. Nascimento; 1 ♂, 1 ♀, MPEG 11954-955, x.1978, leg. F.P. Nascimento & R.S. Pereira. Município de Pinheiro, Paruá, road BR-316: 1 ♂, 1 ♀, MPEG 11228-229, 22.x.1977, leg. F.P. Nascimento.

PARA. Município de Acará, km 16 of road to Acará: 1 ♀, MPEG 9299, 21.x.1975, leg. O.R. Cunha & F.P. Nascimento. Rio Tocantins, present reservoir area of hydroeletric dam Tucuruí, former locality Jacundazinho: 1 ♀, MPEG 13814, 28.vii.1984, leg. R.J.R. Moraes. Carajás, Serra Norte: 1 ♀, MPEG 13742, Rio Itacaiunas, near Serra das Aguas Claras, 30.vii.1984, leg. C.A. Joly; 1 ♂, MPEG 14381, left margin of Rio Parauapebas, c. 2 km to the right of the road N5-Marabá, iv.1986, leg. F.P. Nascimento, M.G.M. Nery & R.Bittencourt Neto. Rio Araguaia, Porto Jarbas Passarinho, road Transamazônica: 3 ♂♂, MPEG 9821-22, MPEG 10705, 07.vi.1976, 2 ♀♀, MPEG 12345-346, 24.ix.1976, all leg. O.R. Cunha & F.P. Nascimento. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 2 exs., MPEG 16480, RMNH 26653, 12.xi.1992, leg. E.S.B. Ribeiro. Município de Oriximiná, southern bank of Rio Trombetas, opposite Ilha dos Maicós: 1 hgr., RMNH 26483, 06.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Rio Nhamundá, Sítio Céu Estrelado, 15 km N of Faro: 1 juv., MPEG 15320, 03.xii.1988, 3 juv., MPEG

15408-409, RMNH 26484, 12.xii.1988, all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Rio Nhamundá, Cabeceira Urucuxi, 16 km N of Faro: 2 juv., MPEG 15411, RMNH 26485, 13-14.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RORAIMA. Município de Boa Vista, Colônia Coronel Mota, região do Taiano: 1 ♂, MPEG 4056, 20.vi.1970, leg. F.P. Nascimento. Município de Boa Vista, Fazenda Bom Intento: 1 ♂, 1 ♀, MPEG 4247, 4394, 01 & 13.vii.1970, leg. F.P. Nascimento.
In addition to specimens listed above, the MPEG has specimens from the following localities: ACRE. Município de Cruzeiro do Sul, Rio Juruá, Novo Oriente (former Seringal Oriente). AMAPA. Amapá (city). AMAZONAS. Anavilhanas. GOIAS. Município de Aragarças; Município de Araguatins; Macaúba, Ilha do Bananal. MATO GROSSO. Barra do Garça. PARA. Município de Viseu, Fazenda Real; Município de Augusto Correa, Cacoal; Município de Bragança, road to Campinho; km 23 road to Maracanã; Município de Marapanim, Marudá; Peixe-Boi; Município de Castanhal, Boa Vista (Apeú); Belém, Utinga; Município de Belém, Ilha do Mosqueiro; Rio Tocantins, Mangabeira (below Baião); km 11 of road PA-332 (to Marabá); road Transamazônica, between Altamira and Marabá, left side of Rio Xingu; Altamira; lower Rio Xingu, Baía de Souzel (near Senador José Porfírio). Serra do Cachimbo. RONDONIA. Forte Príncipe da Beira.

Diagnosis.— *I. iguana* is by far the largest iguanian in Amazonia; it has a relatively small head with blunt snout, a cylindrical body, well-developed limbs, and a long tail. It is characterised by its predominantly green colour; a high (especially in adults) vertebral crest; a large gular fan bordered anteriorly by a series of spikes; and a large, flat, round scale below the ear-opening (the subtympanic plate).

Description.— Iguanid with maximum SVL of 445 mm in a preserved specimen, probably reaching larger sizes (see Lazell, 1973). Head 0.16-0.22 (0.19 ± 0.02, n= 22) times SVL, 1.2-1.7 (1.39 ± 0.14, n= 22) times as long as wide, 0.80-1.12 (1.01 ± 0.07, n= 22) times as wide as high. Snout blunt, high, canthus rostralis round. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.42-0.49 (0.46 ± 0.02, n= 12) times SVL, hind limbs 0.69-0.80 (0.75 ± 0.04, n= 7) times, tibia 0.17-0.24 (0.21 ± 0.01, n= 22) times. Tail long, proximally slightly compressed, distally round in cross section, tapering toward tip; 2.7-3.2 (2.89 ± 0.15, n= 16) times SVL.

Tongue wide, villose, with round, nicked tip. Teeth compressed, with a triangular, polycuspid crown.

Rostral pentagonal to roughly triangular, posterior angle rather blunt, about one and a half times as wide as high; bordered by 8-14 scales posteriorly, which may include nasals. Scales of snout irregularly polygonal, smooth, slightly convex, juxtaposed, distinctly larger posteriorly; 2-5, mostly 3-4, scales across snout between second canthals. Nasal single, large, bulbous, more or less in line with canthals; nostril in its centre, directed latero-anteriorly. Three large canthals, only first (posterior) one slightly angulate. Supraorbital semicircles distinct, with irregularly polygonal, smooth, flat, juxtaposed scales, larger anteriorly; in contact medially or separated by one row of scales. Scales on supraocular region small (slightly larger centrally than peripherally), irregularly polygonal, smooth, juxtaposed; adjacent to supraciliaries, a row of scales parallel to them. Supraciliaries 9-13, anterior two or three longer, each overlapping the scale behind it, others quadrangular or rectangular, juxtaposed. Interparietal relatively large (about as large as some scales of supraorbital semicircle), separated from supraorbital semicircle by a row of small scales. Parietal eye distinct, approximately at centre of interparietal. Parietal region with some relatively

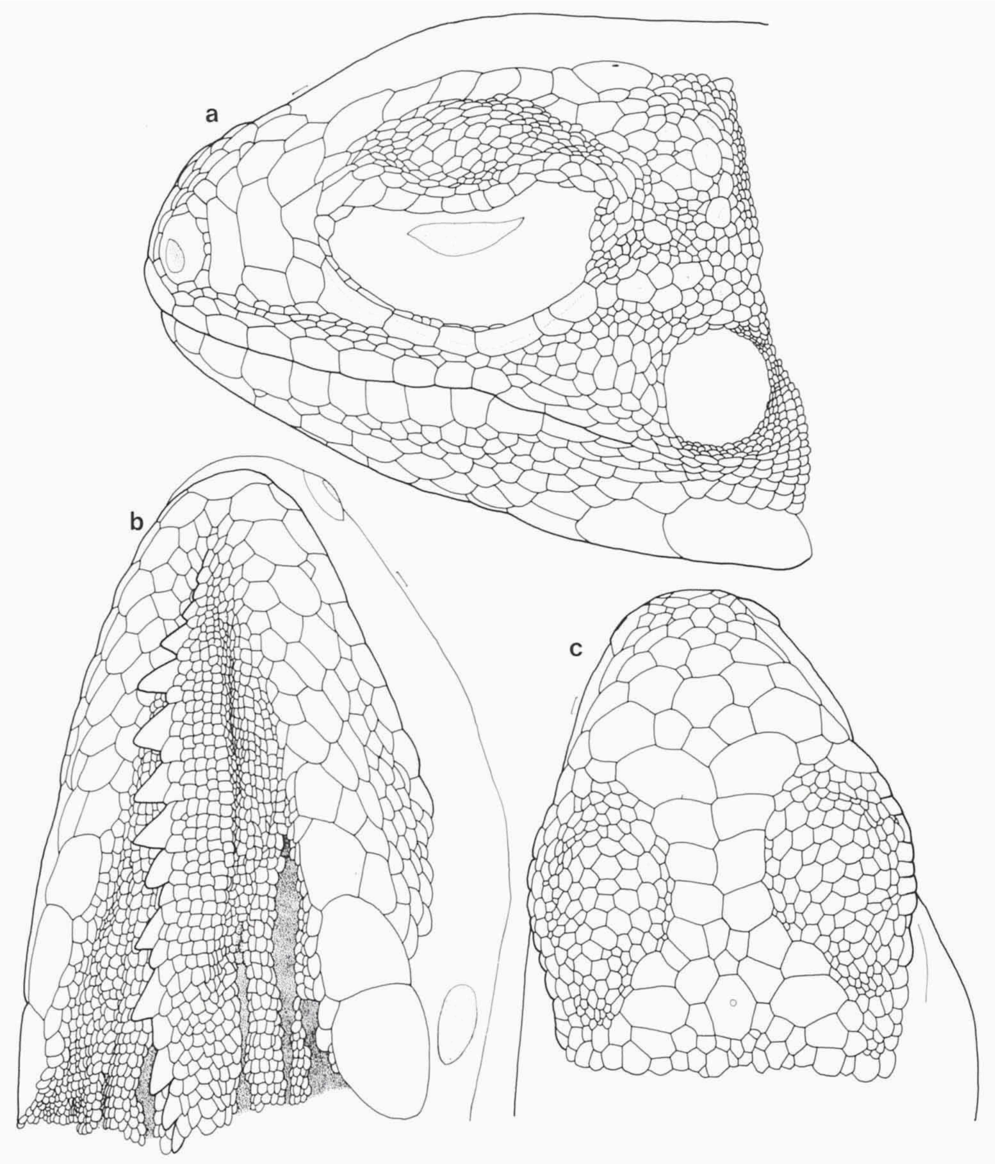


Fig. 8. *Iguana iguana*, MPEG 11229; a, b, c: lateral, ventral, and dorsal views of head.

large scales, posterior ones conical; toward occipital and temporal regions bordered by small scales. Loreal region with a few large, irregularly polygonal, smooth, flat, juxtaposed scales, and two or three rows of small scales contiguous to supralabials. A continuous preocular-subocular series with 5-8, mostly 6-7, keeled scales. Supralabials 7-9, posterior one very elongate, one but last below centre of eye; followed to commissure of mouth by one to three progressively shorter scales. Temporal scales polygonal (hexagonal or other), juxtaposed, smooth, larger on lower part; near ear-opening, a few rows of transversely elongate scales. Supratemporal region distinct, delimited both from temporal and parietal regions by a row of slightly to distinctly larger, low-conical scales; between these rows, scales similar to those on temporal region, heterogeneous in size. Ear-opening large, round to vertically oval, with smooth margin; tympanum superficial.

Mental rather similar in shape to rostral, but shorter; with closed mouth, the two scales form a rhomboid figure. Postmentals 3-7, laterals much larger. Infralabials 7-9 to below centre of eye, followed to commissure of mouth by 2-5 scales which decrease in size posteriorly. A row of large sublabials follows the lateral postmental at each side, anteriorly in contact with infralabials, posteriorly separated from them and decreasing in size, whereas at the same time one or two rows of scales on its medial side increase in size; these end in 1-3 larger scales in a row, posterior one (the subtympanic plate) round to oval, about as large as, to larger than, ear-opening, and lying below it. Scales on chin medially small, quadrangular, juxtaposed to subimbricate. A large gular fan from postmentals to gular fold, covered by scales similar to those on chin, posteriorly becoming rhomboid; medially, approximately reaching level of ear-opening, there is a row of prominent, compressed spikes (about 8-12 larger ones). A distinct transverse gular fold, continued dorsally as an antehumeral fold, is present.

Scales on nape rounded, convex, juxtaposed, with distinctly larger scales interspersed, forming approximately longitudinal rows. A vertebral crest present from occiput to tip of tail; very prominent in large specimens, with compressed, slightly curved spikes along back and base of tail, highest on neck; on tail it continues as a low, serrate crest along most of its length, distally becoming almost inconspicuous (in juveniles the crest is prominent but relatively low, formed by flat-triangular scales). Sides of neck with scales similar to those on nape, decreasing in size toward the gular/antehumeral fold; some irregular folds are present. Dorsals and scales on flanks small, quadrangular to rectangular, diagonally keeled, imbricate, in transverse rows which continue along flanks, and most of them also on the belly. Ventrals larger than dorsals, rhomboid on chest, lanceolate posteriorly, smooth, imbricate; ventrolaterally the scales grade into the dorsals. Scales around midbody 194-226 (208.8 ± 8.3, n= 22). Scales on preanal plate lanceolate, smooth, imbricate, similar in size to ventrals, in transverse rows. Femoral pores 27-37 (31.6 ± 2.7, n= 22) in total (13-19 per side), usually larger in males; each pore surrounded by several scales.

Tail dorsally and laterally with scales similar to dorsals but larger and gradually acquiring a stronger keel distally; keels form longitudinally oblique, low ridges. Base of tail, on ventral surface, with scales similar to ventrals, although slightly larger, grading distally to bluntly lanceolate, strongly keeled and mucronate; keels form distinct longitudinal ridges, stronger than the oblique lateral ridges. Verticils, if present, very inconspicuous.

Forelimbs with rhomboid, imbricate scales, from keeled and larger than ventrals on upper side, to smooth and about as large as ventrals on the underside. Scales on hind limbs rhomboid, imbricate, larger and keeled on their anterior aspect and on posterior aspect of lower legs; similar but smooth on ventral aspect of lower legs, slightly smaller on thighs; distinctly smaller and keeled on dorsal aspect; and similar to that, but gradually loosing the keel, on posterior aspect of thighs. Subdigital

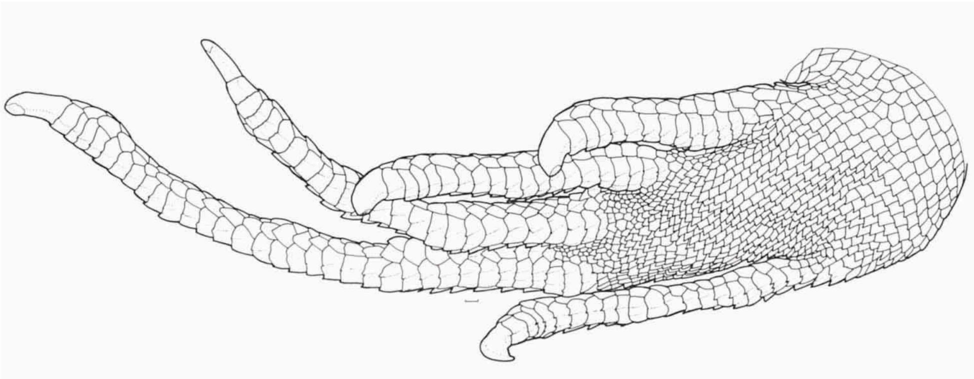


Fig. 9. *Iguana iguana*, MPEG 11229: ventral view of right foot.

lamellae single, mostly tricarinate under fingers, bicarinate under toes; 22-28 (25.1 ± 1.7, n= 43, 22 specimens) under fourth finger, 31-39 (35.5 ± 2.3, n= 43, 22 specimens) under fourth toe.

Colour in life green, usually with some black and white pattern, more or less developed according to the specimen. A specimen in captivity dorsally was shamrock-green (162B) on head, mainly lime-green (159) with dark grey and some white lines on back and flanks; on ventral surface, head and gular fan opaline-green (162D) with some ill-defined flesh-colour (5) spots, elsewhere yellow-green (58). Among three juvenile specimens (MPEG 15408-409, RMNH 26484), two had the gular fan light salmon (106), in the other one the gular fan was green with a distinct salmon (106) midventral line. Other colour descriptions are given by, e.g., Beebe (1944b), Hoogmoed (1973), and Gasc (1990). Lazell (1973) discussed variation in colour pattern. As far as I know, the melanic form mentioned by him is not present in Amazonia.

Several adults and juveniles, in preservative, uniformly green, lighter ventrally; a white band on shoulder and upper part of upper arm is present, in some specimens extending on one or both extremities. Commonly there are transverse, sinuous, black stripes, with light borders, either only ventrolaterally, or across flanks, or continuing across dorsal region; such pattern is frequently present in juveniles, in which the transverse stripes continue on tail, distally changing into wide, alternating, black and green bands; in some adults, the dark stripes may change into oval spots. In MPEG 13814 scales are partially light green, partially black, forming a fine dotted pattern, similar but coarser on forelimbs; hind limbs partially dotted, partially reticulated (a black net encircling light green spots); tail with alternating green and black bands; ventral region light green with a few small, black dots, except gular fan which has a dotted pattern similar to that of forelimbs; white band on shoulder and upper arm almost indistinct. A few specimens present an overall reticulation throughout most of body.

Habitat.— In Amazonia it inhabits mainly forest, especially along rivers (Vanzolini, 1972, 1986a; Dixon & Soini, 1986; Zimmerman & Rodrigues, 1990; Gasc, 1990; Martins, 1991), but Ruthven (1922) and Hoogmoed (1973) reported individuals from Colombia and Suriname, respectively, living far from water in areas of savanna, and Cunha (1981a) reported iguanas from Roraima which were in isolated patches of forest in savanna. Gasc (1990) observed individuals living at the sea shore, and Lazell (1973) reported iguanas to dive into the sea. In the caatingas the species was reported in places far from water (Vanzolini, 1972; Vanzolini et al., 1980). Adults are mainly found high in the vegetation, while juveniles seem to stay on or closer to the ground (e.g., Hirth, 1963; pers. obs.). In the area of Baía de Souzel, lower Rio Xingu, *I. iguana* is very common, and several may be seen close together on "aninga" (*Montrichardia arborescens* Schott) vegetation. The area has a number of sand beaches where the Amazonian turtle *Podocnemis expansa* (Schweigger) oviposits, and which are also suitable for the oviposition of green iguanas (pers. obs., xii.1983). MPEG 13742, from Carajás, was on vegetation bordering the Rio Itacaiunas; it dove into the water and was captured at a depth of about 50 cm (C.A. Joly, pers. comm.). Several juveniles were collected near the Nhamundá river, all in open areas, one on a banana tree c. 1.5 m above the ground. A halfgrown specimen was collected in a pile of wood in open grassland area near the Rio Trombetas. In the city of Belém, introduced individuals live freely in the zoobotanical park of Museu Goeldi, where they can be seen on trees and occasionally on the ground (even large animals). On the campus of the museum, a grassfield with isolated trees and buildings, a juvenile was once seen, probably born in the immediate surroundings. Crump (1971) and Rand & Humphrey (1968) reported the species from the edge of rivers, varzea forest and in open or edge situations around Belém. Rand & Humphrey (1968) suggested it to live also away from clearings and rivers, in the canopy of the forest.

Notes on natural history.— This diurnal, heliothermic lizard frequently is seen basking (Hirth, 1963; Rand & Humphrey, 1968; Hoogmoed, 1973). It may run fast bipedally (e.g., Lazell, 1973). Also, it is a good swimmer and frequently tries to escape by diving into the water and swimming away (e.g., Ruthven, 1922; Vanzolini, 1972; Lazell, 1973; Hoogmoed, 1973; Vanzolini et al., 1980; Gasc, 1990; Martins, 1991).

I. iguana is mainly herbivorous, but other kinds of food — insects (e.g., Goeldi, 1902; Hirth, 1963; Vanzolini et al., 1980), bird eggs (Lazell, 1973), and carrion (Loftin & Tyson, 1965) — also have been reported. In Tabuleiro Embaubal, lower Rio Xingu, I observed 12 green iguanas around the site where food remnants of an isolated house were discarded; the iguanas certainly came for food, although it was not observed which items they were eating. A juvenile was observed on a *Hibiscus* plant on the campus of Museu Goeldi, Belém, where it ate leaves of the plant (pers. obs.).

In the lower Rio Xingu (close to Ilha Grande, Baía de Souzel), a juvenile *I. iguana* was found in the stomach of the fish "aruanã" (*Osteoglossum bicyrrhosum* Vandelli). Beebe (1944b) observed a bird-of-prey, *Elanoides forficatus yetapa* (Vieillot), and a jaguar trying to prey on green iguanas (in the first case a small specimen, in the second a large one). Gasc (1990) mentioned that during oviposition green iguanas are preyed upon by large birds and small felines which live in trees, and by caimans.

Hoogmoed (1973) and Lazell (1973) reviewed a number of references on reproduction in *I. iguana*; other papers are mentioned by Vanzolini (1972). Reproduction seems to be seasonal; the eggs usually are deposited at the beginning of the dry season. Oviposition usually takes place in sandbanks, where the eggs are placed in a hole dug by the female. A temperature near 30°C is required for the development of the eggs (Licht & Moberly, 1965); incubation requires about three to three-and-a-half months. Reports on clutch size vary from nine to 71 with a positive correlation

Fig. 10. Distribution of *Iguana iguana* in northern South America. Closed circles = material studied; open circles = data from literature (Griffin, 1917a; Amaral, 1937c; Parker, 1935; Beebe, 1944b; Schmidt & Inger, 1951; Test, Sexton & Heatwole, 1966; Donoso-Barros, 1968; Müller, 1971; Vanzolini, 1972, 1986a; Hoogmoed, 1973; Lazell, 1973; Hoogmoed & Lescure, 1975; Trajano & Ghiringhello, 1978; Meede, 1984; Fugler, 1989; Zimmerman & Rodrigues, 1990; Martins, 1991); dashed circles = general references to localities (Ayala, 1986 for Colombia, with reference only to states; and Peters, 1967 for Ecuador, on both sides of the Andes).

between clutch size and female body size (Rand, 1984; Fitch, 1985). Beebe (1944b) reported two clutches with four and seven eggs, but the association of these clutches with green iguanas was not conclusive; the clutch of four eggs may not have been intact. Goeldi (1897) reported usually 12-18 eggs, occasionally up to 24, egg laying in September, while Goeldi (1902) mentioned a mean of 18 eggs, occasionally with twice as many, egg laying between February and April. Vanzolini et al. (1980) reported a clutch of 31 eggs in the caatinga.

The reproductive behaviour of green iguanas was studied by a number of authors (e.g., Rand, 1968; Dugan, 1982; Rodda & Grajal, 1990; Rodda, 1992). Rand & Greene (1982) compared the breeding periods from several localities and demonstrated the importance of the rainfall pattern to the reproductive cycle in these lizards. Rand & Bock (1992) observed substantial variability in nesting female size in Panama; such variability apparently was not related to age (growth rates in adults were very low), but probably due to differences in juvenile growth rates. The same authors observed that 40% of the females that came one year to a nesting site returned to this same site in subsequent years.

Distribution (fig. 10).— From Mexico, through Central America and part of the Antilles, to central Brazil and Paraguay. For a detailed distribution on the Antilles and other islands see Lazell (1973). In Brazil it is known from Amazonia, along gallery forests in the cerrados, and from the dry caatinga (Vanzolini et al., 1980); Trajano & Ghiringhello (1978) mentioned a locality (Ponta de Pedras, Pernambuco) in the Atlantic forest.

Remarks.— The literature on *Iguana iguana* is extensive, partly because the species serves as food for humans in several parts of its range (both adults and the eggs; e.g., see Werner, 1991), and also because the skin is sometimes used commercially. No attempt was made here to review all the literature about the species. In Brazilian Amazonia both meat and eggs are eaten by rural people, but it is seldom eaten in cities. Apparently there is no major commercialisation of these lizards in the country. The genus as a whole is included in Appendix II of CITES (Schouten, 1992).

Until recently, several authors recognised two subspecies of *I. iguana* — *I. i. rhinolopha* from northern Costa Rica to Mexico, and the nominal subspecies south of that area. However, Lazel (1973) concluded that geographic variation is complex and does not justify the recognition of subspecies.

Comparisons of tail, limb and head proportions in *I. iguana* from several localities in the state of Amazonas, one locality in Pará (in both cases representing areas of Amazonian forest), and several localities in northeastern Brazil (most of which in areas of caatinga, one in agreste [a dry, open forest transitional between the Atlantic forest and the caatinga] and one in Atlantic forest) by Trajano & Guiringuello (1978) showed low variability. Analysis of the level of heterozigosity in populations of *I. iguana* from central Panama, western Panama, and Venezuela by Bock & McCracken (1988) revealed the lowest levels reported for sexually reproducing, non-insular lizards. They also compared three populations from central Panama and noted that 3 of 20 loci differed significantly in allele frequencies among populations.

Lazell (1973) erroneously mentioned that no type of *I. iguana* existed. He also restricted the type-locality to the island of Terre de Haut, Les Iles de Saintes, Departement de La Guadeloupe, French West Indies. However, this restriction is invalid because there is no evidence that this was the place of origin of the type-specimens. Lazell's (1973) only justification was that the species was "extremely abundant on this island". As pointed out by Hoogmoed (1973: 398) this is no justification for restriction of a type-locality.

Family Polychrotidae Fitzinger, 1843

This family, as proposed by Frost & Etheridge (1989: "Polychridae", corrected to Polychrotidae by Böhme, 1990), corresponds in content to the "anoloids" of Etheridge & Queiroz (1988).

Content.— Eleven genera, of which *Anolis*, *Enyalius*, and *Polychrus* occur in Brazilian Amazonia.

Anolis Daudin, 1802

Diagnosis.— Most species (including all Amazonian ones) readily recognisable by the presence of an extendable, flat dewlap, and by transversely enlarged subdigital lamellae covered by microscopic hair-like processes, on phalanges II and III of all fingers and toes. Distally, at the joint with phalanx I, the dilated lamellae may form a prominent border. Pores absent.

In general, anoles have a moderately elongate head, a well demarcated neck, a slender and cylindrical to depressed body, and a long and slender tail. Size of dewlap is usually larger in males; in some species the sexes differ in colour pattern or in dewlap colour. Anoles usually are agile, fast-moving lizards. In Amazonia, most species are forest dwellers, and are either arboreal or live on the ground and/or low vegetation. *A. auratus* Daudin and *A. nitens brasiliensis* Vanzolini & Williams (in part) are inhabitants of open vegetation.

Distribution.— Most of tropical and subtropical America, from southeastern United States, through Mexico, Central America and Antilles, to approximately 20°S in South America (Etheridge, 1960).

Content.— This is one of the most diverse genera among Iguanians; at present more than 200 species are recognized. In Brazilian Amazonia 10 species are known: *A. auratus, A. bombiceps, A. nitens, A. fuscoauratus, A. ortonii, A. philopunctatus, A. phyllorhinus, A. punctatus, A. trachyderma,* and *A. transversalis.*

Remarks.— Several attempts to divide the genus have been made. Most recently Guyer & Savage (1986) and Savage & Guyer (1989) proposed the partition of *Anolis* into five genera. This proposition was criticized by Williams (1989) and Cannatella & Queiroz (1989), who argued that, at our present stage of knowledge, it is still preferable to keep the genus as one single unit. Savage & Guyer (1992) replied these critics, but the low level of agreement in the several attempts to reorganise the genus is in itself, in my opinion, a good reason to withhold changes in nomenclature until the relationships within the group become clearer.

In South America, Williams (1976) recognised fourteen species groups (defined heuristically, on morphological data). The species here considered are included in four of these groups: *laevis, punctatus, fuscoauratus,* and *auratus.*

A. lindeni Ruthven, 1912, type-locality Santarém, Brazil, is a synonym of *A. cristatellus* Duméril & Bibron, from Puerto Rico (Vanzolini, 1978c). The holotype of *A. lindeni* (MCZ 8306) collected by Charles Linden and donated to the MCZ in 1874 was probably mislabelled (no other specimen from this species, or any similar species, is known from Brazil); it is not considered further.

Anolis auratus Daudin, 1802
(figs. 11, 12, 220)

Anolis auratus Daudin, 1802b: 89 (holotype unknown, type-locality: Suriname); Peters & Donoso-Barros, 1970: 48; Vanzolini, 1972: 91; Hoogmoed, 1979: 277; Cunha, 1981a: 8; O'Shea, 1989: 69.
Norops duodecimstriatus; Cope, 1876: 169.
Norops auratus; Boulenger, 1885b: 95; Burt & Burt, 1933: 38; Goeldi, 1902: 16, 32; Cunha, 1961: 69.
Anolis auratus auratus; Hoogmoed, 1973: 99.

Anolis auratus sipaliwinensis Hoogmoed, 1973: 107 (holotype RMNH 16010a, type-locality: Sipaliwini, between Base Bivouac and Meyer's farm, ± 8 km E of airstrip, Suriname). **New synonym.**
[*Norops*] *auratus*; Savage & Guyer, 1989: 110.

Material.— **Brazil.** AMAPA. Macapá: 1 ♂, 1 ♀, MPEG 15206-207, 1 ♀, RMNH 24678, 23.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Município de Amapá, road BR-156, Cujulim: 4 ♂♂, 4 ♀♀, MPEG 3290, 3292-94, 3297-99, 3301, 'campo' between Cujulim and Flexal rivers, 06.xi.1969, leg. F.P. Nascimento; 1 ♂, 1 ♀, MPEG 3487, 3489, 11.xi.1969, leg. F.P. Nascimento.
AMAZONAS. Manacapuru: 1 ♂, MPEG 14537, ix-x.1985, leg. D. Peccinini-Seale.
PARA. Santarém, Urumari: 1 ♂, 2 ♀♀, MPEG 13885-887, 09.x.1984, leg. J.M. Cardoso, G. Nery & M.B. Sousa; 1 ♂, MPEG 13900, 18.x.1984, leg. Mazaharu. Obidos: 1 ♂, 1 ♀?, KU 130208-209, 28-29.vi.1970, leg. M.L. Crump. Oriximiná: 1 ♀?, CM 64585, 04-08.i.1972, leg. 'Expedição Permanente da Amazônia'.
RORAIMA. Município de Boa Vista, região do Taiano, Colônia Coronel Mota: 4 ♂♂, 4 ♀♀, 1 juv., MPEG 3921, 3923, 3952, 4038, 4068, 4104-07, 13-25.vi.1970, leg. F.P. Nascimento. Município de Boa Vista, Fazenda Bom Intento: 1 ♂, 1 ♀, MPEG 4403-04, 13.vii.1970, leg. F.P. Nascimento. Ilha de Maracá: 2 ♂♂, 2 juv., MR 026, 28.vi.1987; MR 149, 07.viii.1987; MR 205, 20.viii.1987; MR 590, 26.ii.1988, all leg. M. O'Shea, 'INPA/RGS/SEMA Projeto Maracá'.
Guyana. Berbice River, near Blairmont: 1 ♂, RMNH 26479, 01.x.1985, leg. L. Hoevers.

Diagnosis.— Anole with 8-13 longitudinal rows of enlarged, keeled, imbricate dorsals, distinctly larger than the granular scales on flanks, with a sharp demarcation; ventrals large, keeled, imbricate; 60-90 scales around midbody. Subdigital lamellae on phalanges II and III moderately widened, distally not forming a prominent border. Males with a blue, relatively small (reaching level of forelimbs) dewlap, distinctly smaller in females. Maximum SVL 57 mm.

Description.— Anole with maximum SVL in males of 50 mm (MPEG 13900), in females of 57 mm (RMNH 24678). Head 0.22-0.28 (0.24 ± 0.01, n= 36) times SVL, 1.6-2.0 (1.77 ± 0.10, n= 36) times as long as wide, and 1.0-1.4 (1.13 ± 0.07, n= 36) times as wide as high. Snout pointed, frontal region not or only slightly depressed. Neck narrower than head, slightly narrower than body. Body cylindrical. Limbs well developed, forelimbs 0.33-0.46 (0.39 ± 0.03, n= 30) times SVL, hind limbs 0.62-0.79 (0.71 ± 0.04, n= 32) times, tibia 0.18-0.23 (0.21 ± 0.01, n= 35) times. Tail round in cross section, tapering toward tip, in males up to 2.9 times SVL, in females up to 2.5 times.

Tongue wide, villose, tip nicked. Teeth conical anteriorly, tricuspid posteriorly.

Rostral vertical in position, about four times as wide as deep, with convex upper border; just visible from above. Postrostrals 5-7, rarely four or eight. Anterior nasal in contact with postrostral series. Scales on snout irregularly polygonal, subimbricate, mostly multicarinate, in some specimens unicarinate on frontal area; 6-9, mostly 7-8, scales across snout at level of second canthal. Canthus rostralis well defined, with 3-6 canthals; mostly three large, prominent, uni- or multicarinate, partially overlapping canthals between supraciliaries and nasals. Supraorbital semicircles rather indistinct, separated from each other by one or two scales, exceptionally in contact with each other; scales in the supraorbital semicircles and between them on top of head, irregularly polygonal, mostly unicarinate, some multicarinate, juxtaposed. Supraocular region with a group of large, irregularly polygonal, uni- or multicarinate scales medially; anteriorly, posteriorly and laterally surrounded by small, unicarinate scales, which may be slightly larger anteriorly than posteriorly. Supraciliaries in two parallel rows, first one of each row reaching slightly beyond the middle of orbital length, followed by a variable number of distinctly shorter scales; a third, narrower and mostly incomplete row of scales is present at the side of the eye. Occipital region with irregularly polygonal, unicarinate, juxtaposed scales, smaller than those on snout, decreasing in size posteriorly and toward the parietal region, with which no clear boundary exists; interparietal several times larger than adjacent scales; minimum of one or two, rarely three, scales between interparietal and supraorbital semicircle. Loreal scales irregularly polygonal, in approximately longitudinal rows, distinctly larger toward supralabials; upper scales keeled or not, scales in second row above supralabials mostly unicarinate, in the row adjacent to supralabials mostly multicarinate; 4-6, rarely seven, scales in a transverse row at level of second canthal. Suboculars 3-5, exceptionally two, large, mostly tricarinate, either one, two or three of them in contact with supralabials, or subocular series completely separated from supralabials by one row of scales. Supralabials 5-8, unicarinate (mostly) or bicarinate, 5-6 to below centre of eye. Temporal region with relatively small, irregularly polygonal, unicarinate, juxtaposed to subimbricate scales, smaller on upper part; separated from eyelids by a few rows of larger scales, and from parietal region by a double, rather inconspicuous row of slightly larger scales. Eyelids covered with granules, slightly increasing in size toward the rim. Ear-opening relatively small, obliquely oval, its inferior margin at level of commissure of mouth; with denticulate margin and shallow auditory meatus.

Mental arrow-head shaped or semicircular, posterior margin indented by 3-6, mostly four, postmentals, which decrease in size toward midventral line. Infralabials 5-6, 4-5 to below centre of eye. Chin with juxtaposed scales, laterally large, polygonal, multicarinate, medially distinctly smaller, narrower and mostly unicarinate, tending to form longitudinal rows; anteriorly with a medial sulcus. Toward throat, scales with round posterior margin, imbricate. Dewlap relatively small in males, reaching level of forelimbs, with rhomboid, strongly keeled, isolate scales laterally, and phylloid, uni- or tricarinate scales along the rim. Dewlap in females poorly developed. Nape with small, imbricate to subimbricate, keeled scales.

Dorsals rhomboid to hexagonal, strongly keeled, imbricate, in 8-13 (10.4 ± 1.0, n= 36) longitudinal rows, keels forming longitudinal ridges. Scales on the flanks distinctly smaller, almost granular, keeled, with a short transitional zone with dorsals, transition slightly more gradual toward ventrals. Ventrals larger than dorsals, phylloid, strongly keeled and mucronate, imbricate, in about 14-21 (18.2 ± 1.5, n= 34) longitudinal rows, keels forming longitudinal ridges. Scales around midbody 61-80 (72.5 ± 4.3, n= 35) (possibly average counts higher in males than in females; see 'remarks'). Preanal plate with scales similar to ventrals, but smaller and not in longitudinal rows.

Scales on tail dorsally and laterally rhomboid to hexagonal, keeled, imbricate, in longitudinal rows. Ventrally, near the base, scales hexagonal, keeled, imbricate; distally scales narrow, trapezoid, with a median keel, midventrally, and rectangular, with an oblique keel, lateroventrally. The keels form longitudinal ridges all around the tail. Tail, except at base, divided into verticils, three subcaudals corresponding to four, occasionally three, caudals.

Scales on limbs hexagonal, keeled, imbricate, except on lower aspect of forearms and posterior aspect of thighs, where they are granular. Lamellae under fourth finger 16-23 (19.5 ± 1.6, n= 72, 36 specimens); under fourth toe 27-35 (31.4 ± 1.7, n= 69, 36

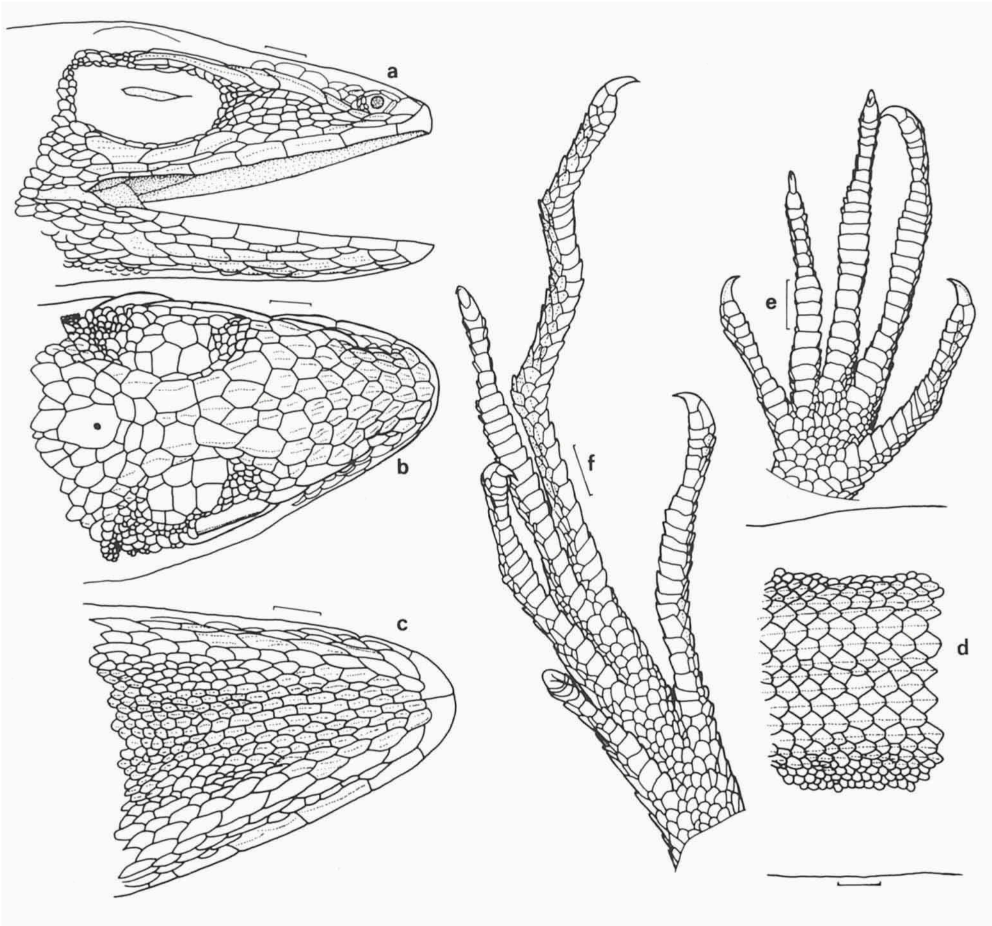


Fig. 11. *Anolis auratus*, MPEG 15206; a, b, c: lateral, dorsal, and ventral views of head; d: dorsal scales at midbody; e, f: ventral view of left hand and left foot.

specimens) (all counts starting from membrane between third and fourth digits). Subdigital lamellae on phalanges II and III moderately widened, continuous with distal phalanx (not forming a prominent border).

Colour in life of MPEG 15206, MPEG 15207 and RMNH 24678 (all from Macapá, Amapá): head light drab (119C) to drab-grey (119D), with darker peppered spots; vertebral band pale horn colour (92) to pale pinkish buff (121D); a raw-umber (123) dorsolateral stripe in one of the females, not evident in the other two specimens (one male and one female); flanks more or less (according to the specimen) densely peppered with glaucous (79) or dark neutral grey (83), in some specimens forming a stripe dorsally. Ventrally, head white, densely peppered with similar pigments as on flanks, especially in the gular region; dewlap in male with a mixture of lime-green (159) and light indigo (73) hues, with scales partially sulphur-yellow (157); in females dewlap very short, either with same colour as in remaining gular region or with a small bluish area; belly white with some peppering. Tail having same pattern as body. Tongue orange. Iris grey. Vanzolini (1972), Hoogmoed (1973), and Gasc (1990) also gave descriptions of colour in life. Hoogmoed (1973) observed colour change in one specimen, from an almost completely black phase to a distinctly lighter, patterned phase.

General dorsal colour in preservative light brown to drab. Some black ornamentation may be present on back, or a light vertebral band, with diffuse margin. A white stripe starts below the orbital region and continues through upper border of ear-opening and above arm insertion, until hind limbs, or fading out somewhere in between; in some specimens the whole stripe is rather inconspicuous. Flanks light grey or smoked cream. Ventral region pearl-colour. Dewlap with blue or blackish skin, almost not visible in females, and white scales. Tail light brown to drab dorsally, lighter ventrally.

Habitat.— An inhabitant of open formations, either natural savannas or perianthropic situations; in Suriname, it also occurs amidst low vegetation on beaches (Hoogmoed, 1973). In Alter-do-Chão, Pará, I observed specimens on and among grasses growing on a stony substrate, on a small hill. Vanzolini (1972) also mentioned a specimen collected in Alter-do-Chão, on a grass clump, and another at the locality Os Patos (near Taperinha, Pará), "sitting on a single-log walk across a stretch of grass-covered swampy ground some 500 m wide". In Roraima, Cunha (1981a) reported specimens on small trees, not very far from the ground. Hoogmoed (1973) reported it (in Suriname) to occur "in grass and on low vegetation, never more than 50 cm from the ground" and, on the hill tops of the Sipaliwini savanna, among large boulders. In Colombia, Ruthven (1922) mentioned them in open woods and clearings, usually on grass and low bushes, as well as in open marshes at Bolívar and Fundación, and Valdivieso & Tamsitt (1963) recorded 11 specimens from Girardot (Dept. Cundinamarca), found in brush, on tree trunks, and in rock piles (also, they mentioned that the species "is commonly seen...in brush and thick vegetation in tropical forests". I believe this is a misstatement, or at least it does not refer to tropical rainforest). In perianthropic situations, they are found in gardens, backyards, grass fields, etc., among vegetation, or on fence posts, walls, or other substrates (Valdivieso & Tamsitt, 1963; Vanzolini, 1972; Hoogmoed, 1973). MPEG 15206-207 and RMNH 24678 were collected in herbaceous vegetation at the base of stone walls of an old Portuguese fort in the city of Macapá, Amapá. Hoogmoed (1973) reported specimens sleeping during the evening clinging to leaves or slender twigs.

Notes on natural history.— This is a diurnal, heliothermic lizard, frequently seen basking. Active animals were observed between 07:30 h and 18:30 h, with body temperatures reaching 32-36°C. The lizard is a sit-and-wait forager, with relatively low frequency of movement and low speed, and it uses relatively small areas during each period of activity. Food consists of a variety of insects (especially Orthoptera, Coleoptera, Hymenoptera) and spiders (Araneae), among which Hymenoptera is most abundant. Prey size correlates with SVL (all data by Hoogmoed, 1973; Magnusson et al., 1985; and Magnusson, 1993).

Hoogmoed (1973) reported gravid females, with one (*A. a. sipaliwinensis*) or two (*A. a. auratus*) mature eggs, in January, February, May, and August.

Distribution (fig. 12).— Northern South America, in Brazil, French Guiana, Suriname, Guyana, Venezuela, and Colombia, northward to Panama. In Colombia it

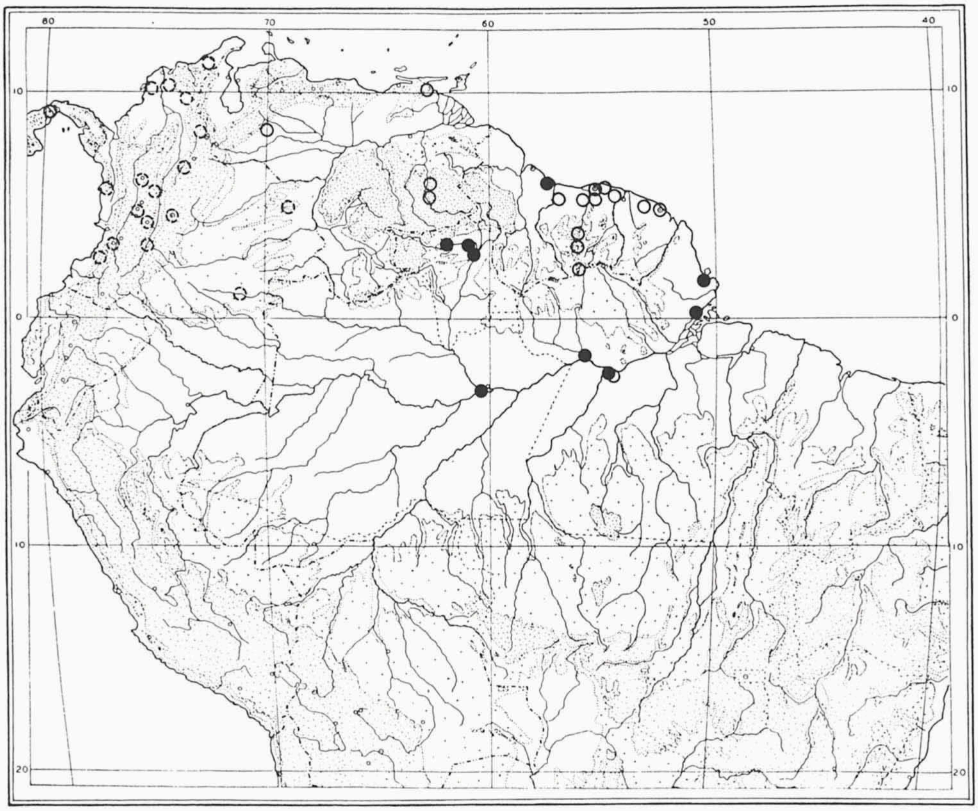


Fig. 12. Distribution of *Anolis auratus*. Closed circles = material studied; open circles = data from literature (Donoso-Barros, 1968; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976; Rand & Myers, 1990); dashed circles = data by Ayala (1986) for Colombian states.

occurs in relatively dry valleys of Rio Magdalena and Rio Cauca between Andean cordilleras (and Caribbean coast); it does not occur on Pacific slopes or lowlands (Duellman, pers. comm.). It was listed by Peters (1967), but not by Miyata (1982), for Ecuador (where, according to Duellman, pers. comm., *A. auratus* does not occur). In French Guiana it is reported only from the coastal savannas (Gasc, 1990), whereas in Suriname it occurs throughout the country where savanna-type habitats are present (Hoogmoed, 1973). In Brazil it occurs in open formation enclaves along the Amazon (Pará and eastern Amazonas) and in the states of Amapá and Roraima.

Remarks.— *A. auratus* was placed in the *auratus* (= *chrysolepis*) group by Williams (1976). Other Amazonian species in the *auratus* group are *A. nitens* (= *A. chrysolepis*) and *A. bombiceps*.

The species was considered monotypic until Hoogmoed (1973) separated the population from the Sipaliwini/Paru savanna, on the border between Suriname and Brazil, as a distinct subspecies, *A. a. sipaliwinensis*. According to Hoogmoed (1973), the two subspecies differ especially in colour pattern, besides slight differences in scutellation. However, the material studied here showed a larger range of variation in characteristics proposed as diagnostic for the subspecies than was observed by Hoogmoed (1973). Cunha (1981a) also pointed out that the characteristics used by Hoogmoed (1973) to separate the subspecies were variable among specimens from Roraima. Moreover, the differences in body proportions mentioned (tibia relatively shorter than head in *A. a. auratus*, and tail slightly longer) seem to be related to size in the samples analyzed. As a whole, the population of *A. auratus* from Sipaliwini seems to have a generally darker colouration than other populations; perhaps the colour is influenced by the dark substrate as suggested by Hoogmoed (1973). Besides, it may have a slightly smaller adult size (considering the sample studied). A more detailed analysis of variation in the entire geographic range of the species is needed to define how much different populations differ between themselves (a study particularly interesting in inhabitants of open vegetation in Amazonia, which at present occurs in several isolated areas). Until such a study is done, I think *A. auratus* should be treated as a monotypic species.

Hoogmoed (1973) reported 69-88 scales around midbody in *A. auratus* (both subspecies; mean, based on the data presented in tables 8-9, 77.1 ± 4.1, n= 42), while I found 61-80 (72.5 ± 4.3, n= 35); these results show a higher number of scales around midbody in specimens from Suriname. Both data show on average a higher count in males than in females (in the material here studied, ♂♂ 68-80, 74.1 ± 3.2, n= 18, ♀♀ 61-78, 69.9 ± 4.6, n= 14; in Hoogmoed's (1973) material, ♂♂ 72-88, 77.9 ± 3.9, n= 21, ♀♀ 69-86, 76.3 ± 4.3, n= 21). An analysis of variation of this character, therefore, has to take into account, simultaneously, both locality and sex. Unfortunately, the limited number of specimens does not permit such an analysis.

Anolis bombiceps Cope, 1876
(figs. 13, 22, 23)

Anolis bombiceps Cope, 1876: 168 (types apparently lost, type-locality: Nauta, Peru); Goeldi, 1902: 16, 32; Peters & Donoso-Barros, 1970: 49; Vanzolini & Williams, 1970: 86; Vanzolini, 1970b: 38; Dixon & Soini, 1975:25, 1986:28.
[*Norops*] *bombiceps*; Savage & Guyer, 1989: 110.

Material.— **Colombia.** VAUPES. Timbó: 1 ♂, UTACV 3527, 21.viii.1971; 1 ♀, UTACV 3935, 12.iii.1974; 1 ♂, UTACV 5207, 03.xii.1974; all leg. J.K. Salser Jr.
Peru. LORETO. Moropon: 1 ♂, TCWC 36774, Rio Nanay, x.1971; 1 ♂, TCWC 42733. Centro Union: 1 ♂, TCWC 41240, ix.1972. Mishana: 1 ♀, TCWC 41242, vii.1972; 1 ♀, TCWC 41243, viii.1972; 1 ♀, TCWC 41793, 01.xii.1972. Iquitos region: 2 ♂♂, 2 ♀♀, TCWC 41934, 44285, 47973, 47978. All leg. J.R. Dixon & P. Soini.

Diagnosis.— As for *A. nitens*. It differs from sympatric *A. n. scypheus* in presenting a blue or black dewlap and in the generally lower number of loreals, of scales across the snout, and of lamellae under fourth toe. It differs from *A. n. tandai* **subspec. nov.** (with which it may also be sympatric) in having hardly enlarged vertebrals, supraorbital semicircles usually separated by 1-2 scales, and dorsal head scales uni- or irregularly multicarinate.

Description.— Similar to *A. nitens*, to the description of which I refer, and in addition it has the following characteristics (for measurements and scale counts see table 1): (1) scales on snout anteriorly small, weakly to distinctly keeled; posteriorly

Table 1. Comparison of body proportions and scale counts in *Anolis nitens* subspecies and *A. bombiceps*.

	chrysolepis	*nitens*	*scypheus*	*tandai*	*brasiliens*	*bombiceps*
no. exs.	30	18	14	27	23	13
max. svl	61 mm	76 mm	83 mm	71 mm	64 mm	74 mm
tail/svl	1.6-2.1	1.8-2.6	1.7-2.2	1.4-2.3	2.2-2.6	1.7-2.0
head/svl	0.24-0.29	0.24-0.28	0.23-0.28	0.23-0.28	0.24-0.27	0.22-0.26
tibia/svl	0.24-0.33	0.25-0.30	0.25-0.29	0.23-0.33	0.23-0.27	0.28-0.33
midbody	106-150	122-173	120-175	107-159	103-147	110-153
	127.2 ± 12.6	149.0 ± 13.7	155.8 ± 16.2	134.3 ± 10.9	129.2 ± 12.4	135.0 ± 15.2
ptrostrals	3-7	5-7	5-9	5-9	5-7	5-9
splabials	10-14	9-13	9-14	10-14	9-13	11-15
iflabials	12-15	9-14	9-13	10-14	9-12	11-16
loreal scs.	5-9	5-7	6-10	6-9	5-8	4-7
canthals	6-9	6-8	6-9	6-9	5-7	5-9
bet.canthal	9-11	9-15	11-15	8-13	8-10	8-13
bet.sporb.	2-5	1-2	1-3	2-4	0-2	1-2
sporb-ipar	2-4	2-3	3-4	2-4	2-4	1-3
ptmental	4-6	6-8	4-8	4-6	4-8	6-7
exp.lam4fg	12-17	14-19	14-18	13-18	14-18	13-19
	13.6 ± 0.5	16.6 ± 1.2	17.0 ± 1.0	15.7 ± 1.3	15.8 ± 0.9	15.7 ± 4.9
exp.lam4toe	19-26	25-32	26-33	21-29	24-31	21-29
	22.7 ± 1.3	28.4 ± 1.8	29.3 ± 1.7	25.1 ± 1.7	27.6 ± 1.6	25.4 ± 2.1

Explanation: no. exs. = number of specimens examined (though some characters may have been based in fewer specimens); max. svl = maximum snout-vent length; tail/svl, head/svl, tibia/svl = respectively the rates of the tail, head, and tibia length with the snout-vent length (the ratios tail/svl and tibia/svl tend to increase with size, while that of head/svl decreases with size; the ranges exhibited here apply to all specimens examined, which in all forms include adults); midbody = number of scales around midbody; ptrostrals = number of postrostrals; splabials = total number of supralabials; iflabials = total number of infralabials; loreal scs. = number of loreal scales below the second canthal; canthals = number of canthals; bet. canthals = number of scales on the snout between the second canthals; bet.sporb. = minimum number of scales between the supraorbital semicircles; sporb-ipar = minimum number of scales between any of the supraorbital semicircles and the interparietal; ptmental = number of postmentals; exp.lam4fg = number of expanded lamellae under the fourth finger; exp.lam4toe = number of expanded lamellae under the fourth toe.

larger, flat, in some cases almost smooth, usually uni- or multicarinate; (2) supraorbital semicircles with enlarged (at least in part), keeled scales, all flat or mid-anterior ones arched; in some specimens supraorbital semicircles quite indistinct; (3) supraocular region with a group of enlarged scales surrounded laterally and posteriorly by granules, with a short transitional zone between them; anteriorly the scales are smaller and keeled, or granular; (4) supraciliary series posteriorly merging into the supraocular granules (specimens from Ecuador), or scales becoming smaller, but still distinct from adjacent granules (specimens from Peru); (5) interparietal distinctly larger than adjacent scales; (6) scales around interparietal subequal to, to slightly larger than posterior scales on snout, grading over a short distance into granules on occipital and supratemporal regions; (7) vertebral scales not or only slightly enlarged; (8) scales on upper arm small, from subequal to, to slightly larger than vertebral scales.

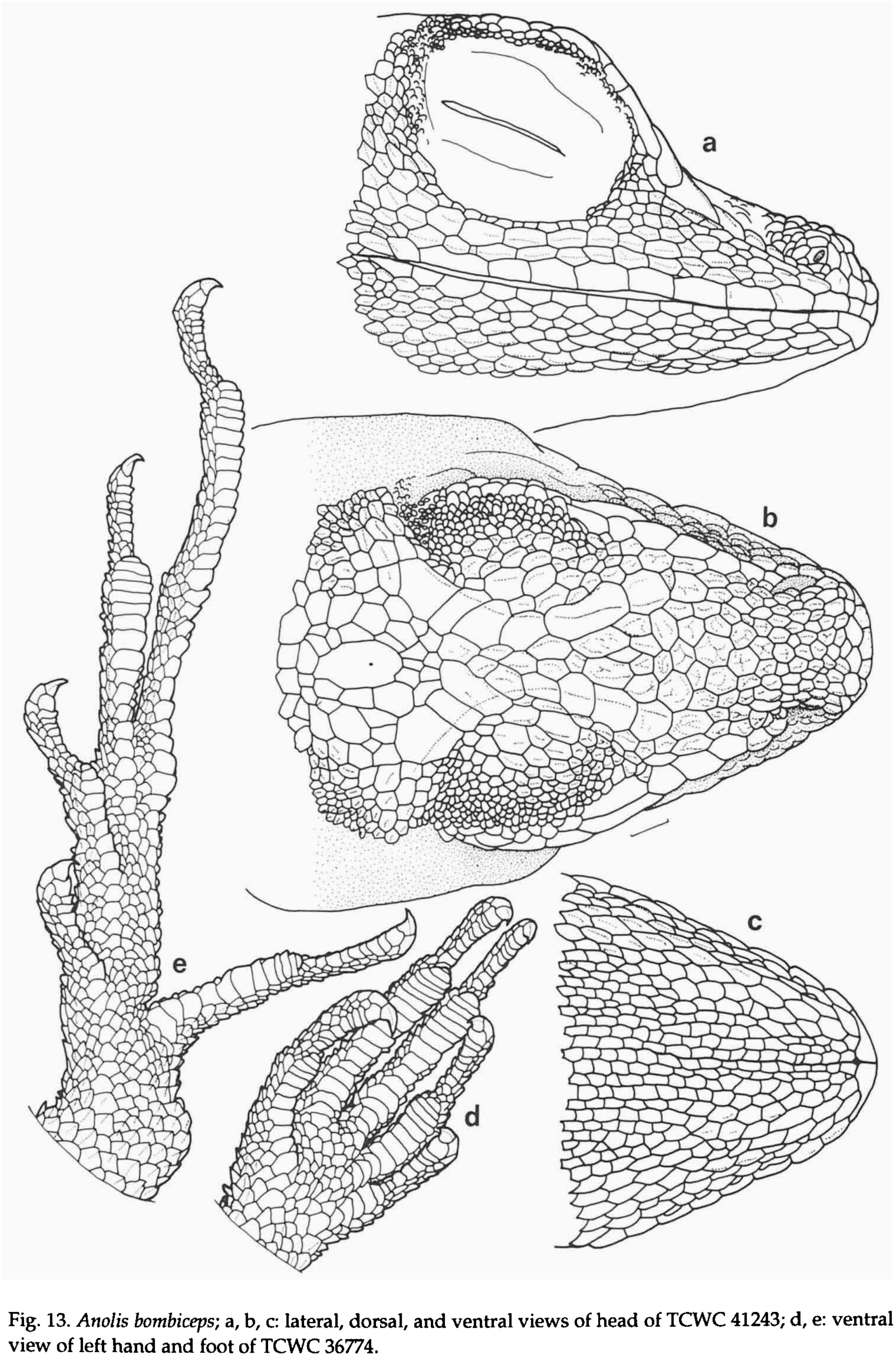


Fig. 13. *Anolis bombiceps*; a, b, c: lateral, dorsal, and ventral views of head of TCWC 41243; d, e: ventral view of left hand and foot of TCWC 36774.

Most specimens studied mainly brown, with an irregular, dark pair of spots between hind limbs, and irregular figures across limbs; faint "V"-shaped lines along back, apex directed posteriorly, may be present. Three females present a light vertebral band from neck (where it narrows into a point) to base of tail. Ventral region tan or whitish-tan. Dewlap deep blue or blackish, scales light or dark. According to Dixon & Soini (1975, 1986), life dorsal colour pattern very similar to that of *A. nitens scypheus*; females may have a light (tan to yellow) vertebral stripe, generally lighter toward its edges and bordered laterally by a thin black line; dewlap (in males) bright blue, with enlarged lateral scale rows varying from yellowish white to a blackish wash.

Habitat.— It is a forest inhabitant. Dixon & Soini (1975, 1986) reported that *A. bombiceps* seldom climbed more than three meters above ground, and most were on the forest floor.

Notes on natural history.— Some data on behaviour and reproduction were given by Dixon & Soini (1975, 1986).

Distribution (fig. 23).— According to Peters & Donoso-Barros (1970) and Vanzolini & Williams (1970), the species occurs in Amazonian Colombia, Ecuador and Peru, and in the state of Amazonas, Brazil. The latter authors refer specifically to the Brazilian locality "Igarapé Belém" (Amazonas), and also to the Colombian locality "Leticia", which is on the border with Brazil (the two localities are close to each other). Since in these localities the occurrence of *A. nitens tandai* **subspec. nov.** is quite probable, and both taxa present blue dewlap (at least in males), identification of animals from these localities should be confirmed.

Remarks.— *A. bombiceps* is similar to *A. nitens* and characteristics separating these two taxa are difficult to find. It was recognised by Vanzolini & Williams (1970) as a distinct species because of its sympatric occurrence with *A. n. scypheus*. From this subspecies *A. bombiceps* can be distinguished by dewlap colour. Moreover, they tend to differ in size (*A. bombiceps* reaches 74 mm svl, *A. n. scypheus* 83 mm svl); number of loreal scales (in *A. bombiceps* 4-7, mostly 5-6, in *A. n. scypheus* 6-10, mostly 7-8); number of scales across snout between second canthals (in *A. bombiceps* 8-13, mostly 8-9, in *A. n. scypheus* 9-15, mostly 10-12); and number of expanded lamellae under fourth toe (respectively 21-29, 25.4 ± 2.1, and 26-33, 29.3 ± 1.7). The geographic range of *A. n. tandai* is relatively close to that of *A. bombiceps*, and they may be sympatric; differences between them are given under the former taxon.

See also remarks under *A. nitens*.

Anolis fuscoauratus Duméril & Bibron, 1837 (figs. 14, 15, 222, 223)

Anolis fusco-auratus Duméril & Bibron, 1837: 110 (holotype MHNP 2420, type-locality: Chile (in error), corrected by D'Orbigny, 1847 to Rio Mamoré, between Loreto and the confluence of Rio Sara, Moxos province, Bolivia); D'Orbigny, 1847: 7; Boulenger, 1885b: 48; Goeldi, 1902: 16, 31; Cott, 1926: 1160; Burt & Burt, 1933: 15; Cunha, 1961: 65.

Anolis Brumeti Thominot, 1887: 184 (holotype MHNP 6556, type-locality: Brazil).

Anolis bruneti; Boulenger, 1888: 10 (synonymising it with *A. fuscoauratus*); Burt & Burt, 1933: 14; Amaral, 1937a: 1735, 1937b: 7.

Anolis kugleri Roux, 1929: 29 (holotype NHMB 9927, type-locality: El Mene, Distr. Acosta, Prov. Falcon, Venezuela).

Anolis fuscoauratus kugleri; Shreve, 1947: 523; Peters & Donoso-Barros, 1970: 54; Hoogmoed, 1973: 127; Hoogmoed & Avila-Pires, 1989: 168.
Anolis fuscoauratus; Rand & Humphrey, 1968: 6; Crump, 1971: 19; Vanzolini, 1972: 91; Vanzolini, 1974: 66; Hoogmoed, 1979: 277; Cunha et al., 1985: 24; Nascimento et al., 1988: 29, 1991: 39; Vanzolini, 1986: 13; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Gascon & Pereira, 1993: 181.
Anolis fuscoauratus fuscoauratus; Peters & Donoso-Barros, 1970: 54.
[*Norops*] *fuscoauratus*; Savage & Guyer, 1989: 110.

Material.— **Brazil**. ACRE. Rio Branco, Parque Zoobotânico UFAC: 1 ♀, MPEG 16012, 03.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAPA. Município de Amapá, road BR-156, igarapé Agua Branca: 1 ♂, 2 ♀♀, MPEG 3144-46, 26.x.1969, leg. F.P. Nascimento. Município Mazagão, Rio Maracá: 2 ♀♀, 2 juv., MPEG 826-27 & 831-32, 1959, leg. M. Moreira. Município Mazagão, Rio Camaipi (affluent of the left bank of Rio Maracá): 1 ♂, 1 ♀, MPEG 2658-59, Cachoeira do Amapá, 13-14.vi.1969; 1 ♂, 1 ♀, MPEG 2664-65, Cachoeira Inajá, vi.1969; all leg. F.P. Nascimento. Serra do Navio: 1 ♂, MPEG 15036, 06.xi.1988; 1 ♀, RMNH 24674, valley of igarapé W of 'Barragem de rejeitos do igarapé Baixinho', 13.xi.1988; both leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Rio Uatumã, Município Presidente Figueiredo, present reservoir area of hydroeletric dam Balbina: 1 ♂, MPEG 14713, 18.xii.1987, leg. R.J.R. Moraes & rescue team; 1 ♀, MPEG 14920, 25.iii.1988, leg. rescue team. Manaus: 1 ♂, MNRJ 1622, 1941, leg. A. Parko; 1 ♂, RMNH 26480, campus INPA V-8, 19.vii.1989, leg. M.S. Hoogmoed. Reserva Florestal Ducke, km 24-26 road Manaus-Itacoatiara: 1 ex., KU 130216, 20.vi.1970, leg. M.L. Crump. Reserva ZF-2/INPA, 60 km N of Manaus: 1 ♀, MPEG 15813, 13.vii.1989, leg. M.S. Hoogmoed. Santa Rita, Município de Maraã, left bank of Rio Paricá (Lago Paricá): 1 ♀, MPEG 15209, 06.xi.1988, leg. F. Braga; 3 ♂, 2 ♀, MPEG 15265-66, 15271-272, 15280, 20-22.xi.1988, leg. S. Ramos. Rio Solimões (southern bank), S of Tefé (Lago Tefé, Rio Tefé): 2 ♂♂, RMNH 24664-665, 17.xi.1985, leg. M.S. Hoogmoed. Porto Urucu, Rio Urucu, S. of Tefé: 1 ♀, MPEG 15866, 26.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Juruá, Carauari: 1 ♀, BM 1979.123, 30.vii.1978; 1 ♂, BM 1979.139, 06.ix.1978; both leg. W.H. Timmis, Wallace Expedition to Amazonia. Rio Solimões (northern bank), Tabatinga: 1 ♂, 1 ♀, MPEG 15876, RMNH 25909, 04.xii.1989; 1 ♂, RMNH 25917, 22.xii.1989; all three leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões (southern bank), Benjamin Constant: 2 ♂♂, MNRJ 1736 & 3636, ii.1942, leg. A. Parko; 1 ♂, 1 juv., MNRJ 3603 & 3605, 1942, leg. A. Parko; 3 ♀♀, MNRJ 3619-21, vi.1950, leg. J.C.M. Carvalho; 2 ♀♀, RMNH 24658-659, 14.xi.1985, leg. M.S. Hoogmoed. Rio Solimões, E of Benjamin Constant (Santo Antonio): 2 ♀♀, MPEG 15899, RMNH 25912, 08.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões, W of Benjamin Constant: 1 ♂, RMNH 25911, 07.xii.1989; 1 ♀, RMNH 25915, 12.xii.1989; 1 ♂, MPEG 15963, 13.xii.1989; 1 ♂, RMNH 25916, 15.xii.1989; 1 ♂, MPEG 15997, 19.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, 1 ♀, MPEG 15914, RMNH 25913, 09.xii.1989; 1 ♀, 2 juv., RMNH 25914, MPEG 15934-935, 11.xi.1989; all five leg. local children (through M.S. Hoogmoed & T.C.S. Avila Pires).
PARA. Ilha de Marajó: 1 ♀, BM 1924.2.28.5, leg. W. Ehrhardt. Ilha de Marajó, Município de Breves, km 6-8 of road PA-159, Breves-Anajás: 1 ♂, MPEG 14721, 25.xi.1987, leg. I.F. Santos, R.J.R. Moraes, S. Ramos & Dionísio Neto; 2 ♂♂, 3 ♀♀, 6 ex., MPEG 14723, 14724, 14736, 14741, 14742, 14748, 14750, 14756, 14757, 14784, 14791, 26.xi-10.xii.1987, leg. I.F. Santos, R.J.R. Moraes & S. Ramos; 1 ex., MPEG 14754, 02.xii.1987, leg. Dionísio Neto. Antonio Lemos (near Breves), alt. 60 ft.: 1 ♂, BM 1926.5.5.9, 23.xi.1925, leg. H.B. Cott. Município de Abaeté, Piratuba: 1 ♂, MNRJ 1627, xii.1937, leg. A.L. Carvalho. Belém: 1 ex., AMNH 125355, IPEAN - Utinga, APEG, 27.xii.1974, leg. D. Hassinger. Rio Tocantins, present reservoir area of the hydroeletric dam Tucuruí: 1 ♀, 1 ex., MPEG 13399-400, Chiqueirão, c. 70 km S of the dam, 11.iv.1984, leg. R.J.R. Moraes; 3 juv., MPEG 13493-494, 13501, c. 2 km S of (old) Vila de Jacundá, 13-14.v.1984 & 30.vi.1984, leg. W.L. Overal & C. Arcanjo; 1 ♂, 2 juv., MPEG 13484, 13488, 13490, 3-5 km S of (old) Vila de Jacundá, 13.v.1984, leg. T.C.S. Avila Pires, I.J. Lopes & R. Santana; 1 ♂, MPEG 13518, idem locality, 16.v.1984, leg. R. Santana; 2 ♂♂, 1 ♀, MPEG 13525-527, same locality, 16-17.v.1984, leg. T.C.S. Avila Pires, I.J. Lopes, R. Santana & F. Braga; 1 ♂, 1 ♀, MPEG 13417-418, c. 5 km S of (old) Vila de Jacundá, 02.v.1984, leg. T.C.S. Avila Pires & C. Arcanjo; 1 ♂, 1 juv., MPEG 13594, 13610, area of igarapé Saúde (between Jacundá and Ilha das Cobras), 31.v.1984 & 01.vi.1984, leg. F.P.

Nascimento & I.J. Lopes; 1 ♀, MPEG 13634, same locality, 06.vi.1984, leg. F.P. Nascimento & R. Santana. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 2 exs., MPEG 16383, RMNH 26648, 23.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 2 ♂♂, 1 ♀, MPEG 16364-365, RMNH 26637, 22.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Paru de Este, Missão Tiriós: 1 ♀, MPEG 1703, iv.1962, leg. E. Fittkau. Cruz Alta, 6 km S of Rio Trombetas: 1 ♂, 2 ♀♀, RMNH 24680, MPEG 15355-356, 07-xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. SE of Cruz Alta, c. 8 km S of Rio Trombetas: 1 ♀, MPEG 15378, 09.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. About midway in the road from Sítio Céu Estrelado to Cruz Alta, between Nhamundá and Trombetas rivers: 2 ♀♀, MPEG 15403, RMNH 24683, 12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ex., CEPB 0228, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr. Ouro Preto d'Oeste, Reserva Ecológica do INPA: 5 ex., MPEG 14490-491, 14493-494, 14496, 21-27.viii.1986, leg. T.C.S. Avila Pires & R.J.R. Moraes.
Bolivia. Rio Mamoré, between Loreto and the confluence of Rio Sara, Moxos province: holotype, ♀, MHNP 2420, leg. A. d'Orbigny.
Peru. Rio Cayaru, Paraná Yahú (or Jaú), W of Puerto Alegria (close to the border with Brazil and Colombia): 1 ♂, 1 ♀, RMNH 25910, MPEG 15881, 05.xii.19889, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Suriname. District Marowijne, Lely Mountains, Camp IV: 1 ♂, RMNH 26481, 30.xi.1974, leg. M.S. Hoogmoed.
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Oiapoque. AMAZONAS. Reserva Ducke, km 24-26 road Manaus-Itacoatiara. Rio Uaupés, Jauareté, Município São Gabriel da Cachoeira. Rio Javari, Estirão do Equador. PARA. Ilha de Marajó, Município Anajás, Rio Aramá, Vila Aramá. Marudá. Viseu, Bela Vista. Ourém, Limão Grande, Puraquequara. Capitão Poço, Santa Luzia. Peixe-Boi. Município de Ananindeua, mouth of Rio Tracateua, Mata Sossego. Nova Timboteua. Apeú, Boa Vista. Benevides, Fazenda Morelândia. Belém (Mocambo; Utinga). Road PA-70, km 72. Rio Tocantins, Mangabeira. Carajás, Serra Norte (areas of Rio Gelado, between N-4 and N-5; Manganês do Azul; forest surrounding N-1; along road N-1 to Caldeirão, near igarapé Azul; Pojuca; Rio Itacaiúnas: Caldeirão, Carreira Comprida, Angical, between Angical and ig. Azul; Rio Salobo). Road Altamira and Marabá (Transamazônica), left bank of Rio Xingu. Km 100 road Altamira-Itaituba (Transamazônica). Município Almerim, Jari, São Raimundo Agroindustrial Ltda. Santarém (road to Cachoeira do Palhão). RONDONIA. Ji-Paraná. Reserva Ecológica do Rio Jamari (former Vila de Santo Antônio), c. 70 km S of Porto Velho. Jaci-Paraná. Rio Abunã, igarapé Marmelo.

Diagnosis.— A brownish/greyish anole with granular, weakly keeled dorsals, and larger (but relatively small), smooth ventrals. Digital expansions well-developed, expanded lamellae under fourth toe about twice as wide as distal phalanx. Scales on posterior part of snout heterogeneous in size, uni- or multicarinate. Supraorbital semicircles separated by one to three scales. One to four suboculars in contact with supralabials. Tibia length 0.21-0.25 (0.23 ± 0.01) times the SVL. No narrow light stripes across chin and limbs. Dewlap variable in colour (in shades of red, yellow, olive, and grey), in some specimens bicoloured; very large in males, distinctly smaller in females. Maximum SVL c. 50 mm.

Description.— Anole with maximum SVL in males of 49 mm (Hoogmoed, 1973), in females of 50.5 mm (MPEG 15355). Head 0.24-0.28 (n= 52) times SVL (mostly 0.24-0.26 in adult specimens), 1.4-2.0 (1.79 ± 0.08, n= 52) times as long as wide, and 1.1-1.4 (1.18 ± 0.05, n= 52) times as wide as high. Snout relatively long, blunt; frontal region with a shallow depression. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.35-0.43 (0.39 ± 1.7, n= 36) times SVL, hind

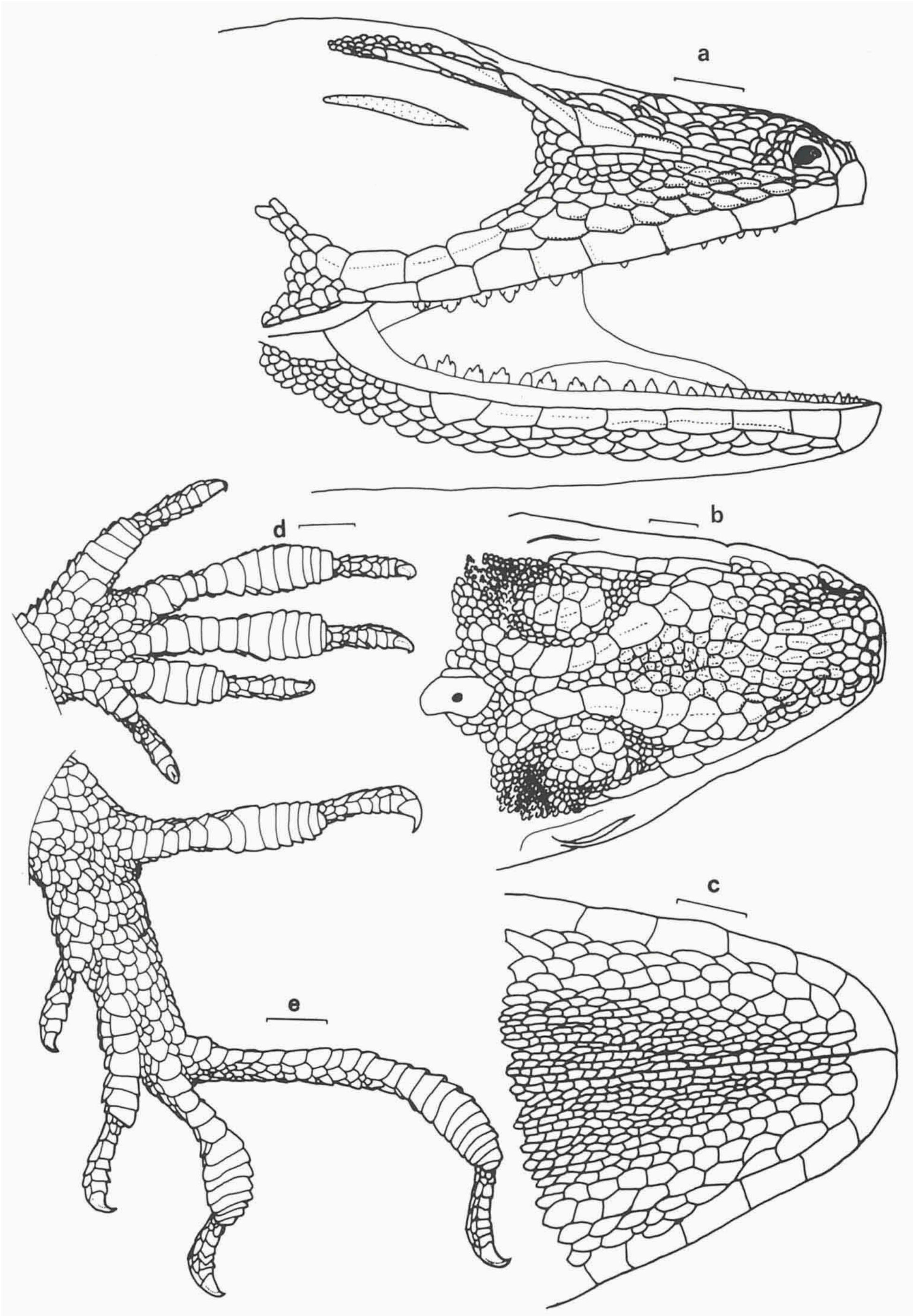


Fig. 14. *Anolis fuscoauratus*, MPEG 15881; a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of right hand and left foot.

limbs 0.65-0.79 (0.72 ± 3.3%, n= 34) times, tibia 0.21-0.25 (0.23 ± 0.01, n= 52) times. Tail round in cross section, tapering toward tip, 1.8-2.2 (1.92 ± 0.10, n= 31) times SVL.

Tongue wide, villose, tip nicked. Anterior teeth conical, posterior teeth tricuspid.

Rostral rectangular, about 3-4 times as wide as high; vertical in position, not seen from above. Postrostrals 6-8, rarely nine. Anterior nasal either is part of postrostral series, or is in contact with this series. Scales on snout irregularly polygonal, juxtaposed, uni- or multicarinate, in some cases smooth on frontal area; mostly relatively small, but with a group of smaller scales in frontal depression, and large, unicarinate scales near upper canthals; 8-14 (mostly 9-13) scales across snout at level of second canthal. Canthus rostralis well defined, with 5-9 (mostly 7-8) canthals, either with 3-5 posterior ones distinctly larger, anterior ones small, or posteriad steadily increasing in size. Supraorbital semicircles distinct, except for a short stretch posteriorly, but not very conspicuous; with 7-12 scales; separated from each other by 1-2, occasionally three, scales. Supraocular region covered by large, polygonal, keeled scales, partially surrounded by granular scales; one large scale borders the first supraciliary. Supraciliaries 2-3 (exceptionally one), elongate, overlapping, decreasing in size posteriad, occupying about first half of orbital length, followed posteriorly by granules. Occipital region with irregularly polygonal, smooth, juxtaposed scales, slightly smaller than those on snout, gradually decreasing in size toward parietal region, without a clear distinction between them; interparietal several times larger than adjacent scales; 2-3, occasionally one or four, scales between interparietal and supraocular semicircles. Loreal scales irregularly polygonal, in approximately longitudinal rows, wider toward supralabials; row adjacent to canthals with a median keel, others with a keel on their lower margin; 5-7 scales in a vertical row at level of second canthal. Suboculars 4-7, large, keeled, of which 2-4, exceptionally one, in contact with supralabials. Supralabials 7-10, 6-9 to below centre of eye (exceptionally 11 supralabials, the tenth under eye). Temporal region with small, granular scales, separated from eyelids by a few rows of larger scales, and from parietal region, anteriorly, by a double row of slightly larger scales. Eyelids covered with granules, with two rows of larger scales bordering the rim. Ear-opening relatively small, obliquely or vertically oval, its lower margin at level of commissure of mouth; with smooth margin and short auditory meatus.

Mental with round anterior and approximately straight posterior margin, completely or partially divided by a median cleft, which continues as a midventral sulcus on anterior part of chin; bordered by first supralabial at each side, and 6-8, occasionally 4-5, scales. Infralabials 8-11, 7-10 to below centre of eye. Chin with larger, polygonal, keeled, juxtaposed scales laterally; distinctly smaller, rectangular, keeled, juxtaposed scales medially, which may form approximately longitudinal rows. Toward throat, scales shorter, roundish. Dewlap very large in males, reaching about half-way between level of forelimbs and middle of body, with small, crescent-moon-like scales in longitudinal, widely separated rows laterally, and half-moon-like scales densely covering the rim. Dewlap in females small, lateral scales similar to those in males, scales on rim similar in shape but much smaller. Nape with granular scales, similar to dorsals.

Dorsals and scales on flanks granular, weakly keeled, juxtaposed to subimbricate, slightly larger toward vertebral region; a double row of vertebral scales may be present. Ventrals small, although distinctly larger than dorsals, roundish, subimbricate, smooth. Gradual transition between scales on flanks and ventrals. Scales around midbody 124-157 (139.0 ± 8.3, n= 50). Preanal plate with scales similar to ventrals, but smaller.

Base of tail with numerous small, feebly keeled, imbricate scales, on ventral surface slightly larger and smooth. Distally, scales distinctly larger, rhomboid to hexagonal, in longitudinal rows, with pronounced keels that form longitudinal ridges; those on ventral surface slightly larger than dorsally. Rather indistinct verticils may be present on tail.

Scales on anterior aspect of limbs rhomboid, keeled, subimbricate; on posterior aspect granular. Digital expansions well developed; 18-23 (20.7 ± 1.1, n= 100, 50 specimens) lamellae under fourth finger, 13-18 (14.9 ± 1.0, n= 102, 51 specimens) to end of digital expansion; 28-36 (31.9 ± 1.5, n= 93, 51 specimens) under fourth toe, 23-28 (25.3 ± 1.3, n= 95, 51 specimens) to end of digital expansion (28-30 in MPEG 13527, but lamellae showed irregularities; all counts started from the membrane between third and fourth digits).

In life *A. fuscoauratus* may be quite uniformly coloured dorsally, some specimens finely peppered, or it may present a mixture of colour or shades (e.g., changing from head to body, or from back toward flanks), or else a vertebral band may be present. General colour light or dark (sometimes changing from light to dark in a specimen). In any case, brownish- or greyish-green colours are involved, e.g., olive-green (42), citrine (51), lime-green (59), olive-brown (28), brownish-olive, (29), dark olive-grey. Vertebral bands in two specimens (MPEG 13975, MPEG 15866) were described respectively as buff (24) and clay-colour (28), in both cases with darker borders; MPEG 16012 was said to have a vertebral black dotted stripe. Some extra ornamentation is occasionally observed, e.g., in MPEG 15036 border of eyelids straw-yellow (56); RMNH 24680 presented a narrow straw-yellow (56) antehumeral bar, preceded by a round black spot; in RMNH 24674 small spectrum-yellow spots were observed on flanks. RMNH 26481 was described by M.S. Hoogmoed (field notes) as having the back green-yellow with yellow flecks and a brown vertebral band. Ventral region white with brown or grey small spots or vermiculation. Dewlap colour variable: light bunting-green (150; MPEG 14490, 14493, 14494), olive-grey (42; MPEG 15036; RMNH 24680), drab (MPEG 16012), drab-grey (119D; RMNH 25910, MPEG 15881, RMNH 25911), pale drab grey (119D; MPEG 15914), pale greenish-beige (MPEG 15764, field notes A.C.M. Lima), pale yellow (MPEG 15876, 15963), flesh-colour (5; MPEG 15866), vinaceous (3; MPEG 13974), red (RMNH 26480, field notes M.S. Hoogmoed), dull red (KU 130216, field notes M.L. Crump); in RMNH 25916 it was light sulphur-yellow (157) toward rim, drab-grey (119D) toward body; in RMNH 26481 anterior third of dewlap orange-yellow, posterior 2/3 purplish-red (M.S. Hoogmoed field notes and slide). In all cases dewlap scales white. Iris described as brown, gold or orangish-brown, with or without a very narrow gold or yellowish rim around pupil. Tongue buff-yellow (53), cream, whitish, or pinkish-white.

Life colour descriptions are also given by Beebe (1944b), Hoogmoed (1973), Dixon & Soini (1975, 1986), Duellman (1978), Donnely & Myers (1991).

In preservative, dorsal region either uniformly brown, or with a vertebral light or dark band from nape to base of tail, which may be bordered at both sides by a black stripe, either only anteriorly or along its entire length; very often there is a light brown transverse stripe, bordered with dark brown, between eyes; some males with a large, oval, black, antehumeral, spot. Ventral region brown ventrolaterally, medially whitish with brown vermiculation, denser toward border with brown area; some specimens with uniform, finely vermiculate ventral region. Tail brown all around, except base of tail ventrally, where the pattern resembles that of belly.

Habitat.— The field notes I have indicate that *A. fuscoauratus* is mainly found on vegetation, up to 2 m, in forest, occasionally also on the ground or higher up (at least up to 5 m). The substrate is variable, e.g., tree trunks (most commonly; usually thin to medium-sized in diameter), stems and leaves of palms, lianas, fallen trunks or branches, or the herbaceous vegetation. It ranges from dense, undisturbed forest to secondary vegetation (capoeira), and even in some arboreous areas in cities (e.g., in the campus of INPA, in Manaus). In forest it is frequently observed in edge situations (e.g., near creeks, swamps, roads, plantations or clearings), and it is found both in terra firme forest and in swamp areas (where it is commonly found on palms or musaceas). RMNH 24674 was found sleeping at night (23:30 h) on the extremity of a long and narrow leaf, 70 cm above a piece of still water along a creek, in a swamp forest at the edge of terra firme forest; MPEG 15813 was sleeping at night (21:00 h), on a twig over a small pool, in terra firme forest not far from a creek.

These observations agree in general with the literature. D'Orbigny (1847) mentioned that the type-specimen was hidden under the old bark of a tree, in an innundated várzea forest. Rand & Humphrey (1968) and Crump (1971) found specimens, in Belém, in terra firme, várzea, igapó, and capoeira; the first authors noted that the species was present in old, but not young, secondary growth. In contrast, Dixon & Soini (1975, 1986) observed the species in the Iquitos region (Peru) to be "abundant in young secondary growth and along forest edges and clearings". Vanzolini (1972) mentioned specimens collected in parks in Belém and Recife, besides others in terra firme, varzea, and igapó forests, and a dense population in a tree plantation; he observed that the species was tolerant to edge situations (observations in several localities along the Amazon). Duellman (1978) observed animals sleeping "horizontally or head-down on grasses, herbs, or limbs of bushes, usually at heights of less than 1 m from the ground". Among the sleeping specimens, this author found 26% in primary forest, 51% in secondary forest, and 15% in forest edge; besides, three specimens were in clearings, and nine in banana groves (Santa Cecilia, Ecuador). Henle & Ehrl (1991) observed specimens active on the ground, during rain, in a banana plantation (Peru). Beebe (1944b) reported two specimens in the top of a 90-foot tree, "within fifteen minutes after it had been cut down", which suggests that the species may also be present in the canopy. Other observations were given by Hoogmoed (1973), Gasc (1981, 1990), Meede (1984), Zimmerman & Rodrigues (1990), Martins (1991).

Notes on natural history.— This diurnal, nonheliothermic lizard usually is observed in shade, although RMNH 26481 was reported by M.S. Hoogmoed (field notes) to be basking on a thin stem, and Duellman (1978) reported that four specimens (out of many) were sunning. Rand & Humphrey (1968) noted that the cloacal temperatures of a few specimens were similar to that of the environment. Active animals were observed by me between 08:00-17:00 h. Some anecdotal observations on behaviour (mostly related to escape efforts) follow: MPEG 12984 was first observed running on a tree trunk up to 5-6 m, subsequently it descended, jumped to other nearby trunks, and eventually came to the ground. MPEG 13005 was 2-3 m high on a trunk when first observed; it ran down as it tried to escape. MPEG 13018 was first seen on a dry leaf of a low plant at about 1 m from the ground, from where it jumped to the stem (apparently to catch an insect); when disturbed it fled to below a fallen tree trunk. MPEG 13975 was initially on the stem of a Musacea; when disturbed it moved up to the leaf. The jumping abilities of this lizard also were noticed by Vanzolini (1972) and Gasc (1990). Meede (1984) mentioned that, during the warm period of the day, *A. fuscoauratus* is hidden under the leaf litter on the forest floor, and that it flees mainly by jumping under the leaf litter and immediately freezing. Such behaviour of hiding under leaf litter has not been mentioned by other authors; neither was it observed by me, although escaping to the ground and freezing was reported by Vanzolini (1972). Individuals are usually solitary, but Vanzolini (1972) noted up to 3-4 specimens per tree in "an old grove of interspersed cocoa (*Theobroma*) and rubber (*Hevea*) trees in Urucurituba (Amazonas); it represents an unusually dense population of this species.

Observations of stomach contents (Beebe, 1944b; Hoogmoed, 1973; Duellman, 1978; Martins, 1991) show that *A. fuscoauratus* eats a variety of insects, spiders and other arthropods. MPEG 12899 was found in the stomach of the snake *Chironius multiventris* Schmidt & Walker (MPEG 9726). Other known predators are the snakes *Imantodes c. cenchoa* (Linnaeus) and *Oxybelis argenteus* (Daudin) (Cunha & Nascimento, 1978; Duellman, 1978; Meede, 1984).

Several females contained one or two oval, developed eggs (7X3 mm, 8X4 mm, 9X4 mm, all measurements of preserved eggs); the largest egg was 9 mm in length; when two eggs were present, they varied from quite similar in size (e.g., both about 6 mm, 8 mm, or 9 mm in length) to slightly or distinctly different (e.g., 6/4.5 mm, 8/6 mm, 8/3.5 mm, 9/5 mm, 9/4 mm). Data by Fitch (1970), Hoogmoed (1973), Dixon & Soini (1975, 1086), and Duellman (1978) indicate that the species reproduces in the areas studied throughout the year or during most of the year. Among the material studied, gravid females were found in March (MPEG 14920), April (MPEG 13399), May (MPEG 13417, 13525), June (MPEG 2659, 2664, 13634), October (MPEG 3144, 3145), November (RMNH 24674, MPEG 15209, 15266, 15272), and December (RMNH 24683, MPEG 14754, 14784, 15355, 15356, 15403). Duellman (1978) observed that the smallest females with mature ovarian eggs had a snout-vent length of 37 mm.

Distribution (fig. 15).— Northern South America east of the Andes, in Brazil, French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru, and Bolivia; it occurs throughout Amazonia. Besides, it occupies part of the Atlantic forest, coastal Brazil, southward reaching the state of Espírito Santo (Vanzolini, 1980).

Remarks.— Roux (1929) described *A. kugleri* from Venezuela, which later was considered by Shreve (1947) as a subspecies of *A. fuscoauratus*. Shreve (1947) examined three specimens of *kugleri* and six of *fuscoauratus*; he mentioned difference in the number of rows of scales between the supraorbital semicircles — one row in *kugleri*, two in *fuscoauratus*. He stressed that the original description of *kugleri* mentioned two to three rows, "so that more material may show *kugleri* is not a recognizable race". This same characteristic alone was used by Peters & Donoso-Barros (1970) to separ-

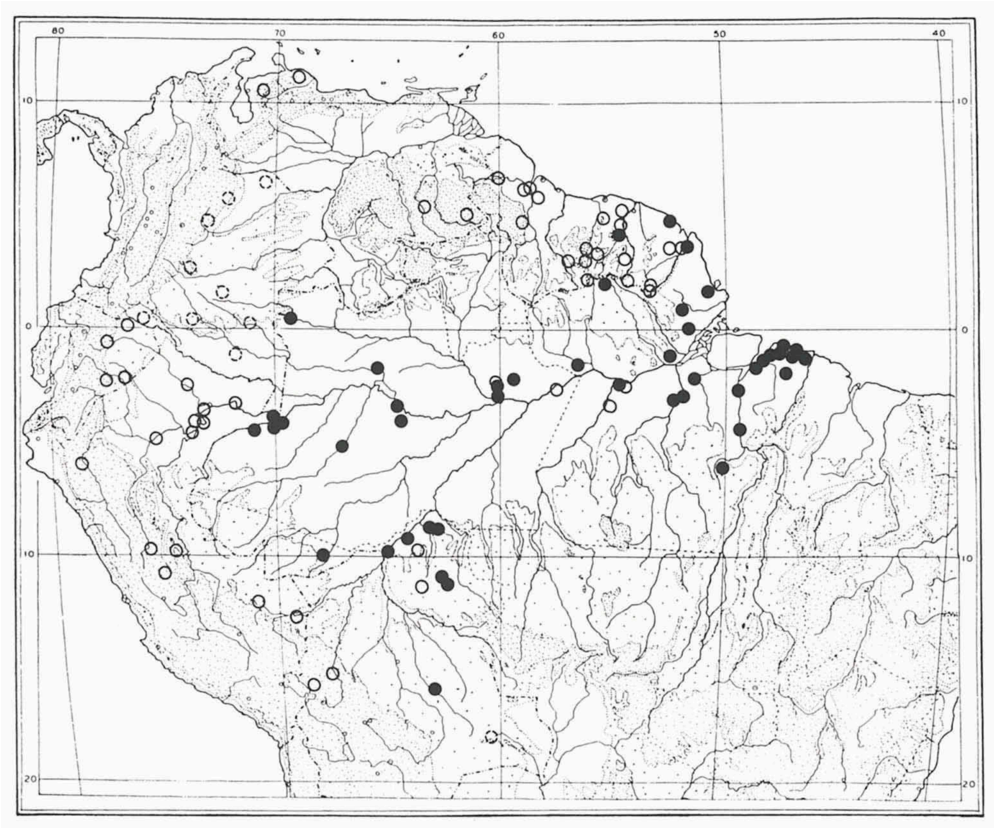


Fig. 15. Distribution of *Anolis fuscoauratus* in northern South America (Atlantic forest not included). Closed circles = material studied; open circles = data from literature (Burt & Burt, 1931; Parker, 1935; Donoso-Barros, 1968; Vanzolini, 1972, 1986a; Hoogmoed & Lescure, 1975; Duellman, 1978; Williams & Vanzolini, 1980; Gasc, 1981; Carrillo de Espinoza, 1983; Meede, 1984; Ayala, 1986; Almendariz, 1987; Fugler, 1989; Rodriguez & Cadle, 1990; Donnely & Myers, 1991); dashed circles = data from literature representing general localities.

ate the two subspecies, which were adopted by a number of subsequent authors (e.g., Hoogmoed, 1973; Dixon & Soini, 1975, 1986; Duellman, 1978; Meede, 1984; Hoogmoed & Avila-Pires, 1989; Henle & Ehrl, 1991). However, Cunha et al. (1985) remarked that in eastern and southern Pará specimens with both one and two rows of scales between the supraoculars occurred. Donnelly & Myers (1991) reported a female from Cerro Guaiquinima, Venezuela, where *A. f. kugleri* should be expected, with two rows of scales. Among the specimens I examined, the following picture emerges (after each locality follows the number of specimens with respectively one, two, and three rows of scales between supraorbital semicircles): Amapá - 9/2/0; Ilha de Marajó - 4/3/0; Tucuruí (Pará) - 7/2/1; Cruz Alta (Pará) - 2/5/0; Balbina and Ducke Reserve (Amazonas) - 3/0/0; Maraã (Amazonas) - 1/5/0; Tefé, Carauari, and Benjamin Constant (Amazonas) - 1/4/1. Thus, although in general terms it seems that in eastern specimens one row of scales predominates, whereas western specimens usually have two, the observed variation is high and does not justify the recognition of subspecies on the basis of this character.

The possibility of geographical variation in other characters was examined. Number of postrostrals is 6-7, 6 slightly predominating, in specimens from Amapá and eastern Pará; 6-9, mostly 7-8, in specimens from Cruz Alta (western Pará) and Amazonas. Specimens from Amapá have 8-12, mostly 9, scales across the snout between second canthals, whereas in other localities 9-14, mostly 10-11, were found. Variation in dewlap colour seems to form a geographic mosaic. Pink/red dewlaps appear in southern Pará (Carajás), in areas near Manaus and in Urucu (Amazonas), French Guiana, Suriname, and Ecuador. Yellow dewlaps occur in French Guiana, Suriname, western Amazonas (Tabatinga, Benjamin Constant), and Peru. Drab/olive-grey dewlaps are found in Amapá; Ilha de Marajó, Caxiuanã and Cruz Alta (Pará); Benjamin Constant (Amazonas) and neighbouring area in Peru; Rondônia; and Acre. Generally at each locality dewlap colour seems to be constant, but in Benjamin Constant both drab-grey and yellow dewlaps occur; Dixon & Soini (1975, 1986) referred to dewlaps as being "pale lemon yellow to pale green" in Iquitos area. Some specimens have a bicoloured dewlap — e.g., RMNH 25916, 26481 (both described above). In Kartabo, British Guiana, individuals having the dewlap yellow with a bright scarlet central area occurred together with individuals having a "dominantly" yellow dewlap (Beebe, 1944b).

This superficial analysis of variation indicates that, firstly, it is not possible to divide the species into two subspecies, and secondly, the species shows a complex pattern of variation, especially in dewlap colour. One possibility to explain such a pattern, would be to relate it to the Pleistocene environmental fluctuations, and the hypothesized Pleistocene refuges. However, a much finer and elaborate analysis (which should include the Atlantic forest populations) is needed. For the time being I consider the species as monotypic, and *kugleri* to be a synonym of *fuscoauratus*.

A. fuscoauratus, *A. ortonii*, and *A. trachyderma* were grouped together, by Williams (1976), in the *fuscoauratus* group, which further included two trans-Andean species, *A. maculiventris* Boulenger and *A. antonii* Boulenger. The three Amazonian species of the *fuscoauratus* group are relatively small, brown or grey anoles with granular dorsals and relatively small, smooth or weakly keeled ventrals. Although the dewlap colour is variable, especially in *A. fuscoauratus*, it seems that locally each species can be distinguished by dewlap colour. The dewlap is slightly smaller in *A. trachyderma* than in the other species. Furthermore, the species differ in body proportions, although such differences are difficult to translate into objective descriptions. In a general way, *A. ortonii* is sturdier with apparently wider head, shorter legs, and the widest subdigital lamellae; *A. fuscoauratus* is slender, agile-looking, with a long snout, and *A. trachyderma* has a shorter snout widening more abruptly into posterior part of head and the longest legs. *A. trachyderma* also is the most "ornamented" of the three; *A. fuscoauratus* and *A. ortonii* are quite homogeneously coloured. These differences in body proportions and colour pattern are interesting, because they suggest a distinct relationship of each species with the environment. The differences in abundance of each species in different habitats and/or localities seem to support this idea. Field observations on microhabitat and behaviour point to some differences among the three species, although there is a wide overlap.

A. ortonii generally has larger, and mostly smooth dorsal head scales, whereas in *A. fuscoauratus* and *A. trachyderma* they usually are smaller and keeled. *A. ortonii* also has enlarged sublabials. The subocular series tends to be partially in contact (at least one scale, usually more) with supralabials in *A. fuscoauratus* and *A. ortonii*, but the series usually is separated from the supralabials by one row of scales in *A. trachyderma* (short contact occurs in a few specimens).

The name *A. fuscoauratus* has been attributed to D'Orbigny, in Duméril & Bibron (1837), by several authors. However, although Duméril & Bibron (1837) referred to the species as "*Anolis fusco-auratus*. D'Orbigny.", the description presented is clearly from Duméril & Bibron themselves, who are thus the authors of the name. The publication by D'Orbigny, "Voy. Amér. mérid. Rept.", to which they referred, only appeared in 1847 (text); the date of publication of plate 3, where *A. fuscoauratus* appears, is unknown (Sherborn & Griffin, 1934; see account of *Stenocercus roseiventris*).

Anolis nitens (Wagler, 1830)

Anolis chrysolepis; Duméril & Duméril, 1851: 56; Boulenger, 1885b: 89; Goeldi, 1902: 16, 31; Burt & Burt, 1933: 14; Amaral, 1937a: 1735, 1937b: 174, 1949: 109; Peters & Donoso-Barros, 1970: 51; Vanzolini, 1970b: 38, 1986a: 13; Hoogmoed, 1979: 277.
[*Norops*] *chrysolepis*; Savage & Guyer, 1989: 110.
Norops nitens; Savage & Guyer, 1991: 366.

These anoles, together with *A. bombiceps*, were studied by Vanzolini & Williams (1970), under the name '*Anolis chrysolepis* species group' (see General remarks for a discussion on nomenclature and an explanation of the name change). Vanzolini & Williams (1970) recognized four subspecies of *A. nitens* (= *A. chrysolepis*), related to "core" areas, and one distinct species (*A. bombiceps*). Most of the specimens examined could be assigned to one of the taxa recognised by Vanzolini & Williams (1970). The only exceptions were specimens from between Borba and Benjamin Constant, in the state of Amazonas, south of the Amazon. All specimens from several localities in this area have a combination of characters distinct from all the other groups; consequently they are named here as a new subspecies.

A general description of the group precedes observations on the differential characteristics of each taxon. Data on habitat and notes on natural history are given for the species as a whole. The preceding citations could not be attributed to one subspecies or were attributable to more than one subspecies and are here placed only under specific name. References specific to one subspecies are given under the corresponding subspecies.

Diagnosis.— Medium-sized anoles with a relatively small dewlap (reaching at most the anterior level of forelimbs) present both in males and females, slightly smaller in the latter; subdigital lamellae relatively narrow; distal lamellae under phalanx II forming a slightly prominent border; two or more rows of slightly to distinctly enlarged scales along vertebral region; ventrals large (always distinctly larger than dorsals), distinctly keeled, imbricate; 103-175 scales around midbody.

Description.— Anoles with maximum SVL in most populations of 60-75 mm, but reaching more than 80 mm in *A. n. scypheus*. Head 0.2-0.3 times SVL (larger in juveniles, head becoming relatively shorter in larger specimens), 1.4-1.8 times as long as wide, 1.0-1.4 times as wide as high. Snout blunt, swollen anteriorly (at level of nostrils), slightly depressed in frontal area; frontal ridges may be present. Canthus rostralis distinct posteriorly, less so anteriorly. Occipital region may be slightly swollen. Neck narrower than head and body. Body and tail cylindrical. Limbs long and slender, forelimbs 0.4-0.6 times SVL, hind limbs 0.8-1.1 times, tibia 0.2-0.3 times; allometric growth of limbs evident in some groups. Tail 1.4-2.6 times SVL, also showing some allometry during growth, juveniles with relatively shorter tails.

Tongue wide, villose, tip slightly nicked. Teeth conical anteriorly, tricuspid posteriorly.

Rostral bandlike, about 3-5 times as wide as high, upper margin frequently convex; hardly visible from above. Postrostrals 4-9. Prenasal in contact with postrostral series, or separated from it by one or two scales. Scales on snout irregularly polygonal, juxtaposed, subequal or heterogeneous in size, uni- or multicarinate, in some cases smooth on frontal area; 8-15 scales across snout at level of second canthal. Canthals 5-9 at each side, either upper (3-6) ones large and those below nostril small (or absent), or increasing gradually in size posteriad. Supraorbital semicircles varying from rather indistinct to partially forming a prominent ridge; when distinct, composed of 7-13 scales; separated from each other by a minimum of 1-4, exceptionally zero or five, scales. Supraocular region with larger, unicarinate, multicarinate, or almost smooth, scales medially, and smaller, in some cases granular, scales laterally; the larger scales may form a group mostly surrounded by distinctly smaller scales, or they may grade laterally into smaller scales. Supraciliaries in two or three rows, anterior scales elongate, posterior ones shorter; forming a distinct series along orbital length, or posteriorly merging into the granules of supraocular area and upper eyelid. Main supraciliary row (continuous with canthals) with anterior scale occupying one third to one half of orbital length, followed by 2-7 scales from distinctly to slightly larger than adjacent supraocular scales. Interparietal from as large as, to distinctly larger than adjacent scales. Scales around interparietal irregularly polygonal, subequal to, to smaller than, larger scales on the snout, surface smooth, rugose, or feebly keeled; 1-4 scales between interparietal and supraorbital semicircles. Occipital and supratemporal scales smaller than, but otherwise similar to those around interparietal, or granular; either with a gradual transition or a short transitional zone between larger and smaller scales. Loreal scales juxtaposed, larger toward supralabials, in variably distinct longitudinal rows; the scales are irregularly polygonal, usually longer than wide but some as wide as long, with a distinct or weak keel, which in most scales is closer to its ventral border; some scales may be bi- or tricarinate; 5-9, rarely 10, loreal scales in a transverse line at level of second canthal. Subocular series variably developed, with 4-11 scales or, in a few specimens, completely indistinct; in its lowest point separated from supralabials by one, in some cases two, scales, occasionally narrowly in contact with supralabials. Supralabials 9-14, 8-12 to below centre of eye. Temporal region with very small, granular or convex, hexagonal, scales centrally, surrounded by slightly larger scales, especially distinct anteriorly; there may be a double row of slightly enlarged scales delimiting temporal and supratemporal regions. Ear-opening relatively small, round, oval or subtriangular, its lower margin at level of commissure of mouth; with smooth or slightly denticulate anterior margin, smooth posterior margin, and a moderately deep auditory meatus.

Mental roughly semicircular or trapezoidal, medially divided; posterior margin may be indented by postmentals; bordered by first infralabial at each side, and 4-8 postmentals, which decrease in size toward midventral line. Infralabials 9-16, 8-14 to below centre of eye. Chin laterally with relatively large, longer than wide, polygonal (mostly approximately hexagonal), keeled (in some cases one main keel plus one or two shorter, lateral ones), juxtaposed scales; medially scales distinctly smaller, hexagonal to rectangular, in more or less longitudinal rows, becoming shorter toward throat; anterior part of chin medially divided by a longitudinal sulcus. Dewlap short, reaching at most the anterior level of forelimbs, slightly smaller in females. Dewlap scales laterally roughly low-trihedral to elongate, keeled, becoming isolated in fully extended dewlap; along rim scales closer together, similar to lateral ones or flatter. Scales on nape similar to those on occipital and supratemporal regions, and to dorsals, or transitional between them; a vertebral double row of slightly enlarged scales may be present.

Dorsals small, vertebral region with a double row, or several rows, of hardly to distinctly enlarged, flat, weakly keeled scales, grading into granules on flanks. Number of enlarged vertebral rows frequently increases posteriad; in *A. n. chrysolepis* some scales may have secondary, lateral keels. Ventrals distinctly larger than dorsals, phylloid, keeled, with a short or a long mucron, imbricate; keels may form longitudinal ridges. A short transitional zone between scales on flanks and ventrals. Scales around midbody 103-175. Preanal plate with scales similar to ventrals, but smaller.

Base of tail with rhomboid to hexagonal, keeled, imbricate scales, in approximately longitudinal rows, ventrally larger, and not to distinctly mucronate. Distally scales larger, variably polygonal, keeled, imbricate, in few longitudinal rows; keels form longitudinal ridges, more pronounced toward ventral side, especially on pair of midventral rows, where scales are also larger. Verticils consisting of three scales in a midventral row, and four or five scales in a dorsal row, are indicated.

Scales on forelimbs rhomboid, keeled, imbricate, except on posterior aspect of upper arms, covered with granules. Scales on upper arms from slightly smaller to distinctly larger than vertebral scales; on antero-dorsal aspect of forearms subequal to, to larger than, those on upper arms; on ventro-posterior aspect of forearms smaller and less strongly keeled. Thighs with rhomboid, keeled, imbricate scales on their anterior aspect, grading dorsally over a short distance into very small scales, which may become granular on posterior aspect of thighs; ventral aspect with scales similar to those on anterior aspect, but smaller. Lower legs with rhomboid, keeled, imbricate scales. Lamellae under fourth finger 19-28, 12-18 to end of digital expansion; 28-43 lamellae under fourth toe, 19-32 to end of digital expansion (all counts from base of digit articulation); 13-20 lamellae under phalanx II and III of fourth toe. Digital expansion moderately developed, distal lamellae of phalanx II slightly prominent in relation to distal phalanx.

Colour pattern rather variable. A transverse dark band across supraoculars is frequently present, as well as some kind of vertebral ornamentation, where triangular or rhomboid figures are not uncommon; in females, a vertebral band is frequently observed. In *A. n. chrysolepis* there is a conspicuous sexual dimorphism in colour pattern.

Anolis nitens nitens (Wagler, 1830)
(figs. 16, 22, 23, 221)

Draconura nitens Wagler, 1830: 149 (type unknown, type-locality: 'America').
Anolis planiceps Troschel, 1848: 649 (holotype ZMB 529, type-locality: Caracas, Venezuela).
Anolis chrysolepis planiceps; Vanzolini & Williams, 1970: 85; Hoogmoed, 1973: 125; Vanzolini, 1986b: 3.
Anolis chrysolepis; Beebe, 1944b: 197; O'Shea, 1989: 69; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.
Anolis nitens; Boulenger, 1885b: 91; Beebe, 1944b: 200; Peters & Donoso-Barros, 1970: 61.
N[orops] n[itens] nitens; Savage & Guyer, 1991: 366.

Material.— **Brazil.** AMAZONAS. Rio Uatumã, area of hydroeletric dam Balbina, mouth of igarapé Agua Branca: 1 ♂, 1 ♀, INPA 038, 040, 03.ix.1985; 1 ♀, INPA 053, 20.iii.1985; all leg. R.C. Best. Rio Uatumã, area of hydroeletric dam Balbina, rio Pitinga (right bank of Rio Uatumã): 1 juv., INPA 066, 09.ix.1985, leg. A.L. Queiroz; 1 ex., INPA 246, vi.1986, leg. N. Silva. Rio Uatumã, area of hydroeletric dam Balbina, igarapé Caititu (right margin of Rio Uatumã): 1 ♂, INPA 206, vi.1986, leg. R. Gribel; 1 ♂, 1 ♀, INPA 143, 159, 20.iv.1987; 1 ♂, 1 ♀, 2 juv., INPA 181, 198, 199, 204, 27-31.vii.1987; all six leg. M. Martins; 2 ♂♂, INPA 214-215, 04.viii.1986, leg. Astrogildo. Manaus: 1 ♀, INPA 123, campus do INPA, 24.vii.1986, leg. Rivelino. Reserva Florestal Ducke, 25 km N of Manaus (km 24-26 road Manaus-Itacoatiara): 1 ♀, RMNH 24656, 07.xi.1985; 1 juv., MPEG 14407, 24.xi.1985; both leg. M.S. Hoogmoed & M. Hero; 1 ♂, MPEG 14415, 17-20.vii.1986, leg. T.C.S. Avila Pires, A. Lima & M. Hero. ZF-2 INPA, 60 km N of Manaus: 1 ♂, MPEG 15814, 14.vii.1989, leg. M.S. Hoogmoed. Anavilhanas: 1 juv., INPA 272, 28.v.1988, leg. U. Gallati. Rio Negro, Tapurucuara: 1 ♀, MPEG 1750, vii.1962, leg. F.M. Oliveira.
RORAIMA. Município de Boa Vista, Região do Taiano, Colônia Coronel Mota: 1 ♂, MPEG 3922, 13.vi.1970, leg. F.P. Nascimento.
Guyana. 2 ♂♂, RMNH 11766.
Venezuela. SUCRE. Depto. Benitez, Sabaquel (7 km S Guaraúnos): 1 ♂, RMNH 24685, 18.vi.1978, leg. M.S. Hoogmoed & S.J. Gorzula. Depto. Benitez, 6 km E Tunapuy: 2 ♂♂, RMNH 24686-687, 28.v.1978, leg. S.J. Gorzula.

Description.— In addition to the general description this taxon has the following characteristics (for measurements and scale counts see table 1): (1) scales on snout anteriorly keeled, almost flat (surface slightly raised), posteriorly larger, flat, weakly keeled to smooth; some scales may be multicarinate; (2) supraorbital semicircles with enlarged scales, in some specimens forming a pronounced ridge; (3) supraocular region with a group of distinctly larger, weakly keeled scales, surrounded anteriorly, laterally and posteriorly by small scales (not granular in specimens from Venezuela and Guyana, partially granular in specimens from Brazil); larger and smaller scales mostly sharply delimited, anteriorly intergrading in MPEG 3922; (4) supraciliary series complete, distinct from the small supraocular scales; (5) interparietal distinctly larger than adjacent scales; (6) scales around interparietal smaller than, to subequal to, posterior scales on snout, with a short transitional zone with the granules on occipital and supratemporal regions; (7) a double row of slightly enlarged vertebrals distinct from nape to base of tail; along back, a few to several rows of flat, weakly keeled scales, increasing in number posteriad, form a gradual transition between the double vertebral row and the granules on flanks; (8) scales on upper arms distinctly larger than vertebral scales.

Among the specimens here included, MPEG 1750, from Tapurucuara, differs mostly from the others, especially in the larger number of tricarinate rostral scales, and the comparatively smaller scales on upper arms.

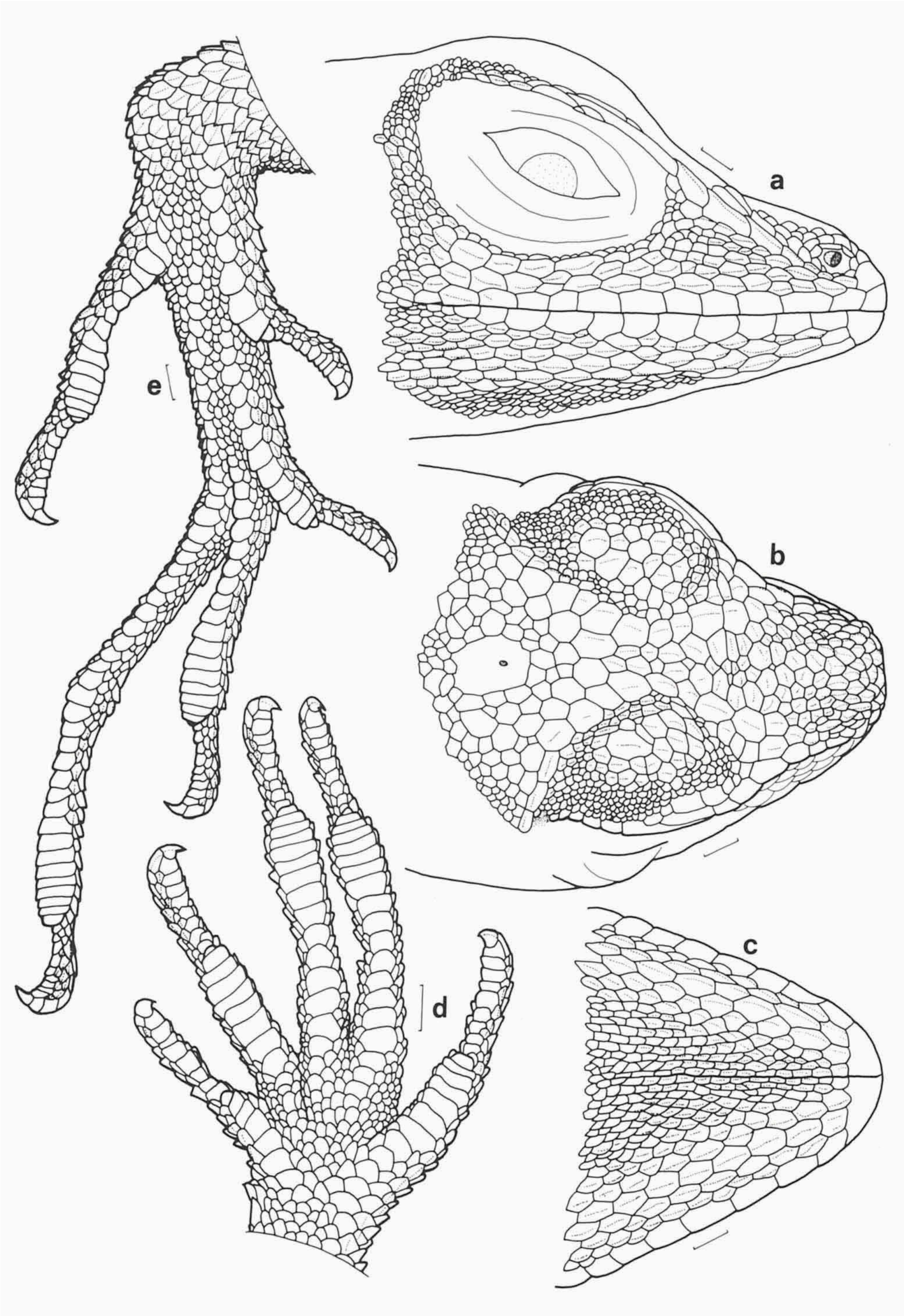


Fig. 16. *Anolis n. nitens*, MPEG 15814; a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of left hand and left foot.

Colour pattern apparently similar for males and females. Most of the specimens observed in which the pattern in preservative is still present, show several "V"-shaped lines dorsally, directed posteriorly, vertex on vertebral area; area inside the "V" usually lighter, but several blurred hues of brown form the general dorsal colour, including head and limbs. A subtriangular dark spot between hind limbs commonly present. Ventral region cream or pearl-white, in some specimens with small dark flecks scattered, especially under head. Dewlap red, but even in specimens with a relatively well preserved pattern it can be rather pale, and commonly shows a lateral lavender area; in MPEG 3922, which has a poorly preserved pattern, it is pale neutral grey with white scales, and in rather bleached specimens it is totally white; the general impression is that the red colour vanishes quite easily.

MPEG 15814, alive, was described as having orange-red dewlap; back beige with dark brown and black pattern elements forming chevrons; a light brown longitudinal stripe on base of tail, in vertebral area; tongue anteriorly yellow, posteriorly cream; iris greenish (field notes M.S. Hoogmoed). INPA 206 (M), RMNH 24685 (M), and INPA 272 (juv.) were also observed to have red dewlaps, with white (RMNH 24685) or black (INPA 206) scales. Beebe (1944b) described colour pattern in a number of specimens (both under *A. chrysolepis* and *A. nitens*); in the cases where it is mentioned, dewlap referred to as 'scarlet'. Vanzolini & Williams (1970) mentioned dewlap colour, for both males and females, as 'uniformly red'. Donnelly & Myers (1991) described a female from Cerro Guaiquinima as having a dull orange dewlap with greyish white scales, and a male with darker and brighter orange-red dewlap.

Distribution (fig. 23).— Core area Venezuela, Trinidad, and the northern half of Guyana (Vanzolini & Williams, 1970). Specimens from the states of Roraima and Amazonas, to the north of rivers Amazonas and Negro, are here included. This area was considered by Vanzolini & Williams (1970) as one of intergradation, although they depicted a specimen from Manaus as belonging to this subspecies (Vanzolini & Williams, 1970, pl. I).

Anolis nitens brasiliensis Vanzolini & Williams, 1970
(figs. 17, 18, 22, 23)

Anolis chrysolepis; Amaral, 1937c: 1722.

Anolis chrysolepis brasiliensis Vanzolini & Williams, 1970: 85 (holotype MZUSP 10319, type-locality: Barra do Tapirapés, Mato Grosso, Brasil, leg. Borys Malkin, 17-28.vii.1963); Williams & Vanzolini, 1980: 99; Cunha el al., 1985: 23; Vanzolini, 1986b: 3.

N[orops] n[itens] brasiliensis; Savage & Guyer, 1991: 366.

Material.— **Brazil.** GOIAS. Porangatu: 1 ♀, MPEG 1699, v.1965, leg. L. Gomes. Fazenda Santo Antônio da Serra Negra (14°05'26"S, 48°25'04"W), Município de Niquelândia, 1500 m S-SW of right margin of Maranhão (Tocantins) river: 1 ♀, CEPB 0425, 10.ii.1990, leg. N.C. do Valle.

MARANHAO. Município Arari, road BR-222, Gancho do Arari: 1 ♀, MPEG 11518, ii.1978; 1 ♂, MPEG 11732, vii.1978; both leg. O.R. Cunha & F.P. Nascimento; 1 ♂, 1 ♀, MPEG 11962-963, x.1978, leg. F.P. Nascimento & Rosemiro; 1 ♂, MPEG 12383, 14.viii.1979, leg. F.P. Nascimento & R.J.R. Moraes; 2 ♂♂, MPEG 12648-649, 02.ii.1980, 1 ♀, MPEG 16089, leg. O.R. Cunha & F.P. Nascimento.

MATO GROSSO. Santa Terezinha, Barra do Tapirapé: 2 ♂♂, 2 ♀♀, MPEG 1705-08, 1961, leg. B. Malkin.

PARA. Carajás, Serra Norte, campo rupestre do N-1: 1 ♂, MPEG 12999, 22.viii.1983; 1 ♀, MPEG 13006, 28.viii.1983; 1 ♀, MPEG 13963, 16.ix.1984; all leg. J.C.S. Pinto; 1 ♀, MPEG 14390, 15.v.1986, leg. F.

Braga; 1 ♂, MPEG 14544, 02.viii.1986, leg. M. Zanuto; 1 ♂, MPEG 14546, 15.x.1986, leg. T.C.S. Avila Pires & M.G.M. Nery. Carajás, Serra Norte, campo rupestre do N-5: 2 ♀♀, MPEG 14106-107, 08.vi.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes. São Felix do Xingu, Gorotire: 1 ♀, MPEG 14274, v-vi.1985, leg. D.C. Oren & M.S. Brígida.

Description.— In addition to the general description this taxon has the following characteristics (for measurements and scale counts see table 1): (1) scales on snout heterogeneous in size, from moderately keeled to smooth; (2) supraorbital semicircle with enlarged, weakly keeled to smooth scales; (3) most of supraocular region co-

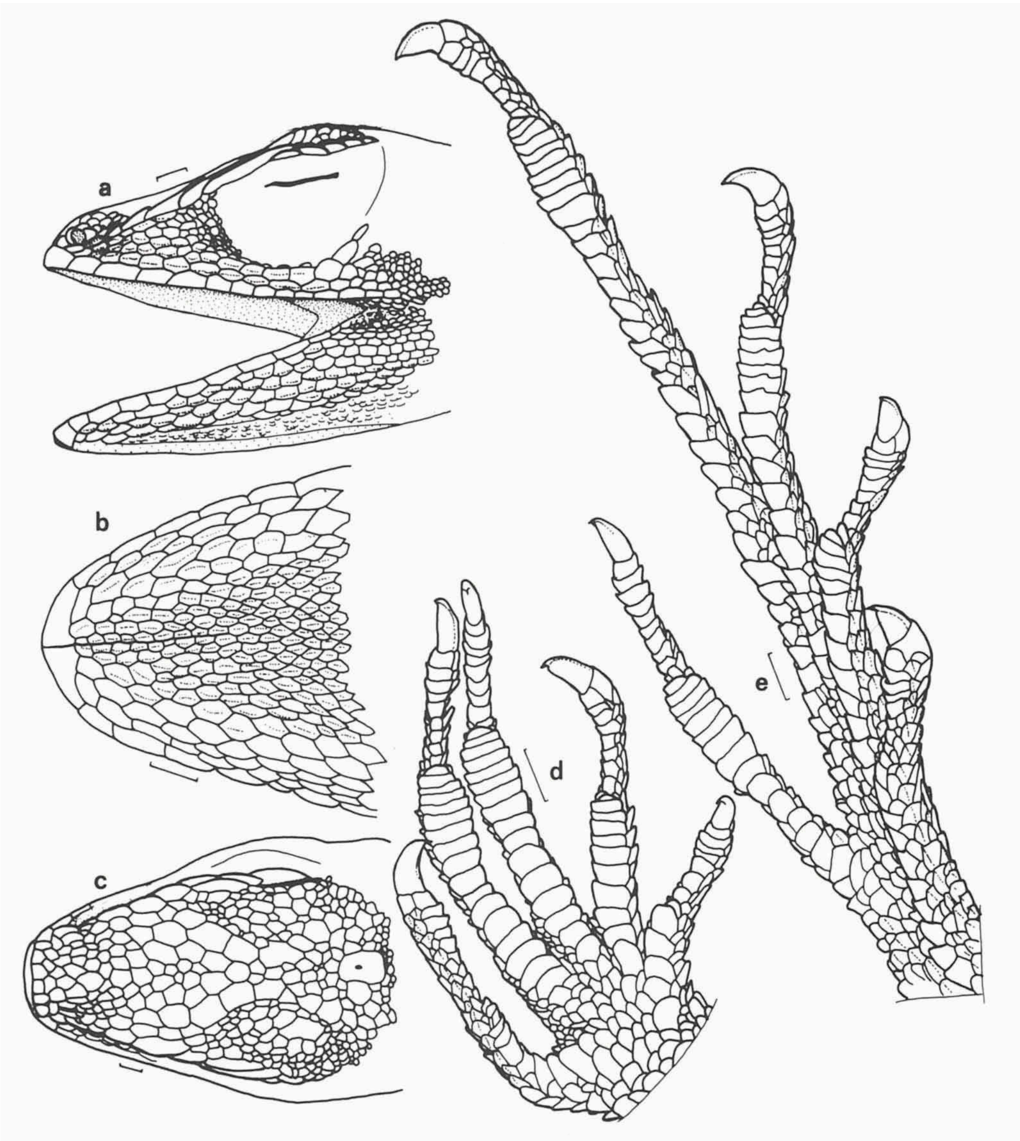


Fig. 17. *Anolis nitens brasiliensis*, MPEG 14546; a, b, c: lateral, ventral and dorsal views of head; d, e: ventral view of right hand and right foot.

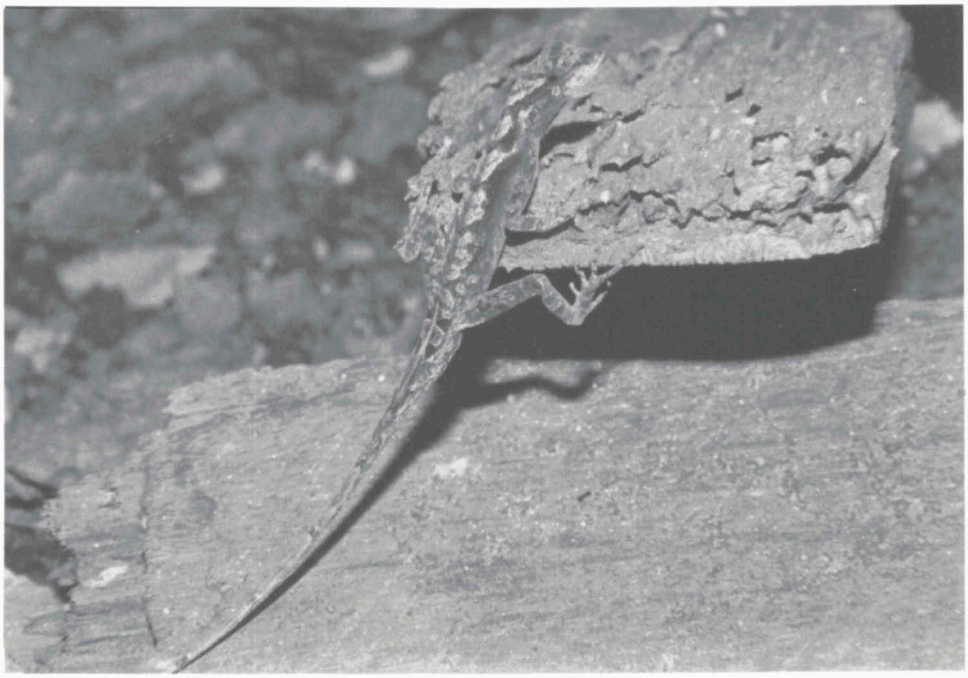


Fig. 18. *Anolis nitens brasiliensis*, "campo rupestre" of N-1, Serra Norte, Carajás, PA, Brazil (T.C.S. Avila-Pires).

vered with enlarged, flat, weakly keeled scales; anteriorly, laterally and posteriorly this group of enlarged scales is surrounded by small scales; a narrow band of granules is present posteriorly and/or latero-posteriorly; (4) supraciliary series complete, sharply distinct from posterior supraocular granules; (5) interparietal distinctly larger than adjacent scales; (6) scales around interparietal smaller than largest scales on snout, grading into granules on occipital and supratemporal regions; (7) a pair of slightly enlarged vertebral rows distinct from nape to base of tail; along back, a few to several rows of flat, weakly keeled scales, increasing in number posteriad, showing a gradual transition between double vertebral row and granules on flanks; (8) scales on upper arms distinctly larger than vertebral scales. This subspecies seems to present the longest tail in relation to SVL (fig. 22), and the shortest tibia (fig. 22).

General dorsal colour in preservative reddish-brown, greyish-brown or pale-horn-colour (latter colour in all examined specimens from Maranhão, former two colours highly predominating in other specimens), either uniform or marbled. A light vertebral stripe may be present, either narrow, with blurred margins, or wide, well delimited by a dark, narrow area. Other kinds of vertebral ornamentations generally also present, including a pair of relatively large, irregular, dark spots at level of hind limbs, frequently followed by a second pair at base of tail. Ventral region reddish-brown, cream or pearl-white, uniform or with scattered dark flecks. Dewlap with blue or bluish-grey skin, scales either white or light-grey, in specimens with light ventral region, or brown, in specimens with brown ventral region (which are rather poorly preserved specimens, possibly with very altered colour). No sexually linked pattern was observed.

In life, specimens from Carajás, southern Pará, with blue dewlap, lighter in females (MPEG 14106-107 were registered as having a light mauve (172D) dewlap), scales varying from light to dark grey, or cream; the area surrounding the dewlap may be chrome-orange (16). Vanzolini & Williams (1970) do not give a description of dewlap colour, but instead they refer to the frontispiece plate as representing the colour in life for a male dewlap; supposing the representation is reliable, the dewlap is green with a brown edge (along rim). Williams & Vanzolini (1980) give partial colour (life) descriptions for several specimens from Arajara, northeastern Brazil; dewlap skin is mentioned as black or purplish black in males, "very light rust-coloured", purple, or rusty red in females.

Distribution (fig. 23).— According to Vanzolini & Williams (1970) the subspecies occurs from northeastern Mato Grosso to northern São Paulo, in Brazil; the localities Loreto, Maranhão, and Cachimbo, southern Pará, were considered as areas of intergradation. Here I included specimens from Serra dos Carajás, southern Pará (already mentioned by Cunha et al., 1985), and Gancho do Arari, Maranhão, as belonging to *A. n. brasiliensis*. Williams & Vanzolini (1980) mentioned specimens from Arajara, northeastern Brazil (07°21'S, 39°24'W).

Anolis nitens chrysolepis Duméril & Bibron, 1837
(figs. 19, 22, 23, 224, 225)

Anolis chrysolepis Duméril & Bibron, 1837: 94 (lectotype MHNP 2456, type-locality: La Mana, French Guiana); Cunha, 1961: 60.

Anolis chrysolepis chrysolepis; Vanzolini & Williams, 1970: 85; Hoogmoed, 1973: 112; Hoogmoed & Avila-Pires, 1989: 168.

N[orops] n[itens] chrysolepis; Savage & Guyer, 1991: 366.

Material.— **Brazil.** AMAPA. Serra do Navio: 3 ♂, 1 juv., MPEG 15041, 15052-053, RMNH 24673, igarapé Piçarra, 07-08.xi.1988; 2 ♂♂, 1 ♀, MPEG 15119-120, RMNH 24675, upper part igarapé Piçarra, 16.xi.1988; 1 ♀, RMNH 24676, terra firme forest near the hospital, 17.xi.1988; 1 ♂, MPEG 15199, Barragem de Agua Limpa do igarapé Jacaré, 21.xi.1988; 1 ♂, 1 ♀, RMNH 24677, MPEG 15200, igarapé Cancão, near Porto Terezinha, 21.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 4 ♂♂, 3 ♀♀, ZFMK 45437-443. Igarapé Caneco, 1 km W of Rio Araguari, road Serra do Navio-Araguari: 1 ♀, MPEG 15133, 18.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Iratapuru, affluent left bank of Rio Jari, Cachoeira da Munguba: 1 ♀, MPEG 15001, 27.v.1987.
PARA. Oriximiná, Porto Trombetas, Serra do Papagaio: 1 ♀, MPEG 14396, 21-23.v.1986, leg. F.P. Nascimento & J.M. Rosa. Cruz Alta, 6 km S of Rio Trombetas: 1 ♂, RMNH 24681, 08.xii.1988; 1 ♂, 2 ♀♀, MPEG 15384-385, RMNH 24682, 10.xii.1988; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Road from Sítio Céu Estrelado to Cruz Alta, between Nhamundá and Trombetas rivers, near igarapé Jamari: 1 ♂, MPEG 15426, 14.xii.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Município de Obidos, Rio Paru de Este, Missão Tiriós: 1 ♂, 1 ♀, MPEG 1702, 1704, iv.1962, leg. E.J. Fittkau.
French Guiana. 1 ♀, MHNP 2439, paralectotype, leg. Rousseau. La Mana: 1 ♂, MHNP 2456, lectotype, leg. Leschenault & Doumerc.

Description.— In addition to the general description this taxon has the following characteristics (for measurements and scale counts see table 1): (1) scales on snout small, tricarinate, mostly subequal (in RMNH 24681 and MPEG 15384 posterior ones slightly larger); (2) supraorbital semicircles with hardly enlarged scales; (3) supraocular scales keeled, subequal to, to slightly larger than scales on snout, grading over a short distance into granules laterally and posteriorly (small, but not granular, scales in MPEG 15052); (4) supraciliary series posteriorly merging into supraocular granules; (5) interparietal as large as, to slightly larger than adjacent scales; (6) scales around interparietal subequal to, to slightly smaller than, scales on snout, grading into the smaller occipital and supratemporal scales; (7) vertebral scales indistinct on nape, distinctly enlarged along body, middorsal row largest; number of rows of enlarged scales increases posteriad; some of the scales may present secondary, lateral keels; (8) scales on upper arms relatively small, from slightly smaller than, to subequal to, vertebral scales.

Colour pattern of body and dewlap sexually dimorphic. Male dorsal pattern rather variable, in preservative marbled with drab or pale-horn-colour, plumbeous and greyish-brown, some specimens generally dark, others distinctly lighter; a wide, light (drab, plumbeous, or both) vertebral band may be present, bordered at each side by a dark greyish-brown irregular band; sinuous transverse lines, or paired triangular spots may be present along vertebral area, and most specimens have a pair of triangular spots, in touch medially or not, at anterior level of hind limbs. Ventral region cream or pearl-white, in some specimens with scattered dark flecks; under head there may be some oblique, sinuous lines converging toward the dewlap. Dewlap skin blue or blackish, with light scales or, toward the rim, partially blue scales.

Female dorsal pattern less variable. A dark brown narrow line begins at posterior corner of each eye, converging toward the neck, and from there continuing along back parallel and close to one another, posteriorly diverging again toward base of tail, where it continues a short distance toward its ventral surface; along body there may occur one to several lateral expansions. The two lines delimit a drab, plumbeous, or mixed vertebral band, which darkens on tail and expands to cover it completely. Most of head drab, continuous with vertebral band. Flanks brown, lighter or darker than vertebral band. Light, small spots at the sides of the vertebral band may be present, as well as irregular, light and dark stripes across limbs. Ventral region cream or pearl-white (RMNH 24676 light orange under head and neck, light yellow on belly), uniform or with scattered dark flecks; under head, a pair of oblique stripes, converging from posterior infralabials toward dewlap area, may be present. Dewlap with same colour as surrounding area; toward the rim part of the scales may be blackish.

A few examples of colour in life in some males and females follow. Among males, MPEG 15041, alive, had head dorsally amber (36), except posteriorly on the sides, and on neck, which were buff-yellow (53); body dusky-brown (19), flanks olive-grey (42) with dark spots; ventrally, head buff-yellow (53) to orange-yellow (18), dewlap cyanine-blue (74) with buff-yellow scales; belly greyish-white with darker spots. MPEG 15052 had anterior part of head, dorsally, mottled with Prout's brown (121A) and cinnamon-drab (219C); posterior part of head and back medium plumbeous (87), some areas with a salmon hue; at each side, a Prout's brown dorsolateral band, partially with darker borders; flanks approximately drab (27); ventral region light greyish-brown, paler under head, dewlap cobalt-blue with white scales. MPEG 15384 had rostral region cinnamon (123A), upper part of head mars-brown

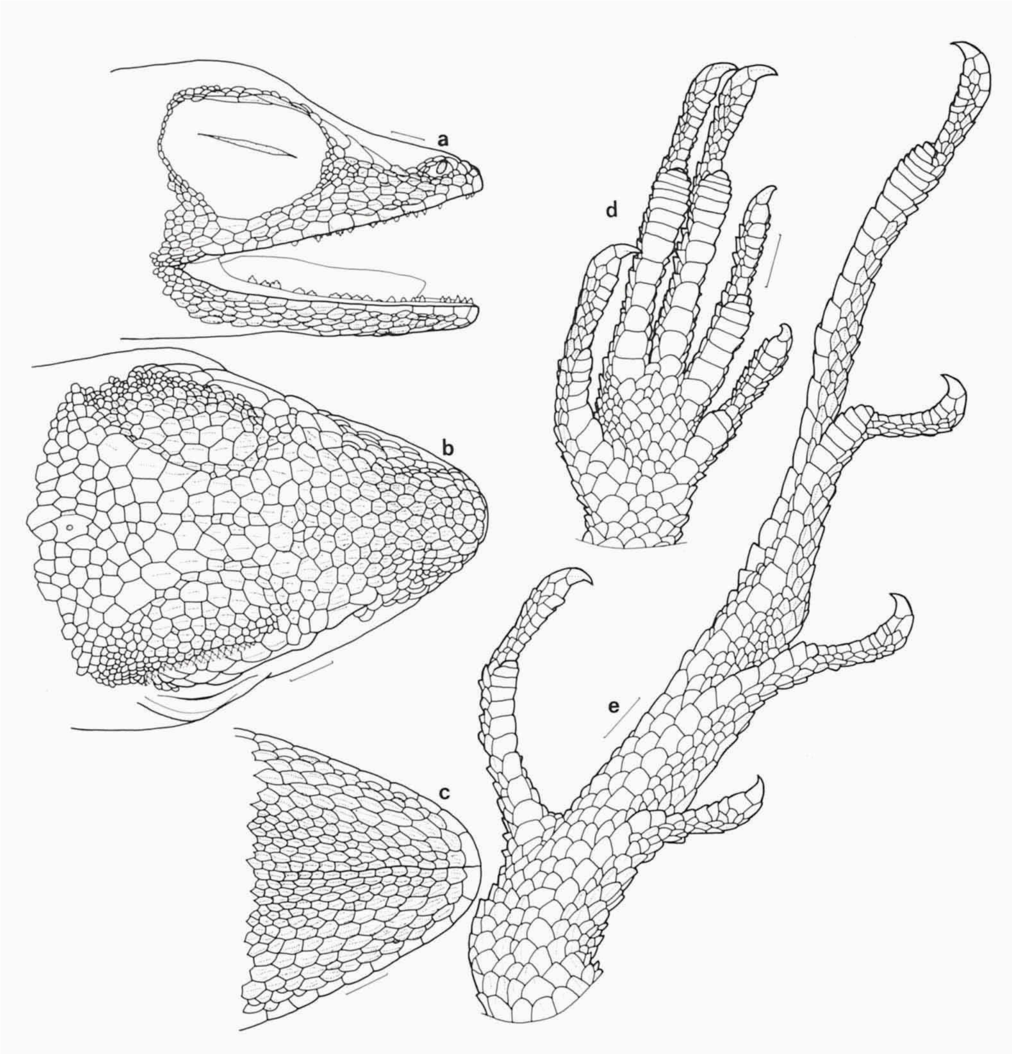


Fig. 19. *Anolis nitens chrysolepis*, MPEG 15119; a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of left hand and right foot.

(223A) with a cinnamon, black-bordered, transverse band; back plumbeous (78) with black to light russet-vinaceous (221D) transverse stripes; flanks peppered, predominantly spectrum-orange (17); ventral region cream-colour (54), dewlap cobalt-blue (168) with cream-colour scales; tail plumbeous (78) to fuscous (21), with some small orange spots, and base of ventral surface cream-colour. All specimens showed a reddish-brown or mars-brown (223A) iris, with a gold rim around pupil, and an orange tongue. In RMNH 24673, a juvenile male (svl 35 mm), the cobalt-blue dewlap was also present, with white to orange scales, and surrounded by a spectrum-orange area which extended through most of ventral surface of head.

Among females, MPEG 15112 had head dorsally clay-colour (26); vertebral band (shaped as described above for preserved specimens) cinnamon-drab (219C) bordered by a raw-umber (123) area; flanks approximately citrine (51); ventral region buff-yellow (53), dewlap sulphur-yellow (157) with buff-yellow scales. In MPEG 15133 rostral region clay-colour (123D); upper part of head tawny (38), with a raw-umber (23) stripe across supraocular regions; vertebral band anteriorly tawny (38), posteriorly grading into vinaceous (3) with a plumbeous (78) median stripe, along its entire length marginated by a raw-umber (23) area; flanks clay-colour (123D) with pale stripes bordered by fuscous (21); ventral region and labial area buff-yellow (53), dewlap sulphur-yellow (157) with marginal scales buff-yellow (53); tail plumbeous (78) dorsally, on ventral surface proximally buff-yellow (53), distally fuscous (21). RMNH 24682 had rostral and supraocular regions mars-brown (223A), posterior part of head, body and limbs light citrine (51), with a straw-yellow (56) vertebral band bordered by raw-umber (223) and black; ventral region spectrum-orange (17) from mid-posterior part of head till chest, lighter elsewhere, with light grey stripes under head and spots on belly; dewlap spectrum-yellow (55) with grey scales. Iris and tongue like in males. MPEG 15053, a juvenile (svl 26 mm), showed also a sulphur-yellow dewlap.

Hoogmoed & Avila-Pires (1991) reported a female from French Guiana with body pattern resembling that of a male, while the dewlap was yellow with orange scales (as typical for females) near body, with a bluish area toward the rim. Two other females from the same area presented the common female pattern, the first specimen probably representing an exception.

Distribution (fig. 23).— The core area for this subspecies, indicated by Vanzolini & Williams (1970), is Suriname, French Guiana, and Amapá in Brazil. Specimens from between the lower rivers Nhamundá and Trombetas, and from Tiriós, on the river Paru de Este, all in the state of Pará, north of the Amazon, are also included here (the specimens from Tiriós were also examined by Vanzolini & Williams, 1970, who considered them under the topic "intergradation").

Anolis nitens scypheus Cope, 1864
(figs. 20, 22, 23, 226, 227)

Anolis chrysolepis; Guichenot, 1855: 15.
Anolis scypheus Cope, 1864: 172 (holotype BM 1946.8.8.55, type-locality: according to Boulenger, 1885b: 90, "Caracas", considered in error by Vanzolini & Williams, 1970: 85); Boulenger, 1885b: 90; Goeldi, 1902: 16, 32; Cunha, 1961: 67; Peters & Donoso-Barros, 1970: 66.
Anolis chrysolepis scypheus; Vanzolini & Williams, 1970: 85; Vanzolini, 1986b: 3.
N[orops] n[itens] scypheus; Savage & Guyer, 1991: 366.

Material.— Holotype, ♀, BM 1946.8.8.55, 'Caracas'.
Brazil. AMAZONAS. Santa Rita, Município de Maraã, left bank of Rio Japurá (Lago Paricá): 4 ♀♀, 1 ♂, MPEG 15245, 15267, 15269, 15277, 15293, 14-24.xi.1988, leg. S. Ramos; 1 ♀, MPEG 15276, 22.xi.1988, leg. Adino R. Filho; 1 ♀, MPEG 15278, 22.xi.1988, leg. E.R. Duarte.
Ecuador. PASTAZA. Pozo Balsaura, 6 km NE (50°) of Shiona which lies 55 km E of Montalvo: 1 ♀, RMNH 24653, 13.viii.1983, leg. M.S. Hoogmoed & A. Almendariz. Destacamiento militar Shiona, Rio Conambo, 55 km E (83°) of Montalvo: 1 ♂, 1 ♀, RMNH 24654-655, 13-14.viii.1983, leg. M.S. Hoogmoed & A. Almendariz.
Peru. Samiria, Estación biologica Pithecia: 1 ♂, 2 ♀♀, MHNG 2072.2-4, 25-29.x.1980, leg. C. Vaucher.

Description.— In addition to the general description this taxon has the following characteristics (for measurements and scale counts see table 1): (1) scales on snout relatively small, with raised (about triangular in cross section) surface; a main median keel and smaller, secondary, ones, very distinct in large specimens, less so in juveniles; (2) supraorbital semicircles with enlarged scales, frequently forming a pronounced ridge; (3) enlarged supraoculars grading over a short distance into granules laterally and posteriorly; anteriorly scales smaller but not granular; (4) supraciliary series complete, distinctly larger than supraocular granules; (5) interparietal distinctly larger than adjacent scales; (6) scales around interparietal slightly smaller than scales on snout, with a short transitional area, or a sharp demarcation, with the granules on occipital and supratemporal regions; (7) vertebral scales mainly indistinct on nape and forming a hardly enlarged double row along body; (8) scales on upper arms relatively small, but still larger than vertebral scales. This subspecies reaches the largest SVL (83 mm).

No sexual dimorphism is apparent in colour pattern. Usually specimens present "V"-shaped lines (similar to those described for *A. n. nitens*) or rhomboid figures along the dorsal region, or a relatively wide vertebral band with some lateral expansions, anteriorly narrowing toward the nape, while posteriorly it extends onto proximal part of tail. Vertebral ornamentations plumbeous, flanks with blurred hues of brown and greyish-brown, plus cream and dark brown narrow lines. A pair of sub-

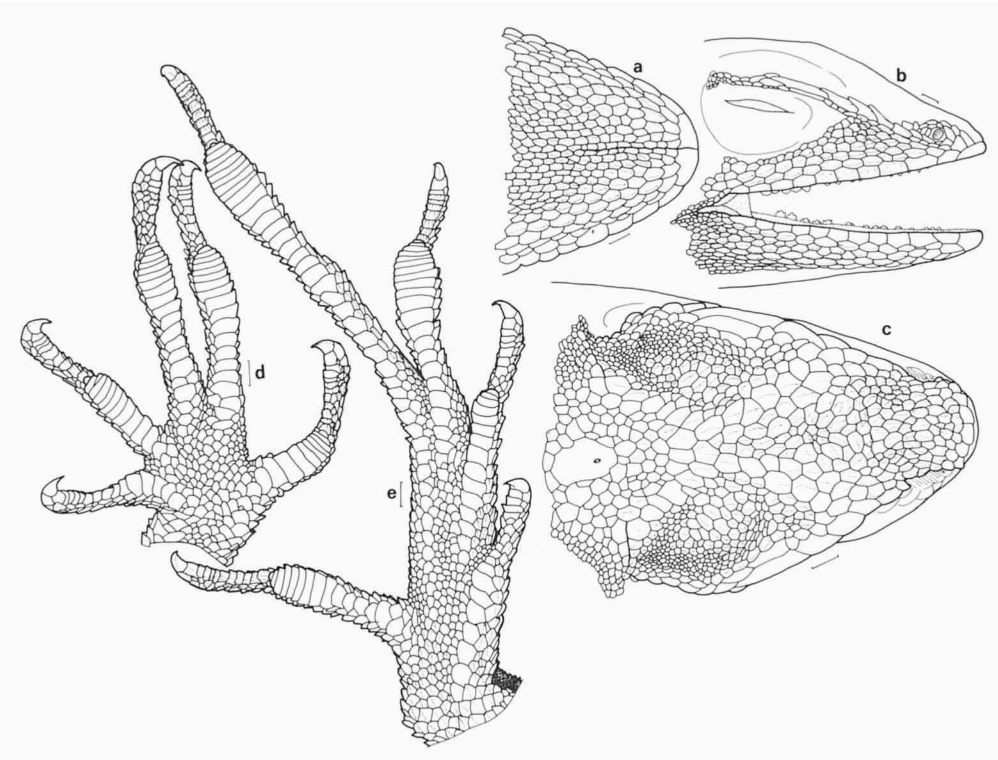


Fig. 20. *Anolis nitens scypheus*; a, b, c: ventral, lateral and dorsal views of head of MPEG 15269; d, e: ventral view of left hand and right foot of MPEG 15277.

triangular dark brown spots between hind limbs commonly present (absent in specimens with a vertebral band). Limbs with or without transverse irregular lines or figures. Ventral region mostly cream or pearl-white, in some specimens belly marbled with cream and light greyish-brown. Dewlap red (in some specimens very pale) along rim (scales mostly also red, or partially black), blue with light scales laterally.

RMNH 24653 in life had the back dark brown with oblique stripes; dark brown spots on shoulders and two in sacral area; head with a dark brown band between eyes, and infralabials with an orange rim; dewlap cobalt blue with red rim, scales white with orange centre; chest and sides of belly orange, middle of belly yellow-white; tongue pale yellow; iris gold colour with a grey network of narrow lines. RMNH 24655 had the back greyish-brown, with dark brown spots on shoulders and sacrum, and an orange vertebral stripe on posterior part of back and proximal part of tail; flanks with oblique, black and cream colour stripes; head with a dark brown band between eyes, and orange infralabials; dewlap with cobalt blue centre and red rim, scales white; belly pale yellow with grey spots; iris gold-brown (both colour descriptions by M.S. Hoogmoed). Dixon & Soini (1975, 1986) described specimens from Centro Unión, Peru (where it is syntopic with *A. bombiceps*), as tannish orange dorsally, with a tricoloured dewlap - edge red, central portion bright blue, and enlarged lateral scale rows white. A similar description of dewlap is given by Vanzolini & Williams (1970) and Duellman (1978).

Distribution (fig. 23).— Core area Amazonian Colombia, Ecuador and Peru. Specimens from Maraã, on the northern margin of Japurá river, Amazonas state, Brazil, are included here.

Anolis nitens tandai subspec. nov.
(figs. 21-23, 228-231)

Anolis chrysolepis; Gascon & Pereira, 1993: 181.

Holotype.— MPEG 15850, ♀, E of Porto Urucu (Petrobrás station RUC-2), Rio Urucu, Amazonas state, Brazil, 22.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires, in primary forest, on the stem of a small tree, about 100 cm above the ground.

Paratypes.— **Brazil.** AMAZONAS. Borba: 2 ♂♂, MNRJ 4432-33, v-x.1943. Rio Urucu, Petrobras area, 3 km S of headwaters: 1 ♂, 1 ♀, INPA 310, 319, v.1989, leg. C. Gascon. Carauari, Rio Juruá: 3 ♂♂, BM 1979.136-138, 05.ix.1978 (date only for BM 1979.138), leg. Wallace Expedition to Amazonia. Benjamin Constant, Rio Solimões: 1 ♂, 2 juv., RMNH 24660-662, 14.xi.1985, leg. M.S. Hoogmoed. E of Benjamin Constant (Santo Antonio): 1 ♂, 1 ♀, RMNH 24666, MPEG 15898, 08.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. W of Benjamin Constant: 2 ♀♀, MPEG 15933, RMNH 24667, 11.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires through local children; 1 ♂, 1 ♀, MPEG 15938, RMNH 24668, 12.xii.1989; 2 ♂♂, MPEG 15949, RMNH 24669, 13.xii.1989; 1 ♀, RMNH 24670, 14.xii.1989; 4 ♂♂, MPEG 15986-987, RMNH 24671-672, 16.xii.1989; 1 ♂, MPEG 15995, 16.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Estirão do Equador, Rio Javari: 2 ♂♂, MPEG 899, 901, 1959, leg. J. Hidasi.

Description.— In addition to the general description this taxon has the following characteristics (for measurements and scale counts see table 1): (1) scales on snout small, mainly tricarinate; (2) supraorbital semicircles hardly differentiated, especially anteriorly; (3) medial supraocular scales about same size as scales on snout, grading into granules laterally over a short distance; (4) supraciliary series mostly incomplete, posteriorly merging into the supraocular granules; (5) interparietal relatively small, usually about twice as large as adjacent scales; (6) scales around interparietal subequal to, to slightly smaller than, scales on snout, grading into granules on occipital and supratemporal regions; (7) vertebral scales almost indistinct on nape, slightly (but distinctly) enlarged along back, number of rows of enlarged scales increasing posteriad; (8) scales on upper arms relatively small, from subequal to, to slightly larger than vertebral scales.

Most females have a well delimited vertebral band, whereas males lack a vertebral band. Males dorsally marbled with drab, greyish-brown and ochre, or plumbeous, drab and ochre; vertebral region may be distinct from flanks, but with blurred limits between them; vertebral ornamentations, as paired subtriangular spots or sinuous transverse lines, may be present; most specimens with a pair of subtriangular spots at level of hind limbs (or slightly anterior to them); ventral region cream, pearl-white, or (observed in some juveniles) moderately dark greyish-brown. Male dewlap blue, mostly with light scales (dark scales in MPEG 15987, which is all dark ventrally); MPEG 901, which is completely bleached, shows skin of dewlap blackish. Most females with a dorsal pattern similar to female *A. n. chrysolepis*, but in some specimens pattern approaches that of male; ventrally, adult females with belly cream or pearl-white, head similar or with a pale orange hue; juvenile females light greyish-brown, with some dark brown, irregular, transverse (anteriorly) and convergent (posteriorly) lines under head; both adult and juvenile females may present irregular dark flecks scattered on ventral region. Dewlap in females when extended shows a large, central blue spot, surrounded by a light area (of same colour of adjacent areas); in not extended dewlap, the rim is light, laterally blue; scales mostly light.

Colour in life of holotype, MPEG 15850: head dorsally raw-umber (123), giving rise to a vertebral band of similar colour anteriorly, which posteriad becomes mixed with vandyke-brown (121), this latter colour predominating on distal part of tail; at each side of vertebral band, a verona-brown (223B) band; flanks raw-umber (123), slightly darker than head; at level of forelimbs, and on limbs themselves, some chamois (123D) marks bordered by dark brown. Ventrally, head and chest light orange, belly chamois, underside of limbs orange, all covered by light grey irregular flecks; tail orange near base, distally mixed with vandyke-brown; dewlap sulphur-yellow (157) with a large indigo-blue (173) spot. Iris grey with an orange rim around pupil.

Among female paratypes, MPEG 15898 had head dorsally mars-brown (223A) and verona-brown (223B), sides of head (posteriorly) and flanks mainly raw-sienna (136), vertebral band and tail plumbeous (78) with raw-umber (223) spots at level of hind limbs; limbs mars-brown with raw-umber and tawny-olive (223D) markings; head ventrally orange-yellow (18) to spectrum-orange (17), with pale grey markings; dewlap with a large indigo (73) central area surrounded by cream-colour, scales cream to orange; belly pale chrome-orange (16) with some dark scales; underside of tail pale chrome-orange with brown flecks at base, light greyish-brown distally; tongue pale orange. Ventral region in MPEG 15933 flesh-colour (53), in RMNH 24667 pale orange with light greyish-brown spots under limbs and tail. Dewlap in RMNH 24667 with a large indigo-blue (173) central spot, along rim medially yellow, anteriorly and posteriorly turning to pale orange; in RMNH 24688 central area ultramarine (270, slightly darker), surrounded by light yellow on rim, and yellow-ochre (123C)

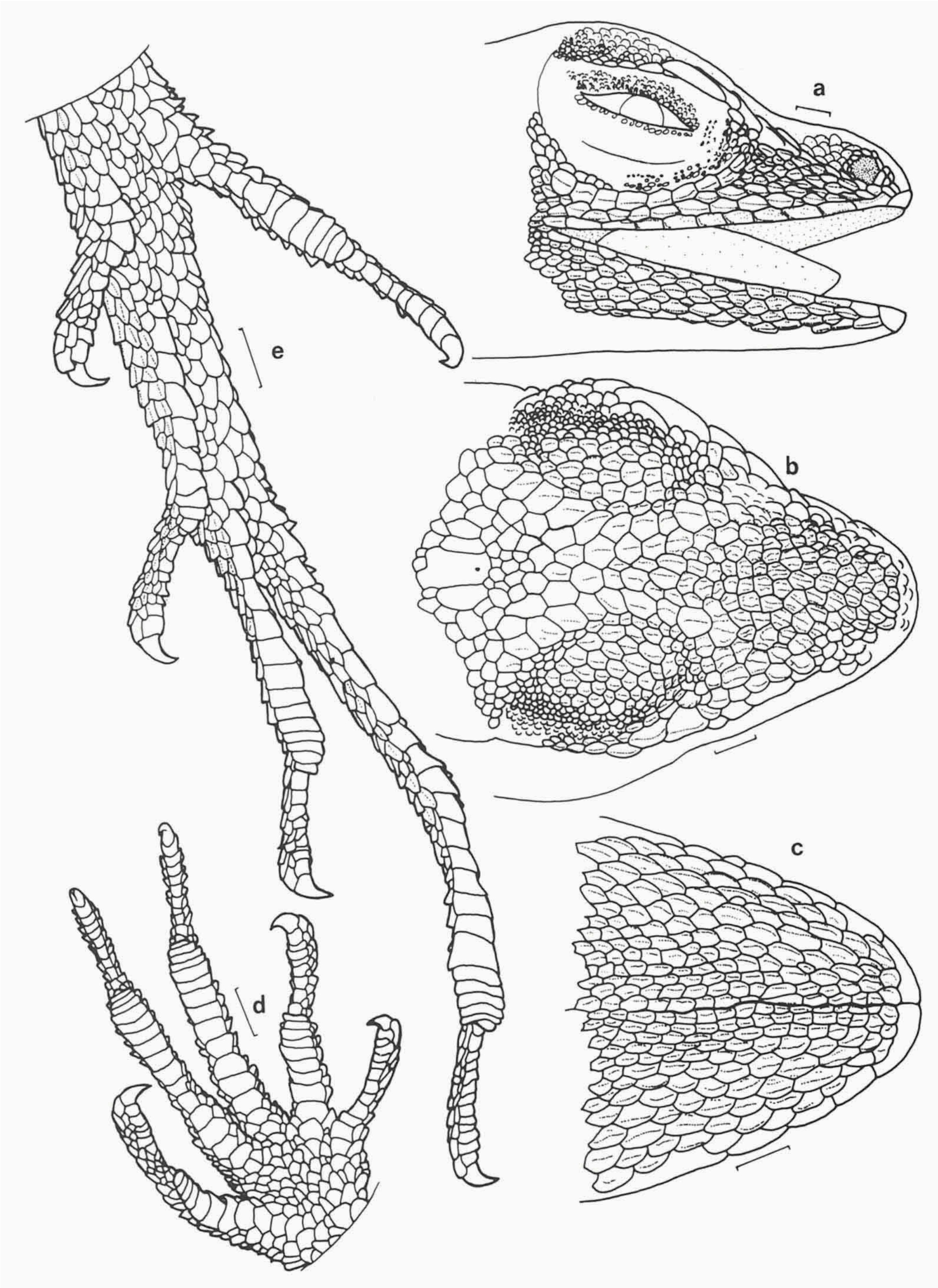


Fig. 21. *Anolis nitens tandai* subspec. nov., MPEG 15850 (holotype); a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of right hand and right foot.

anteriorly, posteriorly, and toward the body; in RMNH 24670 with a central blue area, surrounded by a yellow to orange area; in INPA 319 (C. Gascon field notes) pale yellow, with a central dark blue round spot with white scales. Iris in RMNH 24688 golden, tongue pale orange-yellow.

Among male paratypes, RMNH 24666 had the dorsal region predominantly tawny-olive (223D), on head and at level of hind limbs with mars-brown (223A) spots bordered by raw-umber (223) to black; ventral region pale horn colour (92) with an orange tinge, and pale brown markings; dewlap ultramarine (270) with pale horn colour scales; tongue pale orange. RMNH 24671 had the head dorsally raw-umber (123) and plumbeous (78), vertebral area plumbeous with jet black (89) and Prout's brown (121A) paired spots; flanks cinnamon (123A) with pale irregular stripes; head ventrally pale flesh-ochre (132D) with some pale horn colour (92) areas and light grey markings; dewlap cyanine-blue (74) with pale horn colour scales; belly pale horn colour with a flesh-ocher tinge; tail dorsally proximally plumbeous, distally dusky-brown (19), ventrally pale horn colour near base, dusky-brown distally; iris copper; tongue orange. Back of MPEG 15995 predominantly cinnamon (123A), along flanks and on limbs with an orange-rufous (132C) tinge; a brick-red (132A) band across top of head, between eyes, and another one across vertebral area at level of hind limbs; posterior part of vertebral area and tail dusky-brown (19); ventral region pale horn colour (92) and orange, distal portion of tail dusky-brown; dewlap ultramarine (270) with pale horn colour (92) scales. Dewlap in MPEG 15938 ultramarine (270) with cream-colour scales on rim, orangish-brown scales toward the body; in MPEG 15949 and RMNH 24669 blue with cream scales; in MPEG 15986-987 and RMNH 24672 blue with drab scales. MPEG 15986 with iris copper, tongue orange.

Distribution (fig. 23).— All specimens are from localities in the state of Amazonas, Brazil, south of the Rio Amazonas/Solimões, specifically between the localities Borba (Rio Madeira) and Estirão do Equador (Rio Javari).

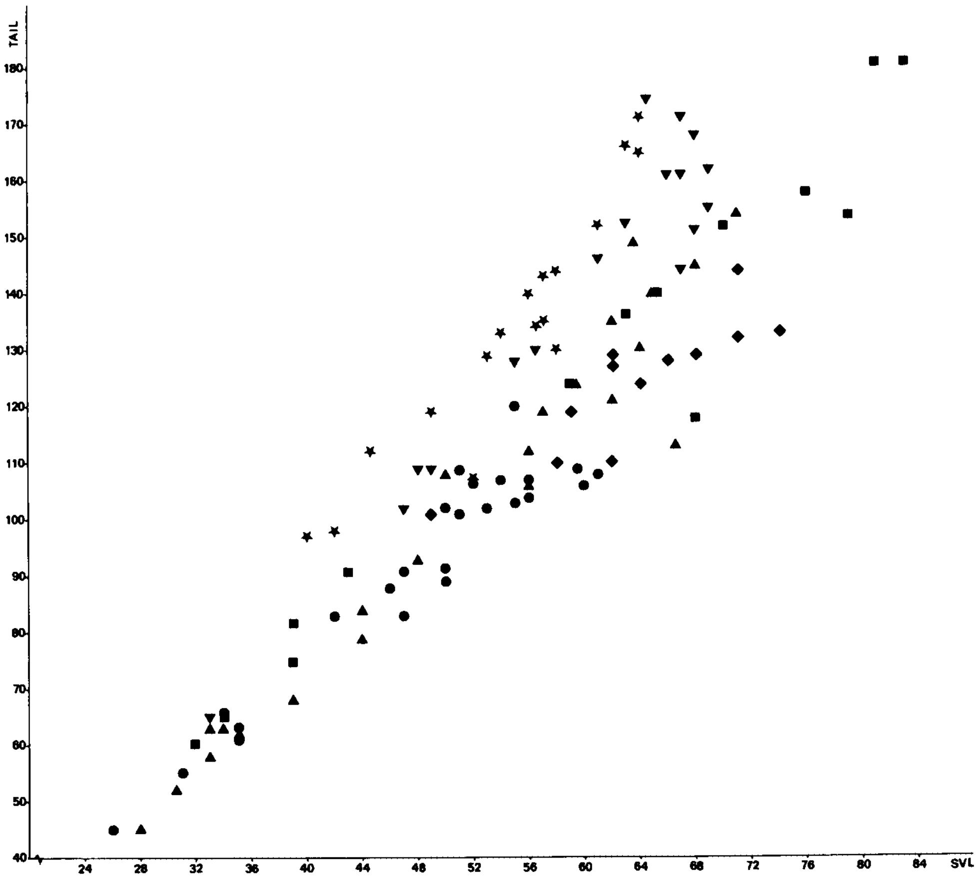
Remarks.— *A. n. tandai* has a unique dewlap colour in females; male dewlap colour is similar to that found in male *A. n. chrysolepis*, in some populations of *A. n. brasiliensis*, and in *A. bombiceps*. From *A. bombiceps* and *A. n. brasiliensis*, *A. n. tandai* can be distinguished by having dorsal head scales mainly tricarinate (unicarinate in *A. n. brasiliensis*; uni- or irregularly multicarinate in *A. bombiceps*), and supraorbital semicircles less distinct and separated by more scales (2-4 versus 0-2 and 1-2 respectively in *A. n. tandai*, *A. n. brasiliensis*, and *A. bombiceps*). Furthermore, *A. n. tandai* differs from *A. bombiceps* in having enlarged vertebrals that form several rows posteriorly (vertebrals hardly enlarged in *A. bombiceps*). From *A. n. brasiliensis*, it differs by the relatively small scales on upper arm (subequal to slightly larger than vertebral scales), whereas in *A. n. brasiliensis* the scales are distinctly larger. The closest resemblance of *A. n. tandai* is with *A. n. chrysolepis*. Apart from the difference in female dewlap colour, there are only minor differences, e.g. scales on upper arms slightly larger in *A. n. tandai*, and average number of expanded lamellae under fourth toe higher in this subspecies (25.1 ± 1.7 versus 22.7 ± 1.3). Also, *A. n. tandai* may reach a larger size than *A. n. chrysolepis*. Considering the geographical separation of these two taxa, clearly they should be considered as different subspecies. Moreover, *A. n. tandai* seems to differ from all other populations in having the longest tibia in relation to SVL (fig. 22).

Etymology.— The subspecies is named after Tanda, one of several boys who helped M.S. Hoogmoed and me to collect material in Benjamin Constant in December 1989, in recognition of their kind help, especially that of Tanda, Abraão, Melkzedek, and Manoel.

Habitat of the species *A. nitens*.— It is primarily an inhabitant of the forest, where it is found on the floor and on low vegetation or the lower part of tree trunks (Vanzolini & Williams, 1970; Hoogmoed, 1973; Dixon & Soini, 1975, 1986; Duellman, 1978; Gasc, 1981, 1990; Martins, 1991). According to Hoogmoed (1973), *A. n. chrysolepis* never ascends more than 50 cm above the forest floor. Gasc (1981, 1990), referring to the same subspecies, categorized it as an inhabitant of leaf litter; he mentioned that at night they sleep on stems about 20 cm above the ground (Gasc, 1981: 291). Martins (1991) noted that *A. n. nitens* (as *A. c. planiceps*) occurs between 0-50 cm above the ground. *A. n. scypheus* is mentioned by Duellman (1978) to sleep horizontally on branches of bushes, less than 1.5 m above the ground (in two cases specimens were higher). Most of the animals I observed, or for which I had access to field notes (not including *A. n. brasiliensis*), were in terra firme forest, sometimes in areas moderately disturbed, near trails, or near creeks; some specimens (e.g., MPEG 15133 and MPEG 15426, *A. n. chrysolepis*; MPEG 15995, *A. n. tandai*) were found in swampy areas surrounded by terra firme forest. Two specimens of *A. n. nitens* (RMNH 24686-687, S.J. Gorzula field notes) were on low vegetation in a cacao plantation. Among 41 specimens observed during the day, 34 were on the forest floor, the remaining seven on the vegetation (on stems or base of tree trunks), between 0.1 m to 1 m above the ground. One specimen (*A. n. tandai*) on the ground fled and climbed to a height of 5 m in a nearby tree. Another one fled onto the stem of a spiny palm. Among seven specimens found between 19:30 h and 23:30 h, six were sleeping on leaves and one on a stem; all were between 0.1 m to 1 m above the ground.

Ecologically *A. n. brasiliensis* is different. The core area indicated for this subspecies largely coincides with the morphoclimatic domain of the cerrados (Ab'Saber, 1977) covered mainly by savannas, but at least in some cases the species seems to inhabit more mesic microclimates. Williams & Vanzolini (1980) reported the species in the Carirí region, northeastern Brazil, "a well irrigated and relatively fertile enclave in the great morphoclimatic domain of the caatingas" (a xerophytic vegetation), living "on the ground and low on trees in the palm stands and once in a banana grove". Cunha et al. (1985) reported it in the open enclaves of Serra Norte, Carajás, close to the southern limit of the Amazonian forest. Previously only two specimens had been observed in the area, but later six more were collected, and a few others observed. All of them were in the area of "campo rupestre" (a savanna type of vegetation, growing on rocky substrate), either in quite open (grassy) areas or in patches covered with trees, sometimes along small streams. Perhaps the lizard depends on these areas of denser vegetation, although it does venture into completely open areas. No specimens were collected in the neighbouring forest. CEPB 0425, from Goiás, was on exposed rocks in open cerrado vegetation. Therefore, *A. n. brasi-*

Fig. 22. *Anolis nitens* and *A. bombiceps*; upper graph: tail versus svl; lower graph: tibia versus svl. Star = *A. n. brasiliensis*; circle = *A. n. chrysolepis*; inverted triangle = *A. n. nitens*; square = *A. n. scypheus*; triangle = *A. n. tandai* subspec. nov.; rhomboid = *A. bombiceps*.


TAIL
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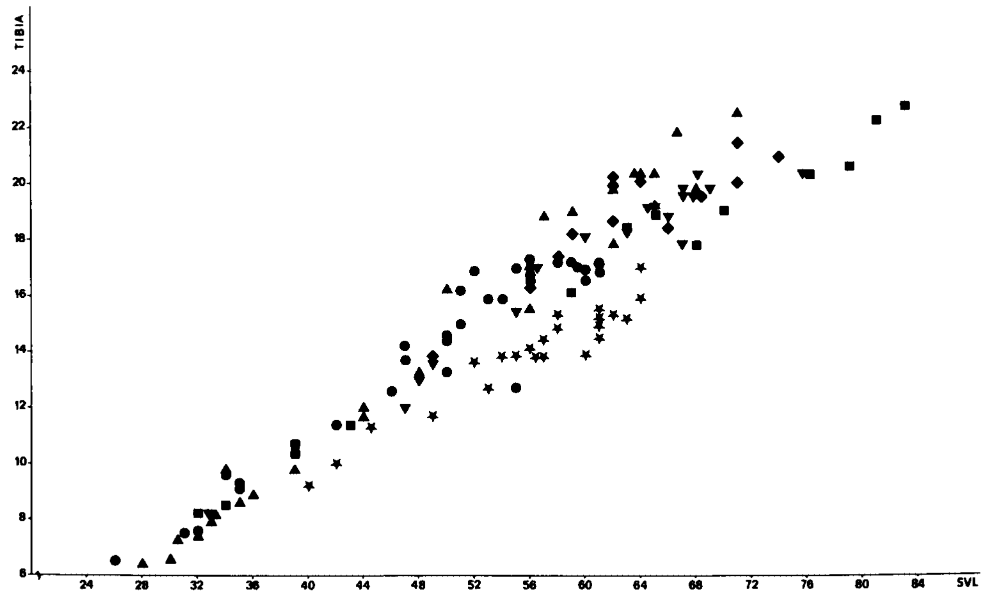
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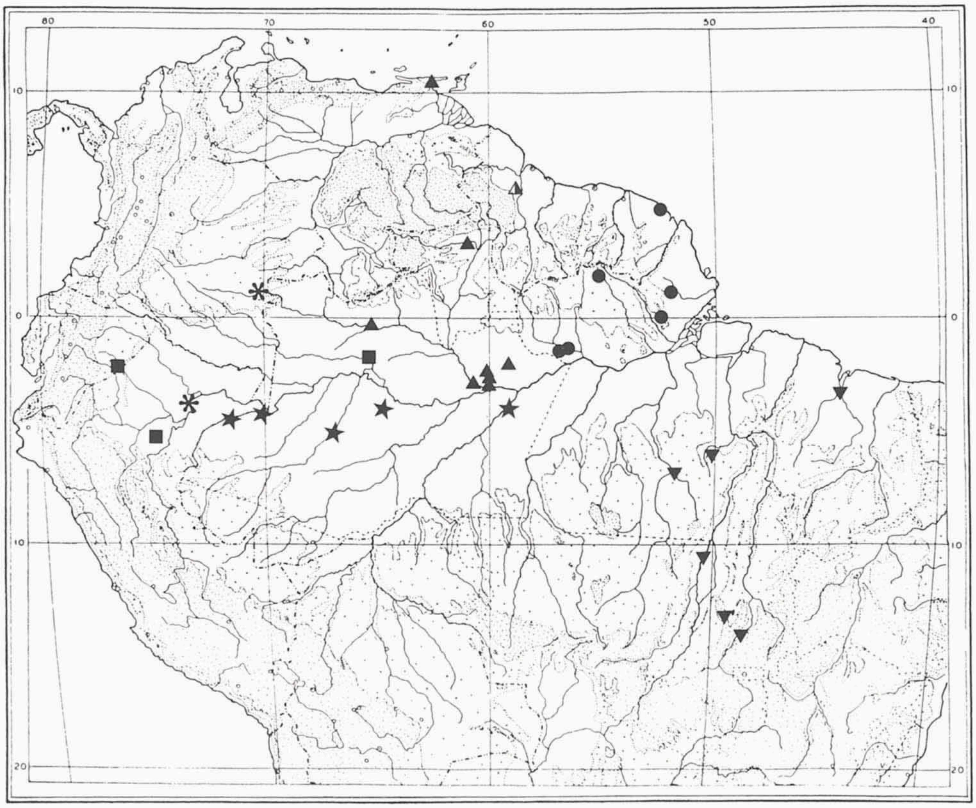


Fig. 23. *Anolis nitens* and *A. bombiceps*, distribution of material studied: *A. n. brasiliensis* (inverted triangles), *A. n. chrysolepis* (circles), *A. n. nitens* (triangles; the half-open triangle represents "Guyana", without further specification), *A. n. scypheus* (squares), *A. n. tandai* subspec. nov. (stars), *A. bombiceps* (asterisks).

liensis differs from the other subspecies in occupying more open forests or completely open situations.

Notes on natural history of the species *A. nitens*.— Fitch (1968) reported a mean body temperature of 27.5°C in eight specimens of *A. n. scypheus*, with a mean deviation from the air temperature of 1.51°C. All specimens had been found in shaded situations on the forest floor, thus suggesting non-heliophilic habits. This agrees with most other observations, but Duellman (1978) mentioned "a few individuals" observed basking on logs and buttresses (*A. n. scypheus*). RMNH 24653 and RMNH 24655 (same subspecies) also were in sunny spots on the ground in primary forest (M.S. Hoogmoed field notes). Thus, some basking behaviour occurs at least in *A. n. scypheus*.

Beebe (1944b), Hoogmoed (1973), Duellman (1978) and Martins (1991) presented data on stomach contents — in all cases a variety of insects and spiders, and also Diplopoda, Oligochaeta, and Crustacea Isopoda. Beebe (1944b) also observed in a stomach the anolid's own skin. Duellman (1978) reported moreover the tail of an *Anolis trachyderma* and an individual eating a *Leposoma parietale*.

Known predators are *Oxybelis aeneus* (Wagler), *O. argenteus* (Daudin) and *O. ful-*

gidus (Daudin) (Beebe, 1946; Cunha & Nascimento, 1978).

Beebe (1944b), Fitch (1970), Hoogmoed (1973), Dixon & Soini (1975, 1986) and Duellman (1978) provided data on reproduction.

General remarks.— *A. nitens*, together with *A. bombiceps*, forms a widespread South American group, apparently of relatively recent origin (they were included by Etheridge, 1960 in the "beta"-anoles which were supposed to have a Mexican-Central American origin). The taxa show, in addition to an overall similarity, a high degree of geographical variation and complex interaction. Vanzolini & Williams (1970), with the aim of having a case study for understanding "the problem of the origin and mode of formation of complex tropical biotas", tried to "dissect" the geographical variation in the group, by analyzing separately each of a series of characters along several long-distance transects. As a result, they distinguished four "core areas" defined as "areas of maximum overlap of distinctive distributions of a number of characters" (p.90) and assigned to each of them a subspecies of *A. nitens* (as *A. chrysolepis*). In core area III, two groups occurred in partial sympatry; this led to the recognition of *A. bombiceps* as a valid species. The areas outside the cores, including the entire Amazonian basin, were considered areas of intergradation showing complex patterns. About Amazonia, they stated (p. 77): "It is obvious that Amazonia is a highly heterogeneous region. The influence of single core areas or of core area combinations is felt, in many cases, far from and even at points diametrically opposite the core area". Developing a hypothesis to explain the origin of the complex, they considered each core area as being the centre of evolution of a subspecies, the intergradation areas resulting from a secondary contact between them. Vanzolini & Williams (1970) related the core areas to late Pleistocene and Holocene forest refuges formed as a consequence of drier climatic periods.

After studying the material available to me I cannot agree completely with the picture presented by Vanzolini & Williams (1970). Even taking into account a number of specimens from areas outside the cores, each subgroup analyzed could still be distinguished from the others on the basis of association of characters, and it seems that intergradation areas would be less extensive than suggested by these authors. Also, a fifth group among *A. nitens* was found in a so-called intergradation area. The different picture obtained by Vanzolini & Williams (1970) may be due to the fact that several differences among the subgroups are qualitative, and not, or only secondarily, reflected in quantitative characters like scale counts. Furthermore, the analysis of each character by itself tends to obscure the information provided by the association of characters, and variation of different characters having different causes may mask similarities. In the specific case of the southwestern Brazilian Amazonian group, another possible cause of it not being recognized is that one of its distinctive characters, the female dewlap colour, may not be perceived in preserved animals, which usually have the dewlap not extended. Another relevant point in relation to the conclusions by Vanzolini & Williams (1970) is that *A. n. brasiliensis*, contrary to its conspecifics, inhabits open vegetation. Their analysis was based on the assumption that these animals were strictly forest dwellers. It is interesting to note that *A. nitens* is absent from the forests of southeastern Pará, which is probably related to the adaptation of *A. n. brasiliensis* to more open types of vegetation (a specimen from Belém, of the FMNH, was reported by Vanzolini & Williams, 1970, and according to the FMNH collection catalogue, collector is unknown; I consider this a doubtful locality for the species).

Such differences in results do not deny the possibility that the subspecies have evolved in isolation, which may have occurred in Pleistocene forest refuges. However, it indicates that a better understanding of this group is still needed, especially in regard to the Amazon Basin, which is not yet well enough represented in collections. Preferably, the study should take into consideration good colour descriptions of live animals. Moreover, some attention should be given to the possible relationships between the subspecies, because similarities among them do not always coincide with geographic proximity. At the moment it is not possible to pursue this matter further.

Mägdefrau et al. (1991) mentioned two specimens of *A. nitens* (as *A. chrysolepis*) from Cerro Guaiquinima, Venezuela, collected at different sites, one of which they identified as *A. n. nitens* (= *A. c. planiceps*), the other as *A. n. scypheus*. Considering the present knowledge about the group, the presence of *A. n. scypheus* in this area does not make sense, and the data should be confirmed (no information about the characteristics used for identification was given).

Draconura nitens Wagler, 1830 is an older name than *A. chrysolepis* Duméril & Bibron, 1837, which recently has been regularly applied to the species. *Nitens* was disregarded by Vanzolini & Williams (1970) who argued that the original description was inadequate, the type lost, the type-locality insufficiently defined, and the usage of the name was confusing. Hoogmoed (1973) observed that none of these reasons was sufficient to discard the name, and that an application should be made to the International Commission on Zoological Nomenclature requesting the suppression of *nitens* Wagler. Hoogmoed suggested Vanzolini & Williams to do so, but apparently no action was taken. More recently, Savage & Guyer (1991) argued for the maintenance of the name *nitens*, because it was clearly a valid name, and it had been regularly in use until Vanzolini & Williams (1970); according to Savage & Guyer (1991), the name would correspond to *A. c. planiceps*. Considering the argumentation by the latter authors, and the fact that up to the present no application was made to the International Commission on Zoological Nomenclature to suppress *nitens*, I think there is no reason not to adhere to the well established rule of priority. Even considering that the type of *A. nitens* is lost, the name has been consistently linked to one taxon by several authors, with no discrepancy between the taxon and the original description. Although some specimens from "Suriname" were identified as *A. chrysolepis planiceps* (see Hoogmoed, 1973) and *A. nitens* by some authors, generally the name *nitens* was associated with specimens from Guyana and Venezuela. This area corresponds to the distribution area of *A. c. planiceps* as used by Vanzolini & Williams (1970). Thus, in agreement with former usage and with the proposal of Savage & Guyer (1991), I consider the taxon occurring in Guyana and Venezuela as the nominal subspecies of *Anolis nitens*. All other subspecies formerly considered to belong to *chrysolepis*, thus become subspecies of *nitens*.

Anolis ortonii Cope, 1869
(figs. 24, 25, 232, 233)

Anolis ortonii Cope, 1869: 97 (holotype ANSP 11404, type-locality: Rio Napo or Upper Rio Marañon, Ecuador/Peru); Procter, 1923: 1064; Cott, 1926: 1160; Boulenger, 1885b: 51; Cunha, 1961: 61; Peters

& Donoso-Barros, 1970: 62; Vanzolini, 1972: 92, 1986a: 13, 1986b: 5; Hoogmoed, 1973: 136, 1979: 278; Williams & Vanzolini, 1980: 102; Cunha et al., 1985: 25; Zimmerman & Rodrigues, 1990: 449; Nascimento et al., 1991: 33.
Anolis ortoni; Parker, 1935: 516; Crump, 1971: 19; Gascon & Pereira, 1993: 181; Vitt, 1993: 2374.
[*Norops*] *ortonii*; Savage & Guyer, 1989: 110.

Material.— **Brazil.** ACRE. Rio Juruá (left bank), Sobral (8°22'S, 72°49'W): 1 ♀, INPA 630, 09.iii.1992, leg. C. Gascon.
AMAPA. Município de Amapá, Rio Tracajatuba, Reserva DNERu (SUCAM): 1 ♂, MPEG 2765, 06.vii.1969, leg. F.P. Nascimento. Município de Amapá, road BR-156, igarapé Agua Branca: 1 ♀, MPEG 3143, 26.x.1969, leg. F.P. Nascimento. Cupixi, 50 km S of Serra do Navio: 1 ♀, MPEG 15117, 15.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Serra do Navio: 1 ex., KU 97851, x.1964.
AMAZONAS. Itacoatiara: 1 ♂, BM 1926.5.5.10, 15.xi.1925, leg. H.B. Cott. Rio Uatumã, Município de Presidente Figueiredo, present reservoir area of hydroeletric dam Balbina: 1 ♀, MPEG 14686, 14.xii.1987, leg. D. Peccinini-Seale & rescue team; 3 ♂♂, MPEG 14693, 14698, 14702, xii.1987, leg. D. Peccinini-Seale & C.F. Rocha. Manaus, Tarumã-Mirim: 1 ex., 1 juv., MHNG 1598.99-100, 31.iii.1976 & 06.i.1977, leg. J. Adis. Rio Urucu, 3 km S of headwaters (Petrobras area): 1 ♂, INPA 321, 14.v.1989, leg. C. Gascon. Rio Solimões, W of Benjamin Constant: 1 ♀, MPEG 15996, 19.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Javari, Estirão do Equador: 4 ♂♂, MPGE 902-905, 1959; 1 ♂, MPEG 1676, xii.1961, all leg. J. Hidasi.
MARANHAO. Nova Vida, road BR-316, 25 km from Rio Gurupi: 1 ♀, MPEG 12043, x.1978, leg. F.P. Nascimento & Rosemiro.
PARA. Ilha de Marajó: 2 ♂♂, 3 ♀♀, BM 1923.11.9.51-55, 2 ♂♂, 2 ♀♀, BM 1924.2.28.6-9, all leg. W. Ehrhardt; 5 exs., MPEG 2426, 2427, 2441, 2443, 2463, Rio Aramá, Vila Nova do Aramá (former Quinta do Aramá), 22-27.ix.1968, leg. O.R. Cunha. Colônia Nova, road BR-316, near Rio Gurupi: 1 ex., MPEG 8096, 07.x.1974, leg. F.P. Nascimento; 2 ex., MPEG 9658-59, 23.ii.1975, leg. O.R. Cunha & F.P. Nascimento; 2 ex., MPEG 11362-363, 24.x.1977, leg. F.P. Nascimento. Viseu, Bela Vista: 2 ex., MPEG 5647, 6192, 25.vi.1972 & 15.iii.1973, leg. O.R. Cunha & F.P. Nascimento; 5 ex., MPEG 6980-81, 6983-84, 6986, 25.x.1973, leg. O.R. Cunha; 2 ex., MPEG 7518, 7524, 28.iii.1974, leg. O.R. Cunha & F.P. Nascimento; 3 ex., MPEG 8199, 81200, 8235, 07.x.1974, leg. F.P. Nascimento; 1 ex., MPEG 12056, x.1978, leg. F.P. Nascimento & Rosemiro; 2 ex., MPEG 12760-761, 05.ii.1980, leg. O.R. Cunha & F.P. Nascimento. Município Augusto Correa, Cacoal: 3 ex., MPEG 7033, 7357-58, 26.x.1973 & 29.iii.1974, leg. O.R. Cunha & Barata. Município de Bragança, Cururutuá: 1 ♂, MPEG 14801, 14.ix.1987, leg. F. Braga & M. Socorro Silva. Parada Bom Jesus, road PA-242, 11 km from Bragança: 1 ex., MPEG 5805, 20.ix.1972; 3 ex., MPEG 6376-78, 22.v.1973; 2 ex., MPEG 8480-81, 02.iii.1975; all leg. O.R. Cunha & F.P. Nascimento. Santa Luzia, road PA-253, 15 km from Capitão Poço: 5 ex., MPEG 7753-57, 21.iii.1974, leg. O.R. Cunha & Barata; 1 ex., MPEG 7788, 21.iii.1974, leg. O.R. Cunha & F.P. Nascimento. Capanema: 1 ex., MPEG 14448, 22.v.1986, leg. R. Lainson; 1 ♂, 3 ♀♀, 1 juv., MPEG 14592-596, igarapé Urucuri, 22-29.vi.1987, leg. M. Moisés da Silva. Ourém, Limão Grande, Puraquequara: 12 ex., MPEG 7169, 7172-82, 23.x.1973, leg. O.R. Cunha; 7 ex., MPEG 7557, 7559, 7560, 7563, 7565, 7567, 7568, 05.vii.1974, leg. O.R. Cunha & F.P. Nascimento; 19 ex., MPEG 7723, 7727-42, 7744, 7745, 22.iii.1974, leg. O.R. Cunha & Barata. Peixe-Boi: 1 ex., MPEG 4624, 16.iv.1971, leg. F.P. Nascimento & O.R. Cunha. Apeú, Boa Vista: 1 ex., MPEG 2147, 21.vi.1971, leg. O.R. Cunha & F.P. Nascimento; 1 ex., MPEG 3893, 01.iv.1970, leg. F.P. Nascimento. Santo Antônio do Tauá: 1 ex., MPEG 5987, 11.i.1973; 1 ex., MPEG 7802, 04.vii.1974; both leg. O.R. Cunha & F.P. Nascimento. Santa Rosa, road to Vigia: 1 ex., MPEG 10485, 17.ix.1976, leg. O.R. Cunha & F.P. Nascimento. Belém: 5 ex., MPEG 1678-81, 1683, IPEAN, 1962, leg. SESP; 1 ex., AMNH 125354, IPEAN - Utinga, APEG, 27.xii.1974, leg. D. Hassinger; 1 ex., MPEG 1984, Utinga, 02.i.1962; 1 ex., MPEG 2462, Rua Silva Castro, vii.1968, leg. M. Amaral; 1 ex., MPEG 14533, Travessa Nina Ribeiro, Bairro Canudos, 06.viii.1985, leg. M. Santa-Brígida; 1 ex., MPEG 15625, campus of FCAP, Av. Perimetral, 25.iv.1989, leg. F. Braga & J.N. Santa-Brígida. Carajás, Serra Norte: 1 ♂, MPEG 13051, area of Salobo-3 alfa, 10.xi.1983, leg. F.P. Nascimento, T.C.S. Avila Pires & R. Bittencourt Neto; 2 ♀♀, MPEG 14122, 14130, road N1-Caldeirão, 06.ix.1985, leg. F.P. Nascimento, R. Bittencourt Neto & M.G.M. Nery. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S,

51°27'11.3"W): 1 ♂, MPEG 16471, 11.xi.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Lower Rio Xingu, Município Senador José Porfírio, Baía de Souzel, Tabuleiro Embaubal, Ilha Grande: 1 ♂, MPEG 13135, 20.xi.1983, leg. P. Sá. Santarém, road PA-3, Estrada do Palhão: 1 ♂, 1 ♀, MPEG 2995, 2998, viii.1969, leg. Milton. Oriximiná: 1 ♂, CM 64596, 03.i.1972, leg. 'Expedição Permanente da Amazônia'. Rio Nhamundá, Sítio Céu Estrelado, 15 km N of Faro: 1 ♀, RMNH 24679, 30.xi.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ex., CEBP 0125, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.
Ecuador. NAPO. Limoncocha, between Santa Helena and Rio Blanco: 1 ♂, RMNH 26482, 02.v.1983, leg. J. Schoorl. PASTAZA. Rio Conambo: 1 ♂, GNM 3578, 23.xi.1955, leg. R. Blomberg, coll. Ramon Olalla.
French Guiana. Mornes de Macouria, NW of Cayenne: 1 hatchling (collected as an egg), RMNH 25918, 17.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

Diagnosis.— A brownish/greyish anole, with granular, smooth or weakly keeled dorsals, and larger (but relatively small), smooth ventrals. Digital expansions well developed, expanded lamellae under fourth toe about three times as wide as distal phalanx. Scales on posterior part of snout relatively large, smooth and flat. Supraorbital semicircles mostly in contact with each other, rarely separated by one row of scales. Three to five suboculars in contact with supralabials. Tibia length 0.18-0.22 (0.20 ± 0.01) times the SVL. Dewlap from orange (or yellow) to red, large in males, distinctly smaller in females. Maximum SVL 57 mm.

Description.— Anole with maximum SVL in males of 57 mm (MPEG 13135), in females of 52 mm (Hoogmoed, 1973). Head 0.24-0.28 (0.26 ± 0.01, n= 42) times SVL, 1.5-1.8 (1.63 ± 0.07, n= 41) times as long as wide, and 1.0-1.4 (1.25 ± 0.06, n= 40) times as wide as high. Snout blunt, wide; frontal region with a shallow depression. Neck narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.36-0.46 (0.40 ± 0.03, n= 16) times SVL, hindlimbs 0.60-0.74 (0.66 ± 0.05, n= 10) times, tibia 0.18-0.22 (0.20 ± 0.01, n= 41) times. Tail round in cross section, tapering toward tip, 1.4-1.8 (1.68 ± 0.12, n= 24) times SVL.

Tongue wide, villose, with nicked tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral rectangular, about 3-5 times as wide as high; vertical or oblique, not or just visible from above. Postrostrals 5-6, occasionally 7-8. Anterior nasal as part of postrostral series. Scales on snout polygonal, juxtaposed, smaller and keeled anteriorly, especially around nasals; large, smooth and flat on upper part; 7-12 (9.0 ± 1.2, n= 38) scales across snout at level of second canthal. Canthus rostralis well defined, with 5-8 canthals, regularly increasing in size posteriorly. Supraorbital semicircles distinct, mostly with a very large scale anteriorly, decreasing in size posteriorly, in total with 7-11, exceptionally six, 12, or 13, scales; in contact with each other or, rarely, separated by one scale. Supraocular region covered by large, polygonal, smooth scales, partially bordered by granular scales. First supraciliary long, in some specimens followed by one to three elongate, but distinctly shorter, partially overlapping, scales; these are followed either by granules, or by a row of keeled, juxtaposed scales, distinctly larger than adjacent granules. Occipital region with irregularly polygonal, smooth, juxtaposed scales, smaller than those on snout, distinctly smaller posterior to interparietal. Interparietal several times larger than adjacent scales; 1-3 scales between interparietal and supraocular semicircles. Granular scales on parietal

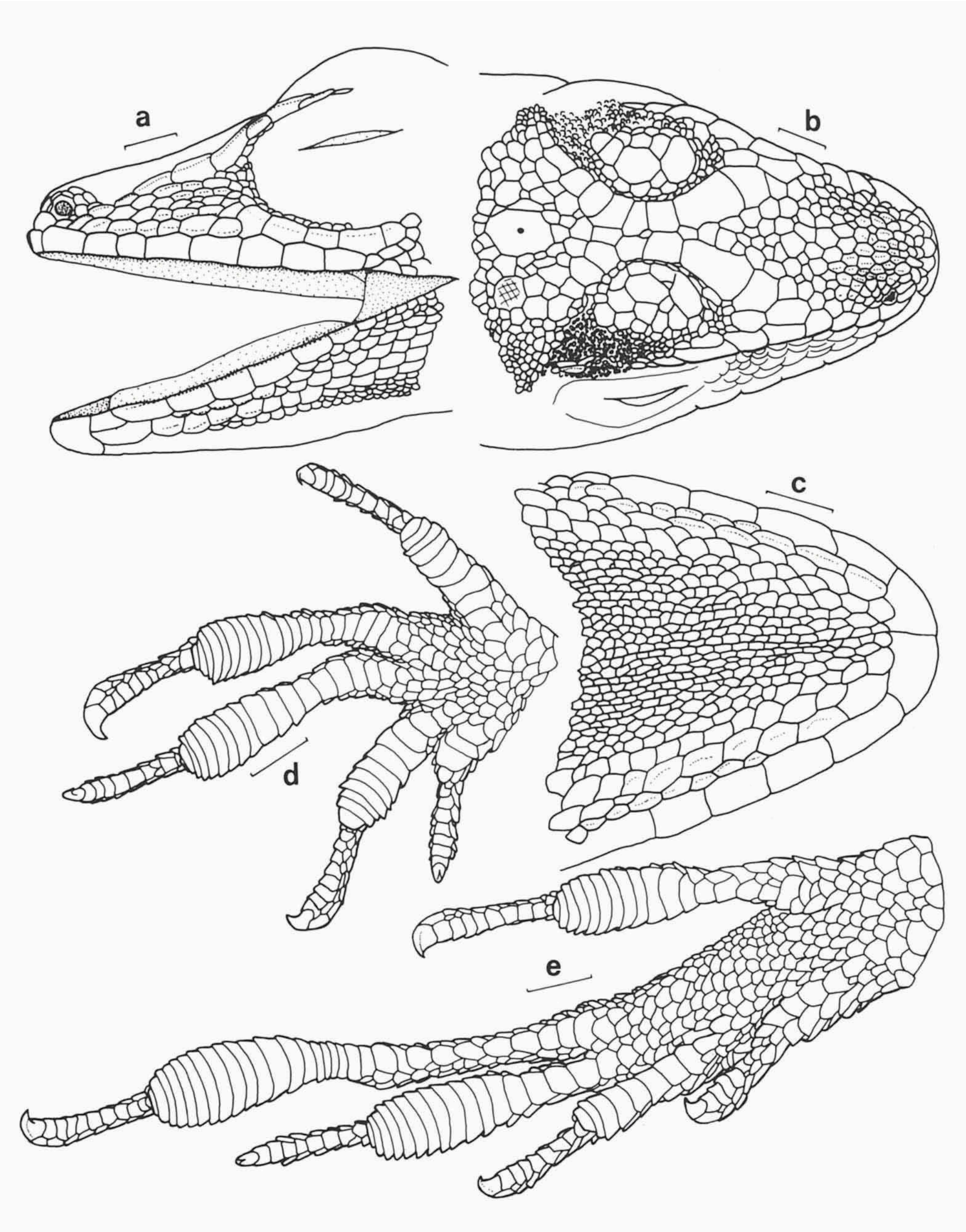


Fig. 24. *Anolis ortonii*, MPEG 15117; a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of left hand and left foot.

region, changing gradually into scales on occipital region. Loreal scales irregularly polygonal, in approximately longitudinal rows, wider toward supralabials; mostly with a broad, low keel, median in position in row adjacent to canthals, near lower margin in the others; 4-7, mostly five or six, scales in a vertical row at level of second canthal. Suboculars 4-8, large, feebly keeled, of which 3-5 in contact with supralabials. Supralabials 7-10, 6-9 to below centre of eye. Temporal region with small, granular scales, separated from eyelids by a few rows of larger scales, and from parietal region, anteriorly, by a rather inconspicuous double row of slightly larger scales. Eyelids covered with granules, with two rows of larger scales bordering the rim. Ear-opening relatively small, obliquely or vertically oval, its lower margin at level of commissure of mouth, or slightly lower; with smooth margin and short auditory meatus.

Mental medially divided, forming a semicircle or each half roughly trapezoid, in some specimens indented posteriorly by postrostrals; bordered by first supralabial and one sublabial at each side, and 2-6, mostly four, smaller median scales. Infralabials 7-10, 6-9 to below centre of eye. Chin laterally with larger, rhomboid or polygonal, keeled, juxtaposed scales; a series of slightly larger sublabials is distinct, with anterior 1-4, mostly 2-3, scales in contact with infralabials. Medially, scales on chin distinctly smaller, rectangular, keeled, juxtaposed, in approximately longitudinal rows; anterior part of chin medially divided by a sulcus. Toward throat, scales shorter, roundish. Dewlap well developed in males, reaching about halfway between level of forelimbs and middle of body, with crescent-moon-like scales in longitudinal, widely separated rows laterally, and smaller, half-moon-like scales densely covering the rim. Dewlap in females small, scales similar to those in males, but smaller on rim. Nape with granular scales, similar to dorsals.

Dorsals and scales on flanks granular, smooth or feebly keeled, juxtaposed; a double row of vertebral scales may be present. Ventrals small, though distinctly larger than dorsals, roundish, subimbricate, smooth. Gradual transition between scales on flanks and ventrals. Scales around midbody 123-180 (154.6 ± 12.7, n= 38). Preanal plate with scales similar to ventrals, but smaller.

Base of tail with numerous small, keeled, slightly imbricate scales, on ventral surface slightly larger and also keeled. Distally, scales distinctly larger, rhomboid to hexagonal, imbricate, in longitudinal rows, with pronounced keels that form longitudinal ridges; scales in middorsal row slightly larger; ventral scales also slightly larger, increasing in size toward the two midventral rows. Verticils distinct along most of tail, with three subcaudals corresponding to four or five middorsal scales.

Forelimbs mostly with small, roundish to rhomboid, subimbricate scales, keeled dorsally, smooth ventrally; distinctly larger, rhomboid, keeled scales on anterior aspect of lower arms. Hindlimbs with rhomboid, keeled, subimbricate scales on anterior aspect, gradually changing into granular scales toward posterior aspect of thighs; on lower legs scales only decrease slightly in size, with those on dorsal aspect keeled, those on ventral aspect almost smooth. Digital expansions well developed; 20-28 (23.6 ± 1.5, n= 77, 40 specimens) lamellae under fourth finger, 15-20 (17.6 ± 1.1, n= 79, 41 specimens) to end of digital expansion; 27-39 (33.5 ± 2.3, n= 70, 39 specimens) lamellae under fourth toe, 22-31 (27.1 ± 1.7, n= 77, 41 specimens) to end of digital expansion (all counts starting from membrane between third and fourth digits).

No distinction in colour between sexes was observed. In life, dorsal surface frequently marbled, though in some specimens it was almost uniformly coloured. Specimens are able to change their colour to a certain degree, from light to dark. MPEG 15117, in daytime, was (dorsally) a mixture of olive (30), olive-yellow (52), and (mainly on flanks) olive-brown (28), with tail olive-grey (42) and raw-umber (223); at night the body became mainly olive-grey (42), dark peppered, tail smoke-grey (44) and raw-umber (223). MPEG 15625 dorsally was smoke-grey, predominantly lighter (44) on head and flanks (flanks marbled), darker (45) on back; tail dorsally smoke-grey (45) with antique-brown (37) transverse bands (description by A.C.M. Lima). MPEG 14592 and MPEG 14596 were light greyish-olive (43), the former with dark rhomboid spots along vertebral area, the latter (a juvenile) almost uniformly coloured, with some black dots and vermiculations. MPEG 14593 and MPEG 14594 had body predominantly dark grey, in MPEG 14593 with some black and spectrum-orange variegation, in MPEG 14594 with a pale beige (almost white) vertebral stripe from occiput to tail, bordered at each side by a suffused band that anteriorly was orange-yellow (18), posteriad changing into spectrum-orange (17) and chrome-orange (16) (these colours superimposed on a dark grey background, therefore not as vivid). A raw-umber (223) band may be present accross the supraocular region, as well as a sepia (119) band across snout. Ventral region tawny-olive (223D) with sepia (119) spots (MPEG 15117), or brownish-olive (29) under head and body, and drab-grey (119D) under tail (MPEG 15652). Dewlap spectrum-orange (17) with orange-yellow (18) scales (MPEG 15117); flame-scarlet (15) with white scales (MPEG 15625, 14592, 14594, 14595); dark flame-scarlet (15) with light scales (MPEG 14593); orange with yellow scales (MPEG 13051); orange-yellow (RMNH 24679); chrome-orange (16) with brown scales (MPEG 15996). MPEG 15117 with iris reddish-brown with a narrow reddish rim around pupil, tongue pinkish-white.

RMNH 25918, a hatchling from French Guiana, dorsally was a mixture of drab (27), olive-brown (28), greyish-olive (43), and very pale (almost white) smoke-grey (44). Ventrally it was smoke-grey (44) with whitish spots, head ventrolaterally with dark olive (30) markings, dewlap with a spectrum-orange (17) tinge and light scales.

Descriptions of colour in life are also given by Beebe (1935), Vanzolini (1972), Hoogmoed (1973), Dixon & Soini (1975, 1986), Duellman (1978), Gasc (1981), Meede (1984).

General colour in preservative light or dark greyish-brown, or reddish-brown, mostly marbled. Some specimens with a narrow, irregular, dark vertebral stripe, or with a wide, light, well defined vertebral band, in both cases from nape to base of tail. Ventral region cream or light brown, with or without small, dark spots; under head some irregular, dark, transverse stripes over a light background may be present, or a pattern of dark/light alternating bands. Tail with alternating light and dark bands.

Habitat.— *A. ortonii* is most common in relatively open situations (e.g., in highly disturbed forests and edge situations, secondary growths, and in some cultivated areas, parks, and yards). It is usually on vegetation but sometimes on the ground. MPEG 15117 was on a tree trunk at about 1 m from the ground in a cultivated area with trees and low vegetation, in a relatively small village in a predominantly forested area. RMNH 24679 was c. 3 m high on a tree trunk in secondary forest; MPEG 15996 was 1 m above the ground on a fallen tree in an open area (a human-made clearing) surrounded by terra firme forest. Among three specimens from Carajás, MPEG 13051 was on a tree trunk in an area where the forest had been heavily disturbed; MPEG 14122 and MPEG 14130 were in a relatively low type of forest, which possibly had some former history of occupation by man. RMNH 26482 was said to be in secondary forest. In the city of Belém, one specimen was collected 3-4 m high on a tree on a college campus where small patches of secondary forest exist, as well as grass fields with sparse trees. Two others were in backyards of houses, and seven were in areas with residual forest. The presence of *A. ortonii* in perianthropic situations (e.g., plantations, yards in villages, and park-like areas) also was mentioned by Vanzolini (1972), Dixon & Soini (1975, 1986), and Duellman (1978; "on a thatched roof in clearing"). Edge situations, or open areas near forest are mentioned by Vanzolini (1972), Hoogmoed (1973), and Dixon & Soini (1975, 1986). It was reported in primary and/or secondary forests by Crump (1971), Vanzolini (1972), Duellman (1978), Fugler (1986), Almendáriz (1987), Zimmerman & Rodrigues (1990). Cunha et al. (1985) mentioned that this species is relatively common in forest and old secondary growths and abandoned plantations in eastern and southern Pará. In most cases this lizard is observed relatively low on trees (or other vegetation), but heights up to 8 m have been mentioned; specimens found on the ground were mentioned by Dixon & Soini (1975, 1986) and Duellman (1978). Duellman (1978) observed two specimens sleeping on low bushes at night.

Notes on natural history.— Although a diurnally active, nonheliothermic lizard, individuals occasionally bask (Zimmerman & Rodrigues, 1990). Individuals usually solitary, but Vanzolini (1972) mentioned two males displaying on the same tree; this probably represented agonistic behaviour. Moreover, Dixon & Soini (1975, 1986) mentioned that "two or more individuals of either sex are commonly seen on the same tree". MPEG 15117 while trying to escape ascended the tree where it was first observed; Vanzolini (1972) reported that three individuals fled upward.

Duellman (1978) examined contents of seven stomachs of *A. ortonii* and found that ants comprised 53.6 % of the volume.

Among the specimens I examined, five females (MPEG 7723, 7731, 7735, 14592, 15117) each had two eggs; two others (MPEG 2995, 3143) one egg each. Eggs oval (e.g., 9 × 4.5 mm, 8.5 × 4 mm, 4.5 × 4 mm; all measurementss of preserved eggs); the largest egg was 11 mm in length (MPEG 14592); when two eggs were present, they were of different sizes (11/6 mm, 9/4.5 mm, 8.5/4.5 mm, 9/3.5 mm). RMNH 25918 was collected on 17 January 1990 as an egg found among damp leaflitter and earth on top of a low concrete pilar in an isolated patch of forest on a small hill in savanna (near Cayenne, French Guiana); the egg hatched on 24 February. The hatchling had a SVL of 21 mm, tail length of 30 mm, and weighed 0.2 g. Dixon & Soini (1975, 1986) reported an egg buried 3 cm deep in an ant nest, another one beneath a fallen piece of bark; the hatchling from one of these eggs had a SVL of 19.5 mm, tail length of 30.5 mm. The same authors observed gravid females in several months of the year, thereby indicating at least a long reproductive period; smallest mature females observed were 39 mm (SVL), smallest males 38 mm.

Distribution (fig. 25).— Northern South America east of the Andes, in Brazil, French Guiana, Suriname, Guyana, Colombia, Ecuador, Peru, and Bolivia. In Brazilian Amazonia known from Pará, Amapá, Amazonas, Rondônia and Acre. Also it

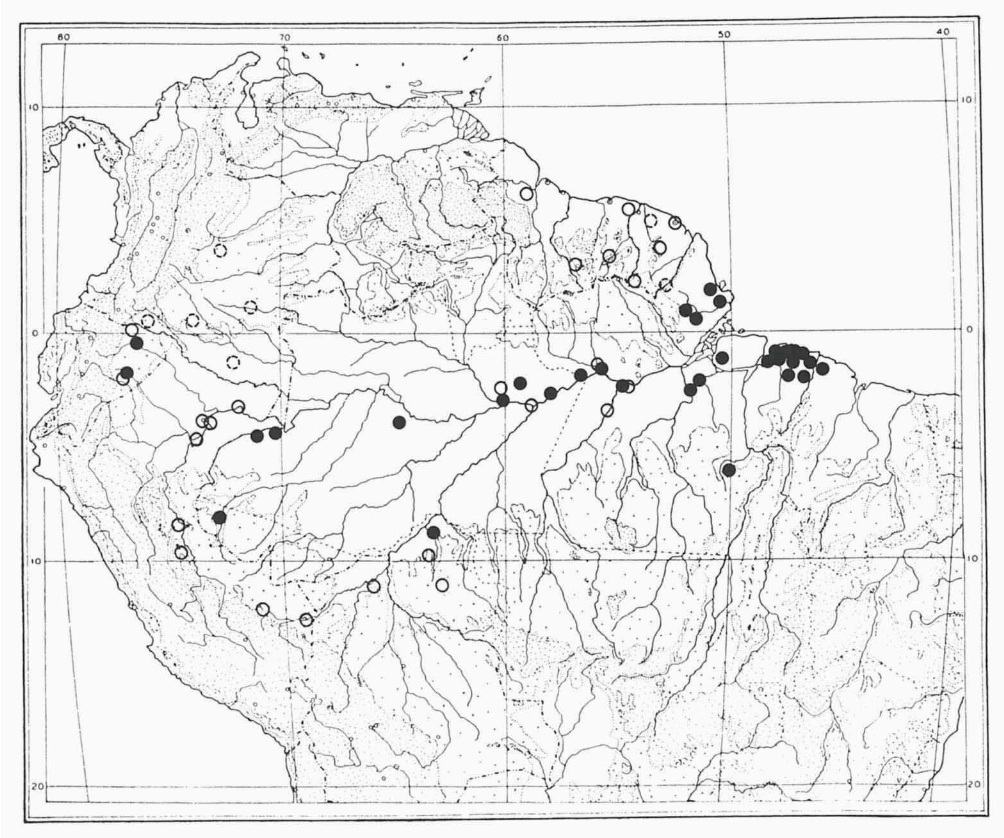


Fig. 25. Distribution of *Anolis ortonii* in northern South America (Atlantic forest not included). Closed circles = material studied; open circles = data from literature (Parker, 1935; Vanzolini, 1972, 1986a; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976, 1981; Duellman, 1978, 1987; Williams & Vanzolini, 1980; Almendariz, 1987; Fugler, 1989; Rodriguez & Cadle, 1990); dashed circles = data by Ayala (1986) for Colombian states.

occurs in part of the Atlantic forest, coastal Brazil, southward to Espírito Santo (Williams & Vanzolini, 1980).

Remarks.— The variation in dewlap colour is much less in this species than in *A. fuscoauratus*. All descriptions of dewlap mention a skin colour somewhere in the range yellow-orange-red. Gasc (1981) mentioned a yellow to orange dewlap in specimens from French Guiana, and Hoogmoed (1973) reported one female from Suriname with a yellow-ochre dewlap. All other descriptions mentioned colours from orange to dark red. Vanzolini (1972) and Duellman (1978) described dewlaps (respectively from Oriximiná and Amazonian Ecuador) with a bicolour skin - orange to red, with yellow around the scales (which were grey or white). Dixon & Soini (1975, 1986) described specimens from Iquitos region, Peru, as having dewlap orange to red with yellow scales, similar to what was observed in MPEG 15117 (Amapá; scales orange-yellow) and MPEG 13051 (southern Pará). In other specimens dewlap scales were white (mostly) or brown/black.

The sample studied suggests the existence of a tendency to a smaller number of scales around midbody in specimens from Amapá and northeastern Pará (including Marajó Island and one specimen from Maranhão) than in specimens from southern and western Pará and from Amazonas; the two specimens studied from Ecuador had the highest counts. As to number of expanded lamellae under fourth toe (less so under fourth finger), specimens from Marajó Island showed the lowest counts, followed by those from northeastern Pará (and Maranhão). All others (including Amapá) had slightly higher, similar counts; one of the specimens from Ecuador had the highest counts. These comparisons have been made with relatively few specimens from each locality, and should be seen only as a possible indication of geographic variation.

A. ortonii is a member of the *fuscoauratus* group of Williams (1976). For a comparison among the Amazonian species of this group, see remarks under *A. fuscoauratus*.

ANSP 11404 was not previously recognized as type of *A. ortonii* (Malnate, 1971), although it was registered as having been collected by Professor Orton in Peru. At my request Mr Edward V. Malnate, from ANSP, compared the specimen with the description by Cope (1869), concluding that it is in fact the holotype (E.V. Malnate, in lit.).

Anolis philopunctatus Rodrigues, 1988
(fig. 26)

Anolis philopunctatus Rodrigues, 1988: 333 (holotype MZUSP 65859, type-locality: INPA/WWF Reserves (2206-Dimona), 90 km NW Manaus, Amazonas); Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 183.

Material.— **Brazil.** AMAZONAS. Rio Uatumã, Município Presidente Figueiredo, present reservoir area of hydroelectric dam Balbina: 1 ♂, INPA 063, 5 km SW mouth rio Pitinga, 07.ix.1985, leg. J. Marinho.

A. philopunctatus? — **Brasil.** AMAZONAS. Rio Uatumã, Município Presidente Figueiredo, present reservoir area of hydroelectric dam Balbina: 1 ♀, INPA 247, igarapé Caititu, 24.vi.1986, leg. R. Gribel; 1 ♀, INPA 263, igarapé Caititu, xi.1987, leg. G. Moreira; 1 ♀, MPEG 14700, xii.1987, leg. D. Peccinini-Seale & C.F. Rocha.

Diagnosis.— "A green anole of the *punctatus* group very close to *Anolis punctatus* but differing from it by an orange dewlap with large black spots" (Rodrigues, 1988).

Description.— Similar to *A. punctatus*, to the description of which I refer, except in the colour of dewlap in male which is orange with large black spots.

Distribution (fig. 26).— Known only from the type-locality and from the present reservoir area of the Balbina Hydroeletric Dam, Rio Uatumã; both localities are in the state of Amazonas, north of Rio Amazonas and east of Rio Negro.

Remarks.— The validity of this species is questionable. In the original description, Rodrigues (1988) remarked that "I have carefully compared the specimens of *philopunctatus* and *punctatus* and no diagnostic differences were found other than the colour of dewlap in male" and that "as dewlap color is the only feature that decisively distinguishes these species, females cannot be identified confidently". If one considers preserved material, even in males a spotted dewlap may be overlooked, because commonly the dewlap is not extended. Thus, variation in the dewlap of *A. punctatus* and *A. philopunctatus* must be ascertained in live (or fresh) specimens from

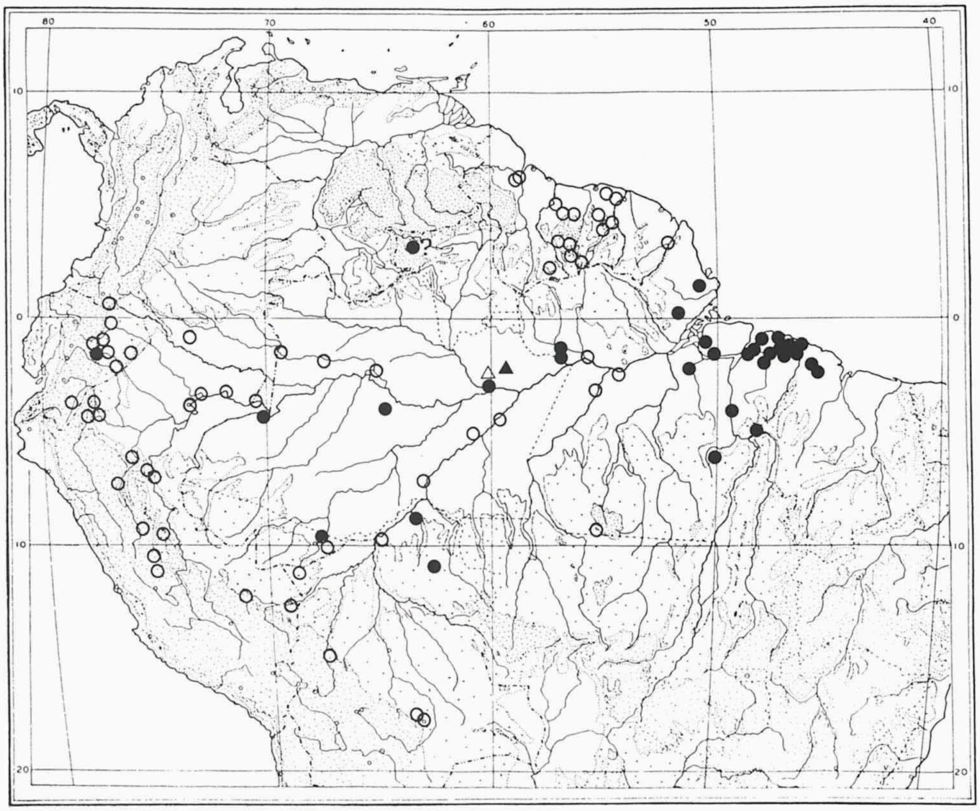


Fig. 26. Distribution of *Anolis punctatus* in northern South America (Atlantic forest not included) (circles) and of *A. philopunctatus* (triangles). Closed symbols = material studied; open symbols = data from literature (Parker, 1935; Peters & Donoso-Barros, 1970; Vanzolini, 1972, 1974; Gasc, 1977, 1981; Williams & Vanzolini, 1980; Meede, 1984; Duellman, 1987; Fugler, 1988a; Rodrigues, 1988; Rodriguez & Cadle, 1990; Martins, 1991); circle with question mark (Roraima) = MPEG 1698 (see text).

a number of localities, to determine whether a constant difference exist between these two nominal taxa.

Zimmerman & Rodrigues (1990) classified the species as an arboreal inhabitant of terra firme upland forest and noted that it is diurnal, non-heliophilic, and insectivorous (including spiders and other small arthropods). Martins (1991) reported a variety of insects (Homoptera, Hymenoptera, Orthoptera, and larvae of Lepidoptera) in three stomachs.

Anolis phyllorhinus Myers & Carvalho, 1945
(figs. 27-29)

Anolis phyllorhinus Myers & Carvalho, 1945: 2 (holotype MNRJ 1804, type-locality: Borba, lower Rio Madeira, State of Amazonas, Brazil); Cunha: 1961: 67; Williams, 1979: 2; Peters & Donoso-Barros, 1970: 63.

A[nolis] phyllorhinus; Williams, 1965: 6.

Dactyloa phyllorhinus; Savage & Guyer, 1989: 107.

Material.— **Brazil.** AMAZONAS. Borba, lower Rio Madeira: holotype, ♂, MNRJ 1804, 14.vi.1943, leg. A. Parko.

Diagnosis.— A green anole, with granular, smooth or keeled dorsals, and larger (but relatively small), smooth or keeled ventrals. Digital expansions well developed. Body and tail slightly to moderately compressed. Mental large, expanded ventrally. A distinct row of sublabials at each side, with scales much larger than median scales on chin. Adult males with a proboscis about as long as the head, vertically flat, flexible and covered with small scales, originating above the rostral (females and juveniles unknown). Dewlap yellow, in males reaching beyond level of forelimbs. Maximum known SVL 71 mm.

Description.— Anole with 71 mm SVL, tail length 152 mm, which represents 2.14 times SVL. Head (not including proboscis) 0.26 times SVL, 1.8 times as long as wide, and 1.1 times as wide as high. Snout relatively long, prolonged by a flexible, vertically flat proboscis, which is 0.72 times the head length when measured from rostral, 1.11 times when measured from the dorsal limit, on middle of snout; height, measured just anterior to rostral, 0.21 times its length measured from dorsal limit; tip round in lateral view. Neck narrower than head and body. Body and tail moderately compressed. Limbs well developed, tibia shorter than thigh, 0.21 times SVL.

Tongue wide, villose. Anterior teeth conical, posterior teeth tricuspid.

Rostral triangular, 2.8 times as wide as long, bordered by nine postrostrals. Median postrostral with a median sulcus and, together with rostral, horizontal in position, facing ventrally, thus forming the ventral base of the proboscis. Upper border of proboscis starting at middle of snout. Proboscis covered with small scales, above snout slightly larger and wider than long; medially, in front of supranasal scales, they are elongate and narrow, toward lower and upper borders becoming wider, and anteriorly roundish. Nasal in contact with postrostrals, directed latero-anteriorly. Scales on snout polygonal, smooth, flat, juxtaposed (pavimentose); nine scales across snout between second canthals. Canthus rostralis well defined, with five elongate, keeled canthals, anterior one small and separated from nostril by two small postnasals. One long, keeled supraciliary aligned with canthals, nearly reaching level of middle of eye, posteriorly followed by granules. Supraorbital semicircles distinct, with nine scales, larger anteriorly; separated medially by one row of scales. Supraocular region with a group of enlarged polygonal, smooth, juxtaposed scales near supraorbital semicircle, elsewhere with granules. Interparietal several times larger than adjacent scales, separated from supraorbital semicircles by one scale. Scales around interparietal polygonal, smooth, juxtaposed, anteriorly slightly larger, laterally and posteriorly grading into granules toward supratemporal and occipital areas. Loreal scales polygonal, longer than wide, forming from two (anteriorly) to four or five (posteriorly) longitudinal rows (four scales in a vertical line under second canthal); scales larger toward supralabials; those on row adjacent to supralabials have a thin keel along their ventral border. A continuous row of three preoculars, three larger suboculars in contact with supralabials, and one smaller subocular not in contact with supralabials; lower preocular (on one side) and suboculars keeled. Seven supralabials on one side, eight on the other, reaching to below centre of eye; followed by small scales to commissure of mouth. Temporal region with small, gra-

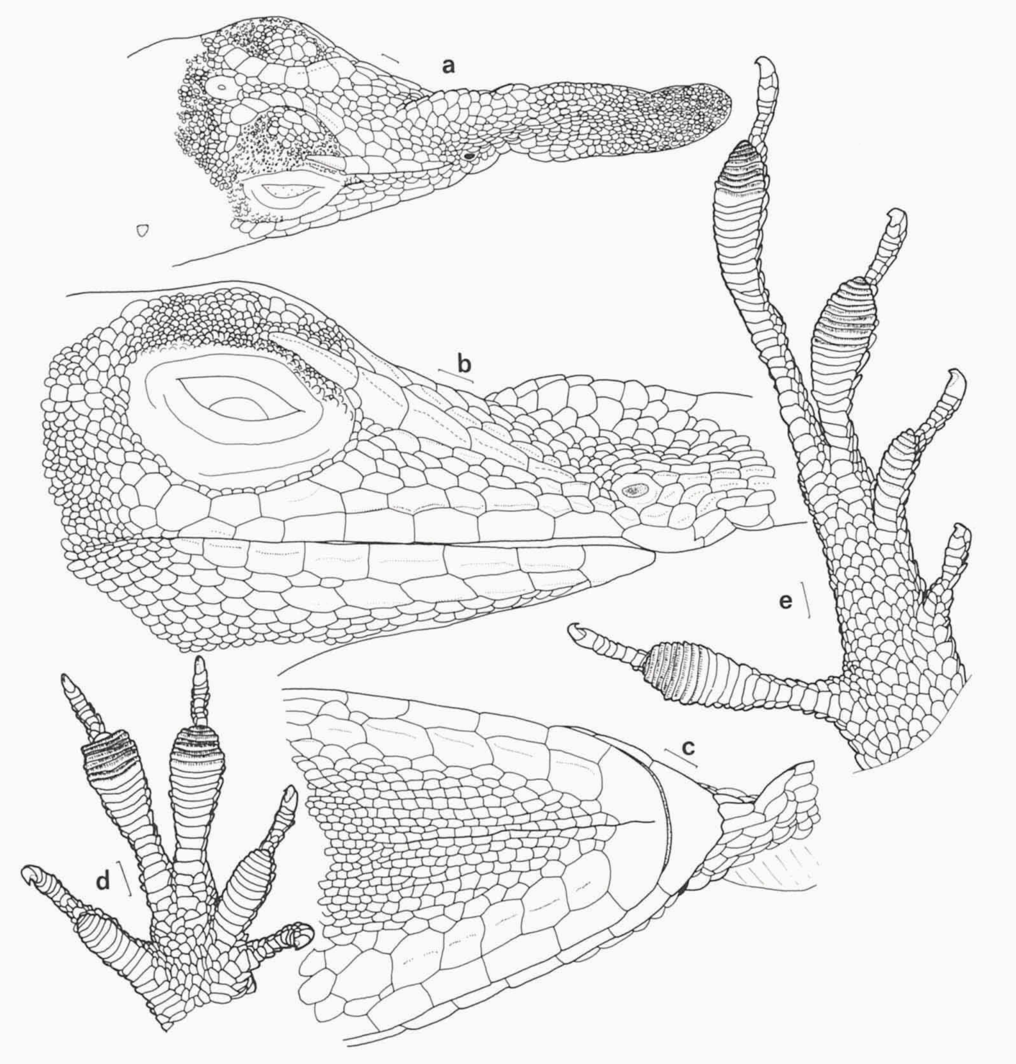


Fig. 27. *Anolis phyllorhinus*, MNRJ 1804 (holotype); a, b, c: dorsolateral, lateral, and ventral views of head; d, e: ventral view of the right hand and right foot.

nular scales, separated from eyelid by a few rows of slightly larger scales, from supratemporal region by a double row of slightly enlarged scales. Ear-opening relatively small, vertically oval, its lower margin at level of commissure of mouth; with smooth margin and short auditory meatus.

Mental formed by two symmetrical semicircles, partially separated by a median cleft, which continues as a midventral sulcus on anterior part of chin; bordered on each side of the sulcus by first infralabial, one sublabial, and two (on one side) or three (on the other side, two of which in one longitudinal row) small, median scales. Seven infralabials, sixth below centre of eye. Chin with five, respectively, six large,

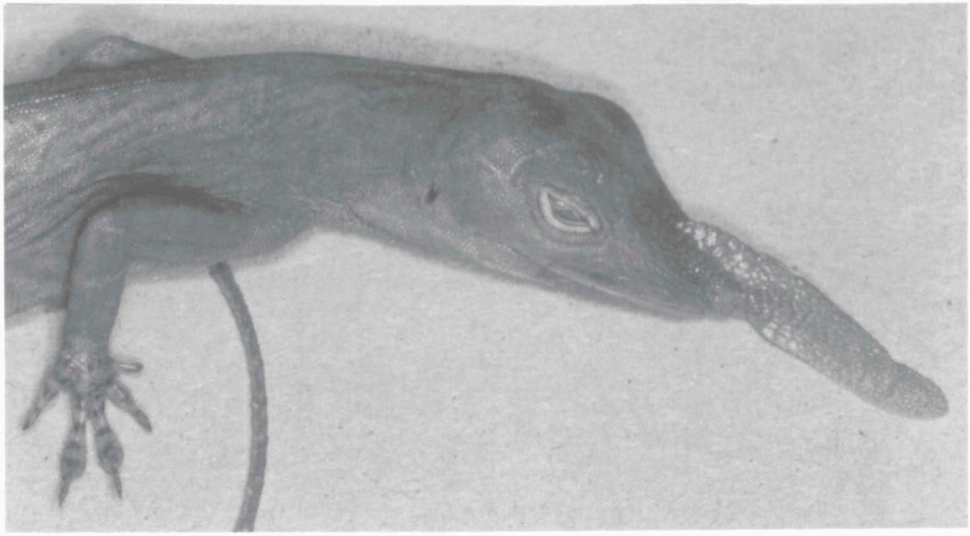


Fig. 28. *Anolis phyllorhinus* Myers & Carvalho, ♂, holotype, MNRJ 1804, Borba, AM, Brazil (T.C.S. Avila-Pires).

broadly keeled sublabials, only posterior one not in contact with infralabials. Chin medially with small, subrectangular scales, which are longer than wide, and arranged in longitudinal rows. Posteriorly these scales become round, and they are in longitudinally oblique, and transverse rows; posterior and medial to sublabials, some polygonal scales of intermediate size. Dewlap, although not extended in the preserved specimen, seems to be well developed, reaching about halfway between level of forelimbs and middle of belly; scales along rim subtriangular (with round corners), imbricate; toward the sides they gradually decrease in size, and are elongate, irregular, surrounded by naked skin, forming approximately longitudinal (partially oblique) rows.

Scales on nape and sides of neck, like dorsals and scales on flanks, small, granular. A double row of vertebral scales, only slightly larger than adjacent scales, distinct from nape to base of tail, anteriorly forming an elevated ridge. Ventrals larger than dorsals, roughly squarish although variable in form, smooth, imbricate. Gradual transition between scales on flanks and ventrals. Scales around midbody 149. Preanal plate covered with small, granular scales. No enlarged postanal scales.

Base of tail wide, dorsally and laterally with numerous small, smooth, juxtaposed to subimbricate scales, which ventrally increase in size toward midventral line. Distally, scales keeled and in longitudinal rows, with a pair of dorsal, and a pair of ventral rows of larger scales; proximally ventral rows, distally also dorsal and lateral rows form distinct longitudinal ridges. Scales on tail arranged in inconspicuous verticils, three pairs of ventrals corresponding to five (proximally) or four (distally) pairs of dorsals.

Scales on limbs mostly small, juxtaposed to subimbricate, smooth. A few rows of slightly larger, hexagonal, keeled scales on anterior surface of forearms. On hind limbs scales slightly larger ventrally than dorsally, with squarish, smooth, subimbri-

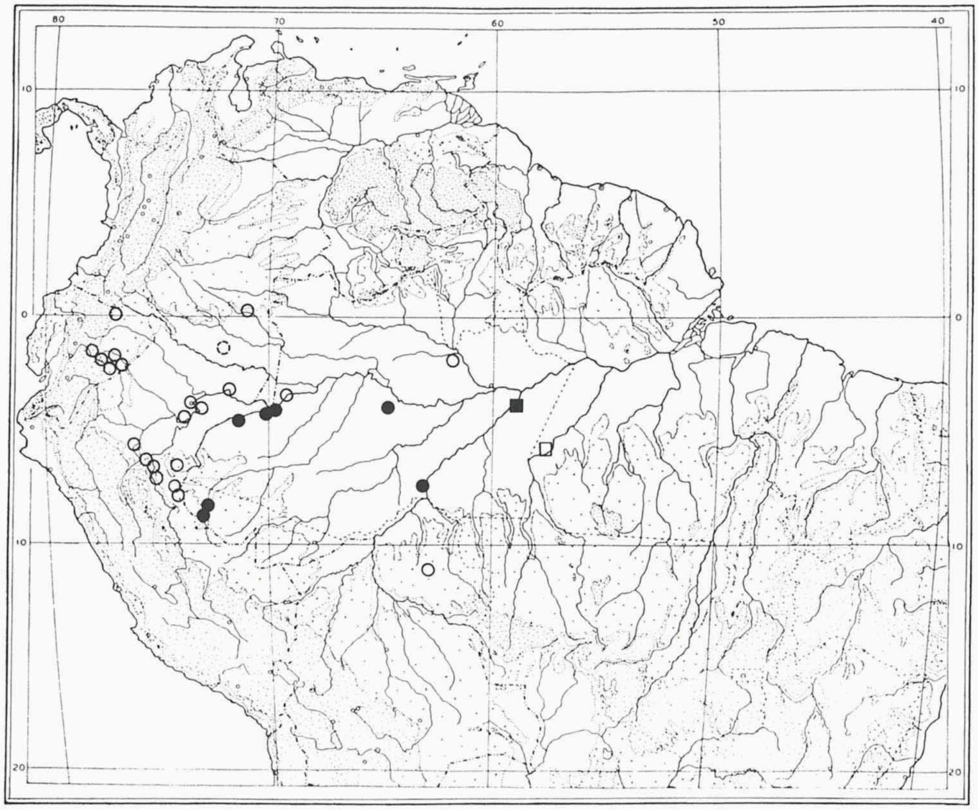


Fig. 29. Distribution of *Anolis phyllorhinus* (squares) and *A. transversalis* (circles). Closed symbols = material studied; open symbols = data from literature (Williams & Vanzolini, 1966; Williams, 1979; Dixon & Soini, 1986; Vanzolini, 1986a) and pers. com. M. Martins for Parque Nacional do Jaú, Amazonas state, Brazil; dashed circle = Amazonas state, Colombia (Ayala, 1986).

cate scales, in vertical rows, on anterior aspect of thighs, ventrally becoming roundish. Digital expansions well developed; 22-28 lamellae under fourth finger, 21-22 to end of digital expansion; 45-47 under fourth toe, 38-39 to end of digital expansion, 25-26 under phalanges two and three.

Colour in life described by Myers & Carvalho (1945), on the basis of a colour sketch made by A. Parko, as bright blue-green, with a yellow dewlap and traces of pink or red on toes, top of snout, and end of rostral appendage.

In preservative the animal is purplish dorsally, cream-colour with a purplish hue ventrally; digits dorsally with light and dark alternate transverse bands.

Habitat.— The holotype was under a fallen tree trunk at 09.00 h in a capoeira (secondary growth) surrounding the town of Borba. No information is available about the second known specimen, except that the locality is a town on the Rio Tapajós and is surrounded by Amazonian forest.

Distribution (fig. 29).— Known from Borba, lower Rio Madeira, Amazonas, and Jacareacanga, Rio Tapajós, Pará (Williams, 1965, 1979).

Remarks.— The species is known only from two specimens, the holotype (MNRJ 1804) and MZUSP 7118, both males. Myers & Carvalho (1945) provided a detailed description and good photographs of the holotype. Williams (1965, 1979) reported the second specimen (MZUSP 7118) and provided drawings of the dorsal and lateral sides of the head. In both papers Williams referred to *A. phyllorhinus* as having 10 scales between second canthals and no scales between semicircles. However, this is not the case in the holotype, nor in his drawing of MZUSP 7118, in which there are nine and one scales, respectively. MZUSP 7118 has 4-5 loreal scales under the second canthal (4 in the holotype), and the interparietal is separated from the supraorbital semicircles by 1-2 scales (1 in the holotype).

Williams (1965) included the proboscis anoles in the *punctatus* group. However, Williams (1979) considered them to be a group separate from the *punctatus* group, and called it *A. laevis* group. Although this division may be useful in some ways, it may conceal the apparent close relationship between these two groups. The only difference between *A. phyllorhinus* and *A. punctatus* seems to be the proboscis, and if the supposition that females do not have a proboscis is correct, it may be quite difficult to distinguish them from females of *A. punctatus*. If one considers that *A. punctatus* itself has a prominent snout, one can imagine that a tendency to develop some kind of protuberance on the snout is a characteristic of this group as a whole (*punctatus/laevis*), and that the proboscis is a parallel development in several species.

Williams (1979) proposed tentatively that the proboscis might function to increase the apparent size of the animal, perhaps as a response to sexual selection.

Anolis punctatus Daudin, 1802
(figs. 26, 30, 31, 234, 235)

Anolis punctatus Daudin, 1802b: 84 (holotype MHNP 2340, type-locality: South America); Duméril & Duméril, 1851: 57; Guichenot, 1855: 16; Boulenger, 1885b: 57; Goeldi, 1902: 16, 30; Burt & Burt, 1933: 19; Rand & Humphrey, 1968: 6; Vanzolini, 1970b: 37, 1972: 93, 1974: 66, 1986a: 13, 1986b: 5; Crump, 1971: 19; Hoogmoed, 1979: 278; Cunha et al., 1985: 25; Nascimento et al., 1988: 29, 1991: 39; Gascon & Pereira, 1993: 181.

Anolis violaceus Spix, 1825: 15 (holotype lost, type-locality: 'confinibus Parae', which according to Vanzolini, 1981a, represents the outskirts of Belém, Pará, Brasil).

Anolis boulengeri O'Shaughnessy, 1881: 242 (holotype BM 1946.8.12.92, type-locality: Canelos, Ecuador); Boulenger, 1885b: 58; Williams & Vanzolini, 1980: 106.

Anolis catenifer Ahl, 1925: 85 (holotype ZMB 27812, type-locality: Brazil); Amaral, 1937b: 174.

A[nolis] punctatus; Williams, 1965: 6.

Anolis punctatus punctatus; Peters & Donoso-Barros, 1970: 64; Hoogmoed, 1973: 141.

Anolis punctatus boulengeri: Peters & Donoso-Barros, 1970: 64; Vanzolini, 1986b: 5.

[*Anolis*] *Punctatus*; Williams, 1982: 29.

?*Anolis p. punctatus*; Hoogmoed & Gruber, 1983: 389.

[*Dactyloa*] *punctata*; Savage & Guyer, 1989: 108.

Material.— **South America.** Holotype, ♀, MHNP 2340.
Brazil. ACRE. 29 km N of Rio Branco, along road AC-010 (Rio Branco-Porto Acre), Projeto Humaitá, km 2 RBR-304: 1 ♂, MPEG 16011, 01.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAPA. Município de Amapá, Reserva DNRu, posto no. 04, igarapé Ariramba, affluent of Rio Tartarugal Grande: 1 ♂, MPEG 2766, 18.vii.1969, leg. F.P. Nascimento. Município de Mazagão, Rio Camaipi, tributary on the left bank of Rio Maracá: 1 ♂, MPEG 2635, Cachoeira Amapá, 15.vi.1969, leg.

F.P. Nascimento; 1 ♂, MPEG 2636, Cachoeira Inajá, 24.vi.1969, leg. F.P. Nascimento.
AMAZONAS. Manaus, campus INPA/V-8: 1 ♀, MPEG 16133, 19.vii.1989, leg. M.S. Hoogmoed. Porto Urucu, Rio Urucu, S of Tefé: 1 ♀, MPEG 15846, 19.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Urucu, 3 km S of headwaters (Petrobras area): 1 ♀, INPA (no number), v.1989, leg. C. Gascon. Rio Solimões, Benjamin Constant: 1 ♀, RMNH 25920, W of the city, 16.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 2 ex., MNRJ 3617-18, vi.1950, leg. J.C.M. Carvalho.
MARANHAO. Nova Vida, BR-316, 25 km from Rio Gurupi: 1 ♂, 1 ♀, MPEG 10598, 10701, iii.1976, leg. O.R. Cunha & F.P. Nascimento; 2 ♂♂, 2 ♀♀, MPEG 11307-310, 24.x.1977, leg. F.P. Nascimento; 1 ♀, MPEG 12042, x.1978, leg. F.P. Nascimento & Rosemiro; 2 ♂♂, MPEG 12261-262, ii.1979, leg. O.R. Cunha & F.P. Nascimento.
PARA. Ilha de Marajó, Município de Breves, km 6-7 of road PA-159, Breves-Anajás: 3 ♀♀, 1 ♂, MPEG 14735, 14736, 14760, 14763, 28.xi-05.xii.1987, leg. I. Fiock dos Santos, R. Moraes & S. Ramos. Ilha de Marajó, Município Anajás, Rio Aramá, Vila Nova do Aramá: 2 ♂♂, 1 ♀, 5 ex., MPEG 2374, 2378-84, 22-27.ix.1968, leg. O.R. Cunha. Belém, Bosque Rodrigues Alves: 3 ex., MNRJ 3613-15, 28.x.1944, leg. M. Valle. Piratuba, Município de Abaeté: 2 ex., MNRJ 3629-30, xii.1937, leg. A.L. Carvalho. Carajás, Serra Norte: 2 ♂♂, 1 ♀, MPEG 12991-993, Angical, Rio Itacaiunas, 22.viii.1983; 1 ♂, MPEG 14255, area of igarapé Azul, close to road N1-Pojuca, 12.xi.1985; all leg. T.C.S. Avila Pires & R.J.R. Moraes. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 1 ♂, MPEG 16413, 28.x.1992; 1 ♂, RMNH 26652, 02.xi.1992; 1 ♀, MPEG 16465, 10.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Cruz Alta, 6 km S of Rio Trombetas: 1 ♀, RMNH 25919, 07.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Road from Sítio Céu Estrelado to Cruz Alta, Between Nhamundá and Trombetas rivers, c. 50 km N of Céu Estrelado: 1 ♀, MPEG 15338, 05.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; 1 ♂, RMNH 24684, near igarapé Jamari, 14.xii.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Nhamundá, Cabeceira Urucuxi, N of Sítio Céu Estrelado, 16 km N of Faro: 1 ♂, MPEG 15422, 13-14.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Ouro Preto d'Oeste, Ecological reserve of INPA: 1 ♀, MPEG 14489, 21.viii.1986, leg. T.C.S. Avila Pires & R.J.R. Moraes. Rio Jamari, reservoir area of hydroeletric plant Samuel: 2 ♂♂, CEPB 0231, 0311, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.
Ecuador. Canelos: Holotype *A. boulengeri*, ♀, BM 1946.8.12.92, leg. Buckley.
Anolis cf. *punctatus*: 1 ♀, MPEG 1698, Roraima, Serra Parima, alt. 1200 m, iv.1962, leg. J. Hidasi.
Besides those listed extensively under 'material', the MPEG collection has specimens from the following localities: MARANHAO. Município do Arari, BR-222, Gancho do Arari. Município Pinheiro, road BR-316 (Pará-Maranhão), Paruá. PARA. Road BR-316, Colônia Nova (near Rio Gurupi). Viseu, Limondêua, Fazenda Real. Viseu, Bela Vista. Viseu, km 224 (former km 74) of road BR-316. Município Augusto Correa, Cacoal. Santa Luzia, road PA-253, 15 km from Capitão Poço. Capitão Poço, São Pedro. Bragança, Parada Bom Jesus. Ourém, Limão Grande. Ourém, Puraquequara (road to Limão Grande). Santarém Novo, Trombetinha (road to Salinas). Belém (Estação Experimental de Una; Utinga; Mocambo). Ilha do Mosqueiro. Rio Pirajauara, road to Acará. Km 16 of road to Acará. Km 72 of road PA-70 (to Marabá). Rio Tocantins, present reservoir area of hydroeletric dam Tucuruí (between Jacundá and Ilha das Cobras; Rio Arapari; Cocal). Carajás, Serra Norte (Manganês do Azul; surroundings N-1; Pojuca; along road N1-Caldeirão; Rio Itacaiunas; Rio Gelado).

Diagnosis.— A green anole, with granular, smooth or keeled dorsals, and larger (but relatively small), smooth or keeled ventrals. Digital expansions well developed. Body and tail slightly to moderately compressed. Mental large. A distinct row of sublabials at each side, with scales much larger than median scales on chin. Dewlap yellow to deep orange, in males reaching slightly beyond level of forelimbs, distinctly smaller in females. Adult males with a protuberant snout. Maximum SVL 90 mm.

Description.— Anole with maximum SVL in males of 90 mm (MPEG 2766), in females of 81 mm (MPEG 2380, MPEG 11309). Head 0.25-0.29 (0.27 ± 0.01, n= 34) times SVL, 1.6-2.1 (1.86 ± 0.11, n= 33) times as long as wide, and 1.1-1.3 (1.19 ± 0.06, n= 33) times as wide as high. Snout long, with a variably developed knob in males, blunt in females; frontal region depressed; parietal region slightly swollen. Neck distinctly narrower than head, less so in relation to body. Body and tail slightly compressed. Limbs well developed, forelimbs 0.34-0.41 (0.38 ± 0.02, n= 23) times SVL, hind limbs 0.62-0.74 (0.67 ± 0.04, n= 19) times, tibia 0.20-0.23 (0.22 ± 0.01, n= 34) times. Tail 2.2-2.5 (2.28 ± 0.09, n= 30) times SVL.

Tongue wide, villose, tip nicked. Anterior teeth conical, posterior teeth tricuspid.

Rostral nearly triangular, not or just visible from above, either in a vertical position, or oblique and projecting forward. Postrostrals 5-12, mostly 8-10. Nasals in direct contact with rostral, or separated from it by postrostrals. Scales on snout, between nostrils, longer than wide, keeled, juxtaposed, small or, in males with a well developed knob on snout, fewer and larger, with a middorsal row of larger scales. Posteriorly, scales polygonal, smooth, juxtaposed; 8-14, mostly 10-11, scales across snout at level of second canthal. Canthus rostralis well defined, with 5-10, mostly 6-8, canthals, increasing in size posteriorly. Supraorbital semicircles distinct, except at their posterior end; with 7-12 scales; semicircles separated from each other by 0-2, mostly one, scales. Supraocular region with a group of large, smooth, juxtaposed, irregularly polygonal scales, surrounded by granules. One long supraciliary, in some specimens followed by one to three shorter ones, occupying about half of orbital length, posteriorly followed by granules. Occipital area with irregularly polygonal, juxtaposed, smooth scales, smaller posteriorly; interparietal several times larger than adjacent scales; 1-3, mostly two, scales between interparietal and supraocular semicircles. Parietal region covered with small scales. Loreal scales irregularly polygonal, longer than wide, in longitudinal rows, larger toward supralabials; row adjacent to canthals with a median keel, others with a keel near their lower margin; 4-6, exceptionally seven, scales in a vertical row at level of second canthal. Suboculars 4-9, mostly 6-8, large, keeled; 3-4 (exceptionally two) in contact with supralabials. Eyelids covered with minute granules, with two rows of larger scales bordering the rim. Supralabials 8-11, 7-10 to below centre of eye. Temporal region with small, granular scales, separated from eyelids by a few rows of larger scales, and from parietal region by a double row of larger scales. Ear-opening relatively small, vertically oval to subtriangular, its lower margin at level of commissure of mouth; with smooth margin and short auditory meatus.

Mental large, roughly semicircular, indented by adjacent scales; semidivided by a median cleft, which continues as a midventral sulcus on anterior part of chin; bordered on each side of sulcus by first infralabial, one sublabial, and one to three, mostly two, small, median scales. Infralabials 7-12, 6-9 to below centre of eye. Chin with a row of large, keeled, sublabials, 3-5 in contact with infralabials; medially scales distinctly smaller, decreasing in size toward midventral line and posteriad. Scales on throat from small and keeled to granular. Dewlap well developed in males, reaching slightly beyond level of forelimbs; laterally with approximately longitudinal, widely separated rows of pyramidal, laterally flattened, isolated, scales; along rim scales mostly smooth, imbricate, with round posterior margin. Females with a small dewlap, covered with rather small, pyramidal scales.

Scales on nape granular, keeled. Males with a low vertebral fold, from nape to base of tail (absent in females). Dorsals granular, juxtaposed, smooth or keeled.

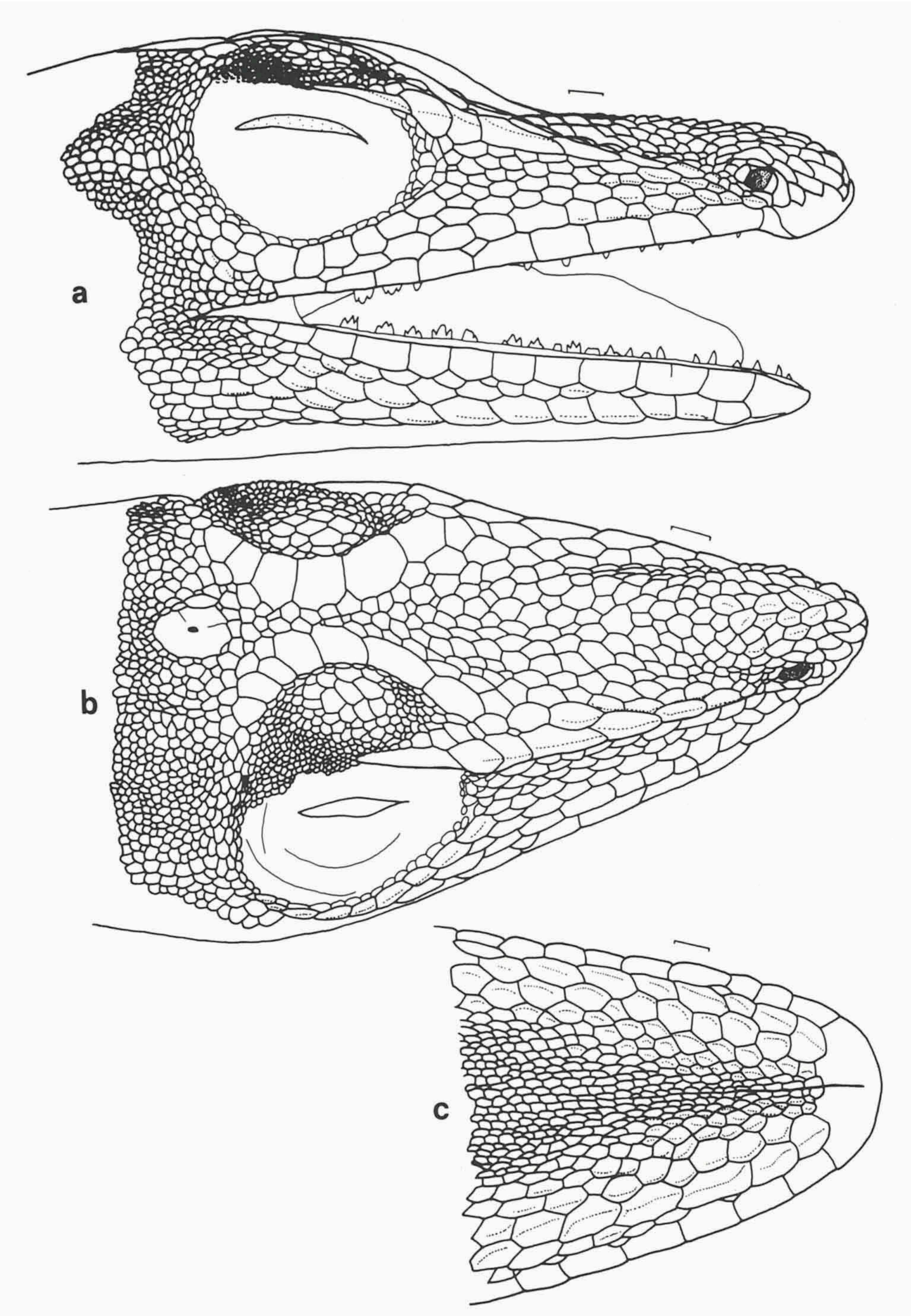


Fig. 30. *Anolis punctatus*, MPEG 13299; a, b, c: lateral, dorsal, and ventral views of head.

Scales on flanks similar, smooth, changing gradually toward ventrals, which are much larger, roughly round or oval, subimbricate, smooth or slightly to distinctly keeled. Scales around midbody 132-167 (145.1 ± 10.0, n= 33). Preanal plate with small, juxtaposed, relatively uniform scales. Enlarged postanal scales may be present in some specimens.

Base of tail wide, with numerous small, keeled, subimbricate scales dorsally and laterally; ventrally scales smooth, increasing in size toward midventral line. Tail distally with large, polygonal, subimbricate scales, in a few longitudinal rows; the pair of ventral, and the adjacent ventrolateral, rows larger; all scales with pronounced keels, which form longitudinal ridges. Part of tail with verticils, 3-4 ventral scales corresponding to 4-6 dorsal scales.

Scales on forelimbs small, keeled, subimbricate, larger on anterior aspect of forearms and around wrist. Hind limbs with large, keeled, subimbricate scales on their anterior aspect, similar but smaller on posterior aspect of lower legs, granular elsewhere. Digital expansions well developed; 26-32 (28.9 ± 1.7, n= 67, 34 specimens) lamellae under fourth finger, 19-25 (22.3 ± 1.5, n= 67, 34 specimens) to end of digital expansion; 35-47 (42.6 ± 2.2, n= 66) lamellae under fourth toe, 29-40 (36.1 ± 1.9, n= 68, 34 specimens) to end of digital expansion.

In life, *A. punctatus* presents two colour phases, a green one and a purplish-brown one, and is able to change relatively fast from one colour to the other. Among the field notes I have, colour change was registered for MPEG 14735 (Ilha de Marajó), MPEG 13010 (Carajás), MPEG 15338 (Faro), MPEG 16133 (Manaus), RMNH 25920 (Benjamin Constant), MPEG 16011 (Acre), and for one male from Rondônia which was not captured. Some examples of colour description follow. MPEG 15338 (♀), when collected, was light grass green with light blue spots on flanks, posteriorly acquiring a dark pattern along back; when dead, before fixation, its head was dorsally shamrock-green (162D), with labial region and border of eyelids yellow-green (58); back parrot-green (60), with robin's egg blue (93) spots on flanks; ventrally, head opaline-green (162D), dewlap spectrum-yellow (55), belly greenish-white; limbs and proximal part of tail similar to body, tail distally fawn-colour (25) and olive-brown (28); tongue orange-yellow (18), iris reddish-brown. MPEG 15846 (♀) was parrot-green (60), with border of eyelids straw-yellow (56); ventrally, head greenish-white, gular region and dewlap yellow, elsewhere white; base of tail similar in colour to body, distally hair-brown (119A) and light drab (119C). RMNH 25920 (♀) when collected was green with bluish spots, afterwards becoming dark purplish-brown with blue spots; ventral region purplish-white, dewlap yellow to greenish; iris light brown, tongue orange. MPEG 16011 (♀) was shamrock-green (162B) to peacock-green (162C), with small, light-sky-blue (168D) spots throughout body, limbs and proximal part of tail; a sulphur-yellow (157) rim around eyelids; ventral region opaline-green (162D), paler under anterior part of head; dewlap spectrum-orange (17) with greenish-white scales; tail distally brown; iris reddish-brown with a pale rim around pupil; tongue chamois. It was green when first seen, but soon after being collected it assumed a dark purplish-brown colour, later on changing again into green. M.S. Hoogmoed (field notes) described MPEG 16133 (♀) as grass-green in life, dewlap butter-yellow with brown scales; after killing it became purple with grey-green spots. MPEG 14255 (♂) had a spectrum-orange (17) dewlap with pale neutral grey (86) scales.

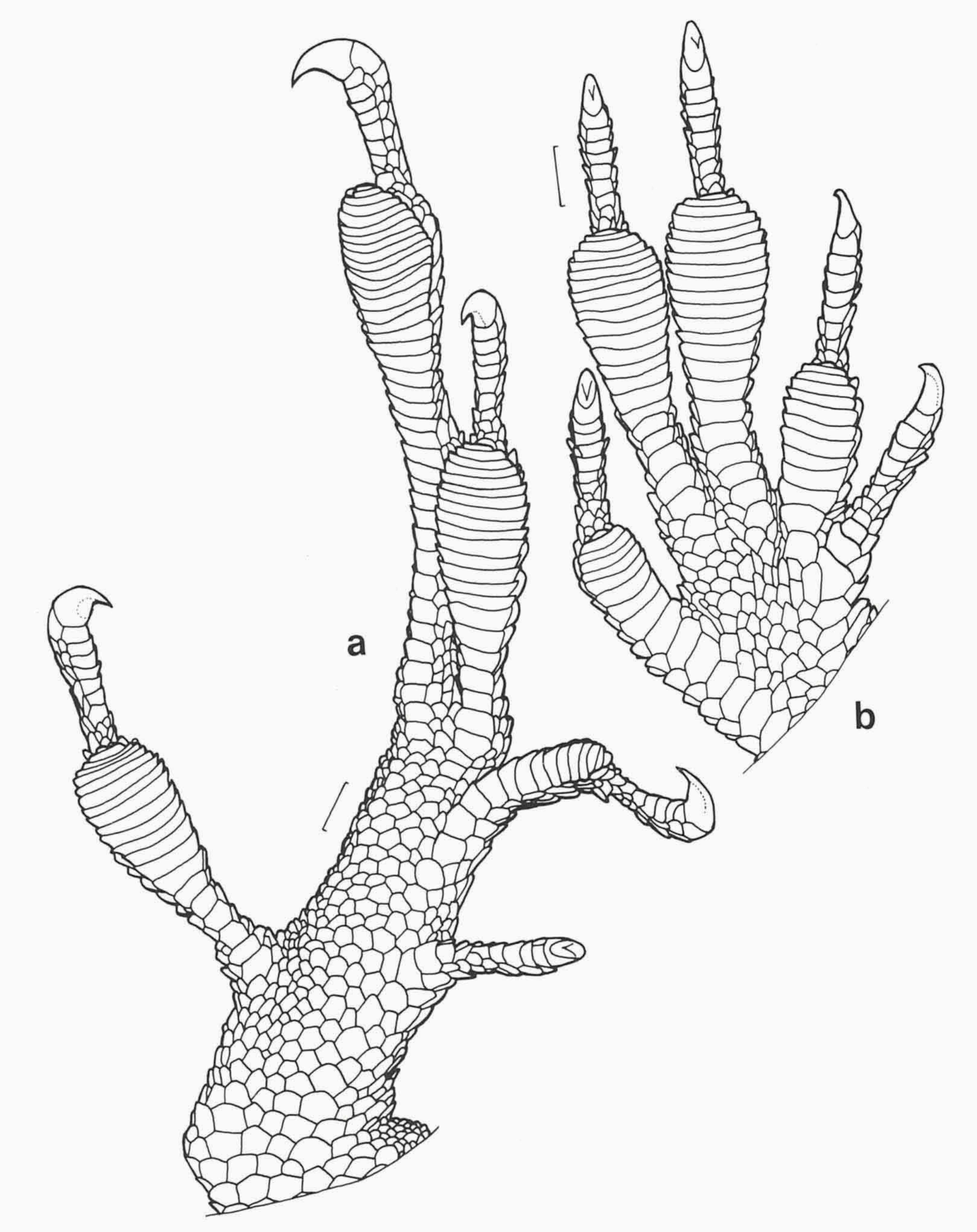


Fig. 31. *Anolis punctatus*, MPEG 13331; a, b: ventral view of right foot and right hand.

Descriptions of colour in life are also given by Beebe (1944b), Hoogmoed (1973), Dixon & Soini (1975, 1986), Duellman (1978), Gasc (1981, 1990), Meede (1984), and Nascimento et al. (1988). According to Meede (1984), juveniles (of indetermined size) have a more brownish, instead of green, colour. The smallest specimen seen by me (MPEG 15338, 49 mm svl) was green, as described above.

Colour in preservative light bluish or purplish grey, to purple or purplish-brown, with or without small, round, light bluish (over dark background) or dark (over light background) spots on flanks; in the holotype (MHNP 2340) a series of elongate dark spots along vertebral region is present. Unlike all other specimens observed, INPA (no number), from Urucu, has a light vertebral stripe from nape to tail. Ventral region whitish or light purplish, with or without dark spots.

Habitat.— An arboreal forest dweller, *A. punctatus* occurs at varying heights on trees; it is rarely seen on the ground. Among 25 specimens about which data are available, 16 were first seen on a tree trunk, three on a fallen trunk, two on stems of palms, and one each on a stem of a small tree, a branch, a thick vine, and running on the ground. MPEG 14010 was eating an insect on a fallen tree trunk. Of 19 specimens, two were less than 1 m above the ground, eight between 1 and 2 m, six between 3 and 4 m, one at c. 5 m high, and two specimens were noted as being "high" or "very high". Hoogmoed (1973) mentioned a specimen collected in the crown of a tree (10 m high) immediately after it was felled. Gasc (1990) mentioned the species as an inhabitant of the canopy. Meede (1984) observed a correlation between rainfall and height in the vegetation; during rainy periods individuals occupied predominantly lower sites (1.5-2 m high), but in dry periods they were higher on tree trunks and in the canopy (> 10 m high). Both Rand & Humphrey (1968) and Meede (1984) observed individuals coming to the ground to feed. The only specimen, among the material with field data, collected at night (21:30 h), MPEG 16011, was along a tractor road through terra firme forest; it was sleeping on a palm leaf, 5 m above the ground. Hoogmoed (1973) reported an individual sleeping on a large leaf of a small tree which was overhanging a creek. Duellman (1978) reported three sleeping individuals, all less than 1.5 m above the ground on bushes. Meede (1984) mentioned individuals observed at night, during rainy periods, on leaves of shrubs, more often on lianas, 2-3 m above the ground. *A. punctatus* occurs in primary and secondary forests, edge situations (e.g., forest edge, river banks), and even in some arboreous areas in cities (like Belém and Manaus). Crump (1971) and Williams & Vanzolini (1980) mentioned *A. punctatus* both in terra firme and varzea forests. Vanzolini (1972) reported one specimen in igapó, on an açaí palm (*Euterpe oleracea* Martius). Meede (1984) and Gasc (1976) noted their presence near human habitations.

Notes on natural history.— This diurnal lizard usually is in shade, but Hoogmoed (1973) reported an adult male (then deep purple with blue spots) and Duellman (1978) a juvenile, that were basking. Rand & Humphrey (1968) noted that cloacal temperatures of several individuals were close to air temperature at time of capture; this similarity is characteristic of nonheliothermic lizards. Active animals were observed by me between 09:30 h and 16:15 h; a sleeping specimen was collected at 21:30 h. Most lizards observed in the wild are green and become completely or partially purple after being caught (this was also true for MPEG 16011, collected at night). If they are undisturbed for some time, the green colour returns. However, MPEG 13010 and the specimen mentioned above were purple when seen and turned green after capture. This suggests that change in colour, rather than the purple colour, is a reaction to disturbance. Meede (1984) observed that resting animals are whitish, but with the slightest light, the green pigment appears fast, first on head, then on legs.

Individuals usually are solitary, but MPEG 12976-977 (♂♂) were running after each other, on a tree trunk, and MPEG 13299-13300 (♂♂) also were running on slender tree trunks; one was all green, the other dark, and the former apparently pursuing the latter. MPEG 12991-993 (2 ♂♂, 1 ♀) were collected in a relatively small area, which had been recently cleared; one was on a thick tree trunk, one on a thick vine, and the other running on the ground. Rand & Humphrey (1968) and Hoogmoed (1973) reported cases where a male and a female were found on the same or adjacent perches. Escape behaviour was observed in two individuals; both reacted by moving up. MPEG 14763 was initially 1 m above the ground on a tree trunk and moved to a height of 3 m; MPEG 15338 was near the base of a *Cecropia* trunk on the border of a road and climbed to about 4 m high. Vanzolini (1972) and Meede (1984) also reported animals fleeing upward, or "by jumping on adjacent leafy vegetation, such as vines and saplings" (Vanzolini, 1972).

Hoogmoed (1973) and Duellman (1978) reported stomach contents, with orthopterans, ants and beetles, among other insects, constituting an important part of the diet. Duellman (1978) reported a specimen in the stomach of the snake *Imantodes c. cenchoa* (Linnaeus).

Hoogmoed (1973) reported gravid females found in August and early September, which corresponded to the early long dry season in Suriname. Data by Dixon & Soini (1975, 1986) and Duellman (1978) suggested reproduction throughout all or most of the year. One or two oviductal eggs were reported (Hoogmoed, 1973; Dixon & Soini, 1975, 1986; Duellman, 1978; Almendáriz, 1987), up to 18.6 mm in length (Duellman, 1978).

Distribution (fig. 26).— Widespread in Amazonia; present probably throughout French Guiana and Suriname, and in parts of Guyana, Venezuela (questionable, mentioned by Donoso-Barros [1968] for Territorio Amazonas, but his only reference [Boulenger, 1885b] does not list specimens from Venezuela), Colombia, Ecuador, Peru, Bolivia (Fugler, 1988), and Brazil. In Brazil throughout all or most of Amazonia (Amapá, Maranhão, Pará, Amazonas, Rondônia, Acre; doubtfully in Roraima — see Remarks), and also in the Atlantic forest, with its southernmost limit in Boraceia, São Paulo (Vanzolini, 1972).

Remarks.— Among the material studied, one specimen, MPEG 1698 (♀), is of doubtful identification. It is quite bleached but still shows a faint pattern of alternate lighter and darker bands along the vertebral region, best seen on the tail. There are some dark areas on the flanks, but it is not clear if these were part of transverse bands, or an artifact of preservation. The number of scales around midbody (122) is lower than usual for *A. punctatus*; the number of scales on snout (8) and of loreal scales (4; both at level of second canthal) are in the lowest part of the range for *A. punctatus*. This specimen is from Serra Parima, in Roraima, alt. 1200 m, where *A. punctatus* has not otherwise been reported. More material from this area is needed to permit a confirmation of the occurrence of the species in the area.

A. boulengeri was described from Ecuador on the basis of its keeled ventrals, whereas in *A. punctatus* the ventrals are smooth; this distinction was later accepted as being of subspecific value (e.g., Peters, 1967; Peters & Donoso-Barros, 1970; Hoogmoed, 1973). However, Williams & Vanzolini (1980) showed that in central Amazonia this character was randomly distributed, and some populations were mixed or intermediate. The specimens I studied agree with the data by Williams & Vanzolini (1980). All specimens from Amapá, Pará, and Maranhão, and the only ones seen from Acre and from Balbina and Manaus (in eastern Amazonas) had smooth ventrals; the few specimens examined from Rondônia and from Urucu and Benjamin Constant (in western Amazonas) had part or all ventrals from slightly to distinctly keeled.

Williams (1982) pointed out two characteristics (the dewlap colour and the presence of a purple phase) of *A. punctatus* that seemed to vary geographically. Thus, based on Hoogmoed's (1973) and Dixon & Soini's (1975) descriptions, he suggested that *punctatus punctatus* had a more yellow dewlap, whereas in *punctatus boulengeri* it was more reddish (a deeper shade). Other data do not support this idea. Duellman (1978) mentioned for *boulengeri* from Ecuador a yellow or orange-yellow dewlap; among the material I studied, a spectrum-orange dewlap was observed in specimens from Carajás (southern Pará) and Acre, more yellow shades (spectrum-yellow, butter-yellow, yellow to greenish) in specimens from between the Nhamundá and Trombetas rivers (Pará), Manaus, Urucu, and Benjamin Constant (Amazonas). The variation does not follow an east/west orientation, neither does it coincide completely with the presence of keeled scales. Regarding the purple phase, Williams (1982) wondered whether it was a general characteristic of *A. punctatus*. A purple phase was explicitly mentioned by Beebe (1944b, British Guiana), Hoogmoed (1973, Suriname), Dixon & Soini (1975, 1986; Iquitos region, Peru), Gasc (1990; French Guiana). Here it is reported for specimens from Pará, Amazonas, and Acre. A purple phase was not mentioned by Duellman (1978), and Williams (1982) noted that "Vanzolini has not noticed such a purple phase in the *punctatus* of Amazonia and eastern Brazil *punctatus* that he has caught". In none of these cases was there a preoccupation of the observer to look for a purple phase, so it may have simply been overlooked (as was probably the case for Amazonia, mentioned by Vanzolini in Williams, 1982). Until there is a positive evidence of absence of a purple phase in *A. punctatus*, I prefer to consider it as a general characteristic of the species.

A. violaceus Spix has been recognized as a synonym of *A. punctatus* by Duméril & Bibron, 1837, an opinion followed by most subsequent authors. However, Hoogmoed & Gruber (1983) on the basis of the description and drawing in Spix (1825) doubted that assignment and argued that *A. violaceus* might be a synonym of *A. ortonii*. I disagree with that suggestion. In my view, the original description and drawing do not permit any firm identification (and it has to be remembered that it was based, according to Wagler, 1830, in Hoogmoed & Gruber, 1983, on a 'very young and damaged specimen'). However, the name *violaceus* is highly suggestive, and among the anoles from Pará it recalls immediately *A. punctatus*. Therefore, I see no reason to doubt the widely accepted opinion that *A. violaceus* is a synonym of *A. punctatus*.

A. punctatus is part of the *punctatus* group of Williams (1976), to which also belong *A. transversalis* and *A. philopunctatus*. A comparison among the eastern members of the group (not including *A. philopunctatus*, which was described later) was made by Williams (1982). The group formerly included the proboscis anoles (Williams, 1965), which were later considered as a separate (*laevis*) group.

Specimens from the Atlantic forest have been named several times, especially in the last century. See Peters & Donoso-Barros (1970) for a complete list of synonyms.

Also, see remarks under *A. philopunctatus* and *A. phyllorhinus*.

Anolis trachyderma Cope, 1876
(figs. 32, 33, 236)

Anolis trachyderma Cope, 1876: 168 (holotype ANSP 11363, type-locality: Nauta, Peru); Boulenger, 1885b: 87; Goeldi, 1902: 16, 31; Peters & Donoso-Barros, 1970: 67; Vanzolini, 1972: 93.
Anolis leptoscelis Boulenger, 1885b: 92 (syntypes BM 67.9.17.13-15 and BM 84.12.18.8, type-localities: Pebas, and Yurimaguas, Huallaga river, both in Peru); Peters & Donoso-Barros, 1970: 58; Goeldi, 1902: 16, 32.
Anolis macropus Cope, 1885: 101 (holotype unknown, type-locality: Pebas, Peru).
Anolis garbei Amaral, 1933: 62 (holotype MZUSP 706, type-locality: Monte Cristo, região do rio Tapajós, Pará, Brasil); Amaral, 1937a: 1735, 1937b: 174, 1949: 109; Cunha, 1961: 59.
[*Norops*] *trachyderma*; Savage & Guyer, 1989: 110.

Material.— **Brasil.** ACRE. Feijó: 2 ex., MCZ 65575-576, leg. P.E. Vanzolini. Rio Juruá (right bank), Porongaba (8°40'S, 72°47'W): 1 ex., INPA 562, 15.ii.1992, leg. C. Gascon. Rio Juruá (left bank), Sobral (8°22'S, 72°49'W): 1 ex., INPA 633, 09.iii.1992, leg. C. Gascon. Rio Juruá (right bank), Nova Vida (8°22'S, 72°49'W): 1 ex., INPA 638, 10.iii.1992, leg. C. Gascon.
AMAZONAS. Rio Juruá (left bank), Condor (6°45'S, 70°51'W): 1 ex., INPA 443, 21.ix.1991, leg. C. Gascon. Rio Juruá, (left bank), Lago Jainu (6°28'S, 68°46'W): 1 ex., INPA 466, 16.x.1991, leg. C. Gascon. Forest about two hours walk from Teresina, which is two hours by motorboat downriver from Leticia: 1 ex., MCZ 100378, 11.viii.1966, leg. P.A. Silverstone. Rio Solimões (northern bank), Tabatinga: 1 ♂, RMNH 24657, 11.xi.1985, leg. M.S. Hoogmoed; 1 juv., RMNH 25899, 04.xii.1989; 1 ♂, 1 juv., MPEG 16001, RMNH 25908, 21.xii.1989; 1 ♂, MPEG 16002, 22.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões (southern bank), Benjamin Constant: 1 ex., MCZ 75389; 1 ♂, MNRJ 3604, 1942, leg. A. Parko; 2 ♂♂, 2 ♀♀, 1 juv., MNRJ 3478, 3600-01, 3637-38, ii.1942, leg. A. Parko; 1 ♂, 1 ♀, MNRJ 3622, 3625, vi.1950, leg. J.C.M. Carvalho; 1 juv., RMNH 24663, 14.xi.1985, leg. M.S. Hoogmoed; 1 ♀, 1 juv., MPEG 15932, 15980, W of the city, 11 & 16.xii.1989, leg. local children (through M.S. Hoogmoed & T.C.S. Avila Pires); 1 ♂, 1 ♀, MPEG 15948, RMNH 25901, 13.xii.1989; 2 ♂♂, 5 ♀♀, MPEG 15974-976, RMNH 25902-905, 15.xii.1989; 1 ♂, 2 ♀♀, MPEG 15992-993, RMNH 25906, 18.xii.1989; 1 ♂, RMNH 25907, 19.xii.1989; all W of the city, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Município Benjamin Constant, Rio Itacoai, 30 km from Rio Javari: 1 ♂, MNRJ 3565, vi.1942, leg. A. Parko.
PARA. Sudam Floral Reserve, 74 km SE Santarém: 1 ♀, MPEG 4543, 02.vii.1970, leg. M.L. Crump; 1 ♂, 1 juv., KU 130213-214, 03-04.vii.1970, leg. M.L. Crump & A.D. Crump. Surroundings of igarapé Curupira, 35 km from road Santarém-Palhão: 2 ♀♀, MPEG 3129-30, ix.1969, leg. M.G. Silva.
Ecuador. NAPO. San Pablo Kantesiya: 1 ♂, 1 ♀, MHNG 2260.64-65, 1986, leg. J.M. Touzet.
Peru. LORETO. Rio Cayaru, Paraná Yahú (or Jaú), W of Puerto Alegria (Peru/Colombia/Brazil border): 2 ♂♂, MPEG 15879, RMNH 25900, 05.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. UCAYALI. Utoquinia region (Peru/Brasil border): 2 ex., MCZ 56888-889, leg. H. Bassler.

Diagnosis.— A brownish/greyish anole with granular, weakly keeled dorsals, and larger (but relatively small), smooth or weakly keeled ventrals; 115-160 scales around midbody. Digital expansions well-developed, expanded lamellae under fourth toe about twice as wide as distal phalanx. Scales on posterior part of snout relatively small, keeled. Supraorbital semicircles separated by two or three, occasionally one, scales. Suboculars mostly separated from supralabials by one row of scales (occasionally just in contact). Tibia length 0.27-0.33 (0.30 ± 0.01) times the SVL. One or more narrow, light stripes across anterior part of chin; narrow, slightly oblique light stripes across limbs. Dewlap orange/red, moderately large in males, smaller in females. Maximum SVL 58 mm.

Description.— Anole with maximum SVL in males of 52 mm (KU 130214), in females of 58 mm (Duellman, 1978). Head 0.23-0.28 (n= 36) times SVL, proportionally slightly larger in females than in males; 1.2-1.8 (1.62 ± 0.10, n= 36) times as long as wide, and 1.0-1.4 (1.23 ± 0.08, n= 36) times as wide as high. Snout blunt, frontal region with a shallow depression. Neck narrower than head and body. Body cylindrical. Limbs relatively long, forelimbs 0.39-0.48 (0.44 ± 0.02, n= 30) times SVL, hind limbs 0.83-0.95 (0.89 ± 0.03, n= 30) times, tibia 0.24-0.29 (0.27 ± 0.01, n= 35) times. Tail round in cross section, tapering toward tip, 1.7-2.1 (n= 28) times SVL, tending to be slightly longer in males than in females.

Tongue wide, villose, tip nicked. Anterior teeth conical, posterior teeth tricuspid.

Rostral rectangular, about four times as wide as high, slightly oblique (upper part more prominent than lower part), just visible from above. Postrostrals 7-8, rarely six, including anterior nasal at each side. Scales on snout relatively small, polygonal, juxtaposed, keeled, larger toward posterior canthals; 11-18 (mostly 12-15) scales across snout at level of second canthal. Canthus rostralis well defined, with 5-9 canthals, anterior ones small, reaching nasals. Supraorbital semicircles rather inconspicuous, in some specimens only distinct medially; with 5-11, mostly eight, distinct scales; separated from each other by two or three, occasionally one, scales. Supraocular region with a group of enlarged, polygonal, keeled scales near supraorbital semicircle, smaller toward supraciliaries, except for one scale bordering first supraciliary, granular anteriorly and posteriorly. Supraciliaries 1-3 (mostly 2), elongate, partially overlapping, occupying about half of orbital length, posteriorly followed by granules; first longest. Occipital region with irregularly polygonal, smooth, juxtaposed scales, smaller posteriorly; interparietal several times larger than adjacent scales, separated from supraocular semicircles by 2-3, occasionally four, scales. Parietal region with granular scales, with a gradual change toward occipital region. Loreal scales polygonal, juxtaposed, in approximately longitudinal rows, slightly wider toward supralabials; row adjacent to canthals with a median keel, others with a keel on their lower margin; 5-8, mostly 6-7, scales in a vertical row at level of second canthal. Suboculars 4-8, slightly enlarged, keeled (in some cases only arbitrarily separated from adjacent scales), either completely separated from supralabials by a row of scales, or with one (rarely two) scales in contact. Supralabials 8-10, 7-9 to below centre of eye. Temporal region with small, granular scales, separated from eyelids by a few rows of slightly larger scales, and from parietal region, anteriorly, by a double, inconspicuous row of scales. Eyelids covered with granules, with two rows of larger scales bordering the rim. Ear-opening moderately large, vertically oval, its lower margin at level of, or slightly lower than, level of commissure of mouth; with smooth margin and short auditory meatus.

Mental medially divided, each half roughly trapezoid; bordered by first infralabial at each side, and 5-9 (most commonly 6-8) postmentals, which decrease in size

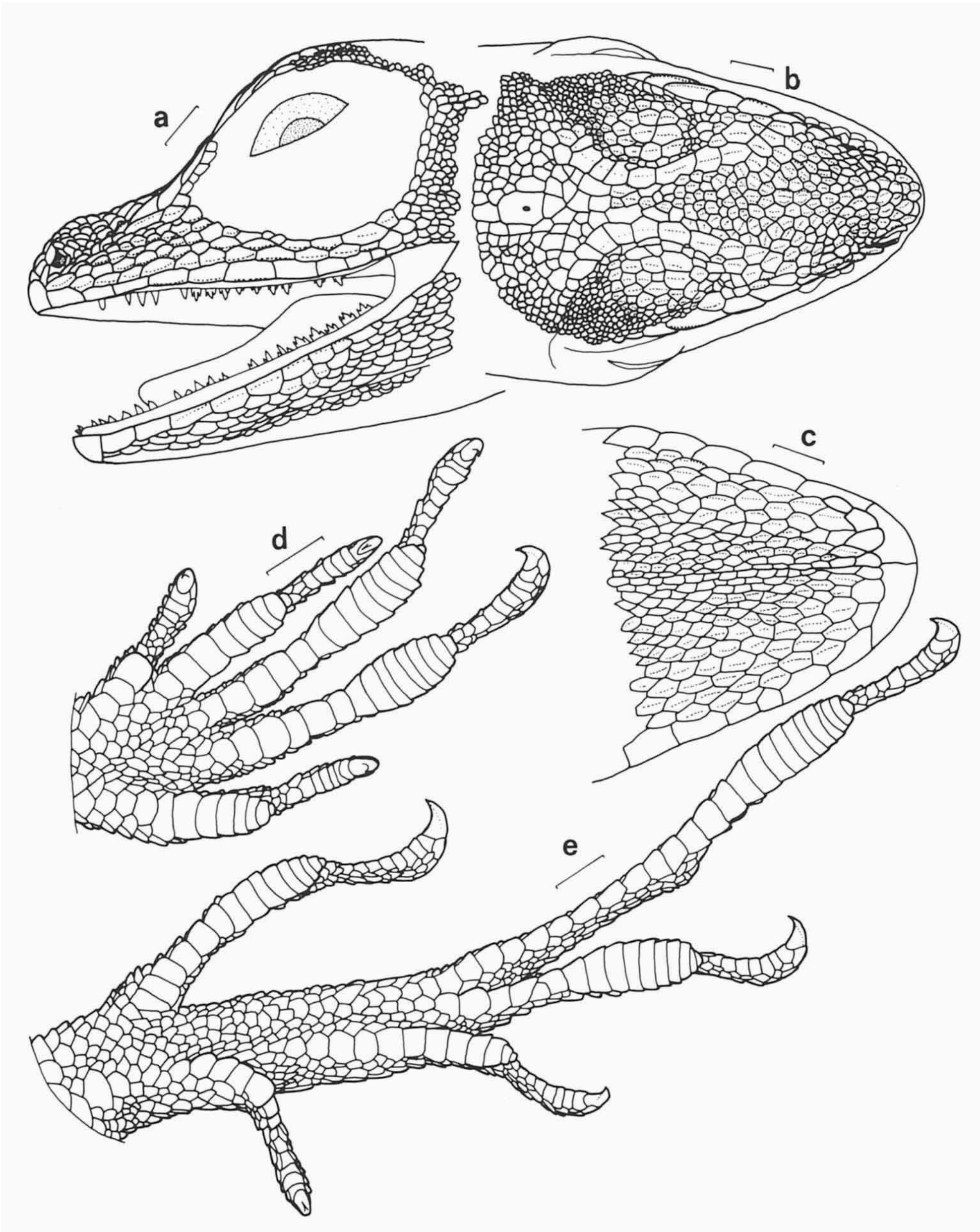


Fig. 32. *Anolis trachyderma*, MPEG 15992; a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of left hand and right foot.

medially. Infralabials 9-14, 8-12 to below centre of eye. Chin with larger, hexagonal, keeled, juxtaposed scales laterally, similar but distinctly smaller scales, in approximately longitudinal rows, medially; anterior part of chin medially divided by a sulcus. Dewlap with elongate, crescent-moon-like scales laterally, which form longitudinal rows separated by naked skin, and shorter, imbricate, half-moon-like scales along rim; in males dewlap reaches level of forelimbs or slightly beyond, in females it is distinctly smaller. Nape with granular scales, similar to dorsals.

Dorsals and scales on flanks granular, toward vertebral area becoming slightly larger, flat, and keeled; a double row of vertebral scales may be present. Ventrals small, although distinctly larger than dorsals, roundish, subimbricate, smooth or some of them weakly keeled, becoming smooth toward midventral area. Gradual transition between scales on flanks and ventrals. Scales around midbody 118-156 (139.3 ± 9.1, n= 32). Preanal plate with scales similar to ventrals, but smaller.

Base of tail with numerous small, keeled, imbricate scales, slightly larger ventrally. Distally scales distinctly larger, imbricate, in longitudinal rows, keels forming longitudinal ridges; scales on ventral surface slightly larger. Tail posteriorly divided into rather indistinct verticils.

Forelimbs with rhomboid, keeled, slightly imbricate scales on anterior and dorsal aspects of both upper- and forearms, and on posterior aspect of forearms; slightly smaller and smooth scales on ventral aspect; and granular scales on posterior aspect of upper arms. Thighs with polygonal, keeled scales, slightly imbricate on anterior and dorsal aspects, granular on posterior aspect, and roundish, smooth ventrally. Lower legs with polygonal, keeled, slightly imbricate scales all around. Digital expansions well developed; 21-26 (23.5 ± 1.1, n= 68, 35 specimens) lamellae under fourth finger, 13-17 (15.5 ± 0.8, n= 69, 35 specimens) to end of digital expansion; 31-39 (34.2 ± 1.9, n= 67, 34 specimens) lamellae under fourth toe, 23-30 (25.8 ± 1.6, n= 68, 34 specimens) to end of digital expansion.

In life, dorsal region usually composed of several hues of brown, with a predominance of dark brown (MPEG 15948, RMNH 25901), or dusky-brown (19) (MPEG 15974-976, RMNH 25903-905). In RMNH 25900 head dorsally predominantly mars-brown (223A), posteriorly plumbeous (78); a dark transverse band was present across eyes; back middorsally also plumbeous, dorsolaterally natal-brown (219A), flanks drab-grey (119D) and natal-brown. RMNH 25902, when collected (sleeping, at night), had a distinct pattern along vertebral region of rhomboid figures bordered by dark triangles; immediately after capture the animal became generally darker, and the pattern faded out. Similarly, RMNH 25907 showed a light band along vertebral area, which disappeared soon after capture. Limbs dorsally with light transverse stripes, which in RMNH 25900 were pale-pinkish-brown (121D) on forelimbs, light-russet-vinaceous (221D) on hind limbs; in MPEG 15948 they were, respectively, drab-grey (119D) and orange, and in MPEG 15974-976 and RMNH 25902-905 pale brown, on hind limbs mostly with an orange tinge. Ventrally, head grey, greyish-white, greyish-brown with some purplish tinge, or dusky-brown, always with irregular, transverse, whitish stripes, especially anteriorly. Dewlap spectrum-orange (17) (RMNH 25899, RMNH 25901, MPEG 15948), chrome-orange (16) (RMNH 25902-905, MPEG 15974-976), orange (MPEG 15932), or, in MPEG 15879 and RMNH 25900, mainly chrome-orange (16), toward rim becoming orange-yellow (18); in all cases with dark (brown) scales. RMNH 24657 and RMNH 24663 were described by M.S. Hoogmoed (field notes) as having a red dewlap. Belly sulphur-yellow (57) in two juveniles (RMNH 25899, RMNH 25908), buff-yellow (53) in a third one (MPEG 15932); pale yellow in the series MPEG 15974-976 and RMNH 25902-905, but paler, almost white, in the largest specimens (females); in RMNH 25901, a female, belly pale-horn-colour (92), and in RMNH 25900 and MPEG 15948, males, white. MPEG 15948 and RMNH 25901 presented a pale brown area along belly, midventrally, while ventrolaterally it was sepia (219). Colour of tail similar to that of body in RMNH 25900, RMNH 25901, and MPEG 15948, except on its ventral side, distally, where it became (dark) greyish-brown; in RMNH 25899 ventral surface of limbs and tail olive-yellow (52), and in MPEG 15932 greyish-brown. Iris (dark) brown with a narrow orange-brown rim around pupil in RMNH 25899 and MPEG 16002, brilliant orange-brown with a lighter rim around pupil in RMNH 25900, bronze in RMNH 25903. Tongue greyish-white, slightly darker anteriorly (MPEG 15974-976, RMNH 25902-905).

Descriptions of colour in life are also given by Vanzolini (1972), Dixon & Soini (1975, 1986), and Duellman (1978).

In preservative, dorsal region greyish-brown with a rich, although rather inconspicuous (all in shades of brown), ornamentation, among which the most conspicuous features are a slightly angulate band across eyes, lighter medially, darker anteriorly and posteriorly; and light, obliquely transverse stripes on limbs. Besides, a light (more commonly) or dark vertebral band is present, margins varying from relatively straight to distinctly undulating, or in some specimens forming a series of rhomboid figures; along vertebral line there may be small, irregular, dark spots, which on proximal part of tail usually change into triangular or roughly "V"-shaped figures. A narrower, dark (occasionally light) dorsolateral band may also be present at each side, usually with darker borders and starting at posterior corner of eye; in some cases it is bordered ventrally by a narrow light band delimited by dark lines. Very small white dots may be widespread on flanks. Tail distally usually shows alternate light and dark (but not very contrasting) bands; in RMNH 25901 light areas rhomboid in shape, while RMNH 25904 presents narrow whitish, dark bordered, bands, separated by much wider brown bands. In MPEG 16001, a juvenile, a distinct light vertebral stripe is present from nape to proximal part of tail, with slightly fainter, irregular expansions along both sides; dorsal surface of head with alternate light and dark transverse bands. In MPEG 15932, another juvenile, there is a wide, plumbeous vertebral area, bordered and partially covered at each side by roughly triangular brown figures, with sinuous borders; the head has a bold, dark (medially light) band across the eyes, and other fainter, irregular spots. Ventral surface of head from light to dark grey or brown (usually at least a bit lighter than flanks), anteriorly with one or more white stripes across chin, posteriorly (at least in specimens with darker surface) with white dots. Throat may be completely brown, or with a median whitish distally becoming light grey or brown. Ornamentation of back probably tends to disappear progressively in alcohol; MPEG 4543 is almost uniformly reddish-brown dorsally, although ventral pattern is still evident; MPEG 3129-30 are lighter brown, with a darker vertebral band with diffuse margins, and well defined, obliquely transverse, light stripes on limbs.

Habitat.— *A. trachyderma* inhabits forest, where it is found on the ground and on low vegetation. Among a series of specimens collected in terra firme forest in Tabatinga and Benjamin Constant, ten were on the forest floor, one on a branch which was on the ground, and one on a fallen palm sheath 10 cm above the ground; they were either in relatively undisturbed forest, in a patch of forest where all the undergrowth had been removed, or in an area with secondary growth near a creek. Seven other specimens captured between 18:45 and 21:45 h were sleeping on leaves 20-50 cm above the ground in terra firme forest along a creek, near a clearing and near an area of secondary growth. In a dry varzea forest in Puerto Alegria (a Peruvian locality near the two previous ones), two specimens were collected (plus one *A. fuscoauratus*) on small trees and Musacea, 10-200 cm above the ground. Two other specimens (RMNH 24657, 24663) from Benjamin Constant were in primary forest, one on the forest floor, the other on the lower part of a small tree. Vanzolini (1972) mentioned specimens (from Monte Cristo, Pará) on the ground or up to 1.5 m on the vegetation (but generally below 40 cm) in terra firme forest. Dixon & Soini (1975, 1986) reported the species (in Peru) in primary and secondary forests, forest edge, and farming areas, both on the ground and on low vegetation never higher than 2 m. Duellman (1978) found individuals (in Ecuador) mostly in primary and secondary forests, and some in forest edge situations, on the forest floor and low vegetation; sleeping individuals (found at night) were on low vegetation. Almendariz (1987) reported one juvenile (from Ecuador) collected at night on a leaf at 1 m above the ground in secondary forest.

Notes on natural history.— This diurnal lizard usually is in shade. Duellman (1978) studied the stomach contents of 27 specimens and found a variety of arthropods, with predominance of spiders (42.2% of the volume). The same author reported a specimen in the stomach of the snake *Oxybelis argenteus* (Daudin). Dixon & Soini (1975, 1986) and Duellman (1978) provided data on reproductive females that indicated that reproduction may occur throughout most or all of the year. Fitch (1970; under *Anolis leptoscelis*) reported five gravid females (all from March), each with two eggs of different sizes. Duellman (1978) reported eggs varying in size between 10 × 3.4 mm and 14 × 6 mm, and hatchlings with SVLs of 22-29 mm; he recorded an incubation period of 77 days. MHNG 2260.65 (in preservative) had a large egg (9.6 × 5.1 mm) in the abdominal cavity, which otherwise had been emptied.

Distribution (fig. 33).— Western Amazonia, in southern Colombia, Ecuador, Peru, and Brazil. In Brazil known from western part of Amazonas state, from Acre, and from the eastern margin of Rio Tapajós in Pará. There is a wide gap between the latter and the former two localities in Brazil, which may be due to deficiency of collecting, or that it is less common in eastern localities than it is in the western part of its distribution.

Remarks.— Although preserved specimens of *A. trachyderma* resemble most closely *A. fuscoauratus*, in the field it reminded (in a general, subjective way) both M.S. Hoogmoed and me more of *A. nitens*. Vanzolini (1972) also noticed the sharp

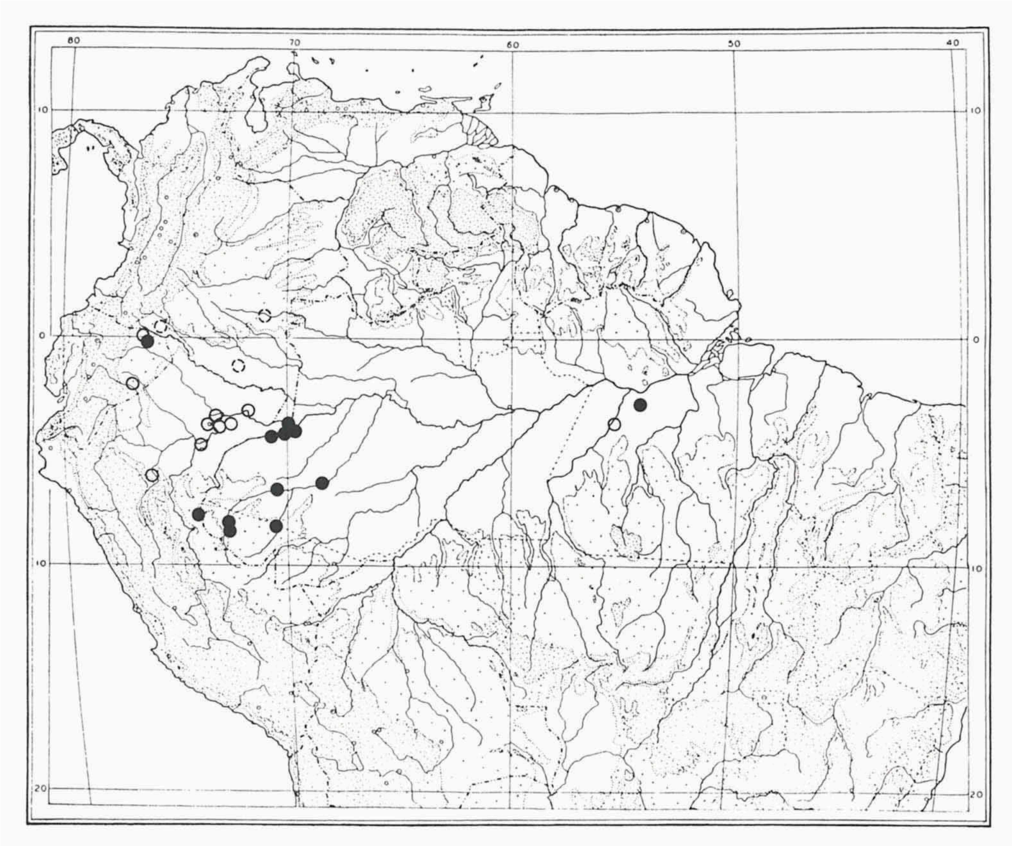


Fig. 33. Distribution of *Anolis trachyderma*. Closed circles = material studied; open circles = data from literature (Boulenger, 1885b; Vanzolini, 1972; Duellman, 1978; Carrillo de Espinoza, 1983; Ayala, 1986; Almendariz, 1987); dashed circles = data by Ayala (1986) for Colombian states.

visual distinction between *A. trachyderma* and *A. fuscoauratus* in the field. Duellman (1978) presented data from Santa Cecilia (Ecuador) that indicated that *A. trachyderma* and *A. fuscoauratus* were about as common in primary forest, but that the former tended to predominate in secondary forest.

A. trachyderma is part of the *fuscoauratus* group of Williams (1976). For comparison among the Amazonian species of the group, see remarks under *A. fuscoauratus*.

A. leptoscelis was pointed out to be a synonym of *A. trachyderma* by Vanzolini & Williams (1970) and Vanzolini (1972); *A. garbei* was synonymised by Vanzolini (1972, 1978c).

Anolis transversalis Duméril, 1851
(figs. 29, 34, 238-241)

Anolis transversalis A. Duméril, in Duméril & Duméril, 1851: 57 (holotype MHNP 2449, type-locality: South America, restricted by Guichenot, 1855: 18 to Sarayacu, Peru); Guichenot, 1855: 17; Boulenger, 1885b: 58; Williams & Vanzolini, 1966: 197; Peters & Donoso-Barros, 1970: 67; Vanzolini, 1970b: 37, 1986a: 13.

Anolis buckleyi O'Shaughnessy, 1880: 492, pl.49 (syntypes BM 1946.8.13.18-19, type-locality: Ecuador, restricted to Canelos by Boulenger, 1885b); Boulenger, 1885b: 58; Shreve, 1941: 71; Cunha, 1961: 63.
[*Anolis*] *Transversalis*; Williams, 1982: 29.
[*Dactyloa*] *transversalis*; Savage & Guyer, 1989: 108.

Material.— **Brazil.** ACRE. Rio Juruá (left bank), Porongaba (8°40'S, 72°46'W): 1 ♂, INPA 583, 22.ii.1992, leg. C. Gascon. Rio Juruá (left bank), Sobral (8°22'S, 72°49'W): 1 ♀, INPA 623, 07.iii.1992; 1 ♀, INPA 635, 09.iii.1992; 1 juv., INPA 714, 21.iii.1992; all leg. C. Gascon. Rio Juruá (right bank), Nova Vida (8°22'S, 72°49'W): 1 ♂, INPA 670, 17.iii.1992, leg. C. Gascon.
AMAZONAS. Rio Madeira, Puruzinho: 1 ♀, USNM 200680, 03-06.xii.1975, leg. 'Expedição Permanente da Amazônia-MZUSP'. Rio Urucu, 3 km S of headwaters (Petrobras area): 1 ♀, INPA 320, 16.v.1989, leg. C. Gascon. Rio Solimões, Tabatinga: 1 ♀, MPEG 15877, 04.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Benjamin Constant, Rio Javari: 1 ♂, MNRJ 3602, ii.1942, leg. A. Parko. Rio Javari, Estirão do Equador: 3 ♂♂, MPEG 894-896, 1959, leg. J. Hidasi; 1 ♂, MPEG 1677, ii.1961, leg. J. Hidasi.
Colombia. VAUPES. Timbó: 1 ♀, UTACV 3762, 05.vi.1973, leg. W.F. Pyburn; 1 ♀, UTACV 3933, 05.iii.1974, leg. J.K. Salser Jr.
Peru. Sarayacu: holotype, ♀, MHNP 2449, Castelnau-Deville.

Diagnosis.— A green anole, with granular, smooth dorsals, and larger (but relatively small), smooth ventrals. Digital expansions well developed. Body and tail slightly to moderately compressed. Mental large. A distinct row of sublabials at each side, with scales much larger than median scales on chin. A pattern of transverse dark lines or bands, showing sexual dimorphism, present along back: in males forming oblique rows of dashed and/or dotted lines, in females forming wider bands, with or without dotted lines in between. Dewlap in males extending almost to middle of belly, yellow to reddish orange, with light green to yellowish, or grey to bluish grey diagonal lines or scale rows; in females reaching about level of forelimbs, white or yellow, with brown or black transverse bars. Iris blue. Maximum SVL 88 mm.

Description.— Anole with maximum SVL in males of 88 mm (O'Shaughnessy, 1880), in females of 86 mm (USNM 200680). Head relatively large, 0.23-0.25 (0.24 ± 0.01, n= 11) times SVL, 1.6-1.8 (1.70 ± 0.06, n= 11) times as long as wide, and 1.0-1.2 (1.11 ± 0.05, n= 11) times as wide as high. Snout relatively long, blunt; frontal region with a shallow depression; occipital region slightly swollen. Neck narrower than head and body. Body and tail moderately compressed. Limbs well developed, forelimbs 0.37-0.43 (0.39 ± 0.02, n= 7) times SVL, hind limbs 0.66-0.70 (0.68 ± 0.02, n= 6) times, tibia 0.20-0.23 (0.22 ± 0.01, n= 10) times. Tail 1.8-2.1 (1.91 ± 0.10, n= 7) times SVL.

Tongue wide, villose, tip nicked. Anterior teeth conical, posterior teeth tricuspid.

Rostral about three times as wide as high, higher medially, and with indented posterior margin; just visible from above. Postrostrals 5-10, mainly 7-8, including prenasals. Scales on snout, between nostrils, forming one to three semicircular rows of narrow scales, at each side, parallel to nasals; medial scales wider, polygonal, smooth or rugose. Posteriorly on snout, scales polygonal, smooth, flat, juxtaposed, variable in size; 5-8, mostly 5-6, scales across snout at level of second canthal. Canthus rostralis well defined, with 5-7 canthals, increasing in size posteriorly. Supraorbital semicircles distinct, with 6-10 scales; in contact with each other or separated by one scale. Supraocular region with a group of enlarged, polygonal, smooth scales near supraorbital semicircle, elsewhere with granules. One long supraciliary scale, occasionally followed by a second, shorter one, reaching somewhere between one-third to one-half of orbital length, posteriorly followed by granules. Interparietal several times larger than adjacent scales; parietal region with irregularly polygonal, juxtaposed, smooth scales, smaller posteriorly; 0-2 scales between interparietal and supraocular semicircles. Occipital and supratemporal regions covered with small scales, slightly larger anteriorly. Loreal scales irregularly polygonal, longer than wide or about as wide as long, in longitudinal rows, slightly or distinctly increasing in size toward supralabials; mostly with a keel near their lower margin, some smooth; 3-5, mostly four, scales in a vertical row at level of second canthal. Suboculars 6-9, large, smooth, of which 3-5, mostly four, in contact with supralabials. Supralabials 7-12, 6-10 to below centre of eye. Temporal region with small, granular scales, separated from eyelids by a few rows of larger scales, and from supratemporal region by a double row of larger scales. Ear-opening relatively small, vertically oval, its lower margin at level of commissure of mouth; with smooth margin and short auditory meatus.

Mental large, roughly forming two symmetrical semicircles, partially separated by a median cleft, which continues as a midventral sulcus on anterior part of chin; bordered at each side of sulcus by first infralabial, one sublabial, and two or three small, median scales. Infralabials 6-10, mostly 7-8, 5-9 to below centre of eye. Chin with a row of large, smooth or broadly keeled sublabials, 3-5 in contact with infralabials; medially scales distinctly smaller, decreasing in size toward midventral line and posteriad. Scales on throat small, almost granular. Dewlap well developed in males, extending almost to middle of belly, with approximately longitudinal, widely separated rows of small scales laterally, and similar or slightly larger ones along rim. Dewlap in females smaller, reaching level of forelimbs. Nape with granular scales, similar to dorsals.

Dorsals and scales on flanks granular, juxtaposed, smooth; a double row of slightly larger vertebral scales. Ventrals distinctly larger, roundish or squarish, subimbricate, smooth. Gradual transition between scales on flanks and ventrals. Scales around midbody 152-203 (170.9 ± 16.8, n= 11). Preanal plate with small, relatively uniform scales. Enlarged postanal scales may be present.

Base of tail wide, dorsally and laterally with numerous small, smooth, juxtaposed to subimbricate scales, ventrally scales increasing in size toward midventral line, subimbricate. Distally, scales in longitudinal rows, with a pair of dorsal, and a pair of ventral rows of larger, keeled scales, keels forming longitudinal ridges; lateral scales smooth, except those in the row adjacent to ventrals, which are slightly larger and distally become keeled; scales arranged in verticils, formed by 4-6 pairs of ventral scales and 6-8 pairs of dorsal scales.

Scales on forelimbs slightly larger than dorsals, smooth, juxtaposed to subimbricate, except on anterior aspect of forearms, where they are about the size of ventrals and subimbricate. Hind limbs with smooth scales, about the size of ventrals and subimbricate on anterior aspect of thighs, and anterior and posterior aspects of lower legs; gradually changing into granular toward posterior aspect of thighs; juxtaposed, intermediate in size, on lateral aspects of lower legs. Digital expansion well developed; 27-35 (30.0 ± 2.1, n= 22, 11 specimens) lamellae under fourth finger, 19-25 (21.9 ± 1.5, n= 22, 11 specimens) to end of digital expansion; 37-50 (45.0 ± 3.8, n= 14, 9 specimens)

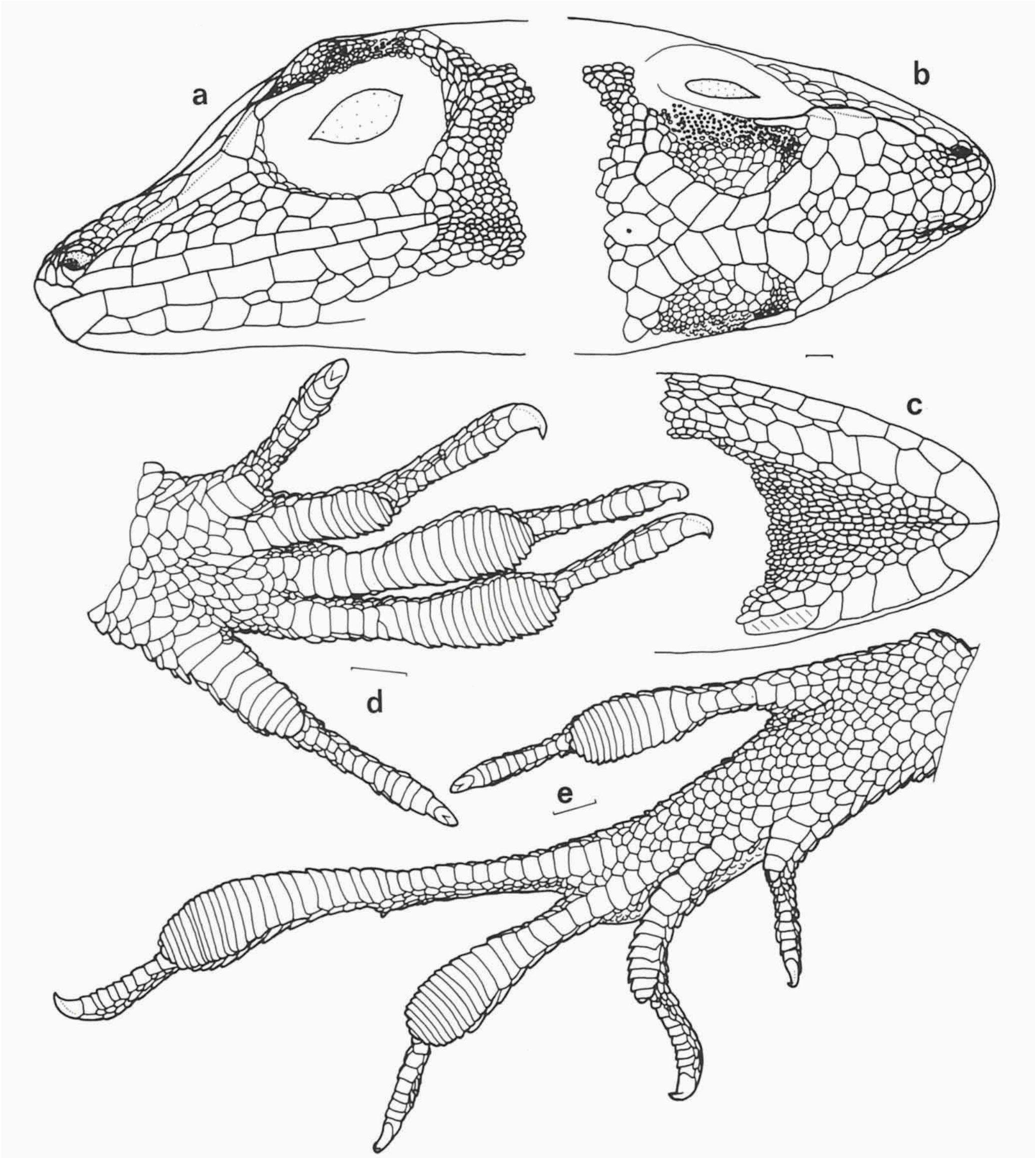


Fig. 34. *Anolis transversalis*, MPEG 15877; a, b, c: lateral, dorsal, and ventral views of head; d, e: ventral view of left hand and left foot.

lamellae under fourth toe, 31-41 (35.9 ± 3.1, n= 19, 11 specimens) to end of digital expansion (all counts starting from the membrane between third and fourth digits).

Colour in life of MPEG 15877 (♀), dorsally light green and brown, with dark brown transverse bands and black dots; ventrally white with black dots, dewlap white with black transverse bars; iris vivid sky blue (66). A male was observed to change colour (when handled) from completely green with transverse, black dotted lines, to gold-yellow with narrow dark bands on tail; dewlap (during yellow phase) gold-yellow with lemon-yellow scales (M. Martins, in lit. and slides). Descriptions of colour in life were also given by Dixon & Soini (1975, 1986), and Duellman (1978), who both referred to the bright blue iris (both sexes examined). Dixon & Soini (1975, 1986) described female dewlap as chocolate brown with scale rows and ventral edge yellowish tan, and male dewlap varying from lemon-orange to reddish orange, with scale rows light green to yellowish. Duellman (1978) reported the dewlap as yellow with bold black or dark brown vertical bars, or narrow grey or bluish grey diagonal lines.

Colour pattern shows sexual dimorphism. Males, in preservative (partially bleached), with general colour cream; head with a few to several small, irregular, dark spots; neck with irregularly distributed flecks or dots, which along body form oblique rows, either consisting of dotted lines, or of dashed lines alternating with large dotted lines; flecks may appear also on ventral region, although scattered. Dewlap of same colour as body, with dark dots along the scale rows. Females with several dark spots on head dorsally, and on chin; a dark band across supraoculars may be present, continuing through eye to chin, meeting or not its opposite number mid-ventrally. Dewlap with two transverse dark bands. Back with four to six wide, transverse, dark bands, from nape to base of tail, those between limbs more developed, wider along vertebral region, laterally narrower or reduced to a dark stripe, and continuing ventrally but mostly not meeting each other mid-ventrally. Between dark bands uniformly coloured, or with dots in poorly defined oblique lines dorsally, scattered ventrally. Limbs variably patterned, with dots or transverse lines, which may continue on the underside. Tail with dark bands, lighter on the underside.

Habitat.— The species seems to occupy mainly the upper levels of the forest, in or near the canopy of large trees (Dixon & Soini, 1975, 1986; Duellman, 1978). MPEG 15877 was found on the base of a small tree, in forest near a clearing caused by a fallen tree.

Notes on natural history.— Three specimens examined by Duellman (1978) only had beetles in their stomachs. Dixon & Soini (1975, 1986) and Duellman (1978) gave some data on gravid females. One or two oviductal eggs were found, the largest measuring 7.6 x 16.7 mm.

Distribution (fig. 29).— Western Amazonia, in Colombia, Ecuador, Peru, and the states of Acre, Amazonas and Rondônia, Brazil. Donoso-Barros (1968) mentioned it from Venezuela (Territorio Amazonas), but with no reference to specimens or a literature record.

Remarks.— *A. transversalis* is part of the *punctatus* group of Williams (1976). Williams & Vanzolini (1966) made a general review of the information available about the species up to that time, and synonymised *A. buckleyi* with *A. transversalis*.

Enyalius Wagler, 1830

Diagnosis.— Polychrotid with no extendable gular fan or transversely expanded subdigital lamellae; pores absent. Body compressed, with long limbs and digits. Tail long, for most of its length slender and round in cross section. Dorsal surface of head covered by relatively small scales. Nasal scale small, with nostril oriented laterally. Except for one species, a vertebral row of enlarged scales is present, forming a serration or crest; in the exception (*E. leechii*), a double row of slightly enlarged, nonprominent vertebral scales is distinct.

Distribution.— Eastern South America (mainly in Atlantic forest) and Amazonia.

Content.— Etheridge (1969) listed eight species in the genus. *E. leechii* is the only one to occur in Amazonia.

Enyalius leechii (Boulenger,1885)
(figs. 35, 36, 237)

Enyalioides leechii Boulenger, 1885b: 473 (holotype BM 1946.8.9.7, type-locality Santarém, Pará, Brasil); Goeldi, 1902: 514, 527; Burt & Burt, 1933: 24; Amaral, 1937a: 1735, 1937b: 175, 1949: 109.
Garbesaura garbei Amaral, 1933: 64 (holotype MZUSP 705, type-locality Monte Christo, Rio Tapajós, Pará, Brasil); 1937a: 1736, 1937b: 177, 1949: 109.
Enyalius leechii; Etheridge, 1969: 252, 1970a: 117; Vanzolini, 1973: 173, 1986a: 14; Nascimento et al., 1987: 43.

Material.— **Brasil.** MARANHÃO. Ilha de São Luiz, zona do salobro, north of the island: 1 ♂, MNRJ 4434.
MATO GROSSO. Alta Floresta: 1 ♀, MPEG 16759, 11.xi-18.xii.1993, leg. F.S. Braga & D. Pimentel N.
PARA. Carajás, Serra Norte: 1 ♂, MPEG 13999, area of Salobo-3 Alfa, 22.xi.1984, leg. A.C. Venâncio; 1 ♂, MPEG 14218, forest around old road to N-3, 28.x.1985, leg. R. Secco & O.C. Nascimento; 1 ♀, MPEG 14365, area of Manganês do Azul, 21.iii.1986, leg. M. Zanuto. Santarém: 1 ♀, BM 1946.8.9.7 (holotype), leg. J.H. Leech.
RONDONIA. Rio Jamari, area of hydroelectric dam Samuel: 1 ♀, MPEG 14831, 05.ii.1988, leg. C. Carneiro.

Diagnosis.— *Enyalius* with dorsal head scales relatively small, polygonal, keeled; dorsals relatively small, convex, keeled, juxtaposed, with a double row of vertebral scales which do not form a prominent crest; ventrals distinctly larger than dorsals, flat, keeled, slightly imbricate; subdigital lamellae distinctly keeled. Among Amazonian lizards it is easily recognizable by its colour pattern in shades of brown to beige, with a middorsal series of dark brown, approximately hexagonal to rhomboid figures, from which oblique lines extend laterally.

Description.— Polychrotid with maximum SVL in males of 93 mm (MNRJ 4434), in females of 107 mm (BM 1946.8.9.7, holotype). Head 0.23-0.25 (0.24 ± 0.01, n= 7) times SVL; 1.2-1.3 (1.24 ± 0.04, n= 7) times as long as wide; and 1.2-1.3 (1.23 ± 0.04, n= 7) times as wide as high. Snout short, round, rising steadily toward top of head; canthus rostralis angulate. Neck distinctly narrower than head and body. Body roughly round-triangular in cross section, slightly compressed. Limbs well developed, forelimbs about half (0.48 ± 0.01, n= 6), hind limbs about as long as SVL (0.99 ± 0.08, n= 6), tibia 0.30-0.34 (0.31 ± 0.01, n= 7) times SVL. Tail slightly compressed near base, round in cross section distally; 1.7-1.9 (1.80 ± 0.09, n= 7) times SVL.

Tongue villose, with rounded tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral usually band-like, 4-5 times as wide as high, just visible from above; in MNRJ 4434 rostral partially divided medially, in MPEG 14365 divided into three scales of about same width, median one higher than laterals (which could be considered as first supralabials) and slightly higher than wide. Postrostrals 4-5, mostly wider than long, with a transverse keel. Scales on snout relatively small, mostly longer than wide, with their surface raised toward a longitudinal keel; 10-14 scales across snout between first canthals; toward canthus rostralis they form rows approximately

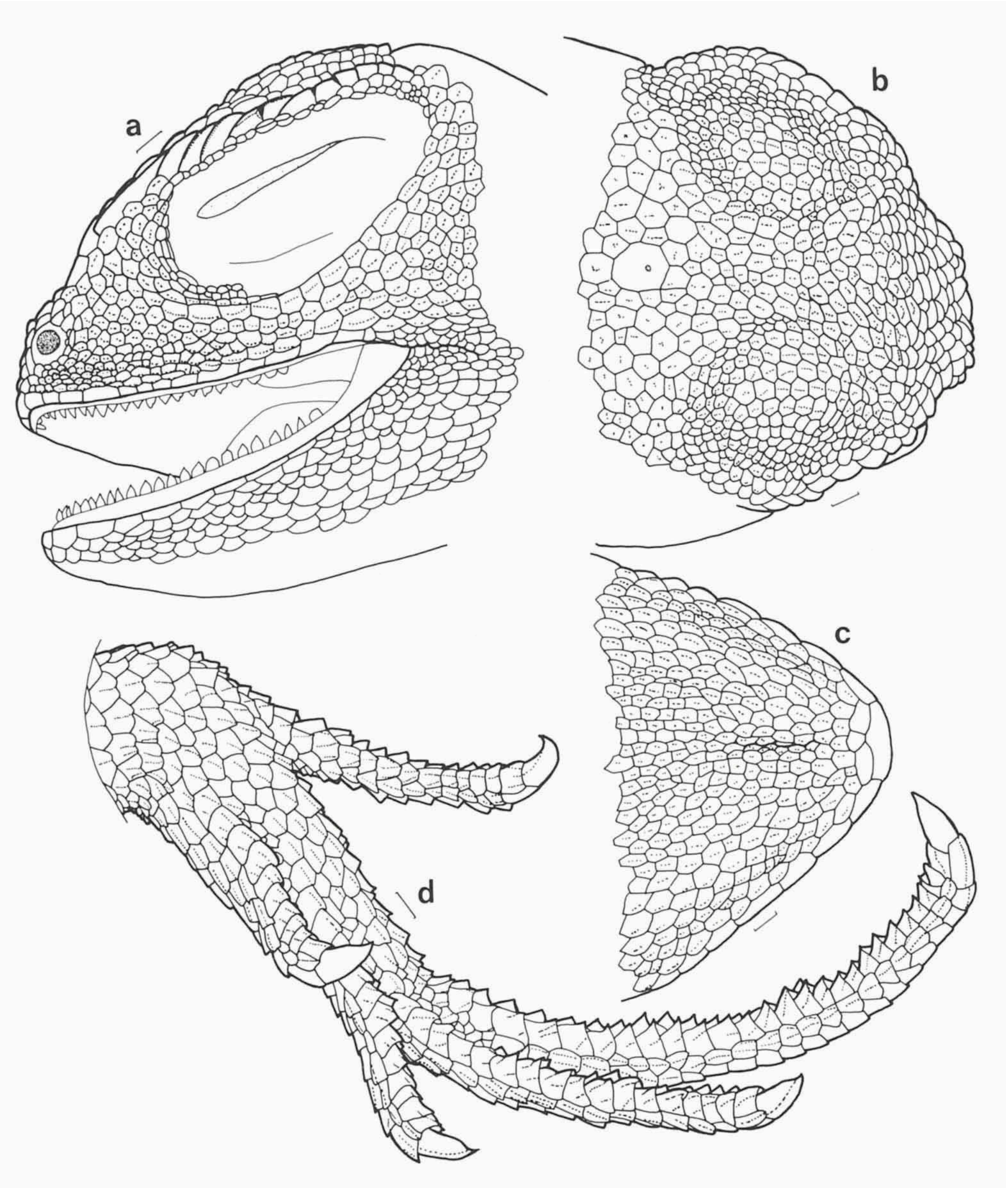


Fig. 35. *Enyalius leechii*, MPEG 13999; a, b, c: lateral, dorsal, and ventral views of head; d: ventral view of right foot.

parallel to it. Canthus rostralis with a double row of canthals, 3-4, occasionally five, in a row between supraciliaries and level of nostril, about 6-7 between supraciliaries and postrostrals. Supraorbital semicircles with up to 18-22 scales, or partially inconspicuous; separated medially by 3-4 rows of scales. Supraoculars centrally about as large as scales on snout, hexagonal, medially keeled, surrounded by smaller scales; adjacent to supraciliaries two parallel rows of scales with keels close to their lateral borders. Supraciliaries 10-12, occasionally 13 or 14, anterior ones long and overlapping posteriorly, posterior ones short and juxtaposed or slightly overlapping anteriorly; they form a supraciliary ridge continuous with canthus rostralis. Interparietal a few times larger than parietals, with a distinct parietal eye. Parietals similar to scales on snout, laterally and posteriorly surrounded by distinctly smaller scales. Loreal region with scales relatively small, keeled, mostly hexagonal; a few rows of narrower scales parallel to supralabials, with a keel nearer its ventral border. Nasal small, below canthus rostralis, much closer to rostral than to eye; nostril oriented laterally, occupying most area of nasal. A continuous row of 8-14, mostly 10-11, keeled preoculars and suboculars, separated from supralabials by two or three rows of scales. Supralabials 11-13, elongate, convex to keeled, 10-11 to below centre of eye. Temporal scales hexagonal, keeled, slightly larger along supratemporal arc, compressed near ear-opening. Ear-opening large, with a short auditory meatus.

Mental wide, bordered posteriorly by two to four relatively large, convex, smooth scales. Infralabials 10-14, elongate, convex to keeled, one or two before the last below centre of eye. Scales on chin keeled, medially relatively short and irregular in shape, toward infralabials elongate, hexagonal. Gulars low-trihedral, keeled, medial ones distinctly larger anterior to gular fold. Gular fold continuous at each side with an antehumeral fold, none of them very pronounced.

Scales on nape and sides of neck similar to dorsals but slightly smaller. Dorsals juxtaposed, irregularly polygonal, convex and obtusely keeled, decreasing in size toward flanks. A double vertebral row of keeled scales, scarcely larger than adjacent dorsals, extends from nape to posterior part of body or base of tail; 126-165 (148.9 ± 15.8, n= 7) scales along a single vertebral row, from nape to posterior margin of hind limbs. Ventrals distinctly larger than dorsals, irregularly polygonal to roughly quadrangular, flat with a distinct median keel, slightly imbricate, in poorly defined transverse rows; 45-54 (50.1 ± 2.9, n= 7) scales in a midventral line, from level of shoulders to anterior margin of hind limbs. Ventrolaterally scales on flanks and ventrals merge into each other. Scales around midbody 136-158 (144.6 ± 8.7, n= 7). Scales of preanal plate similar to ventrals. Preanal and femoral pores absent.

Scales on tail polygonal, flat, slightly imbricate, with a distinct median keel; ventrally scales larger, with a stronger keel. Distally the scales form longitudinal rows, keels forming continuous longitudinal ridges.

Forelimbs mostly with rhomboid to hexagonal, flat, keeled, slightly imbricate scales, larger on forearms; granular scales on posterior aspect of upper arms. Hind limbs mostly with rhomboid to hexagonal, flat, keeled, slightly imbricate scales, with stronger keels on anterior aspect of thighs and on lower legs; granular scales on posterior aspect of thighs; distinctly smaller scales in an antero-dorsal band along lower legs. Subdigital lamellae distinctly keeled, keels very prominent under toes; 17-21 (19.2 ± 1.4, n= 14, 7 specimens) lamellae under fourth finger, 22-27 (25.9 ± 1.6, n= 14, 7 specimens) under fourth toe.

Colour of MPEG 13999 described after seventeen days in alcohol (the specimen had been observed before fixation, and the colours seemed to be quite the same on both occasions). Nascimento, Avila-Pires & Cunha (1987: 44) presented a description of this same specimen. Head dorsally dark cinnamon-brown (33), with a few dark, narrow, transverse lines, largest of which across supraocular regions, "continuing" at each side from suboculars to supralabials; another dark line from posteriorly of orbit,

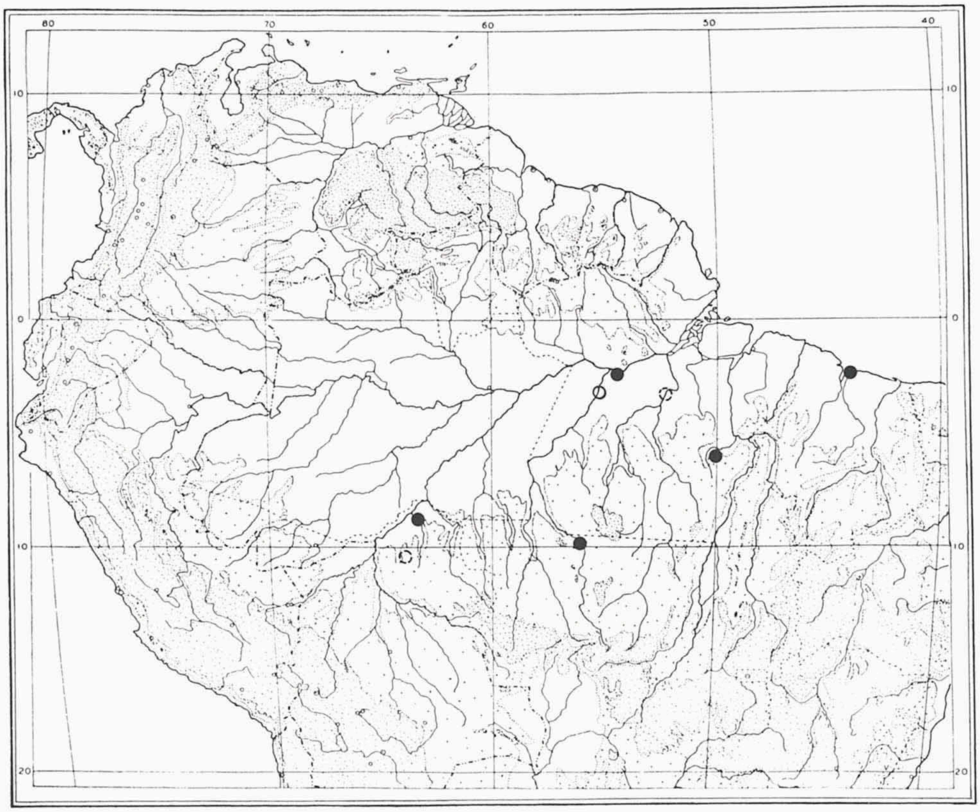


Fig. 36. Distribution of *Enyalius leechii*. Closed circles = material studied. Open circle = type-locality of *Garbesaura garbei* Amaral, 1933. Dashed circles = upper Rio Candeias, Rondônia (MZ/USP, 1985) and Rio Xingu (pers. comm. L.J. Vitt).

through inferior margin of ear-opening, to base of forelimbs. Head ventrally with a light rose-pink (108D) tinge. Body dorsally fawn colour (25), with a middorsal series of large, dark coffee-brown, roughly hexagonal to rhomboid figures, with beige (219D) margins. On neck, anterior margin of first spot whitish, dorsolaterally forming a white oval spot at each side. From the middorsal figures, smudged dark greyish-brown (20) areas spread laterally, anteriorly delimited by well-defined dark-brown and beige lines, which continue ventrolaterally. Ventral region pale beige (219D), with a dark midventral line. Limbs dorsally fawn colour, lighter posteriorly, with dark coffee-brown spots; underside beige with dark transverse lines. Tail pale fawn colour with rhomboid dark coffee-brown figures dorsally, and lighter, suffuse spots ventrally.

All specimens present a pattern very similar to that described, except that in females colours are slightly less contrasting.

Habitat.— A forest dweller. MPEG 1399, 14218 and 14365 were found on the forest floor, MPEG 14831 on a tree trunk, about 0.5 m from the ground, MPEG 16759 on a tree trunk at the margin of a river (where it was collected from a canoe).

Notes on natural history.— Both MPEG 13999 and 14365 showed "freezing" behaviour when collected, at least in the case of MPEG 13999 after a short run. MPEG 15365 had 12 ovarian eggs that were oval, 19-21 mm in length, and 9-10 mm in width (after fixation).

Distribution (fig. 36).— Southern Amazonia, in Pará (Serra dos Carajás; Xingu river; Tapajós river), Rondônia (Jamari river; upper Candeias river), and northern Mato Grosso (MZ/USP, 1985; L.J. Vitt, pers. comm. and slide [Acampamento Juruá, Rio Xingu, Pará]; present study).

Remarks.— Although apparently widely distributed in southern Amazonia, the species seems to be quite rare: eleven specimens are known in collections (besides the material studied, four specimens in MZUSP collection, including the type of *Garbesaura garbei*). One thing that may contribute to this apparent rarity is that its colour pattern is highly mimetic with that of dry leaves which, coupled with "freezing" behaviour, makes the animal very difficult to spot among the dead, fallen leaves on the forest floor.

Polychrus Cuvier, 1817

Diagnosis.— Polychrotids with an extendable, sac-like gular fan; no transversely expanded subdigital lamellae; third and fourth fingers, and third and fourth toes, subequal; cone-shaped eyes, with eyelids partially fused; femoral pores present. Body compressed, with long limbs and digits; tail very long, round in cross section, tapering toward the tip. Dorsal surface of head covered by relatively large, polygonal scales. Dorsal crest completely absent, or present anteriorly [*P. peruvianus* (Noble)].

The species of *Polychrus* are relatively large, arboreal, slow-moving lizards, able to change colours to some degree; these characteristics are reflected in parts of Brazil by the name "camaleão" (= chameleon).

Several chromosomal studies have been done on *Polychrus* (summarized by Vanzolini, 1983).

Distribution.— Central America northward to Nicaragua; in large part of South America, on both sides of the Andes.

Content.— Six species are known; three occur in Amazonia. *P. marmoratus* is the most widespread species in the region; *P. liogaster* is restricted to southwestern Amazonia and neighbouring areas; *P. acutirostris*, an inhabitant of open formations, is known in Amazonia only from a few localities where enclaves of open vegetation exist.

Polychrus acutirostris Spix, 1825
(figs. 37-40)

Polychrus acutirostris Spix, 1825: 15 (type lost according to Hoogmoed & Gruber, 1983: 389, type-locality Bahia); Boulenger, 1885b: 99; Goeldi, 1902: 514, 517; Griffin, 1917a: 311; Burt & Burt, 1931: 284; Schmidt & Inger, 1951: 451; Peters & Donoso-Barros, 1970: 233; Vanzolini et al., 1980: 98; Hoogmoed & Gruber, 1983: 389; Vanzolini, 1983: 122; 1988: 333.
Polychrus marmoratus acutirostris; Burt & Burt, 1933: 41; Cunha, 1961: 87.
P[olychrus] acutirostris; Parker, 1935: 516.

Material.— **Brazil.** CEARA. Guaiuba, Sítio São Jerônimo: 1 ♀, MPEG 14608, 19.xii.1985, leg. J.M.F. Furtado.

GOIAS. Brasilia, D.F.: 1 juv., MPEG 16160, 08.vii.1970; 1 ♀, MPEG 3116, cerrados in the surroundings of Brasília, 1969; both leg. C. Alho. Goiânia: 1 ♀, MPEG 1589, 05.v.1962, leg. J. Hidasi. Aragarças: 2 ♂♂, MPEG 579, 580, 1958, leg. J. Hidasi.
PARA. Rio Tocantins, Mangabeira (below Baião): 1 juv., MPEG 625, 1953, leg. O.R. Cunha. Serra do Cachimbo: 1 hgr., MPEG 016, v.1958, leg. J. Hidasi.

Diagnosis.— *Polychrus* with a pointed snout; scales on dorsal surface of head moderate in size, and tending to become rugose in larger animals; nasal in contact with second and third, third, or third and fourth supralabials; gular crest absent; gular fan reaches level of forelimbs; scales on flanks about as large as, or larger than, scales on tail; ventrals sharply pointed and keeled. Males in reproductive condition with a series of black spots on upper part of flanks. Inhabitant of open formations.

Description.— *Polychrus* with maximum SVL in males of 124 mm, in females of 146 mm (Vitt & Lacher, 1981; Vanzolini et al. mentioned SVL of 150 mm, with no reference to sex or specimen). Head 0.22-0.23 times SVL among six (sub-)adults studied, 0.26-0.28 times in two juveniles (MPEG 625, MPEG 16160); 1.5-1.8 (1.68 ± 0.07, n= 8) times as long as wide; 1.0-1.1 (1.05 ± 0.06, n= 8) times as wide as high. Snout pointed; canthus rostralis distinct posteriorly. Neck narrower than head, almost as wide as anterior part of body. Body compressed. Limbs well developed, tibia 0.12-0.16 (0.14 ± 0.01, n= 8) times SVL. Tail round in cross section, tapering toward tip, 1.9-2.4 times SVL in four (sub-)adult specimens, 1.7-1.8 times in two juveniles.

Tongue wide, villose, tip nicked. Anterior teeth conical, posterior teeth tricuspid.

Rostral pentagonal (most commonly), approximately trapezoid or triangular, distinctly wider than high, just visible from above. Bordered posteriorly by 2-3 scales. Scales on snout heterogeneous in size (mostly relatively large), irregularly polygonal, juxtaposed, flat and smooth in juveniles, becoming rugose in large specimens; 4-6 scales in a transverse row between second canthals. Three relatively small canthals between nasal and supraciliaries. Supraorbital semicircles distinct, with 6-9 scales, separated medially by one row of scales about as large as those of supraocular semicircles (except in MPEG 625, where the median scales are very narrow). Scales of supraocular region smaller than those on snout, polygonal, juxtaposed, flat, and smooth, usually decreasing in size toward supraciliaries. Supraciliaries 9-12, juxtaposed or slightly imbricate, smooth, squarish or slightly longer than wide; in a continuous series with canthals. Scales on parietal region smaller but otherwise similar to those on snout, and as large as, to larger than, largest supraoculars. In the largest specimen observed (MPEG 1589) part of supraorbital series and scales around interparietal distinctly convex and rugose. Interparietal usually slightly larger than adjacent scales; parietal eye distinct, in centre of scale. On occipital region scales smaller than those adjacent to interparietal, smooth, flat and juxtaposed or, in the largest specimens, slightly convex and imbricate. Loreal region with few scales; mostly two, exceptionally three scales between second canthal and supralabials. Nasal undivided, usually in contact with second and third supralabials, in some specimens only with third, or with third and fourth (in this case apparently due to an extra supralabial resulting from a division of the rostral). Nostril directed lateroposteriorly. Eyelids partially fused together, covered by granules, larger toward rim. Preoculars small; 2-3 suboculars, in contact with supralabials, followed by 4-6 postoculars.

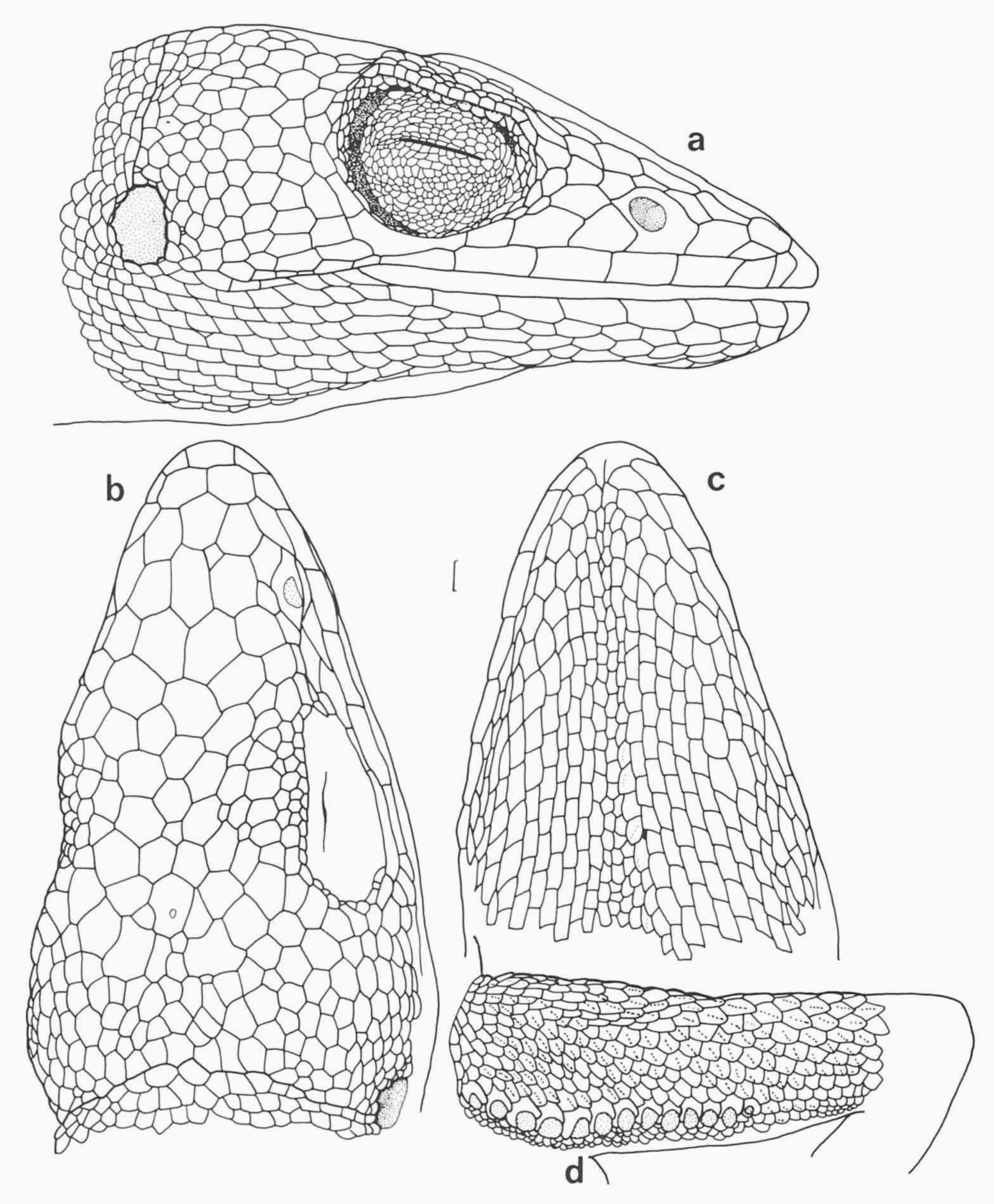


Fig. 37. *Polychrus acutirostris*, MPEG 579 (♂); a, b, c: lateral, dorsal, and ventral views of head; d: ventral aspect of right thigh, showing femoral pores.

Supralabials 6-8, last or one before last below centre of eye; followed to commissure by 2-4 (usually three) relatively small scales. Temporal region with scales similar to those on occipital region, from which they are separated by a single or double row of scales; scales smaller near ear-opening. Ear-opening large, vertically oval, with smooth margin; tympanum superficial.

Mental triangular, posteriorly indented by first infralabials and postmentals, and

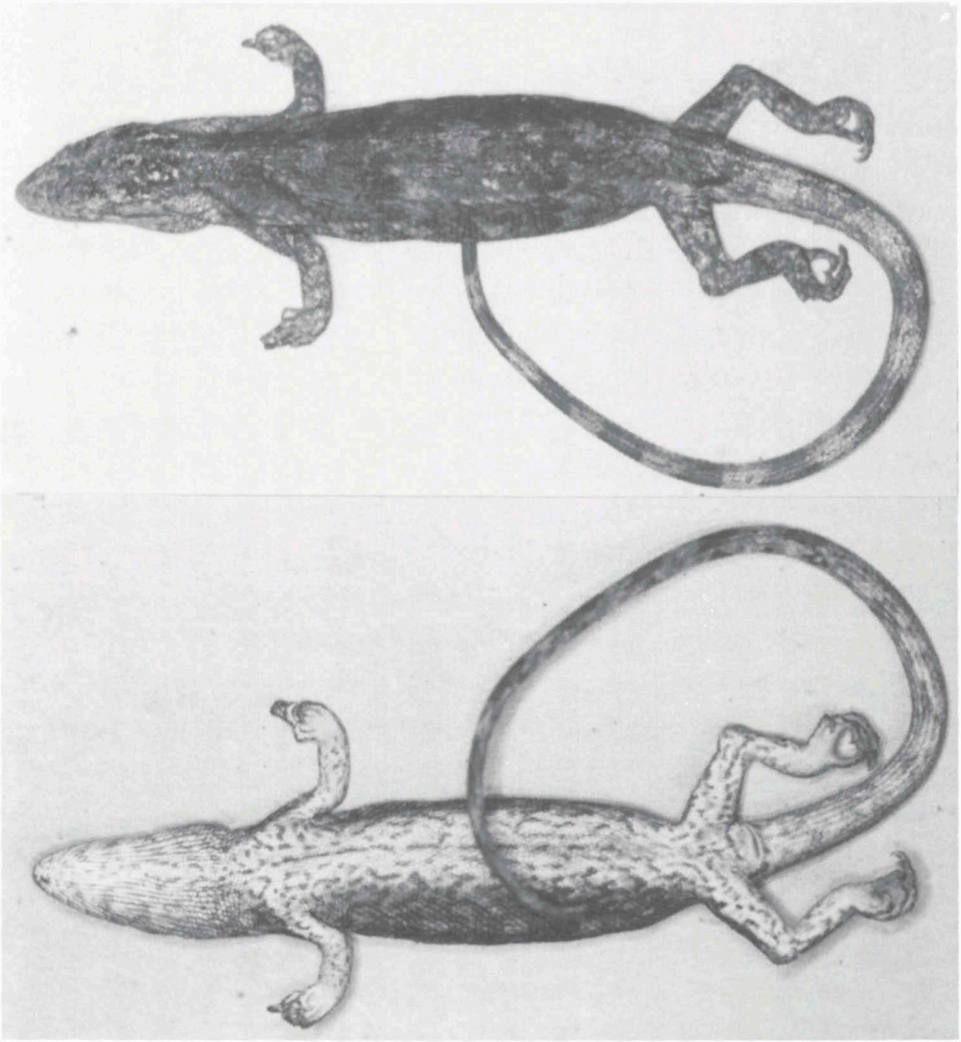


Fig. 38. *Polychrus acutirostris*, ♀, MPEG 14608, Guaiuba, CE, Brazil: upper figure dorsal view, lower figure ventral view (T.C.S. Avila-Pires).

partially divided by a median sulcus. Postmentals 2-4, lateral ones distinctly larger than median ones. Infralabials 6-8, last or one before last below centre of eye; followed to commissure by small scales. Scales on chin polygonal, longer than wide, grading from slightly larger, variable in shape, flat and juxtaposed near infralabials, to smaller, rectangular, convex, and imbricate medially; a short medial sulcus is more or less apparent anteriorly, according to the specimen. Toward gular region scales predominantly rectangular, imbricate, in longitudinal rows, medial scales on gular fan smaller and shorter, in some cases broadly keeled. In MPEG 1589 rows of scales distinctly separated by naked skin. Gular fan reaches anterior level of forelimbs.

Scales on nape anteriorly relatively small, quadrangular to irregularly polygonal,

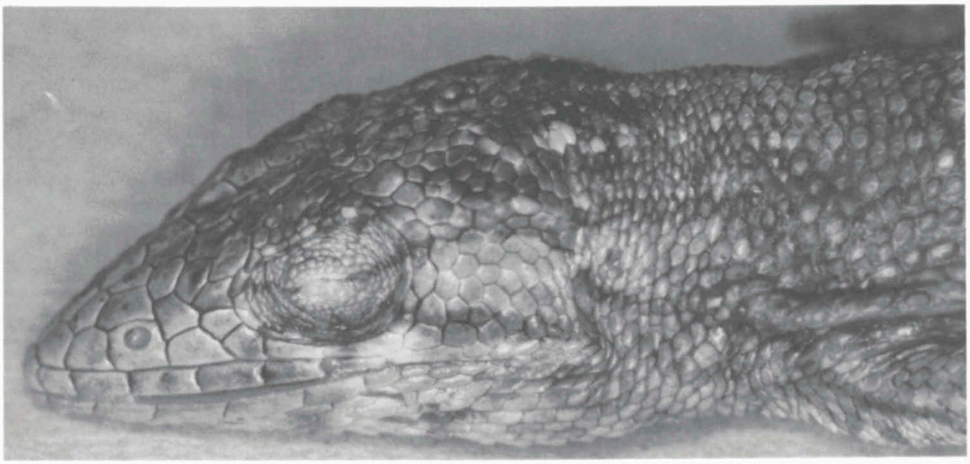


Fig. 39. *Polychrus acutirostris*, ♀, MPEG 14608, Guaiuba, CE, Brazil: lateral view of head (T.C.S. Avila-Pires).

juxtaposed to subimbricate, convex, smooth; posteriorly grading into dorsals. On sides of neck scales tending to become oval, ventrally grading into gulars. Dorsals roughly rhomboid or irregularly polygonal, imbricate, flat, keeled; 111-126 (116.0 ± 7.3, n= 7) scales in a middorsal line between occiput and posterior margin of hind limbs. Scales on flanks oval or rectangular, larger than dorsals, juxtaposed or slightly imbricate, convex, smooth or broadly keeled, in oblique rows which may be separated by areas of skin covered by small, irregular granules. Ventrals rhomboid, sharply pointed (more rounded in MPEG 625) and keeled, imbricate. A gradual transition between dorsals, laterals and ventrals. Scales around midbody 57-73 (64.8 ± 5.8, n= 6). Preanal plate with scales similar to ventrals, but smaller. Preanal pores absent. Femoral pores 23-24 in total (11-13 per side), in two males; 13-20 (6-10 per side) in four females; and 12-17 (5-9 per side) in two juveniles. In both sexes pores form a notch in the scales in which they are located, but they are much larger in males, and may be quite small and indistinct in females.

Tail with variably polygonal, imbricate, flat, keeled scales, distally in longitudinal and oblique rows. Keels stronger on ventral surface, distally forming longitudinal ridges. MPEG 579 (svl 103 mm) has a damaged tail of 96 mm, with a round tip closed by scales, but without regenerated segment.

Scales on limbs mostly rhomboid, imbricate, flat, varying from smooth to distinctly keeled; larger on anterior and dorsal aspects, smaller on ventral and posterior aspects. Subdigital lamellae of fingers and toes single, short, multicarinate; 19-26 (24.7 ± 1.8, n= 15, 8 specimens) under fourth finger, 23-32 (29.1 ± 2.7, n= 15, 8 specimens) under fourth toe (respectively 19-21 and 23-24 in MPEG 625, 23-26 and 27-32 in remaining specimens).

Colour in life described by Vanzolini et al. (1980) as pale olive on dorsal region, either uniform or with irregular, angulate, transverse black bands; males in breeding condition with a row of three round, black spots on flanks behind the arm. Belly and limbs lighter, greyish-white, in some specimens with dark marbling. Black lines radi-

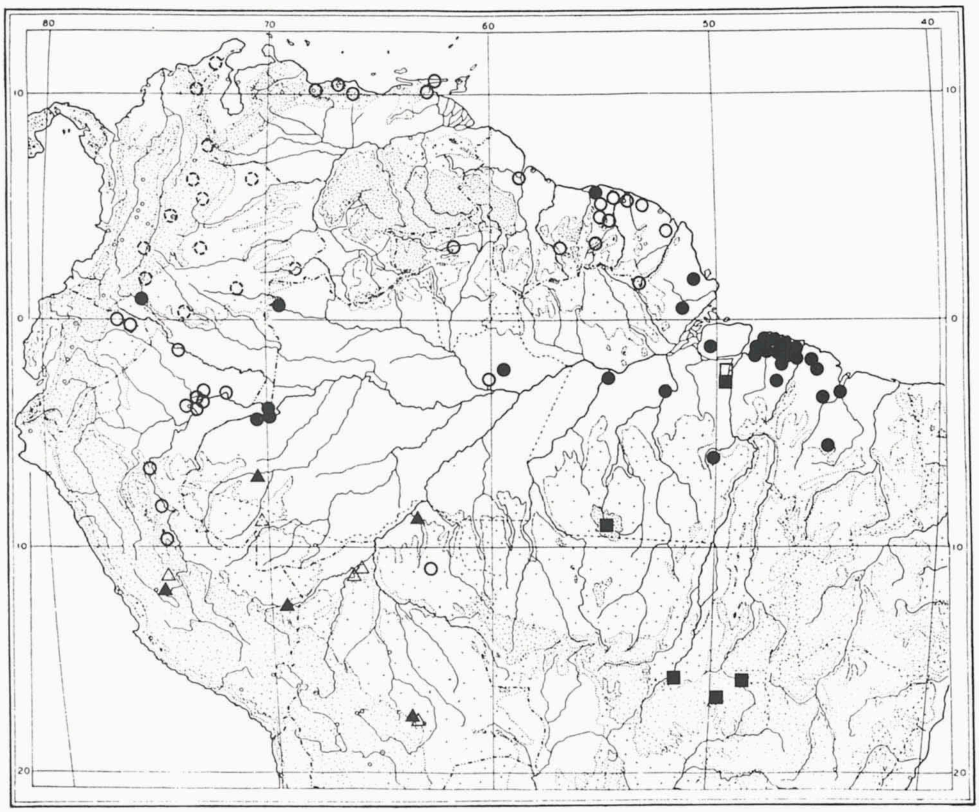


Fig. 40. Partial distribution of *Polychrus*. Circle = *P. marmoratus*; triangle = *P. liogaster*; square = *P. acutirostris*. In all cases, closed symbols represent material studied (locality of MPEG 14608, *P. acutirostris*, outside the area represented in the map); open symbols data from literature (*P. marmoratus* - Guichenot, 1855; Beebe, 1944b; Shreve, 1947; Test et al., 1966; Donoso-Barros, 1968; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Duellman, 1978; Gasc, 1981; Dixon & Soini, 1986; Lescure & Gasc, 1986; Vanzolini, 1986a; O'Shea, 1989; Henle & Ehrl, 1991; Henzl, 1991; M. Martins, pers. com. for Reserva Ducke, AM. *P. liogaster* - Burt & Burt, 1931; Fugler, 1989. *P. acutirostris* - Parker, 1935); dashed symbols = general localities (reference to Colombian states by Ayala, 1986, and to Brazilian state of Acre by Peters & Donoso-Barros, 1970). For a complement of the distribution of *P. marmoratus*, and a general distribution of *P. acutirostris* see Vanzolini (1983: fig. 2).

ating from eyes, of which two reach insertion of forelimbs, and an inferior, less distinct one, running through tympanum. Mertens (1930) noticed that the species can change its colour considerably, with a light, grey to nearly white phase, and a dark, brown phase.

In preservative specimens studied predominantly light sand-colour, MPEG 580 cream-colour, MPEG 016 tan. Among the two males, MPEG 579 was almost uniformly coloured; MPEG 580 presented seven (at one side) plus eight (at the other side) dark spots along upper part of flanks (nuptial pattern?), of which first and last ones at each side elongate, first one running between ear-opening and insertion of forelimbs (anterior to it, between eye and ear-opening, a paler dark band). Females and juveniles with five transverse, irregular, dark bands, which may intercalate with narrower bands; posterior wide band at level of hind limbs or base of tail, followed along tail by several other transverse dark bands; in MPEG 1589 bands interrupted on vertebral region, and in MPEG 3116 only some lateral remnants of bands are present. Two narrow stripes at each side run from eye to insertion of forelimb, upper one passing above ear-opening, lower one through it (that is, reaching anterior border, and continuing again from posterior border). Ventral region light, uniformly coloured, either in males, females and juveniles.

Habitat.— An arboreal inhabitant of open formations, this lizard is found mainly on the branches of trees and bushes (Mertens, 1930; Vanzolini, 1983).

Notes on natural history.— Vitt & Lacher (1981) studied the behaviour, diet and reproduction of *P. acutirostris* in northeastern Brazil. Rand (1982) mentioned 17 females 90-143 mm SVL, having 5-23 eggs (mean 13.2); the eggs varied between 0.5 ml and 1.3 ml in volume (mean 0.9 ml), total clutch volume 3.6-19.7 (mean 11.9) ml. Some notes on natural history also were given by Vanzolini et al. (1980), Vanzolini (1983), and in other papers mentioned by the latter author. MPEG 3116 had eight round ovarian eggs with diameters of 8.4-9.9 mm. MPEG 625 has a snout-vent length of 34 mm and represents most certainly a recently hatched specimen; an umbilical scar is still evident.

Distribution (fig. 40).— Open formations of South America east of the Andes, from Pará to northern Argentina, including Brazil, Bolivia, Paraguay and Argentina. Vanzolini (1983) discussed the southern limit of distribution of the species, and cast doubt on the extension of its range in Argentina and its presence in Uruguay. In Pará the species was reported from Cametá (Parker, 1935) and Mangabeira (Cunha, 1961), both localities on the Rio Tocantins, and from Serra do Cachimbo (Cunha, 1961).

Remarks.— The species occurs mostly south of Amazonia. Serra do Cachimbo represents an area of complex interdigitation of forest and open formations at the southern border of Amazonia. It is to be expected that the fauna of the open formations there is similar, or closely associated, with that of the open formations of central South America. Several relatively small savanna enclaves exist along the Tocantins river, and Dr O.R. Cunha, who collected the specimen from Mangabeira, observed that areas of savanna existed not far from the village; he did not reach these areas, but he obtained material from local inhabitants, who may have collected the specimen in one of them. The report of Parker (1935) of specimens from Cametá reinforces the idea that *P. acutirostris* occurs along the Rio Tocantins. A similar case is that of *Tropidurus oreadicus*, which occurs in several places along the lower Tocantins to Belém.

For comparisons between this species and *P. marmoratus*, see remarks under the latter.

Polychrus liogaster Boulenger, 1908
(figs. 40-42)

Polychrus liogaster Boulenger, 1908: 113 (syntypes BM 1946.8.8.24-26, Provincia Sara, eastern Bolivia, alt. 750 m; BM 1946.8.8.22-23, Chanchamayo, eastern Peru); Burt & Burt, 1931: 284; Peters & Donoso-Barros, 1970: 234; Fugler, 1988b: 8, 1989: 64; Henle & Ehrl, 1991: 154.

Polychrus marmoratus liogaster; Burt & Burt, 1933: 41.
Polychrus marmoratus; Duellman, 1987: 492 (part), 493; Duellman & Salas, 1991: 8.

Material.— **Brazil.** AMAZONAS. Rio Juruá (right bank), Condor (6°45'S, 70°51'W): 1 ♀, INPA 452, 26.ix.1991, leg. C. Gascon.
RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ♂, 2 ♀, CEPB 0239, 0302, 0303, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.
Bolivia. Provincia Sara (eastern Bolivia): syntypes, 1 ♂, 1 ♀, 1 juv., BM 1946.8.8.24-26, leg. J. Steinbach. Buenavista: 2 ♀♀, RMNH 5243, bought from W.F.H. Rosenberg.
Peru. Chanchamayo (eastern Peru): syntypes, 2 ♀♀, BM 1946.8.8.22-23, leg. C. Schunke. Puerto Maldonado: 1 ♀, ZFMK 34230, 1981, leg. E. Leukenhoff.

Diagnosis.— *Polychrus* with a blunt snout; relatively large and nearly smooth scales on dorsal surface of head; nasal in contact with second supralabial, in some specimens also with a short suture with first or third supralabial; a gular crest formed by low and wide, enlarged scales present anterior to gular fan; scales on sides of neck larger than those on nape, and those on flanks about as large as, or smaller than, scales on tail; ventrals smooth or only slightly keeled; with three black lines radiating from each eye, two of which reach level of forelimbs. No sexual dimorphism in colour pattern. A forest inhabitant.

Description.— Very similar to *P. marmoratus*, to the description of which I refer, except for what follows. Maximum SVL in males 134 mm (BM 1946.8.8.26), in females 152 mm (RMNH 5243a). Head 0.21-0.25 (0.22 ± 0.02, n= 12) times SVL, 1.5-1.6 (1.57 ± 0.05, n= 12) times as long as wide, 1.0-1.2 (1.14 ± 0.06, n= 12) times as wide as high. Forelimbs 0.35-0.39 (0.37 ± 0.02, n= 7) times SVL, hind limbs 0.49-0.51 (0.50 ± 0.01, n= 5) times, tibia 0.14-0.17 (0.15 ± 0.01, n= 12) times, tail 2.4-3.1 (2.67 ± 0.23, n= 10) times.

Postrostrals 2-4. Scales on snout between second canthals 2-4, mostly three. Canthals two. Scales in supraorbital semicircle 7-8, exceptionally nine. Supraciliaries 9-13, mostly 11-12. Loreal scales below second canthal 1-3. Preoculars 2-3, suboculars 2-3, postoculars 3-4. Supralabials 6-7, one but last below centre of eye, followed to commissure by 2-4 scales. Postmentals 2-4, mostly three. Infralabials 5-7, 4-6 to below centre of eye, followed to commissure by 2-4 (mostly three) scales. Enlarged scales in gular crest low, wide. Scales on sides of neck slightly larger than those on nape. Dorsals smooth or slightly keeled, 103-125 (110.3 ± 6.9, n= 12) scales in a middorsal line between occiput and posterior margin of hind limbs. Scales on flanks mostly smooth. Ventrals mostly smooth or, in some specimens, part of them (especially posteriorly) slightly keeled. Scales around midbody 66-95 (79.4 ± 7.6, n= 12). Femoral pores either form a notch in a scale, or occupy its centre; total number 15-24 (21.3 ± 2.8, n= 12). Lamellae under fourth finger 29-37 (32.6 ± 2.4, n= 24, 12 specimens), under fourth toe 38-47 (42.1 ± 2.7, n= 24, 12 specimens).

BM 1946.8.8.26 is mainly blue, with a wide tan vertebral band and tan tail; it has a label on which it is described as "nice live green, the light brown colour of tail runs over the back until the neck" (translated from German). CEPB 302-303 have a similar pattern, while the remaining specimens are an irregular mixture of blue and brown, with or without "V"-shaped transverse light bands along back and flanks. The three black lines radiating from eyes, which are present in *P. marmoratus*, are also seen, but here the two that are directed posteriorly continue along neck, where they may become wider, reaching level of forelimbs (in INPA 452 the head and neck segments

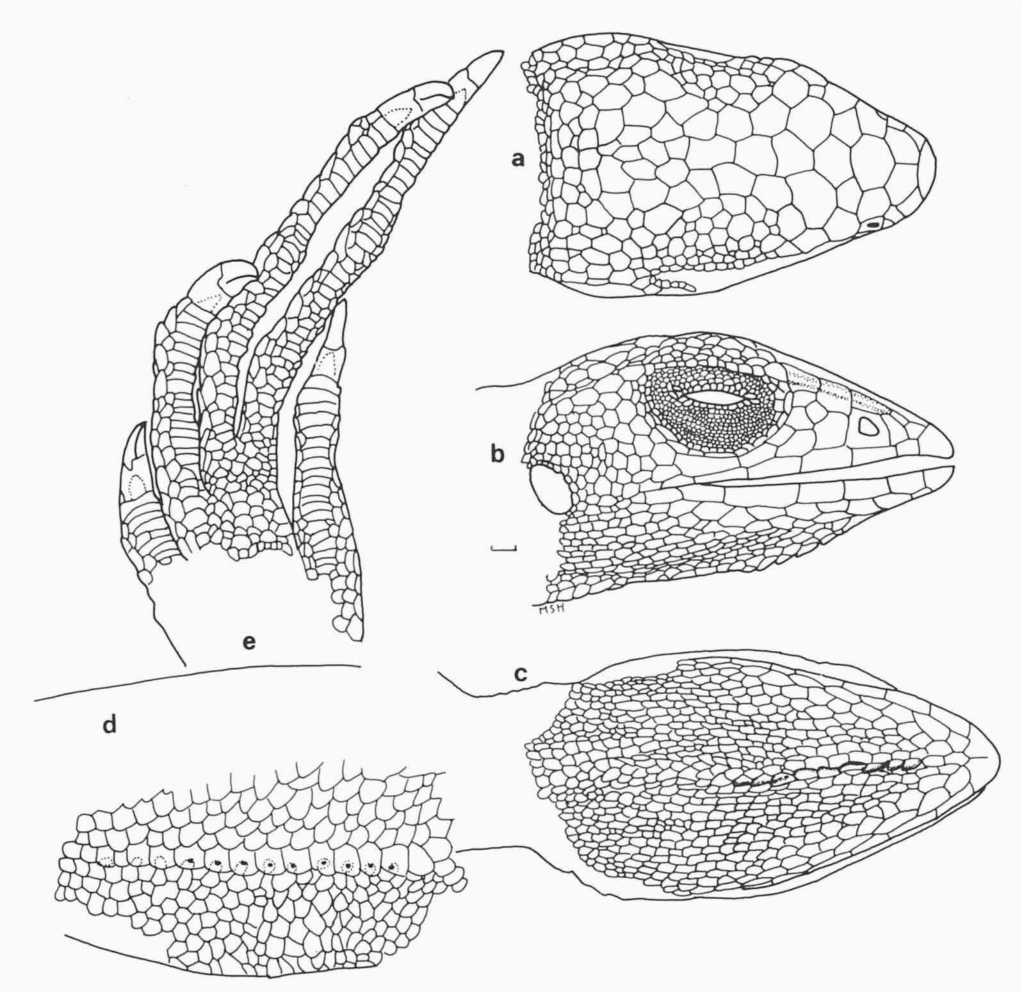


Fig. 41. *Polychrus liogaster*, RMNH 5243; a, b, c: dorsal, lateral, and ventral views of head; d: ventral aspect of left thigh, showing femoral pores; e: left foot (drawings by M.S. Hoogmoed).

are separated by a gap); they may enclose an area lighter than the area outside. The juvenile RMNH 5243 dorsally is brown with a banded pattern, ventrally mostly tan, chin and gular fan medially cream; the lines radiating from eyes are present but not very conspicuous.

Habitat.— INPA 452 was collected at night, in varzea forest, near water (C. Gascon field notes). Duellman (1987) and Duellman & Salas (1991) reported the species to occur on treelimbs, bushes and vines, up to 2 m above ground.

Notes on natural history.— Duellman (1987) and Duellman & Salas (1991) considered the species heliophylic. Boulenger (1908) reported that BM 1946.8.8.25 "laid ten white eggs with parchment-like shell, regularly elliptical in shape", 29 × 14 mm.

Distribution (fig. 40).— Southeastern Peru, Bolivia, and the states of Acre (Peters & Donoso-Barros, 1970), Amazonas (southern part) and Rondônia in Brazil.

Remarks.— *P. liogaster* can be distinguished most easily from *P. marmoratus* by its

Polychrus liogaster,

smooth ventrals, in association with smoother scales on flanks. Other characteristics that seem to separate the two species are (1) two black lines that radiate from eyes and continue along neck in P. *liogaster,* while in P. *marmo*~~ss~~*e*thak the radiat marmo99 u1995) a3o

Pebas, Peru, but Dixon & Soini (1975, 1986) re-identified these specimens as *P. marmoratus*. Peters (1959) suggested that some specimens from Ecuador seen by him might be *P. liogaster*, but he was not sure about the identification, and most likely the species does not occur in Ecuador. Duellman (1987) and Duellman & Salas (1991) reported *Polychrus marmoratus* from Cuzco Amazonico, southern Peru, but at my request Duellman re-examined the specimen and found that it follows the characteristics here referred to for *P. liogaster*.

Boulenger (1908) stated that both *P. liogaster* and *P. acutirostris* were present in the collection from Province Sara, Bolivia. Paynter et al. (1975) reported the following vegetation types for this locality: campos forest, camp woods, high forest, and camp. These could explain the presence of both species, one (*P. liogaster*) inhabiting the forested areas, the other (*P. acutirostris*) the open formations.

Polychrus marmoratus (Linnaeus, 1758)
(figs. 40, 43, 242)

Lacerta marmorata Linnaeus, 1758: 208 (2 syntypes, UUZM Linnean collection nos. 14, 31; type-locality 'Hispania', restricted by Hoogmoed, 1973: 179 to the vicinity of Paramaribo, Suriname).

Polychrus marmoratus; Spix, 1825: 14; Duméril & Bibron, 1837: 65; Guichenot, 1855: 14; Boulenger, 1885b: 98; Goeldi, 1902: 514, 517; Müller, 1912: 14; Procter, 1923: 1064; Cott, 1926: 1160; Burt & Burt, 1930: 21, 1931: 284; Parker, 1935: 515; Peters, 1967: 30; Rand & Humphrey, 1968: 5; Peters & Donoso-Barros, 1970: 234; Crump, 1971: 19; Hoogmoed, 1973: 175, 1979: 278; Hoogmoed & Gruber, 1983: 388; Vanzolini, 1983: 122, 1986a: 14, 1986b: 20, 1988: 327; Cunha et al., 1985: 28; O'Shea, 1989: 69.

Polychrus marmoratus marmoratus; Burt & Burt, 1933: 41; Amaral, 1949: 110; Cunha, 1961: 88.

Material.— **Brazil.** AMAPA. Confluence of rio Vila Nova with igarapé Vila Nova, near ferryboat connection of road Cupixi-Vila Nova: 1 ♂, MPEG 15113, 14.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

AMAZONAS. Rio Uatumã, Município Presidente Figueiredo, reservoir area of hydroelectric dam Balbina: 1 ex., MPEG 14701, xii.1987, leg. D. Peccinini-Seale & C.F. Rocha. Benjamin Constant: 1 ex., MNRJ 1632, ii.1942; 2 exs., MNRJ 2228-29, rio Javari; 1 ex., MNRJ 2232, confluence of rivers Javari and Itacoaí, viii.1943; 4 exs., MNRJ 2233-36, mouth of rio Javari, v.1942; 1 ♂, 1 ♀, MNRJ 2392-93, rio Itacoaí, vi.1942, all leg. A. Parko; 1 ♀, MPEG 15891, W of Benjamin Constant, 07.xii.1989, leg. local children through M.S. Hoogmoed & T.C.S. Avila Pires.

MARANHAO. Nova Vida, road BR-316, 25 km from rio Gurupi: 2 ♀♀, MPEG 9579, 9597, 23.ii.1976, leg. O.R. Cunha & F.P. Nascimento.

PARA. 2 ♂♂, 1 ♀, NHMB 140D (2 ex.), 140E, c. 1900, leg. E. Goeldi. Km 224 (old km 74) of road BR-316: 1 ♀, MPEG 9603, 23.ii.1976; 2 ♀♀, MPEG 10215-215, vi.1976, all leg. O.R. Cunha & F.P. Nascimento. Município Augusto Correa, Fazenda Cacoal: 6 ♀♀, 1 hgr, MPEG 6776, 6779-80, 6782-84, 6786, 24.vii.1973, leg. O.R. Cunha & F.P. Nascimento. Benevides, São João da Pratinha, km 9 of road of Açucareira (Genipauba): 1 ♂, 3 ♀♀, MPEG 11009-010, 11012, 11017, x.1977, leg. F.P. Nascimento; 1 ♀, MPEG 12620, viii.1979, leg. F.P. Nascimento & R.J.R. Moraes. Ananindeua, Seminário Pio X: 1 ♀, MPEG 6066, 14.iii.1973, leg. Coelho. Ariramba, Mosqueiro: 2 ♀♀, MPEG 2359, 25.v.1968, leg. J. Barata. Belém, Utinga, IPEAN: 1 ♀, MPEG 1506, 1962, leg. SESP. Carajás, Serra Norte: 1 ♀, MPEG 13022, road to Manganês do Azul, x.1983; 1 ♂, MPEG 13315, road N1-N5, close to N4, 24.iii.1984, both leg. J.C.S. Pinto; 1 ♀, MPEG 14139, road N1-N2, 08.ix.1985, leg. R. Bittencourt Neto & Walter; 1 ♀, MPEG 14176, area of Barragem Estéril Sul, 17.ix.1985; 1 ♀, MPEG 14182, road N1-N5, close to entrance to Manganês do Azul, 18.ix.1985, both leg. F.P. Nascimento, M.G.M. Nery & R. Bittencourt Neto. Santarém, surroundings of igarapé Curupira, 35 km from road Santarém-Palhão: 1 ♂, 2 ♀♀, MPEG 3131-33, ix.1969, leg. Milton Silva.

Colombia. AMAZONAS. Leticia: 1 ♀, MPEG 16266, leg. J.J.S. Haad. HUILA. Road Guadalupe-Florencia, 11 km from Guadalupe: 1 ♂, RMNH 26486, 01.x.1980, leg. S.B. Kronenberg.
Suriname. PARAMARIBO. Paramaribo: 1 ♀, RMNH 26487, xii.1965, leg. G.V. Vreden. PARANAM. Powakka: 1 ♀, RMNH 26490, 30.v.1979, leg. M.S. Hoogmoed, W.N. Polder & J. Bruin. SARAMACCA. Airstrip Tafelberg, camp 13 km NW: 2 juv., RMNH 26488-489, 12.vi.1979, leg. M.S. Hoogmoed & W.N. Polder (Tafelberg expedition).
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Município Amapá, road BR-156, igarapé Agua Branca. AMAZONAS. Rio Uaupés, Iauareté. MARANHAO. Município do Arari, road BR-222, Gancho do Arari. Município Barra do Corda, road BR-226, Aldeia Sapucaia. Paruá, road BR-316. São Raimundo (near Santa Inês), road BR-316. PARA. Ilha do Marajó, Rio Aramá, Vila Nova do Aramá. Viseu: Bela Vista; Curupati; Fazenda Real. Colônia Nova, road BR-316, near Rio Gurupi. Parada Bom Jesus, road PA-242, 11 km from Bragança. Rio Guamá, Boca Nova, 18 km from Capitão Poço. Capitão Poço: Santa Luzia; São Pedro. Ourém: Limão Grande; Puraquequara. Peixe-Boi. Santarém Novo (road to Salinópolis). Km 75 road Belém-Brasília. Acará, Jacarequara. Road to Acará: km 16-17; igarapé Parajauara; rio Pirajauara. Vila Nova, road Tomé-Açu to Paragominas. Tomé-Açu. Km 23 and 47 of road to Maracanã. Curuçá, Vila Marauá. Inhangapi. Castanhal, rio Apeú: Boa Vista; Macapazinho. Santa Rosa, road to Vigia. Santo Antônio do Tauá. Ilha do Mosqueiro. Benevides, Seminário Redentorista de Benevides. Ananindeua, Guajará. Belém, park of MPEG. Moju, rio Ubá, povoação do Luso, km 36 of road Moju-Acará. Rio Xingu, Altamira.

Diagnosis.— *Polychrus* with a blunt snout; relatively large and nearly smooth scales on dorsal surface of head; nasal in contact with second supralabial, sometimes also having a short suture with first or third supralabial; a gular crest formed by compressed, pointed, enlarged scales present anterior to gular fan; gular fan reaches level of forelimbs; scales on sides of neck from slightly smaller than, to as large as those on nape, and those on flanks smaller than scales on tail; ventrals slightly to distinctly keeled; with three black lines radiating from each eye, none of which reaches the neck. No sexual dimorphism in colour pattern. A forest inhabitant.

Description.— *Polychrus* with maximum SVL in males of 126 mm, in females of 144 mm (Vanzolini, 1983). Head 0.21-0.26 (0.23 ± 0.01, n= 26) times SVL, 1.40-1.68 (1.56 ± 0.09, n= 26) times as long as wide, 1.01-1.36 (1.12 ± 0.08, n= 26) times as wide as high. Snout blunt; canthus rostralis distinct posteriorly. Neck narrower than head, and almost as wide as anterior part of body. Body compressed. Limbs well developed, forelimbs 0.34-0.40 (0.36 ± 0.02, n= 7) times SVL, hind limbs 0.46-0.59 (0.51 ± 0.05, n= 7) times, tibia 0.14-0.18 (0.16 ± 0.01, n= 26) times. Tail round in cross section, tapering toward tip; in males 2.7-3.0 (2.85 ± 0.12, n= 5) times SVL, in females 2.4-2.8 (2.58 ± 0.10, n= 20) times.

Tongue wide, villose, tip nicked. Anterior teeth conical, posterior teeth tricuspid.

Rostral pentagonal, about two to two-and-a-half times as wide as high, just visible from above. Bordered posteriorly by 2-4 (mostly two) scales. Scales on snout heterogeneous in size (mostly relatively large), irregularly polygonal, juxtaposed, flat, and smooth (or nearly so); 2-3, exceptionally five, scales across snout between second canthals. Two, rarely three canthals between nasal and supraciliaries, anterior one usually wide. Supraorbital semicircles distinct, with 6-10 (mostly 7-8) scales, separated medially by one row of scales about as large as those of supraocular semicircles. Scales on supraocular region distinctly smaller than those on snout, polygonal, juxtaposed, flat, and smooth; irregularly arranged, except for a row of smaller scales adjacent to supraciliaries. Supraciliaries 9-13, juxtaposed or slightly imbricate, smooth, anterior ones slightly longer; in a continuous series with canthals. Scales on parietal and occipital regions irregularly polygonal, juxtaposed, flat, smooth, larger toward interparietal area, where they are intermediate in size between those on snout and on supraocular region. No enlarged interparietal; parietal eye absent. Loreal region with few scales; mostly one, rarely two scales between second canthal and supralabials. Nostril directed laterally, in the centre of a single nasal. Nasal in contact with second supralabial, sometimes also with a short suture with first or third supralabial. Eyelids partially fused together, covered by granules increasing in size toward rim. A continuous series of 2-3 preoculars, 1-4 (mostly 2-3) suboculars, which are in direct contact with supralabials, and 2-4 (mostly 3-4) postoculars. Supralabials 5-8, commonly six, usually one but last below centre of eye; followed to commissure of mouth by 3-4 relatively small scales. Temporal region with polygonal, juxtaposed, flat, and smooth scales, smaller toward ear-opening; delimited dorsally by a single or double row of enlarged supratemporal scales. Ear-opening large, vertically oval, with smooth margin; tympanum superficial.

Mental roughly semicircular to trapezoidal, posteriorly indented by first infralabials and postmentals, and partially divided by a median sulcus. Postmentals 2-4, lateral ones distinctly larger than median ones. Infralabials 5-8, mostly six, 4-6 to below centre of eye; followed to commissure by 2-4 small scales. Lateral scales on chin relatively large, irregularly polygonal, subimbricate, smooth, and slightly convex. Medial scales narrow, elongate, smooth, slightly convex; posteriad, a median row of scales progressively becoming more prominent, forming a serrate crest of compressed, pointed, elevated scales which continues until anterior part of gular fan. Gular fan with scales along rim broadly keeled, pointed, densely packed, imbricate. Laterally, scales elongate, broadly keeled to convex, in single or double longitudinal rows which are separate from each other by an extensible skin partially covered with granules. Both in males and females gular fan reaches level of forelimbs.

Scales on nape anteriorly relatively small, quadrangular to irregularly polygonal, juxtaposed to subimbricate, convex, either with a short, posterior keel, or striated; posteriorly grading into dorsals. On sides of neck scales from slightly smaller than, to as large as, those on nape, and more elongate, merging ventrally with gulars. Dorsals approximately rhomboid to hexagonal (some irregular), imbricate, flat, sharply keeled; occasionally some scales are multicarinate; 102-118 (109.6 ± 5.5, n= 23) scales in a middorsal line between occiput and posterior margin of hind limbs. Scales on flanks slightly smaller, rhomboid to oval, convex, weakly or distinctly keeled, in oblique rows. Ventrals about as large as dorsals, lanceolate, imbricate, flat, distinctly to slightly keeled (smooth in RMNH 26488-489, two hatchlings from Suriname), sometimes slightly mucronate; in poorly defined oblique and transverse rows. A gradual transition between dorsal, lateral, and ventral scales. Scales around midbody 68-90 (79.0 ± 6.3, n= 26). Preanal plate with scales similar to ventrals, but slightly smaller. Preanal pores absent. Femoral pores 17-23 (20.3 ± 1.6, n= 27) in total, 8-12 per side, in males large and mostly occupying centre of a slightly larger scale, in females small, usually forming a notch in posterior part of a scale (which is several times larger than pore).

Tail with rhomboid, flat, sharply keeled scales, distinctly larger than dorsals; in

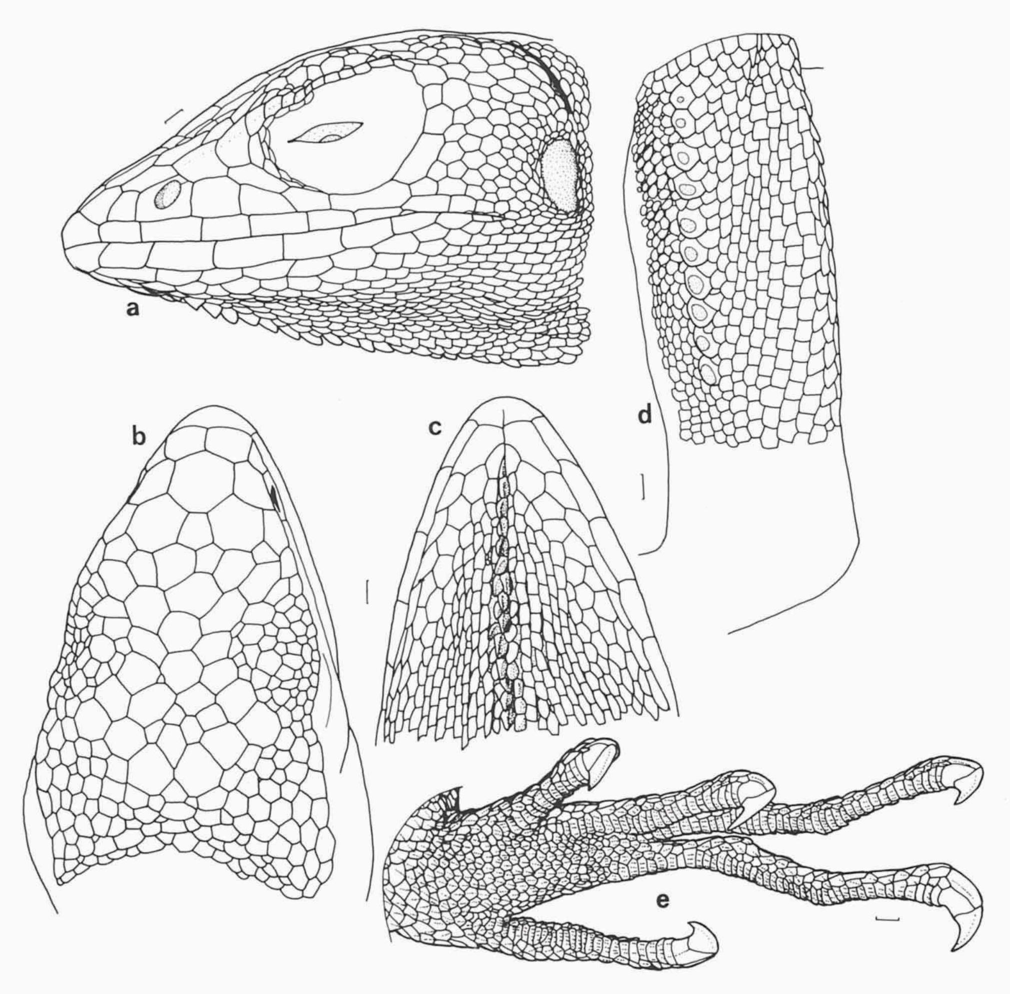


Fig. 43. *Polychrus marmoratus*; a, b, c: lateral, dorsal, and ventral views of head of MPEG 6786; d: ventral aspect of left thigh of MPEG 11017 (♂), showing femoral pores; e: left foot of MPEG 11010.

longitudinal and oblique rows, keels aligned longitudinally; on ventral surface scales slightly narrower. No specimen with regenerated tail was seen, though a few missed the extremity of the tail. Thus, possibly tail lacks autotomy, as was already observed by Hoogmoed (1973).

Scales on forelimbs mostly slightly larger than dorsals, rhomboid, flat, weakly or distinctly keeled; slightly smaller and less distinctly keeled on ventral aspect of forearms; and small, rectangular, convex, and smooth on the ventro-posterior aspect of upper arms. Anterior aspect of thighs, and lower legs with scales similar to those on forelimbs; toward posterior aspect of thighs, both dorsally and ventrally, scales become distinctly smaller. Subdigital lamellae of fingers and toes single, short, multicarinate; 24-37 (30.9 ± 2.4, n= 54, 27 specimens) under fourth finger, 33-46 (41.2 ± 3.0, n= 53, 27 specimens) under fourth toe.

Dorsal surface of head of MPEG 15113 in life lime-green (59), with sides mainly yellow-green (58) and black stripes radiating from eyes; back parrot-green (60) anteriorly, grading into leaf-green (146) posteriad, with a middorsal brown band (of several hues of brown) and brown transverse stripes; dorsal surface of limbs parrot-green (60), and of tail light drab (119C), proximally with parrot-green spots. On ventral surface, head opaline-green (162D); gular fan opaline-green to dirty-white, with blackish stripes; belly dirty-yellow with yellow-green (58) spots; limbs dirty-white; tail light drab. Iris brown with a golden rim around pupil. Tongue warm-buff (118), back of mouth and throat black. This same specimen showed a brown phase, where head became raw-umber (123), laterally with a greenish hue; middorsal band predominantly mikado-brown (121C); flanks fuscous (21) with buff (24) to raw-umber (23) transverse stripes. The ventral surface became predominantly tawny-olive (223D), more whitish under head; gular fan tawny-olive with fuscous (21) bands. Limbs and tail with same colours as body.

MPEG 15891 in life dorsally was pale Pratt's Payne's grey (88) on head, back predominantly apple-green (61) and lime-green (159), and tail mars-brown (223A) and sepia (119). Ventral region mainly pistachio (161), tail predominantly lime-green (159) near base, army-brown (219B) distally.

In preservative, general dorsal colour most commonly brown, sometimes olive-grey; large or small bluish areas are not uncommon. Head with some black and/or bluish spots; sides of head with three (or two) black lines radiating from eye, of which one vertical reaching supralabials (occasionally this stripe may be missing), one oblique in the direction of the commissure of the mouth, and one horizontal, slightly curved, reaching dorsal limit of ear-opening. Back usually with five or six transverse ("V"-shaped), dark brown bands, but sometimes only narrow lines are seen, and in other cases there is a dark brown marbling, more intense on flanks than dorsally, no bands being discernible. Ventral region whitish to tan, sometimes with light blue areas, and mostly variably spotted. Body pattern continued on limbs. Tail with dark brown bands, either very wide, or reduced to narrow lines; ventrally it may be lighter, especially toward the base. In two hatchlings (RMNH 26488-489), dorsal surface of head almost uniformly brown, and on sides, between the black lines that radiate from eyes, it is white; a bluish area is present on sides of neck; flanks with a distinct banded pattern, along vertebral area the light bands becoming narrower and paler; tail with brown and light brown bands, not very contrasting, and limbs dark brown with some light brown transverse lines; ventral region white anteriorly to tan posteriorly, with some pale brown transverse lines from labials to chin, and on belly.

Habitat.— A forest dweller mainly found in edge situations, e.g., in the neighbourhood of water, roads or plantations (Rand & Humphrey, 1968; Hoogmoed, 1973; Duellman, 1978; Gasc, 1981, 1990; Cunha et al., 1985; Dixon & Soini, 1986; O'Shea, 1989), where they are usually seen on the branches of bushes or trees (Cott, 1926; Beebe, 1944b; Cunha, 1961; Hoogmoed, 1973; Dixon & Soini, 1986), occasionally on the ground (Test et al., 1966). Inside dense forest it is seldom seen, and it has been supposed that it occurs in the canopy (Rand & Humphrey, 1968; Vanzolini, 1983; Gasc, 1990). Crump (1971) found the species in terra firme, varzea, igapó and second growth forests. Vanzolini (1986a) reported a specimen found in a yard, on the branch of a lemon tree. Hoogmoed (1973) and Duellman (1978) mentioned sleeping specimens, in heights between 0.5-2 m. Field notes I have available indicate that three specimens (MPEG 13022, 13315, 14139) from Carajás, southern Pará, were on the ground, near or on a road through forest; MPEG 14176, also from Carajás, was in the neighbourhood of an artificial lake, on vegetation. MPEG 15891, from Benjamin Constant, Amazonas, was found along a road in an agricultural area near terra firme forest, 1.5 m above the ground, in shrubs. MPEG 15113, from Serra do Navio, Amapá, was found between 19:00-20:00 h on an inclined branch of a dead tree, 1.5 m above ground, in an open area with a muddy ground (caused by overflow of creek due to man-made alterations), near terra firme forest.

Notes on natural history.— *P. marmoratus* may be relatively abundant in some areas (Cott, 1926; Beebe, 1944b; Rand & Humphrey, 1968; and which also is evident from the large number of specimens from eastern Pará in the MPEG collection). On the other hand, it may be hard to detect, because of its cryptic colouration (which can change between a brown and a green phase) and its ability to stand still in odd positions for long periods (Cott, 1926; Mertens, 1930; Beebe, 1944b; Vanzolini, 1983). The behaviour of some individuals was extensively described by Beebe (1944b). Cott (1926) and Mertens (1930) noted the ability of the species to jump, and to stand on its hind limbs to reach another branch; they also referred to the (tip of the) tail acting as a prehensile organ. Gasc (1990) observed that *P. marmoratus* jumps from one branch to another by simultaneously extending both hind limbs. Mertens (1930) observed the animal sometimes to move through slender branches by just using the forelimbs, while the hind limbs trailed passively behind.

Rand & Humphrey (1968) observed that the cloacal temperatures of three specimens were higher than the ambient air temperature at the time of capture and concluded that the species was probably heliotherm. Hoogmoed (1973) stated that the species "was observed basking several times".

Beebe (1944b) reported specimens in full breeding condition from January, July, and August; one gravid female observed by him had seven eggs (three of which were laid in a terrarium) with averages of 26.2 × 11.7 mm and 1.9 g. Another female had seven immature eggs 3-4 mm in length. Hoogmoed (1973) mentioned that females from August and September contained four and six round, immature eggs. Rand (1982) reported three specimens with 8-10 eggs, 1.9-2.7 ml in volume and total clutch volume of 16.7-21.3 ml. Dixon & Soini (1986) mentioned seven gravid females found between January and April containing 7-11 eggs, the largest of which was 13.0 × 13.1 mm and the smallest 10.0 × 10.2 mm. Among specimens in the MPEG collection, several females are distinctly gravid. Two of them (collected in July, from eastern Pará) were dissected, MPEG 6776 (SVL 127 mm) carrying eight eggs with an average size of 22.5 × 9.6 mm, MPEG 6779 (SVL 123 mm) containing twelve eggs, 22.1 × 10.6 mm.

Analysis of stomach contents of *P. marmoratus* by Beebe (1944b), Rand & Humphrey (1968), Hoogmoed (1973), and Duellman (1978) revealed that it eats a variety of insects and spiders, plus plant material (leaves, flowers, fruits and seeds).

One specimen of *Polychrus* was taken by Beebe (1944b) from the stomach of a white-collared hawk, *Leucopternis a. albicollis* (Latham); another specimen that had been dropped by a hawk (probably also *L. albicollis*) was collected by Test et al. (1966). Cunha & Nascimento (1994) reported *Chironius multiventris* Schmidt & Walker as preying upon *Polychrus* (species not specified, but on geographical grounds most probably *P. marmoratus*).

Distribution (fig. 40).— Northern South America east of the Andes (French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru, and Amazonian Brazil), and in the Atlantic forest, from Recife, in Pernambuco, to São Sebastião, in São Paulo (distribution in Atlantic forest according to Vanzolini, 1983). In Brazilian Amazonia it is known from Maranhão, Pará, Amapá, Roraima, and Amazonas. Vanzolini (1986a) reported one specimen from Rondônia, which is commented upon below.

Remarks.— Vanzolini (1983) presented a review of the literature and discussed the geographic distribution of *P. marmoratus* and *P. acutirostris*. The two species have a parapatric distribution, the former is associated with forest and the latter with open formations. Several morphological differences, besides those mentioned in the key, exist. These include a relatively longer tail and longer hind limbs in *P. marmoratus* than in *P. acutirostris*, a smaller opening of the eyelids in *P. acutirostris*, and the presence in *P. acutirostris* of a nuptial livery, absent in *P. marmoratus*. Mertens (1930) pointed out that *P. marmoratus* is able to jump whereas *P. acutirostris* is not, and that the latter more often uses the tail as a prehensile organ during climbing.

Vanzolini (1986a) reported a specimen (MZUSP) from Santa Cruz da Serra, Rondônia. Because the only two specimens I saw from Rondônia were *P. liogaster* (see account of that species) and because *P. liogaster* and *P. marmoratus* are quite similar, I defer final judgement of identification until I am able to examine the MZUSP specimen.

A distinctly larger number of females than males is represented in the MPEG collection; maybe this discrepancy exists because females are larger than males and thus more easily detected.

Family Tropiduridae Bell, 1843

This family, as proposed by Frost & Etheridge (1989), corresponds in content to the tropidurines of Etheridge & Queiroz (1988).

Content.— Three subfamilies (Frost & Etheridge, 1989), of which only Tropidurinae occurs in Amazonia. Five genera in Brazilian Amazonia — *Stenocercus* of the tribe Stenocercini Frost, 1992, and *Plica, Tropidurus, Uracentron*, and *Uranoscodon* of the tribe Tropidurini Bell, 1843.

Remarks.— Frost (1992) proposed the synonymization of *Plica* and *Uracentron* with *Tropidurus*. However, I prefer to wait for a confirmation of his results before adopting this position. Frost (1992) himself remarked that the most parsimonius tree he obtained for the *Tropidurus* group was unstable. Moreover, at least regarding the *Tropidurus torquatus* group, the species are so much alike that it is difficult to accept that they are paraphyletic, as suggested by Frost's (1992) results.

Stenocercus Duméril & Bibron, 1837

Frost (1992) synonymised *Ophryoessoides* and *Proctotretus* with *Stenocercus*. Frost (1988) already suggested this and Cadle (1991) followed him. The synomymisation was based on the recognition that the two former nominal taxa are derived from *Stenocercus*. However, in all cases the authors emphasized the provisory condition of this arrangement, until a general revision of the taxa is accomplished. I here follow

Cadle (1991) and Frost (1992), although I believe that each of the three taxa described below under *Stenocercus* - *S. dumerilii*, *S. fimbriatus* **spec. nov.**, and *S. roseiventris* - represents a distinct genus. *Stenocercus* sensu Frost (1992) is quite variable and includes many species, most of them out of the scope of the present study. The diagnosis given below takes into consideration only the three species included in the present study.

Diagnosis.— Head scales variable. Interparietal small or absent. Supraciliaries elongate, overlapping. Scales on frontonasal region slightly imbricate posteriorly. Nostril directed posterolaterally. One or two rows of lorilabials. No gular or antegular folds. Folds on neck present or absent. A low vertebral crest. A dorsolateral crest at each side present or absent. Dorsals flat, imbricate, smooth or keeled. Scales on flanks slightly to distinctly smaller than dorsals. Ventrals flat, imbricate, smooth or keeled, smaller or about the same size as dorsals.

Distribution.— Mainly western South America, in parts of Colombia, both sides of the Andes in Ecuador and Peru, and in parts of Brazil, Bolivia, Paraguay, and Argentina. It reaches the Atlantic coast in Argentina, Uruguay, and southern Brazil, to the south, and in eastern Pará, to the north. Probably also in Minas Gerais, Brazil.

Content.— About 46 species are included in *Stenocercus* sensu Frost (1992), three of which occur in parts of Brazilian Amazonia: *S. dumerilii*, *S. fimbriatus* spec. nov., and *S. roseiventris*.

Stenocercus dumerilii (Steindachner, 1867)
(figs. 44, 45, 243)

Ophryoessoides Dumerilii Steindachner, 1867: 33 (holotype NMW 16363, type-locality: "Brazilien bei Pará", restricted by Cunha, 1981b: 108, to surroundings of Belém, Pará, Brasil).
Liocephalus dumerilii; Boulenger, 1885b: 170.
Liocephalus dumerili; Müller, 1912: 14.
Leiocephalus dumerilii; Burt & Burt, 1933: 27; Amaral, 1937a: 1736, 1937b: 178; Cunha, 1961: 86.

Rio Guamá): 1 ex., MPEG 1815, 1961, leg. W. Egler. Município Acará, Pirajauara (at Rio Pirajauara, km 34 of road to Acará, PA-252): 1 ex., MPEG 9484, 11.ii.1976, leg. O.R. Cunha & F.P. Nascimento.
Material of *Stenocercus tricristatus* studied for comparison.— **Brazil.** Holotype, ♂, MHNP 6825, leg. M. Claussen.

Diagnosis.— *S. dumerilii* is separated from all other *Stenocercus* except *S. tricristatus* by the following characteristics: head pyramidal, canthal and supraciliaries forming a pronounced crest which ends in an enlarged post-supraciliary; in lateral view the head has the shape of a scalene triangle, with the apex formed by an enlarged post-supraciliary. Supraoculars not enlarged. One elongate subocular. Interparietal small, parietal eye distinct. No gular or neck folds. Scales on sides of neck relatively large, imbricate. A vertebral and low dorsolateral crests. Dorsals, laterals and ventrals relatively large, imbricate, keeled. Mite pockets absent.

From *S. tricristatus* it is distinguished by: body slightly depressed; three or four supraciliaries in dorsal view, followed by a distinctly pointed, enlarged post-supraciliary; two enlarged scales above ear-opening; scales around midbody 41-50, of which 11-14 dorsals; tibia about as long as thigh; tail relatively short, 1.2-1.4 times SVL.

Description.— Tropidurid with maximum SVL in males of 104 mm (MPEG 6273), in females of 112 mm (NMW 16363, MPEG 7376). Head 0.23-0.29 (0.26 ± 0.01, n= 33) times SVL, 1.07-1.24 (1.17 ± 0.04, n= 33) times as long as wide, 1.28-1.61 (1.45 ± 0.09, n= 31) times as wide as high. Snout bluntly pointed in dorsal view, pointed in profile. Canthus rostralis well defined, continuous with supraciliaries which end in a prominent trihedral scale, giving the head the shape of a four-sided pyramid. In profile, the head shows an ascending line until level of post-supraciliary prominent scale, then a descending line toward neck. Neck narrower than head and body. Body slightly depressed. Limbs well developed, forelimbs 0.42-0.52 (0.47 ± 0.02, n= 29) times SVL, hind limbs 0.54-0.67 (0.62 ± 0.03, n= 29) times. Tibia 0.17-0.21 (0.19 ± 0.01, n= 33) times SVL, and 0.27-0.33 (0.31 ± 0.01, n= 29) times length of hind limb. Tail round in cross section, tapering steadily toward tip, in males 1.18-1.42 (1.29 ± 0.08, n= 15) times SVL, in females 1.07-1.27 (1.18 ± 0.06, n= 14) times.

Tongue wide, villose, with rounded, nicked tip. Teeth small. Anterior teeth conical, posterior teeth slightly compressed with three small cusps.

Rostral semicircular to low-triangular, largest width about four times median height, only barely seen from above. Postrostrals 2-3, occasionally four. Snout, supraocular and interorbital regions form a continuous, rather flat, surface, covered with irregularly polygonal, subimbricate to juxtaposed scales, flat with a distinct low keel, and variable in size, though in general relatively large. Scales across the snout between posterior canthals 3-6, mostly five. Supraorbital semicircle and supraocular scales not or only slightly differing from the surrounding scales. Two canthals, anterior one reaching the post-rostrals, posteriorly continuous with supraciliaries. Supraciliaries mostly four, exceptionally three, first two elongate and overlapping posteriorly, third elongate and overlapped anteriorly and posteriorly, fourth short, anteriorly overlapping the third. In lateral view an additional median, elongate scale is present. Canthals and supraciliaries form a distinct crest which ends in a very prominent pyramidal scale immediately posterior to supraciliaries. This crest delimits a sharp angle between dorsal and lateral surfaces of head. Interparietal small to moderately enlarged, rhomboid or pentagonal, parietal eye distinct. A pair of relatively large, obliquely keeled scales borders the interparietal posteriorly and is followed by another pair of large scales with a central conical elevation; one or two small scales may occur in the midline, partially or completely separating the second pair of enlarged scales. These are followed either by two relatively large scales, separated medially by one to several small scales and forming an oblique row with the two anterior pairs of enlarged scales, or by three or four subequal scales; rarely small scales separate this row (which reaches the posterior border of the head) from the anterior enlarged scales.

Laterally to these post-interparietal enlarged scales, the scales are similar to those on snout, though slightly smaller. Nasal lateral in position (below anterior canthal), large, undivided; nostril in its posterior part, directed latero-posteriorly. Loreal region with a distinct row of lorilabials, mostly anteriorly and posteriorly single, medially double; between lorilabials and canthals a few large (and sometimes a few small as well), irregularly polygonal, keeled scales, with variably rugose surface. Scales in a transverse row between posterior canthal and supralabials 4, occasionally 5 or 6. Two suboculars, anterior one about three times as long as high, with a longitudinal keel close to its upper margin; posterior one about as large as adjacent temporal scales, keeled. Anterior subocular frequently in contact with posterior supralabial, sometimes separated from supralabials by the row of lorilabials. Supralabials five, six, or sometimes seven, very narrow and keeled, except usually the posterior one, which may be higher; followed to commissure of mouth by 2-3 scales, first or second of which may be relatively large, its surface raised toward a median keel. Temporal region with irregularly polygonal, mostly flat and sharply keeled scales, smaller on lower part; four scales in an oblique row from lower posterior border of orbit to above ear-opening, the two posterior ones distinctly enlarged, trihedral. A supratemporal row of scales formed by the enlarged post-supraciliary scale, the enlarged scale above ear-opening (posterior one of oblique temporal row), and two or three scales in between. Ear-opening relatively large, vertically oval, with smooth margin; tympanum superficial.

Mental small, about same size as adjacent infralabials, bordered posteriorly by two bulky scales, occasionally also by one or two (one per side) sublabials. Infralabials 5-7, mostly six, very narrow, keeled, posterior one below centre of eye; mostly followed by two, sometimes one or three, scales to commissure of mouth. Three rows of elongate sublabials, with a high median keel; two of the rows continue beyond labials until below ear-opening, becoming progressively shorter and with a prominent mucro. Scales on chin anteriorly relatively small, approximately hexagonal, imbricate, flat and distinctly keeled, posteriad grading into gulars. Gulars relatively large, phylloid, imbricate, flat, strongly keeled and mucronate (similar to dorsals, but with a stronger keel and mucro), in longitudinal rows; no gular or lateral folds.

Scales on nape similar to dorsals, except for the most anterior ones, which are smaller. A low vertebral crest of larger, mainly flat, and sharply keeled scales, from nape (but not reaching the occiput) to posterior level of hind limbs. A dorsolateral row of scales at each side form a low, serrate crest from the high trihedral scale above ear-opening, to posterior level of hind limbs. Crest more prominent on neck, where

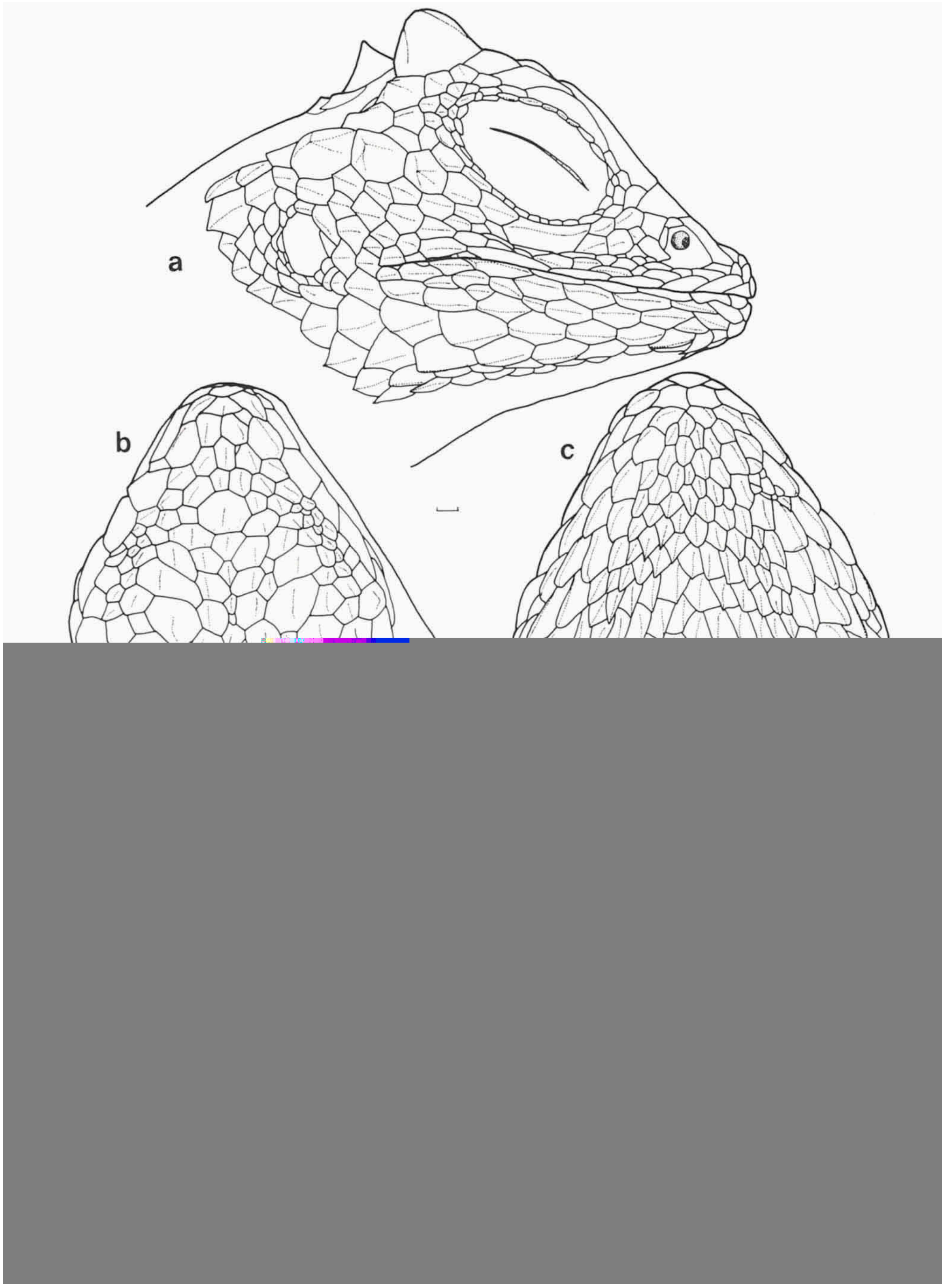


Fig. 44. *Stenocercus dumerilii*, MPEG 7323; a, b, c: lateral, dorsal, and ventral views of head (enlarged postsupraciliary on right side with tip missing); d: ventral view of right foot.

scales are raised and sharply mucronate. Scales on sides of neck similar to but smaller than dorsals, in 2-3 longitudinal rows. Limited ventrally by a row of larger (similar size as ventrals), slightly prominent and sharply mucronate scales, which continues from one of the sublabial rows up to insertion of arm. Dorsals phylloid, imbricate, distinctly and sharply keeled, not or only slightly mucronate; 11-14 (12.2 ± 1.0, n= 33) dorsal scales in a transverse row at midbody, between and including the dorsolateral rows; 24-30 (26.9 ± 1.5, n= 33) vertebral scales from occiput to base of tail. Flanks with similar but slightly smaller scales, delimited dorsally by the dorsolateral crest, and ventrally by a weaker ventrolateral crest between the fore- and hind limbs. A third, median, low crest may be present, starting somewhere on the ventrolateral row of larger scales on neck, passing over insertion of forelimbs, and not reaching hind limbs. Ventrals subequal to slightly smaller, and narrower, than dorsals, phylloid, strongly keeled, mucronate, in longitudinal and oblique rows; 28-35 (31.3 ± 1.8, n= 31) ventral scales along a midventral line between anterior level of forelimbs and anterior level of hind limbs. Scales around midbody 41-50 (45.3 ± 2.5, n= 33). Scales on preanal plate in transverse rows, more conspicuous in some specimens than in others. Mite pockets absent.

Scales on tail dorsally rhomboid, imbricate, flat, keeled, not or only slightly mucronate, smaller distally. On ventral surface similar but slightly larger and with a stronger keel and mucro, the keels forming longitudinal ridges. No distinct verticils.

Limbs mostly with rhomboid, imbricate, flat, keeled and mucronate scales, about as large as dorsals. On anterior aspect of upper arms, on most of forearms, and anterior and ventral aspects of hind limbs, the keels form distinct ridges. Antero-ventral aspect of upper arms and articulation areas with smaller scales. Subdigital lamellae single, tricarinate; 12-18 (14.8 ± 1.1, n= 65, 33 specimens) under fourth finger, 18-24 (20.6 ± 1.3, n= 62, 33 specimens) under fourth toe.

Colour in life of MPEG 16401, vandyke-brown (221) on top of head, back vandyke-brown and verona-brown (223B) with paired, blackish, triangular spots, dorsal surface of tail predominantly vandyke-brown. On the sides, eyes with a blackish band, posteriorly verona-brown (223B); tympanum chamois (123D); sides of neck with a blackish band bordered ventrally by a clay colour (123B) stripe; flanks anteriorly black (as a continuation of the black band on neck), posteriad as the back. Ventral surface predominantly cinnamon-rufous (40), with a vandyke-brown irregular pattern; underside of tail predominantly vandyke-brown, but less than on dorsal surface. Iris tending to verona-brown (the specimen was said to be very light when collected, later on getting the dark colouration described above).

Colour in preservative variable, buff-yellow, straw-yellow, pale smoke-grey, light drab or, especially among males, dark drab. Dorsal and ventral surfaces of same colour. A triangular, umber spot may be present at level of centre of eyes, on top of head, as well as an umber, oblique, slightly curved band from middle of lower eyelid to posterior labials. Sides of neck in males with a black longitudinal band from about middle of neck to insertion of forelimb, anteriorly narrow, widening posteriad, bordered below by a light line. In females the black (or dark umber) band dorsally merges into an umber area which occupies most of the area on the side of the neck, and may extend anteriorly to the border of ear-opening. Along the back there may occur four transversely elongate, sub-rhomboid umber spots, equidistant from each other, the anterior one at about the level of forelimbs (or slightly posteriad), the posterior one on the level of hind limbs; the three anterior ones are often interrupted at the vertebral line. In all females the series of spots is present; in males it may be present, completely absent, or only the posterior spot present. Tail and limbs with dark and light bands, but mostly not very conspicuous. Ventral region usually uniformly coloured, or with some dark and light marbling. Juveniles with a pattern similar to that of females. MPEG 6089 (38 mm SVL) predominantly light and, besides the spots mentioned above, some pale brown, irregular spots on head and body dorsally, transverse brown bands across supraciliaries and labials, from where they continue on part of chin; some dotted longitudinal brown lines along gular region; belly, underside of limbs and of tail marbled with brown. Hatchlings MPEG 16324-325 with back predominantly light, top of head, limbs, flanks and tail darker (all with a number of light and dark brown spots); ventral surface completely marbled.

Habitat.— The species inhabits a region originally covered with rain forest, which since about the end of last century was colonized and consequently was deforested. Presently it is covered by secondary vegetation ("capoeira") in several stages of development. In older stages the vegetation forms a low, open (sunny) forest, with a dense growth in the lower strata (see Cunha, 1981b for a more extensive description of the area). MPEG 16401 was collected in one of these areas of old capoeira, on a tree trunk of c. 40 cm of diameter, 1.5 m above the ground. According to Cunha (1981b), *S. dumerilii* is arboreal, living on the branches of low trees, not much above the ground; it shows relatively slow movements, a cryptic mimetism, and is heliophylous. Considering its occurrence in an area relatively close to the coast, with many rivers running directly into the sea, through which the coastal vegetation can penetrate further inland, I think it is possible to imagine that its original habitat could have been the border of the forest with the coastal vegetation and along the margins of rivers, where more open situations could be found.

Notes on natural history.— *S. dumerilii* is diurnal, and it seems to be very cryptic in its habitat. According to reports of local inhabitants from places where it occurs, the lizard is found mainly during clearing for plantation. Cunha (1981b) mentioned a variety of Arthropoda found in the stomach contents of the specimens studied by him: Coleoptera, Hemiptera, Hymenoptera, Orthoptera, larvae of Coleoptera and Lepidoptera; Arachnidae; Chilopoda; and Diplopoda. The same author reported six females, collected between January and June, which contained from two to six oviductal eggs. The smallest juveniles were collected in January-February.

MPEG 16401 was kept in terrarium between August 21, 1992 and November 3, 1993. It accepted a variety of insects as food, including orthopterans and large winged ants, and it usually ran toward the prey to get it. Most often it slept on a branch, but during some periods (of several subsequent nights) it stayed on the ground, or partially or completely burrowed itself. The lizard was collected on 18.viii.1992 (in Patateua, Município de Ourém), and between 6 and 21 September 1992 at least two, possibly four, eggs were laid (unfortunately no precise date or number of eggs is available due to conditions under which eggs were laid in a communal terrarium). One juvenile *S. dumerilii* was found on 18.xii.1992, and another one on 27.xii.1992. This indicates an incubation period of between 88-112 days. The

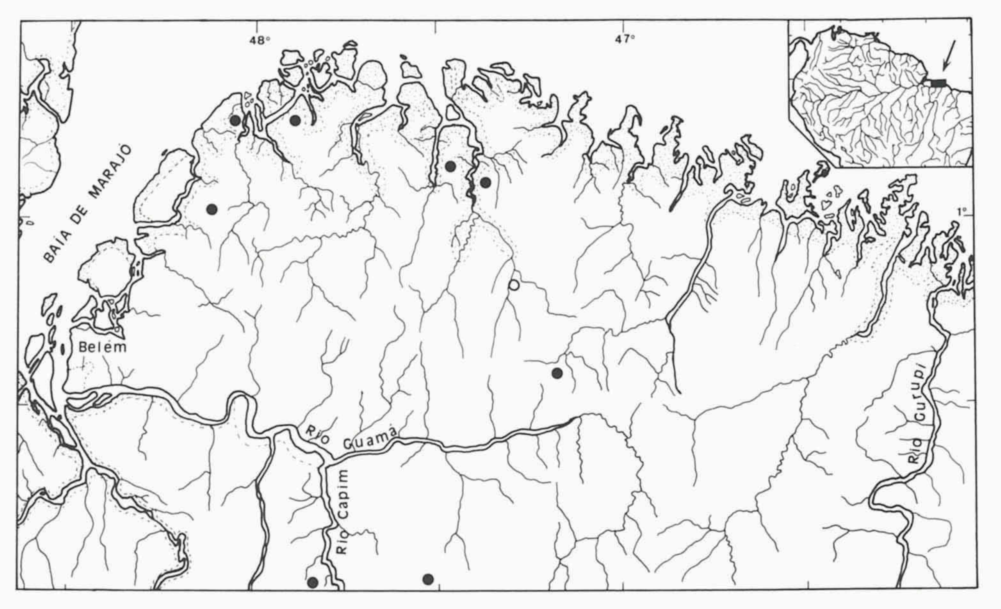


Fig. 45. Distribution of *Stenocercus dumerilii* in eastern Pará (the rectangle in the small map enclosed shows the area represented in the larger map). Closed circles = material studied. Open circle = data by Müller (1912) for Peixe-Boi.

hatchlings (MPEG 16324-325) had respectively 33 & 35 mm SVL, 34 & 38 mm tail length, and 1.1 & 1.2 g of weight.

Distribution (fig. 45).— Northeastern Pará, Brazil. Up to now known only from a rather restricted area, between Baía de Marajó and Gurupi river, and from the coast to about 40 km south of Guamá river.

Remarks.— Steindachner (1867) described this species based on a specimen collected by Natterer in "Brasilien bei Para", which, as observed by Cunha (1981b), is equivalent to the surroundings of Belém, in the state of Pará. In the description, Steindachner (1867) observed the resemblance of the species with *S. tricristatus* (Duméril, 1851), although pointing out some differences. The holotype was the only specimen known in the literature until Cunha (1981b) reported extensively on this species. A similar situation was true for *S. tricristatus*, described on the basis of one specimen collected in "Brazil" by Claussen. Etheridge (1966), redefining the genus *Leiocephalus*, listed both species under *Ophryoessoides*. Later, however (Etheridge, 1970b), *O. dumerilii* was listed in the synonymy of *O. tricristatus*. Cunha (1981b) accepted this synonymization on the basis of the literature description alone (without studying the types). I had the opportunity to examine both types, plus the collection studied by Cunha (1981b), and it turns out that the two names correspond to two quite distinct species, although with a series of similar conspicuous features, which make them generally alike. Consequently, I here resurrect *S. dumerilii* from the synonymy of *S. tricristatus*. The two species can be distinguished by the characteristics listed in table 2. Besides, judging from the drawing of *S. tricristatus* presented by Duméril (1856: pl. xxii, 1), the colour pattern of this species is very different from that

Table 2. Comparison between *S. dumerilii* and *S. tricristatus*.

	S. dumerilii	*S. tricristatus*
enlarged post-supraciliary	distinctly pointed	blunt
two enlarged scales above ear-opening	present	absent
supraciliaries (in dorsal view)	mostly 4, excpetionally 3	2
scales on chin	smaller than, and dissimilar to gular scales	rather similar to gular scales
no. of dorsals between (and including) dorsal crests	11-14	8
body	slightly depressed (wide back, low flanks)	slightly compressed (narrow back, high flanks)
no. scales around midbody	41-50	33
tail/SVL (♂♂)	1.18-1.42	1.69
head	more pointed and narrower	blunter and wider
head length/SVL	0.23-0.29	0.23
head length/head width	1.07-1.24	1.01
head width/head depth	1.28-1.61	1.31
tibia/hind limb	0.27-0.33	0.24
tibia *versus* thigh	tibia about as long as thigh	tibia distinctly shorter than thigh

of *S. dumerilii*, with several transverse bands along the back, and also along the flanks; at present, only some remains of a pattern are seen in the holotype.

In conclusion, this means that the specimens known from eastern Pará are *S. dumerilii*, while *S. tricristatus* still is only known from the holotype (MHNP 6825), with uncertain type-locality (except that it comes from Brazil). The specimen was said to have been collected by Claussen, who had a farm in Minas Gerais, and who made some collecting trips, all inside this state (Papavero, 1971). Minas Gerais is, therefore, the probable place of origin of the specimen.

MCZ 160242, a complete cleared and double-stained skeleton, mentioned as *S. tricristatus* by Frost (1988), comes from Pará, km. 93 of road BR-38. It is thus most likely *S. dumerilii*.

Etheridge (1966) mentioned *S. dumerilii* as coming from "Brazil", and *S. tricristatus* from "Bolivia"; in Etheridge (1970b) the distribution given for *S. tricristatus* (including *S. dumerilii*) is "western Brazil". No reference is given to explain the origin of these data.

X-ray photos of two specimens of *S. dumerilii* (MPEG 6035, 6512) were examined, and they agree with the observation by Frost (1988) that the species does not have postxiphisternal ribs meeting, or in close contact, at the midventral line.

As explained under the generic account, allocation of this species to *Stenocercus* is provisional, until a general revision of the taxa as a whole can be made. However, judging from external characteristics, I think it is most probable that this species, together with *S. tricristatus*, should stay in a genus by their own (*Ophryoessoides*, type-species *O. tricristatus*), separate from all other *Stenocercus*.

Stenocercus fimbriatus spec. nov.
(figs. 46, 47, 244)

Ophryoessoides aculeatus; Dixon & Soini, 1975: 32, 1986: 37.
"grondbewonend leguaantje"; Hoogmoed, 1992: 73.

Holotype.— TCWC 41795, ♂, type-locality Peru: Departamento Loreto: Iquitos region: Mishana, 01.xii.1972, leg. J.R. Dixon & P. Soini.
Paratypes.— **Brazil.** ACRE. Upper Rio Juruá, igarapé Caipora, Taumaturgo: 1 juv., ZUEC 837, 06-08.vi.1989, leg. A.J. Cardoso.
AMAZONAS. Rio Juruá (left bank), Condor, 6°45'S, 70°51'W: 1 ♀, INPA 430, 16.ix.1991, leg. C. Gascon. Rio Juruá (left bank), Lago Jainu, 6°28'S, 68°46'W: 1 juv., INPA 514, 30.x.1991, leg. C. Gascon. Rio Solimões, Benjamin Constant: 1 ♂, MPEG 15915, W of the village, 10.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 3 ♀♀, RMNH 25694-25696, 14.xi.1985, leg. M.S. Hoogmoed; 1 ♂, UMMZ 115645, leg. J.C. Carvalho.
Peru. LORETO. Iquitos, 350': 1 ♂, 1 ♀, 2 juv., AMNH 56780, 56786-87, 56793, leg. H. Bassler. Iquitos region, Rio Itaya, 360': 1 ♂, 1 ♀, 3 juv., AMNH 56778-779, 56783-785, leg. H. Bassler. Iquitos region, Mishana: 2 ♂♂, 2 ♀♀, TCWC 39009-39012, iii.1972; 1 ♂, TCWC 41303, vii.1972; 1 juv., TCWC 41304, viii.1972; 2 ♀♀, TCWC 45576, 47138; all leg. J.R. Dixon & P. Soini.
UCAYALI. Ucayali River Valley, Pampa Hermosa, mouth of Rio Cushabatay, 500': 4 ♀♀, 5 juv., AMNH 56788, 56790-792, 56794-796, 56801-802, leg. H. Bassler. Ucayali River Valley, Contamana, 500': 1 juv., AMNH 56803, leg. H. Bassler. E of Contamana, on trail to Contaya, 700': 2 ♀♀, AMNH 56781-82, leg. H. Bassler. Peru-Brazil Frontier, Utoquinia Region, 1000': 1 ♂, 2 juv., AMNH 56789, 56799-800, leg. H. Bassler. Rio Curanja, Balta: 1 ♂, LSUMZ 17519, vii.1967, leg. J.P. O'Neill, ca. 300 m; 3 ♂♂, 1 juv., LSUMZ 25402-25404, 26720, 01.viii.1968, leg. A.L. Gardner, ca. 300 m; 1 ♂, 2 ♀♀, LSUMZ 26721-26723. Alto Purus, Igarape Champuia, Alto Curanja: 1 ♂, MCZ 1226, leg. R. Schultz.
SAN MARTIN. La Pinita, Rio Mixiollo, trib. of Upper Huallaga, 3500': 1 ♂, 1 ♀, AMNH 56797-798, leg. H. Bassler.
HUANUCO. Ca. 35 km SE Tingo Maria, Hacienda Sta. Elena, ca. 1000 m: 1 ♀, LSUMZ 26966, 03.vii.1972, leg. E. Tallman; 1 ♀, LSUMZ 26967, 08.x.1972, leg. D. Tallman.

Material of *S. aculeatus* studied for comparison.— **Peru.** Moyobamba: syntypes, 1 ♂, 2 ♀♀, 1 hgr., BM 1946.8.12.33-36, leg. A.H. Roff.
Ecuador. Pastaza, Mera, 1140 m: 1 ♀, RMNH 25693, 16.iv.1983, leg. M.S. Hoogmoed & A. Almendariz. Napo-Pastaza, Villano: 1 ♂, GNM 3600, 23.iii.1952, leg. R. Blomberg. Napo-Pastaza, Vitagua (near Puyo): 1 ♂, 1 ♀, GNM 3601, 08.vi.1955, leg. R. Blomberg. Canelos: 1 ♀, BM 80.12.8.52, leg. Mr. Buckley. El Topo, Rio Pastaza, 4200': 1 ♂, BM 1912.11.1.30, leg. M.G. Palmer, purch. Rosenberg. Pallatanga: 2 ♂♂, 1 ♀, BM 80.12.8.49-51, leg. Mr. Buckley (possibly a wrong locality; see Peters, 1955).

Diagnosis.— A low vertebral crest, and at each side a dorsolateral crest which continues from an antehumeral crest. The dorsolateral crests distinctly demarcate the back from the flanks, giving the body a squared shape in cross section. Supraoculars enlarged. Parietal/occipital region with large scales. Interparietal indistinct, parietal eye absent. Supratemporals small or only slightly enlarged, with a moderately high keel. Gulars imbricate, phylloid, keeled and mucronate. Scales on sides of neck relatively large, imbricate. No gular or neck folds. Dorsals imbricate, mostly smooth, some weakly keeled; about as large as, or only slightly smaller than, scales on vertebral crest, and slightly larger than scales on flanks. Ventrals imbricate, keeled. Hind limbs with a row of enlarged, prominent scales on each thigh, and three or four longitudinally oblique rows of large and strongly keeled scales on lower legs. Tail crest indistinct or absent.

Description.— Tropidurid with maximum SVL in males of 72 mm (LSUMZ 17519), in females of 87 mm (LSUMZ 26966). Head 0.24-0.31 (n= 51) times SVL, relatively longer in smaller specimens; 1.1-1.3 (1.21 ± 0.03, n= 51) times as long as wide; 1.1-1.4 (1.29 ± 0.07, n= 51) times as wide as high. Snout round in dorsal view, pointed in profile. Canthus rostralis well defined; together with the angle formed by labials, it gives the head the shape of a four-sided pyramid. In profile, dorsal surface of head forms an ascending convex curve up to approximately the level of posterior end of supraciliaries, from there on becoming horizontal. Neck slightly narrower than head, about as wide as anterior part of body. Body moderately depressed, roughly rectangular in cross section. Limbs well developed, forelimbs 0.45-0.53 (0.49 ± 0.02, n= 49) times SVL, hind limbs 0.88-1.08 (0.99 ± 0.05, n= 49) times, tibia 0.23-0.31 (0.29 ± 0.02, n= 51) times. A relatively small, deep axillary pocket is present. Tail round in cross section (very close to base squarish), tapering toward tip, 1.6-2.2 (n= 22) times SVL, relatively shorter in smaller specimens.

Tongue wide, villose, with blunt, nicked tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral with a rectangular base and a medially convex posterior margin, about three to three and a half times as wide as high, barely visible from above. Postrostrals 5-6, rarely seven; the lateral one at each side forms part of the lorilabial series. Scales on snout relatively large, variably polygonal, mostly flat, and frequently uni- or multicarinate; 4-7, rarely eight, scales between posterior (or the single) canthals. Canthus rostralis formed by the nasal/supranasal suture, and an elongate, keeled canthal; between them one or a few small scales, or a smaller canthal, may be present. Supraorbital semicircles conspicuous, in contact on top of head; 7-10 (mostly eight) scales, flat in the smallest specimens, slightly convex in the others (the posterior scale distinctly convex, pyramidal, in AMNH 56784); anterior scales may be keeled. Parietal/occipital region mostly with five large scales, of which one medial-posteriorly surrounded (anteriorly and laterally) by the other four scales; two of the four scales are in contact, at each side, with the scales of the supraocular semicircle; medially, between the four scales and the supraorbital semicircle, there are from zero to six smaller scales. In TCWC 41303 and AMNH 56781 the medial-posterior scale is substituted by three scales, in LSUMZ 25402 and AMNH 56791 by two. In AMNH 56789 there is a small, extra scale between the medial-posterior and the two medial-anterior. TCWC 39010 has the latero-posterior scales divided, and TCWC 39011 only has one of them divided, so that the medial-posterior scale is surrounded by six (TCWC 39010) or by five (TCWC 39011) scales. Scales of the parietal/occipital region slightly convex (flat in the smallest specimens); along the posterior margin of head (formed by the medial-posterior scale and one enlarged scale at each side) a weak, transverse ridge may be present. Parietal eye absent. Supraocular region convex, with 3-5 (rarely six) transversely enlarged scales; they are surrounded by small scales, arranged anteriorly in a cluster, medially in a single row, and laterally in two (anteriorly) to one (posteriorly) rows. Supraciliaries 4-7, keeled, elongate, the three to five anterior ones broadly overlapping. Nasal in contact with postrostrals, nostril in its posterior part, directed latero-posteriorly. Loreal region with one or (partially) two rows of elongate, keeled lorilabials, the keels closer to the lower margin; on the upper part, 5-15 irregularly polygonal scales. Part of loreal scales may be keeled, occasionally bi- or tricarinate; 3-5, occasionally six, scales between posterior (or single) canthal and supralabials. One distinctly enlarged, or one or two moderately enlarged, suboculars may be present, sometimes followed by a smaller subocular. They are preceded either by small preoculars or by a moderately enlarged preocular, and all are keeled. In some specimens preoculars and suboculars rather inconspicuous. Suboculars separated from supralabials by one or two rows of scales. Supralabials four, rarely five, uni- or bicarinate; the fourth longest and below centre of eye. Supralabials followed by one (occasionally two) elongate, keeled scale(s) to the commissure of the mouth, triangular in cross section. Temporal region with hexagonal, rhomboid, or round, imbricate scales, smooth or weakly keeled (in small juveniles distinctly keeled in lower part of temporal region). Supratemporal area with one or two scales about as large as, to slightly larger than temporals, with a moderately high keel. Ear-opening large, vertically oval, with undulating anterior and smooth posterior margin; tympanum slightly recessed. Most scales on dorsal and lateral sides of head, except temporals, rugose and subimbricate.

Mental pentagonal. Postmentals usually 2-3, occasionally 4-5 (in this case one or both laterals very small). Behind lateral (in case two or three are present) postmentals, a row of two to four polygonal, smooth or keeled, subimbricate chinshields, slightly to distinctly larger than other scales on chin. Posteriad they gradually decrease in size and become indistinguishable from adjacent scales. Chinshields separated from infralabials anteriorly by one, posteriorly by two rows of narrow and elongate, broadly to distinctly keeled scales. Separated medially by smaller, imbri- [illegible]

gular region, scales larger, imbricate, phylloid, sharply keeled, and mucronate; keels tend to form longitudinal ridges. Infralabials 5-6, rarely seven, posterior one below or starting below centre of eye. They are followed to commissure of mouth by one or two elongate, medially keeled scales, triangular in cross section.

Scales on nape sharply distinguished from scales of head, imbricate, flat, round or bluntly pointed, smooth; posteriorly they merge into dorsals. Scales on sides of neck similar, or some may be keeled and mucronate. Ventrolaterally, from posterior corner of mouth until anterior level of forelimbs, there may be a longitudinal row of keeled, mucronate scales, similar to gulars but with stronger keels, which makes a distinct border between gular region and sides of neck. This row varies from very conspicuous in some specimens (reinforced by a distinction in colour pattern), to completely absent in other specimens. Dorsals imbricate, flat, round to sub-rhomboid, mostly smooth, in some specimens with a weak keel on posterior part of scale,

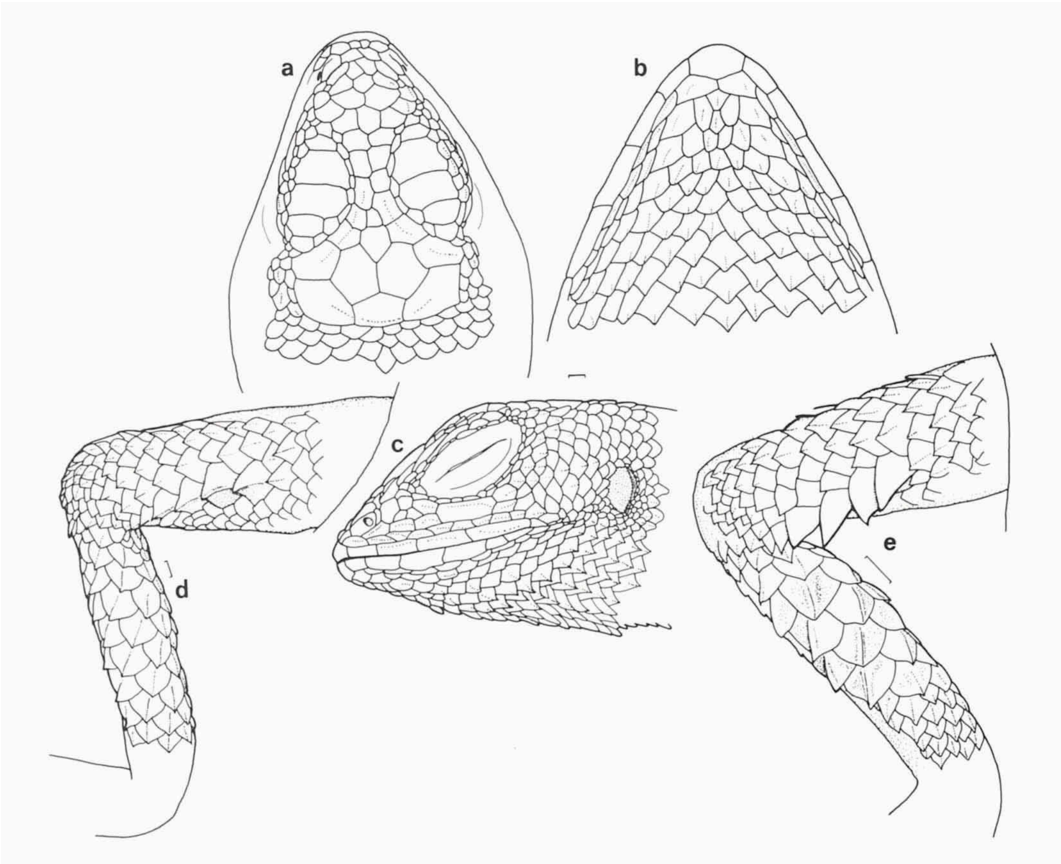


Fig. 46. *Stenocercus fimbriatus* spec. nov., TCWC 41795 (holotype); a, b, c: dorsal, ventral and lateral views of head; d: dorsal view of left leg; e: dorsal view of left leg of MPEG 15915 (juv.).

antehumeral crest, no sign of a dorsolateral crest exists. Thirteen-17 (14.7 ± 1.2, n= 50) scales across midbody, between and including the dorsolateral crests. Scales on flanks similar but slightly smaller than dorsals, and usually more pointed; smooth, or part of them (especially toward the ventral region and posteriad) with a weak keel and/or a short mucro. Ventrals imbricate, flat, rhomboid or phylloid, sharply keeled, mucronate; in longitudinal rows, the keels forming low longitudinal ridges; 22-31 (26.7 ± 1.9, n= 43) scales along a midventral line, from anterior margin of forelimbs until anterior margin of hind limbs, 29-39 (34.0 ± 2.3, n= 43) until the cloaca. No sharp delimitation between ventrals and laterals. Scales around midbody 39-51 (44.4 ± 3.0, n= 44). Scales on preanal plate imbricate, flat, keeled, mucronate, variable in shape, in 3-5 transverse rows; they form no or rather irregular longitudinal rows. No distinct boundary between scales on preanal plate and ventrals.

Scales on tail imbricate, flat, mostly variably rhomboid, in longitudinal rows. The vertebral crest continues halfway down the tail, distally becoming indistinguishable from other rows of scales. The dorsolateral crests disappear closer to base of tail. Proximally scales of vertebral and dorsolateral crests, and those under tail, keeled and mucronate, other scales either all smooth, or partly keeled. Distally all scales distinctly keeled and mucronate, in transverse rows around the tail; the keels form longitudinal ridges.

Forelimbs with imbricate, flat, distinctly keeled and mucronate scales. The keels form distinct longitudinal ridges which extend along forelimbs and dorsal surface of hands and fingers; they are higher on posterior aspect of forearms. Scales on palms also sharply keeled and with pronounced mucrones, but keels do not form continuous ridges. Dorsal aspect of thighs with a row of enlarged, keeled scales which distinctly project from the surface. Dorsal aspect of lower legs with 3-4 longitudinally oblique rows of large, strongly keeled scales; the keels form parallel ridges that may be very pronounced (especially in juveniles, but also in some larger specimens). Other scales on hind limbs imbricate, flat, keeled, with a short mucro, in longitudinal (or longitudinally oblique) rows; the keels are longitudinally aligned but do not form pronounced ridges. Dorsal surface of feet and toes with distinct longitudinal ridges (sometimes more irregular on feet); in some juveniles the ridges along feet are very pronounced. Scales on soles similar to those on palms. Lamellae under fingers tricarinate, under toes mostly bicarinate, distally tricarinate; 12-16 (14.6 ± 0.8, n= 102, 51 specimens) under fourth finger, 19-27 (23.0 ± 1.3, n= 100, 50 specimens) under fourth toe.

As already noted by Dixon & Soini (1975, 1986), the species has a colour pattern that makes it resemble a dead leaf. In MPEG 15915, a juvenile (SVL= 42 mm) from Benjamin Constant, dorsal and lateral surfaces of head and neck, plus back, pale tawny-olive (223D) with raw-umber (223) markings. These included narrow lines across dorsal surface of head, a wider band crossing the eyes and reaching labials, and a series of narrow chevrons across the back. Also on the back, above level of forelimbs, two black spots. Flanks and limbs raw-umber (223), with some sepia (219) transverse bands on hind limbs. Ventral region varying from walnut-brown (221B) to vinaceous-pink (223C). Under head some short, oblique, cream lines starting on labials, plus a longer line from the corner of the mouth to base of forelimb. A cream line also on each forelimb, close to its base. Belly with some light spots. Tail proximally with a pattern similar to that on back, with two thicker, black chevrons. Distally it gradually changes into sepia (219), with sepia coloured (119 and 219), irregular, transverse lines which ventrally turn to beige (219D). Iris orange-brown. Tongue light grey.

RMNH 25694-25696, three juveniles (SVL 35-45 mm) also from Benjamin Constant, were described by M.S. Hoogmoed as having "back gold-colour, flanks black; belly with some purple hue". Hoogmoed (1992) published a colour photograph of one of these specimens. The following colour descriptions accompanied some of the specimens from the LSUMZ collection from Peru: "Pinkish-brown, dark markings, sides of face silver" (LSUMZ 26966, by E. Tallman); "Dorsal: dark-brown on silver tan, tail grey. Ventral: white spots on light brown, tail grey. Sides: dark brown lightening posteriorly, barred light" (LSUMZ 26967, by D. Tallman); "Lighter parts 'dead-leaf brown'; darker parts dull chocolate; sides of belly dull shining purple" (LSUMZ 17519, by N.I. Kexin). The colour in life of TCWC specimens, from Mishana, Peru, was described by Dixon & Soini (1975, 1986).

In preservative most specimens present two basic colours in dorsal view, of which a lighter one over head, neck and back, a darker one on flanks, delimited by the antehumeral-dorsolateral crest. The dark areas are dark brown, dark greyish-brown, or bronze; the light areas light grey, pearl-colour, cream, tan or, in some cases, dark greyish-brown as the flanks. In some specimens the head (TCWC 45576, AMNH 56797), or head and body up to level of forelimbs (holotype TCWC 41795, TCWC 39011, AMNH 56787, 56782, 56794, 56795), has(ve) a different colour, sharply delimited from the colour of back and flanks; the combinations of colours are variable, head and back respectively buff-yellow and tan, buff-yellow and dark greyish-brown, pearl-colour and caramel, caramel and dark greyish-brown. The scales that loose their external horny layer (which has happened in large areas in some of the material studied) become lighter, usually bluish-grey. The tail usually has the same colour as the back near its base, gradually darkening distally, but in some specimens it is lighter than the back, with the two areas distinctly demarcated. The following markings are present in most specimens: (1) a dark brown transverse band from eyes to labials, usually continuing and widening ventrolaterally, anterior margin ending shortly after labials, posterior margin extending for a variable distance toward base of forearms; (2) a pair of dark brown or black, oval or irregular spots, at level of forearms, on the back. Other markings are commonly present, but variably developed in different specimens: (a) dark brown, transverse, narrow lines across dorsal surface of head; one of these lines, crossing the anterior part of supraocular regions, slightly thicker and sometimes the only one present; occasionally no line is present; (b) a series of chevrons on the back is frequently present; in this case, there are at least two chevrons between fore- and hind limbs, which may alternate with three narrower ones; 1-3 other chevrons may be present on neck; at level of hind limbs a thicker one, frequently followed by another proximally on tail; distally on tail they change to irregular, transverse bands widely separated from each other; (c) in some specimens there is a white line from the corner of the mouth to near arm insertion (usually coinciding with a row of scales with higher keels), and another white line starting at the upper arms, proximally, and following the antehumeral crest. Additionally, some short, oblique lines from labials toward the chin, and scattered white spots on belly, under limbs, and under tail may be present. A few specimens are mostly uniformly brown; it is not clear if this is a result of preservation (in all cases they are relatively poorly preserved).

Habitat.— MPEG 15915 was collected in terra firme forest, at the edge of a clearing, in sunny spot on a root close to a trail. RMNH 25694-25696 were found in terra firme forest, on the leaf litter of the forest floor, one of them near a fallen tree; the three specimens were collected relatively close (a few hundred meters) from each other (field book & pers. comm., M.S. Hoogmoed). INPA 430, INPA 514 and ZUEC 837 were also in terra firme forest, the former two on the ground, the later on branches (field data by respectively C. Gascon and A.J. Cardoso). Dixon & Soini (1975, 1986) reporded the specimens from Mishana, in Peru, as inhabiting closed canopy (primary) forest, where they were frequently heard (though seldom seen) running across the leaf litter of the forest floor. According to their field notes, the holotype (TCWC 41795) was near a stream in leaf litter, TCWC 39009-010 on a fallen log, TCWC 39011-012 on trunk and at base of a big tree, near edge of a creek, and TCWC 41304 was on the forest floor.

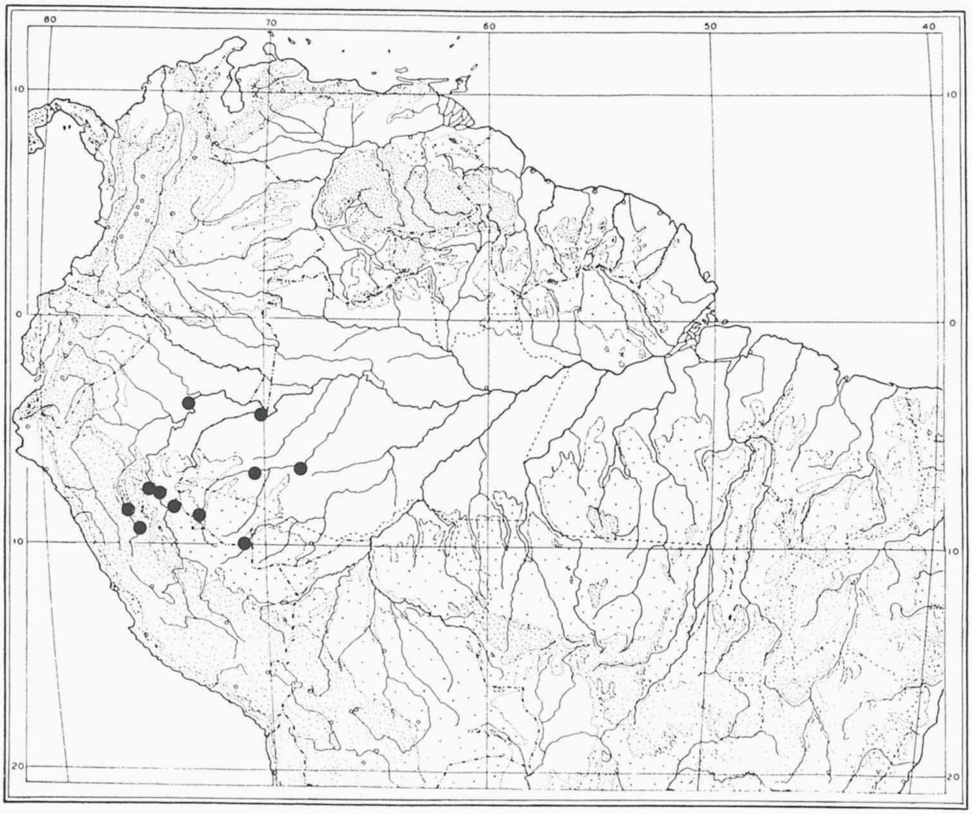


Fig. 47. Distribution of *Stenocercus fimbriatus* spec. nov.

Notes on natural history.— The behaviour of 'freezing' of this species, causing the animal to be very difficult to see because of its cryptic colouration when against a background of dead leaves, was registered by Dixon & Soini (1975, 1986). M.S. Hoogmoed and I also had the opportunity to observe this behaviour while collecting MPEG 15915. The lizard fled for a short distance and then froze, becoming hardly visible.

One curious observation is that, in Benjamin Constant, the pattern of MPEG 15915 very much resembled that of a cricket (Gryllidae) of the subfamily Eneopterinae, which was very common in the same area where the lizard was found. Both had the same light brown colour on head and "back" (wings in the cricket), narrowing posteriorly, contrasting with the dark sides and legs. With "some" imagination, the comparison could go even further, the structure formed by the enlarged scales on the hind limbs of the lizards being reminiscent of the stridulation organ of the cricket! However, we never heard it made a sound, and the lizard was distinctly larger.

Distribution (fig. 47).— W. Brazil and E. Peru. In Peru, on the eastern slopes of the Andes (up to c. 1000 m), and in the Amazonian lowlands. In Brazil, up to now known from Benjamin Constant (close to the border with Colombia and Peru) and from Rio Juruá, in Acre and Amazonas states.

Table 3. Comparison between *Stenocercus fimbriatus* spec. nov. and *S. aculeatus*.

	S. fimbriatus	*S. aculeatus*
scales of vertebral crest	about same size as dorsals	larger than dorsals
no. paravertebral less no. vertebral scales	-2 to 7 (1.5 ± 1.9)	6 to 13 (9.5 ± 2.4)
scales on hind limbs	row of enlarged, keeled scales project from surface of thighs; 3-4 oblique rows of large, strongly keeled scales on lower legs (especially prominent in juveniles)	no row(s) of distinctly enlarged scales
Gulars and most ventrals	relatively wide, phylloid	elongate-triangular, forming an acute posterior angle
dorsals	mostly smooth, some with a weak keel on posterior part of scale	mostly keeled, at least on posterior part of scale
supratemporals	1-2 only slightly enlarged, with a moderately high keel	2 blade-like projecting supratemporals in linear sequence above lorilabials
scales on loreal region	5-15	5-7
lorilabials	one or two rows	one row
preocular/subocular series	one or more preoculars, 1-4 suboculars (one may be larger, elongate) occasionally inconspicuous	a distinct preocular, and a distinct, elongate subocular; a second, shorter subocular may be present
scales around midbody	39-51 (44.4 ± 3.0)	34-42 (40.6 ± 0.7)
lamellae under fourth finger	12-16 (14.6 ± 0.8)	17-19 (18.2 ± 0.7)
lamellae under fourth toe	19-27 (23.0 ± 1.3)	23-29 (25.9 ± 1.9)
tail crest	indistinct or absent	distinct and serrate in proximal part of tail

Remarks.— *S. fimbriatus*, though being described here for the first time, was known to Drs E.E. Williams and P.E. Vanzolini since 1960. They were planning to describe the species in the broader context of a general revision of the *Stenocercus-Ophryoessoides* complex. Nevertheless, when I contacted Dr Williams, because I had some specimens of '*Ophryoessoides*' from Benjamin Constant, which I thought were from a species not yet described, he was so kind, in agreement with Dr Vanzolini, not only to permit me to describe the species, but he also sent me all his notes about it, and took care that I could receive the material (from several collections) he had with him. The name *fimbriatus*, here adopted, was chosen by Williams & Vanzolini and used as a manuscript name. Dr Williams' notes were valuable for the description of the species and the comparison with *Stenocercus aculeatus* (O'Shaughnessy), although the data as here presented are my responsibility. Several other persons probably were also aware of the existence of this new taxon.

S. fimbriatus resembles *S. aculeatus*, and it was identified as such by Dixon & Soini (1975, 1986). The two differ, however, in several characteristics (see table 3).

X-ray photos of two specimens (LSUMZ 17519, LSUMZ 26966) were examined, in order to observe the condition of the postxiphisternal ribs. Both specimens showed three postxiphisternal ribs meeting midventrally (possibly fused, but this is not clear from the photos).

As explained under the generic account, the inclusion of this species in *Stenocercus* is provisional, pending a revision of the whole group.

Etymology.— From the Latin *fimbriatus* meaning fringed, in allusion to the enlarged and strongly keeled scales on the legs, which form a fringed surface.

Stenocercus roseiventris Duméril & Bibron, 1837
(figs. 48, 49, 246, 247)

Stenocercus rosei-ventris Duméril & Bibron, 1837: 350 (holotype MHNP 6879, type-locality Bolivia, restricted by d'Orbigny, 1847 to the slopes of the Irupana mountains, in the province of Yungas, toward the valley of Rio de la Paz [Departamento La Paz]).

Stenocercus atrigularis Werner, 1913: 11 (holotype originally in ZMH, probably destroyed during World War II; type-locality Provincia Beni, Bolivia).

Stenocercus roseiventris; Boulenger, 1885b: 133; Etheridge, 1970e: 257; Fritts, 1974: 63; Meede, 1984: 69.

Material.— **Bolivia.** BENI. Charuplaya (Rio Sécure): 1 ♀, MHNG 683.93, ii.1901, leg. Rosenberg. LA PAZ. Province of Yungas, slopes of the Irupana mountains toward the valley of Rio de la Paz: holotype, ♂, MHNP 6879, leg. D'Orbigny.

Peru. HUANUCO. W of Panguana, lower Rio Llullapichis, branch of Rio Pachitea: 1 ♂, RMNH 25697, 09.iii.1983, leg. M.S. Hoogmoed. UCAYALI. Provincia Pucallpa: 1 ♂, ZFMK 38873, leg. J. Schunke.

Diagnosis.— *Stenocercus* with a low vertebral crest and no dorsolateral crests. A dorsolateral fold may be present on anterior part of body. Dorsal head scales of variable size, but none much larger than the others. Interparietal indistinct, parietal eye absent. A well developed antehumeral fold, as well as other irregular folds on sides of neck, which is covered by small scales. Dorsals imbricate, keeled, distinctly larger than scales on flanks. Ventrals imbricate, smooth or slightly keeled. Tail with relatively large, spinose scales. Mite pockets absent.

Description.— Tropidurid with maximum SVL in males of 97 mm, in females of 95 mm (Meede, 1984). Head 0.24-0.29 (n= 4) times SVL, 1.4 (n= 4) times as long as wide, 1.2-1.6 (n= 4) times as wide as high. Snout round, both in dorsal view and in profile. Canthus rostralis anteriorly rounded, posteriorly angulate. Head in profile rising in a convex line toward parietal region. Neck narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.4 times SVL, hind limbs 0.7 times (measurements for holotype, MHNP 6879); tibia 0.17-0.18 (n= 4) times SVL. Tail mostly slightly depressed, distally round in cross section, spinose, tapering toward tip; 1.0-1.2 (n= 3) times SVL.

Tongue wide, villose. Anterior teeth conical, posterior teeth tricuspid.

Rostral approximately pentagonal, much wider than high, barely visible from above. Postrostrals six (in holotype, MHNP 6879, one of the medial scales separated from rostral by a short suture between its two neighbouring scales). Lateral postrostral, at each side, forms part of lorilabial series. Scales on snout variably polygonal, 7-8 between second canthals. Canthus rostralis formed by 2-3 canthals, and anteriorly by a rounded ridge on the upper part of a loreal scale. Nasal dorsal to canthus rostralis, single, bulbous. Nostril in its posterior part, directed dorsolaterally and slightly posteriorly. Supraorbital semicircles in contact medially, each with 11-13 scales not larger than other dorsal head scales, sometimes partially indistinct; antero-medial scales may form a low ridge. Parietal/occipital region with scales of variable size

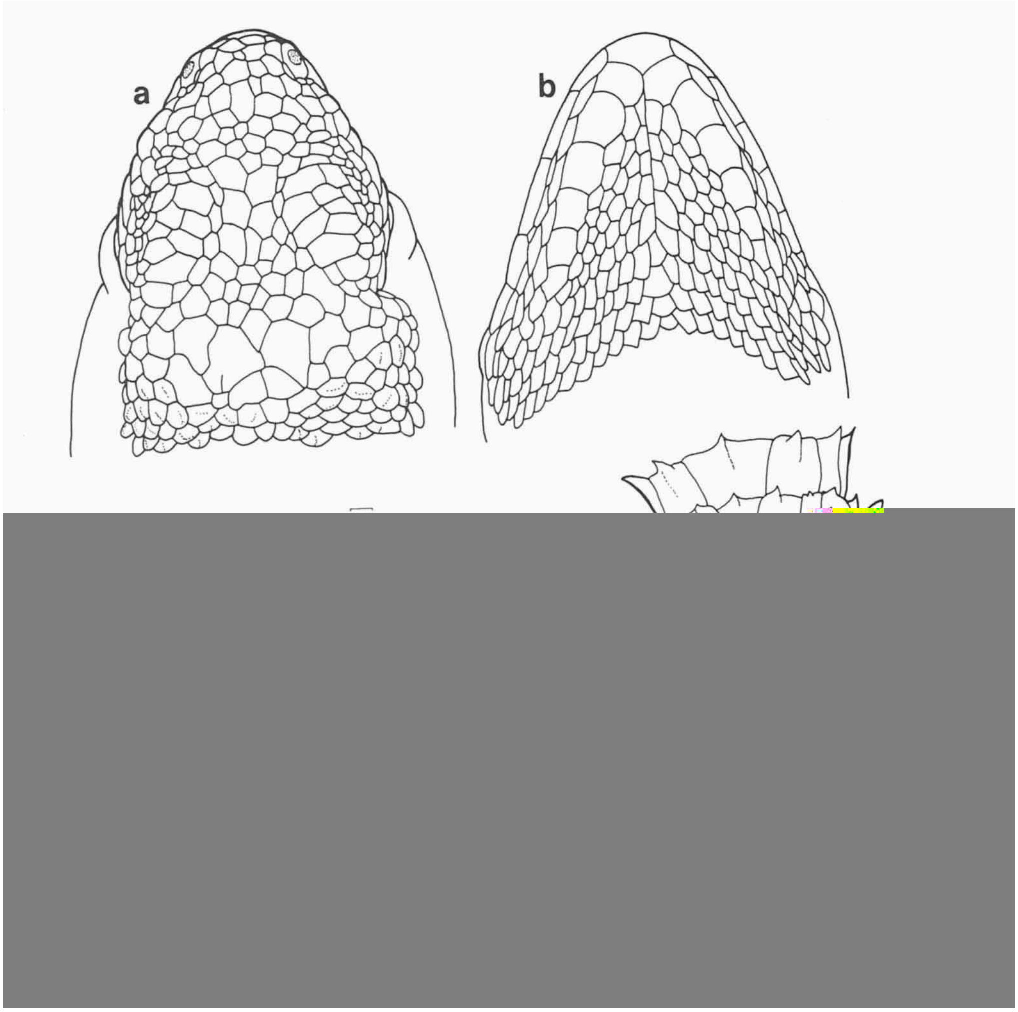


Fig. 48. *Stenocercus roseiventris*, RMNH 25697; a, b, c: dorsal, ventral and lateral views of head; d: dorsal view of tail.

and shape (usually polygonal). Parietal eye absent. Supraoculars approximately in 3-5 longitudinal rows, scales increasing in size toward medial row; besides, a patch of relatively small scales is present anteriorly, as well as a peripheral row of small, elongate scales, flatter laterally (adjacent to supraciliaries). Supraciliaries 6-7, elongate, anteriorly broadly overlapping. Loreal region with 5-8 scales plus a row of lorilabials. One preocular, not especially distinct from loreal scales. One large, elongate subocular, separated from supralabials by the row of lorilabials. It may be followed by a second subocular, only slightly larger than temporal scales. Five supralabials, fourth below centre of eye; followed to commissure of mouth by one or two smaller, broadly keeled scales. Temporal scales mostly hexagonal, imbricate (narrower and elonslightly smaller, longer than wide, with a prominent keel. Ear-opening large, vertically oval, with a finely lobed anterior margin, and smooth posterior margin. Tympanum slightly recessed. Most scales on dorsal and lateral sides of head subimbricate, smooth, slightly convex; most of dorsal ones, and some on sides of head, covered with minute pits.

Mental pentagonal, with concave margins at borders with infralabials and postmentals. Postmentals 2-3; when three, medial small. Each of the two larger postmentals forms the starting point of a series of 4-5 enlarged chinshields, which gradually decrease in size posteriad; they are separated from infralabials by one (anteriorly) or two (posteriorly) rows of elongate scales. Both the chinshields and the lateral scales are smooth, slightly convex, subimbricate. Medially, on anterior part of chin, scales similar to, but smaller than, scales adjacent to infralabials, in more or less longitudinally oblique rows; a medial sulcus is distinct. Posteriorly, scales grade into gulars. Gulars triangular or rounded, flat, imbricate, smooth to weakly keeled, in transversely oblique (anteriorly) to transverse rows (on neck). Infralabials 5-6, posterior one below centre of eye. Gular fold absent.

Scales on nape similar to dorsals. Sides of neck with distinctly smaller, almost granular, scales. A well developed antehumeral fold, and several other irregular folds, are present. Dorsals rhomboid to subhexagonal, imbricate, sharply keeled, mucronate, increasing in size posteriad; in approximately longitudinal and transverse rows (in both cases slightly oblique); about 13-16 dorsal scales in a transverse row at midbody. A low vertebral crest from nape to tail, anteriorly scales distinctly larger than dorsals, posteriorly about the same size; 51-56 (n= 4) vertebral scales from nape to posterior margin of hind limb, corresponding to 67-82 (n= 4) scales in a paravertebral row. Along neck and anterior part of body there may be a dorsolateral fold, with at least part of the scales more angulate and pointed than dorsals. Scales on flanks similar in shape to, but distinctly smaller than dorsals, increasing in size posteriad; closer to both fore- and hind limbs dorsals and laterals have a sharp demarcation, near midbody they grade into each other. Ventrals rhomboid, quadrangular, or phylloid, smooth to weakly keeled, imbricate; in oblique rows, and 40-46 (n= 4) transverse rows from anterior margin of forelimbs to anterior margin of hind limbs. No sharp delimitation between ventrals and laterals. Scales around midbody 62-63 (n= 4). Preanal plate with imbricate, smooth scales, variable in shape, in transverse rows; no distinct boundary with ventrals.

Tail dorsally and laterally with relatively large, spinose scales. Near the base only large scales are present, but a short distance from the base these are separated by smaller scales. Both larger and smaller scales arranged in transverse rows. Distally the scales gradually decrease in size, and the size difference of consecutive rows disthighs) on the antero-dorsal aspect, weakly keeled on posterior aspect, smooth ventrally. Lamellae bi- or tricarinate under fingers, uni- or bicarinate under toes; 14-16 (n= 6, 3 specimens) under fourth finger, 18-21 (n= 6, 4 specimens) under fourth toe.

Colour in life of RMNH 25697 was described by M.S. Hoogmoed as: "Back bluish-grey with dark grey transverse stripes. Vertebral crest with cream coloured (three, on the neck) or light green (back and tail) spots. A black collar, posteriorly delimited by a yellowish-green stripe. Flanks reddish-brown with yellowish-green dots. Dorsal surface of the head brown, laterally with white spots. Chin white with brown and black spots, chest similar, belly pink with a vague brown stripe in the middle. Spines on the sides of the tail with turquoise spots. A light yellow spot above the eye. Iris around pupil reddish-brown, toward the periphery gold colour. A brown spot on the gular area". Meede (1984) described the colour in life of other specimens from Panguana, Peru. Life colour of the holotype (MHNP 6879) was described by D'Orbigny (1847).

In preservative, RMNH 25697 has the dorsal surface of head brown. Sides of head brown on the upper part, with part of supraciliaries white, and some brown spots on temporal region. Ventral surface of head white with dark brown spots. Nape brown with white and bluish dorsolateral and transverse stripes (in the shape of a ladder), and also some dark brown spots. Sides of neck mostly dark brown and black, but lower anterior part white with black spots (continuing the pattern of the chin); posteriorly the black area is limited by a white vertical stripe. Back mostly brown along vertebral area, and forming several lateral extensions on a bluish-grey background. Flanks brown with scattered bluish scales; some bluish scales also present along the anterior dorsolateral fold. Limbs and tail in dorsal view brown

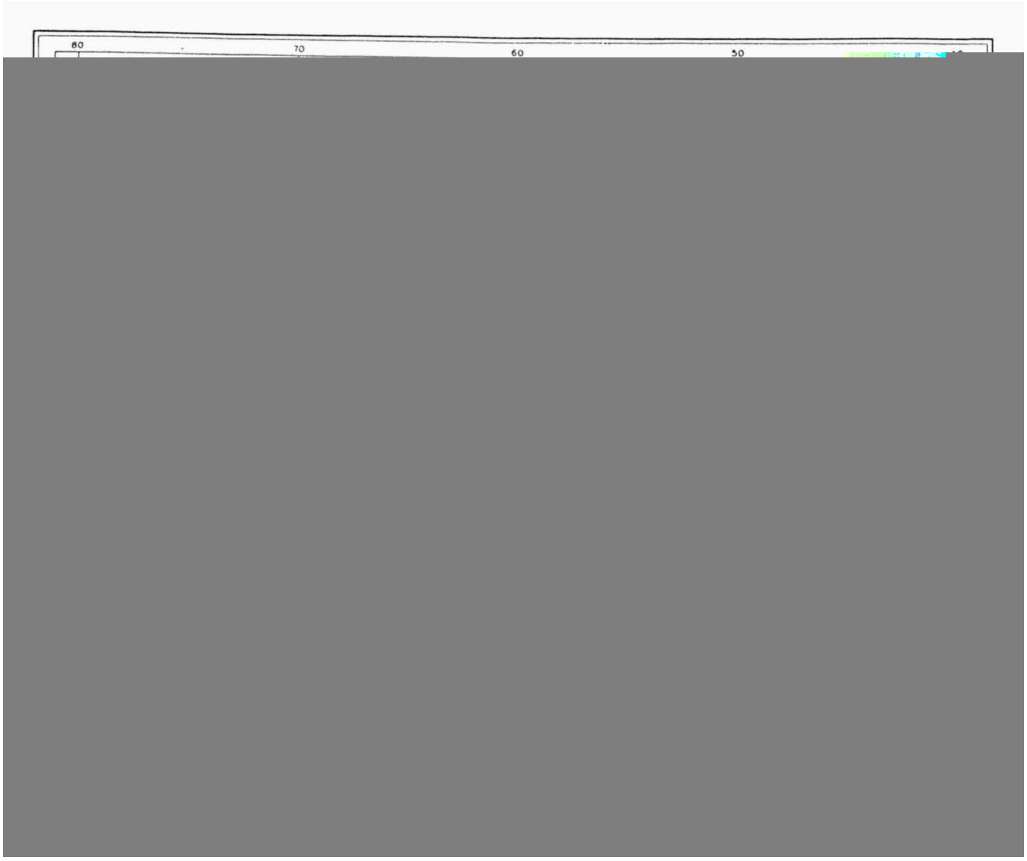


Fig. 49. Distribution of *Stenocercus roseiventris*. Closed circles = material studied. Open circles = data from literature (Mertens, 1942; Fritts, 1974; Duellman, 1987). Dashed circles = general localities from literature (state of Acre, Brazil; Provincia Sucre, Bolivia). Localities Salta and Jujuy, Argentina, are outside the area represented in the map.

end of January, with one egg being laid on 25 April. The egg was 22.8 × 11.8 mm in dimension, and had a weight of 0.9 g.

Distribution (fig. 49).— Amazonian Peru (lowlands and peripheral Andean regions); Bolivia; Acre state, in Brazil (Etheridge, 1970e); and Jujuy and Salta provinces, in Argentina (Fritts, 1974).

Remarks.— Fritts (1974) considered D'Orbigny the author of the name *S. roseiventris*, based on the fact that Duméril & Bibron (1837) referred to D'Orbigny. However, although they attributed the name to D'Orbigny, Duméril & Bibron (1837) were the first authors to publish a valid description of the species. D'Orbigny's 'Voyage dans l'Amérique méridionale' was published between 1835 and 1847. Sherborn & Griffin (1934) mentioned that the text of the Reptile section was published in 1847, plate 1 in 1835, plates 2 and 5 in 1837, but the dates of publication of plates 3-4 (*S. roseiventris* was in plate 4) were not recorded. Duméril & Bibron (1837) explicitly mentioned that D'Orbigny's figure of the species had not yet been published. Therefore, the first valid description of *S. roseiventris* is to be considered that of Duméril &

Bibron (1837), who are thus the authors of the name.

An X-ray photo of RMNH 25697 was examined, showing no postxiphisternal ribs meeting, or in close proximity, at midventral line.

I could not locate any specimen of *S. roseiventris* from Brazil in the collections I examined. The first reference of the occurrence of this species in Brazil was given by Etheridge (1970e), but it is not clear on which material this reference was based.

Plica Gray, 1831

Diagnosis.— Tropidurid with enlarged interparietal; supraorbital semicircle distinct; supraoculars enlarged; supraciliaries elongate, overlapping; subocular series formed by several scales, or indistinct (when only 1-2 scales distinct, not much enlarged); scales on frontonasal region slightly imbricate anteriorly; nostril directed dorsolaterally; loreal scales small and numerous, with no distinct row of lorilabials. Gular and antegular folds present, the former continuous with an antehumeral fold, the latter with a short oblique neck fold. Vertebral crest present. Dorsals keeled, ventrals smooth or keeled; dorsals and ventrals subequal in size. Fourth finger longer than third. Tail long and slender, forming indistinct verticils.

Distribution.— Northern South America east of the Andes, in Brazil, French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru, and Bolivia. Also in Trinidad.

Contents.— Three species, two of which occur in Amazonia. The third species (*Plica lumaria* Donnelly & Myers, 1991) was recently described from a tepui in Venezuela.

Plica plica (Linnaeus, 1758)
(figs. 50, 51, 245)

Lacerta Plica Linnaeus, 1758: 208 (holotype NRM 112, type-locality: "Indiis", restricted by Etheridge (1970c: 242) to vicinity of Paramaribo, Suriname, and by Hoogmoed (1973: 160) to the confluence of the Cottica River and the Perica Creek, Suriname).

Lophyrus panthera Spix, 1825: 11 (type lost according to Hoogmoed & Gruber, 1983; type-locality: "Ecgá", presently Tefé, Rio Solimões, Brazil).

Lophyrus agamoides Gray, 1827: 208 (type in BM according to original description, but could not be located [C. McCarthy, *in lit.*]; type-locality unknown).

Hypsibatus agamoides; Guichenot, 1855: 24.

Hypsibatus punctatus Duméril & Bibron, 1837: 258 (holotype MHNP 2387, type-locality unknown).

Uraniscodon plica; Boulenger, 1885b: 180; Goeldi, 1902: 514, 522.

Plica plica; Burt & Burt, 1931: 282; 1933: 40; Cunha, 1961: 78; Etheridge, 1970c: 242, 1970d: 230; Vanzolini, 1972: 97, 1986a: 14; Hoogmoed, 1973: 159, 1979: 278; Cunha, 1981a: 9; Cunha et al., 1985: 26; Nascimento et al., 1988: 31; Hoogmoed & Avila-Pires, 1989: 168; O'Shea, 1989: 69; Zimmerman & Rodrigues, 1990: 414; Nascimento et al., 1991: 39; Vitt, 1991: 504.

T[ropidurus] plica; Frost, 1992: 51.

Material.— **Brazil.** ACRE. Rio Juruá (right bank), Occidente (8°21'S, 72°47'W): 1 ex., INPA 558, 10.ii.1992, leg. C. Gascon. Rio Juruá (right bank), Porongaba (8°40'S, 72°47'W): 1 ex., INPA 590, 21.ii.1992, leg. C. Gascon.

AMAPA. Serra do Navio: 1 ♀, MPEG 15014, 2 juvs., MPEG 15020-021, 05.xi.1988 (eggs); 1 ex., RMNH 26274, 08.xi.1988; 2 juvs., RMNH 26275-276, 09.xi.1988 (eggs); 1 ♀, MPEG 15092, 11.xi.1988; 1 ex.,

RMNH 26277, 12.xi.1988; 1 hgr., MPEG 15118, 26.xi.1988; 1 ♂, MPEG 15125, 17.xi.1988; 2 juvs., MPEG 15144-145, 19.xi.1988 (eggs); 1 juv., MPEG 15175, 19.xi.1988; 1 ex., MPEG 15189, 21.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Rio Urucu, E of Porto Urucu, near Petrobras RUC-2: 1 ♂, MPEG 15869, 29.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Lago Amanã, Igarapé Tupé: 1 ex., INPA 243, 06.viii.1981, leg. R.C. Best. Rio Juruá (left bank), Condor (6°45'S, 70°51'W): 1 ex., INPA 444, 22.ix.1991, leg. C. Gascon. Rio Juruá (left bank), Lago Jainu (6°28'S, 68°46'W): 2 ex., INPA 472-73, 18.x.1991, leg. C. Gascon. Rio Solimões, Tabatinga: 1 ♀, RMNH 26278, 04.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões, W of Benjamin Constant: 1 ♂, MPEG 15931, 11.xii.1989; 1 ♀, RMNH 26279, 14.xii.1989; 1 ♂, MPEG 15981, 16.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires (from local children).
PARA. Ilha de Marajó, Município de Breves, km 6-7 road Breves-Anajas: 2 exs., MPEG 14726, 14729, 26.xi.1987; 1 ex., MPEG 14737, 28.xi.1987; 1 ex., MPEG 14761, 04.xii.1987; 2 exs., MPEG 14778, 14780, 08.xii.1987; 1 ex., MPEG 14872, 01.iii.1988; all leg. I.F. Santos, R.J.R. Moraes & S. Ramos; 1 ex., MPEG 14752, 01.xii.1987, leg. Odilson Filho. Ilha de Marajó, Município de Breves, Comunidade Tancredo Neves (c. 18 km from Breves, road Breves-Anajás): 1 ex., MPEG 15738, 15.v.1990, leg. A.C.M. Lima, J.S. Lima-Verde, R.A.T. Rocha & J. Orlando. Município de Portel, Floresta Nacional de Caxiuanã, Rio Caxiuanã near IBAMA post (1°47'32.3"S, 51°26'01.5"W): 2 exs., RMNH 26280, MPEG 16502, 17.xi.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Melgaço, Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11,3"W): 1 ex., MPEG 16407, 27.x.1992; 2 exs., RMNH 26281, MPEG 16412, 28.x.1992; 2 exs., RMNH 26282, MPEG 16417, 29.x.1992; 1 ex., RMNH 26283, 30.x.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Tocantins, present reservoir area of hydroeletric dam Tucuruí: 1 ♂, MPEG 13599, 01.vi.1984, leg. I.J. Lopes & R. Santana. Carajás, Serra Norte: 1 ♂, 1 ♀, MPEG 12994-995, Angical, Rio Itacaiunas, 22.viii.1983, leg. T.C.S. Avila Pires & R.J.R. Moraes; 1 ♀, MPEG 13035, surroundings N-1, 07.xi.1983, 1 ♂, 1 ♀, MPEG 13042-043, Rio Gelado, 08.xi.1983, 1 ♂, 1 ♀, MPEG 13113-114, Manganês do Azul, 19.xi.1983, all leg. F.P. Nascimento, T.C.S. Avila Pires & R. Bittencourt N.; 2 ♂♂, MPEG 13686-687, Jardim Botânico de Carajás (surroundings N-5), 18.vii.1984, 2 ♂♂, MPEG 13728-729, Pojuca, 27.vii.1984, all leg. T.C.S. Avila Pires, E. Faria, M.G.M. Nery & J.C.S. Pinto; 1 ♂, MPEG 13968, 11.xi.1984, 1 ♀, MPEG 13986, 15.xi.1984, both Igarapé do Fogo (surroundings N-4), leg. T.C.S. Avila Pires, R.J.R. Moraes & J.C.S. Pinto; 1 ♀, MPEG 13988, Pojuca, 16.xi.1984, leg. T.C.S. Avila Pires & R.J.R. Moraes; 4 ♀♀, 1 ♂, MPEG 14025-029, Manganês do Azul, 08.ii.1985, leg. F.P. Nascimento, R. Bittencourt N. & W. França; 1 ♂, 1 ♀, MPEG 14046-047, Manganês do Azul, 15.ii.1985, leg. F.P. Nascimento & R. Bittencourt N. Road Altamira-Marabá, Igarapé do Jôa, 30 km from Altamira: 1 ♀, MPEG 4759, 11.viii.1971, leg. F.P. Nascimento. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 1 ♀, MPEG 15345, 06.xii.1988; 1 ♂, MPEG 15361, 08.xii.1988; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, road between Sítio Céu Estrelado and Cruz Alta, c. 21 km N of the former: 1 ♂, MPEG 15424, 14.xii.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Município de Faro, Rio Nhamundá, Sítio Céu Estrelado (15 km N of Faro): 1 ♂, RMNH 26284, 04.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Rio Jamari, reservoir area of hydroeletric plant Samuel: 2 exs., CEPB 0180, 0238, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr. Ouro Preto d'Oeste, km 16, Line 62 (right bank Igarapé Paraíso): 1 ♂, 1 ♀, MPEG 13907-908, 09.xi.1984, leg. F.P. Nascimento & R. Bittencourt Neto.
RORAIMA. Município de Boa Vista, Colônia Coronel Mota, Região do Taiano: 1 ♂, 1 ♀, MPEG 3946, 3949, 16.vi.1970; 1 ♂, 1 ♀, MPEG 3957-58, 17.vi.1970; all leg. F.P. Nascimento.
Guyana. Bartica: 1 ex., RMNH 26236, 07.v.1986, leg. L.G. Hoevers.
Peru. Tingo Maria: 1 ♀, ZFMK 27646, iv.1979, leg. R. Schulte. Puerto Maldonado: 1 ♂, ZFMK 34232, 20.ii.1981, leg. E. Leukenhoff. El Boquerón del Padre Abad: 1 ♀, ZFMK 38878, leg. C. Prentise.
Suriname. District Nickerie. Kabalebo area, road to Amotopo, 100 m: 1 ♂, RMNH 26243, 11.v.1981, leg. M.S. Hoogmoed & D.G. Reeder. 1 ♂, RMNH 26242, 15.v.1981, leg. M.S. Hoogmoed. Kabalebo area, airstrip Amotopo, 120 m: 1 ♀, RMNH 26241, 23.v.1981, leg. M.S. Hoogmoed, D.G. Reeder & J. Toto.
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Railway Porto Santana-Serra do Navio, km 110. Município de Mazagão, Rio Maracá,

Cachoeira Pancada. Município de Mazagão, Rio Camaipi (affluent left side of Rio Maracá). Rio Calçoene, near Igarapé Flaman. AMAZONAS. Rio Negro, Tapurucuara. Rio Javari, Estirão do Equador. MATO GROSSO. Rio Aripuanã, Cachoeira Dardanelos. PARA. Ilha do Marajó, Município Anajás, Rio Aramá, Vila Nova do Aramá. Rio Tocantins, Mangabeira (below Baião). Rio Tocantins, Fazenda Boa Esperança, 30 km from Tucuruí. Carajás, Serra Norte (Igarapé Bahia, Salobo-3 alfa, Rio Cinzento, Igarapé Azul, Fofoca, surroundings N-2). Oriximiná, Porto Trombetas, Rio Saracazinho. RONDONIA. Road BR-364 (Porto Velho-Cuiabá), km 30, Fazenda Rio Candeias; Ji-Paraná.

Diagnosis.— As generic diagnosis, and in addition the following features: depressed body; several tufts of spinose scales on neck; scales around midbody 121-162; maximum SVL c. 150 mm. Green, with a fuscous or black pattern usually forming spotted (non solid) transverse bands.

Description.— Tropidurid with maximum SVL in males of 177 mm, in females of 151 mm (Vitt, 1991). Head 0.21-0.27 (0.24 ± 0.01, n= 28) times SVL; 1.1-1.2 (1.13 ± 0.04, n= 28) times as long as wide; 1.3-1.7 (1.53 ± 0.10, n= 27) times as wide as high. Snout rounded, canthus rostralis posteriorly distinct, anteriorly rounded. Neck narrower than head and body. Body depressed. Limbs well developed, forelimbs 0.54-0.67 (0.60 ± 0.05, n= 7) times SVL, hind limbs 0.80-0.92 (0.87 ± 0.04, n= 7) times, tibia 0.23-0.31 (0.27 ± 0.02, n= 28) times. Tail long, round in cross section, tapering toward tip; 1.6-2.1 (1.79 ± 0.14, n= 27) times SVL.

Tongue villose, tip rounded. Anterior teeth conical, posterior teeth tricuspid. Premaxillary teeth very small, anterior maxillary teeth longest.

Rostral band-like, three to four times as wide as high, hardly seen from above. Postrostrals 4-8. Scales on snout approximately polygonal, subimbricate (directed anteriorly), larger posteriorly; surface flat to convex, mostly slightly rugose (due to scale tubercles); exceptionally some scales may present a short keel. Scales across snout between first (or single) canthals 5-9, mostly 6-8. Nasal large, undivided, separated from rostral by 1-3 scales. Nostril directed dorsolaterally, approximately in centre of scale, at about level of canthus rostralis. One canthal, exceptionally two (RMNH 26236, 26278, in both cases on one side only, the other side with one canthal). Supraorbital semicircles with 10-13, rarely nine or 14, arched, keeled scales, anterior one about the size of posterior scales on snout, posteriorly smaller, reaching approximately same size as parietal scales; in contact or separated medially, and separated from interparietal by one row of scales. Supraocular region with 4-7 transversely enlarged scales, surrounded by smaller scales which medially and posteriorly form a double row. Supraciliary crest moderately pronounced, with 6-8, exceptionally five, elongate scales, anteriorly the anterior ones overlapping the more posterior ones, posteriorly the posterior ones overlapping the more anterior ones; bordered at both sides by a series of flat scales. Interparietal several times larger than parietal scales, triangular to roughly oval, slightly convex, surrounded by several relatively small scales. Parietal eye distinct. Parietal scales numerous, imbricate, with rounded free (anterior) margin, and a high, sharp keel mid-anteriorly; scales posterior to interparietal similar but smaller. Loreal region mostly with slightly imbricate, polygonal, longer than wide, smooth to feebly keeled scales, approximately in longitudinal rows; upper scales larger, about as long as wide, with rounded free margins, keeled; 5-8 loreals in a transverse row below first canthal. Subocular series well developed, with 4-8, mostly 5-7, relatively large, arched, keeled scales. Supralabials 4-6, mostly

4-5, posterior one below centre of eye; followed by small scales. Temporal scales similar to parietals. A group of larger, spinose scales may be present on posterior part of supratemporal area. Ear-opening large, vertically oval, with a short auditory meatus; anterior margin spinose, mostly with a group of larger scales mid-anteriorly, posterior margin smooth.

Mental mostly semicircular, narrower and slightly to distinctly longer than adjacent infralabials. Postmentals 3-5, occasionally six. Infralabials 4-7, exceptionally eight, last or last but one below centre of eye. Scales on chin smooth, slightly imbricate, medially rhomboid and small, laterally rectangular and larger, in oblique rows diverging from midline. A gular sac is present and forms a median longitudinal fold which ends in the antegular fold, both variably developed. The antegular fold may be divided into smaller folds, and it connects laterally the oblique neck fold and a number of other irregular, short folds. A well defined gular fold continues laterally into the antehumeral fold. Gular scales keeled, tending to be spinose, smaller medially, larger toward sides. Near posterior border of ear-opening they form one or two high tufts of spines. Several scales of head with minute tubercles, giving them a partially rugose appearance.

Scales on nape mostly similar in shape to dorsals, but distinctly smaller, keeled and with a high and sharply pointed mucro. A vertebral crest from nape to anterior part of tail, forming a serrate line along body, higher on neck; in males, 55-70 (60.8 ± 4.3, n= 11) vertebral scales from nape to anterior margin of hind limbs, 64-78 (69.5 ± 4.3, n= 11) to posterior margin of hind limbs; in females respectively 57-73 (65.6 ± 4.8, n= 14) and 66-84 (75.0 ± 5.4, n= 14). At each side, spinose scales appear in two high tufts dorsolaterally on neck (anterior one larger); in a dorsolateral row from antehumeral fold to posterior level of hind limbs; and in a lateral fold between fore- and hind limbs. Lateral fold as much as, or less developed than dorsolateral fold, and both less developed in juveniles. Dorsals and laterals rhomboid, imbricate, sharply keeled and distinctly mucronate, in oblique and transverse rows; slightly larger toward mid-dorsal line. Ventrals rhomboid, imbricate, smooth, some shortly mucronate, in 70-93 (81.6 ± 7.0, n= 11) transverse rows in males, 74-95 (86.3 ± 6.9, n= 14) in females; ventrolaterally grading into scales on flanks. Scales around midbody 121-162 (135.5 ± 9.1, n= 27) (no significant difference between sexes). Scales on preanal plate rhomboid to polygonal, imbricate, smooth, slightly to distinctly larger than ventrals.

Base of tail with scales similar to dorsals and a low but distinct vertebral crest. Distally scales rhomboid to rectangular, keeled, in transverse rows, vertebral crest absent. Underside of tail with slightly larger scales, near the base similar to those dorsally, but feebly keeled. Distally they form two distinct paramedian rows of keeled scales. Tail divided into indistinct verticils, each verticil mostly with six rows of dorsals and four rows of ventrals.

Forelimbs with rhomboid, imbricate, sharply keeled and distinctly mucronate scales on anterior and dorsal aspects of upper arms. Toward their ventro-posterior corner the scales become gradually smooth and not or slightly mucronate. Scales on forearms with lower keels and short mucro, smooth and not mucronate on ventro-anterior corner. Scales on hind limbs rhomboid, imbricate, mostly sharply keeled and distinctly mucronate. On their ventral aspect scales smooth to feebly keeled, and not

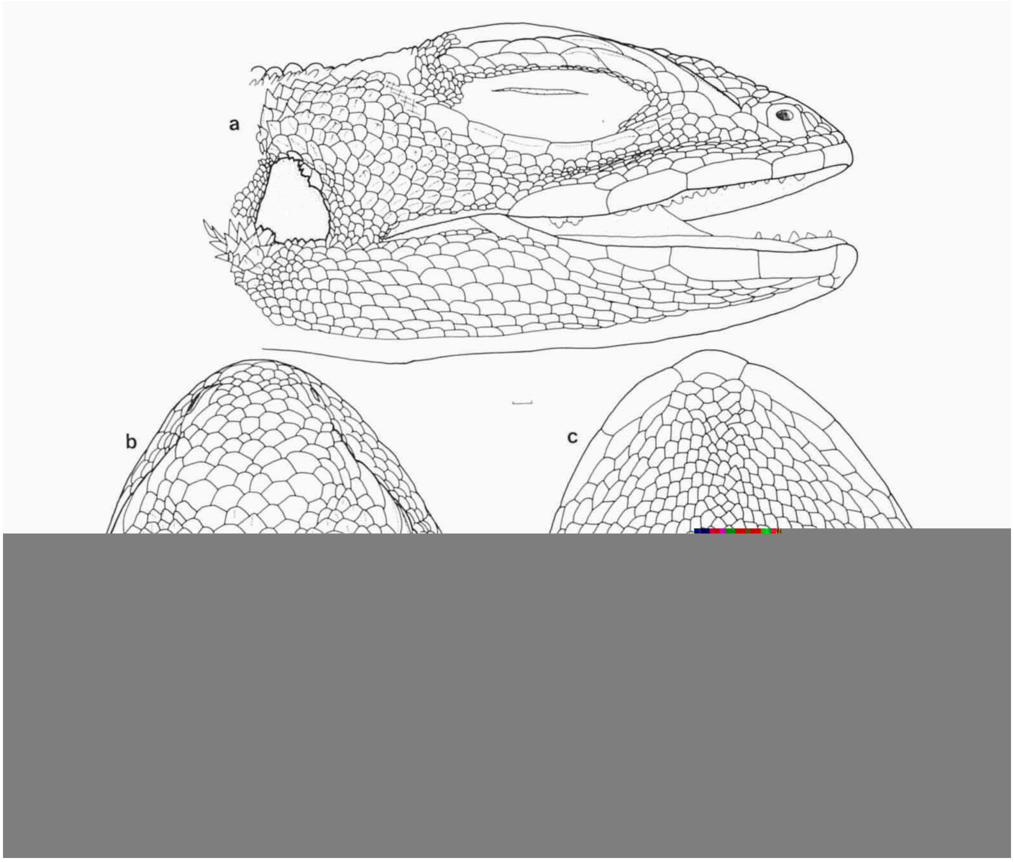


Fig. 50. *Plica plica*, MPEG 13035; a, b, c: lateral, dorsal, and ventral views of head.

to only slightly mucronate. Subdigital lamellae single, with a distinct median keel, and in some specimens proximally with extra, feebler keels; 21-28 (24.6 ± 1.8, n= 55, 28 specimens) lamellae under fourth finger, 29-39 (33.0 ± 2.1, n= 53, 27 specimens) under fourth toe.

Colour in life predominantly green with a fuscous or black pattern usually forming transverse, widely opened "V"-shaped bands on body, transverse bands on limbs and tail. The head may be completely or partially covered by a pinkish or salmon hue (observed at least in specimens from Caxiuanã and Carajás, Pará). Ventral surface cream, pale green or salmon, with black spots under head, belly spotless; the gular region may be grey or black. MPEG 15014 in life had the dorsal surface of head greyish-olive (43) to olive-green (46) and black; back and limbs olive-green (46) to citrine (51) with brick-red (132A) spots surrounded by black, which were arranged approximately in transverse, slightly "V"-shaped bands; tail with alternate green and black bands. Ventral surface predominantly salmon (6), with black spots under the head, gular region black, and some areas of limbs pale green. Tongue white, iris pale grey. RMNH 26275-276, hatchlings, had the dorsal surfaces of head and body green (between pistachio, 161, and opaline-green, 162D), with raw-umber (223) to black spots forming a banded pattern. Ventral surface predominantly light peach red (94), with infralabials green and gular region black bordered posteriorly by green and black. Tongue pale grey. Digits dorsally with alternate black and green transverse bands, ventrally grey. Descriptions of colour in life also given by Parker (1935), Beebe (1944b), Vanzolini (1972), Hoogmoed (1973).

In preservative most specimens present a greyish-blue and dark brown to blackish, marbled dorsal pattern. Head irregularly spotted or with some transverse bands or lines, body mostly with a series of alternating light and dark transverse bands, which in some specimens are completely disrupted into irregular dark spots over a light background. Ventrolateral region marbled, vermiculate or with dark spots. Limbs and tail with alternating light and dark transverse bands. Ventral region predominantly cream. Under head usually with irregularly arranged dark spots, immaculate in some specimens, others with some dark oblique lines which may form a reticulation (especially in juveniles). A triangular black area on gular region in males,

of tail dark.

Habitat.— A forest dweller, mostly found on large tree trunks. Among 57 individuals observed on tree trunks in daytime, 22 (38.6%) were at heights close to the ground up to 2 m; 18 (31.6%) were higher than 2 m and up to 4 m; 13 (22.8%) were higher than 4 m and up to 6 m; and four (7.0%) were higher than 6 m and up to 8 m. Eight other animals were found on different substrata - five on fallen tree trunks, one on a stone (near a creek), and two on the ground. Two individuals collected sleeping at night (21:45 h-23:00 h) were one on a rock (laterite), 20 cm above ground, the other on a tree trunk, about 1 m above ground. Most individuals were found in primary, terra firme forest, sometimes in forest borders. They may also be found in secondary or disturbed areas which are connected to less disturbed forest. In Serra Norte, Carajás, individuals were frequently seen in an area where the forest had been selec-

1991 stated that individuals are most often in a head-down position). Individuals are seen alone or sometimes in pairs (usually a couple, e.g., MPEG 12994-995, 13042-043, 13113-114, 14046-047; MPEG 13686 and 13728, both ♂♂, were each on the same tree trunk with a smaller [♀?] individual). In one case (MPEG 14025-029) 4 ♀♀ and 1 ♂ were found together in the same tree.

P. plica may be quite inconspicuous on a tree trunk due to its colouration. When disturbed it may remain motionless, or flee away, usually for short distances and circling the tree trunk (although in some cases it may run fast upward, as with MPEG 16502 which moved from the base of a tree up to 10 m above ground). It flees frequently upward, sometimes downward. In some cases it hides between buttresses; MPEG 13988 fled into a hole in the root of a tree.

Pairs were seen in the months of February, July, August and November (Serra Norte, Carajás). Three clusters of eggs were found in Serra do Navio (Amapá), in rotten tree trunks, during November 1988. Each consisted of two oval eggs of 29-33 mm (longest axis) versus 14-16 mm (shortest axis). The eggs, kept in laboratory, hatched between 25.xii.1988 and 24.i.1989. The two eggs of each cluster either hatched on the same day or on two consecutive days. Longest incubation period, since collection of the eggs, 72 days. Hatchlings had SVL 44-46 mm, tail length 70-79 mm (1.6-1.8 times SVL) and a weight of 2-2.5 g. Hoogmoed (1973) reported pregnant females with two or three mature eggs, and Vitt (1991) registered up to 5 eggs in a clutch. Vitt (1991) noted a significant correlation between SVL and clutch size.

According to data by Vitt (1991), diet is dominated numerically and volumetrically by ants, although in a population from Pará this dominance was not so strong as in a population from Rondônia. Among 53 individuals of *P. plica* from Serra Norte, Carajás, Hymenoptera appeared in 87% of the stomachs, and Coleoptera in 77%. Other items were Orthoptera, Hemiptera, Araneae, larvae of insects, Diplopoda, Isoptera, Diptera, Pseudoscorpionida, Phasmida, Blattaria, Homoptera and Lepidoptera. Vegetable matter appeared in three stomachs (Avila-Pires & Pimentel, unpubl.).

Meede (1984) stated that snakes are the main predators of *P. plica*. As an example she mentioned *Pseustes poecilonotus* (Günther).

Besides those authors already cited, data on habitat and natural history were also given by Beebe (1944b), Vanzolini (1972), Nascimento et al. (1985, 1988), Dixon & Soini (1986), Rodriguez & Cadle (1990), and Zimmerman & Rodrigues (1990). They agree in general terms with the above observations. Vitt (1991) made extensive observations on two populations of *P. plica*, and his article should be consulted for more information on the species.

Distribution (fig. 51).— Northern South America east of the Andes, throughout most of the Amazonian region (Brazil, French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru and Bolivia) and reaching the Atlantic coast in the Guianas and eastern Venezuela. Also in Trinidad. In Brazil it occurs in the states of Pará, Amapá, Roraima, Amazonas, Acre, Rondônia and Mato Grosso (northern border). Up to the present it has not been reported east of the Rio Tocantins.

Remarks.— See Etheridge (1970c) for a nomenclatorial history of the genus, and a complete list of synonyms. I follow Hoogmoed & Gruber (1983) in considering *Lophyrus panthera* as a synonym of *P. plica* (see discussion by these authors).

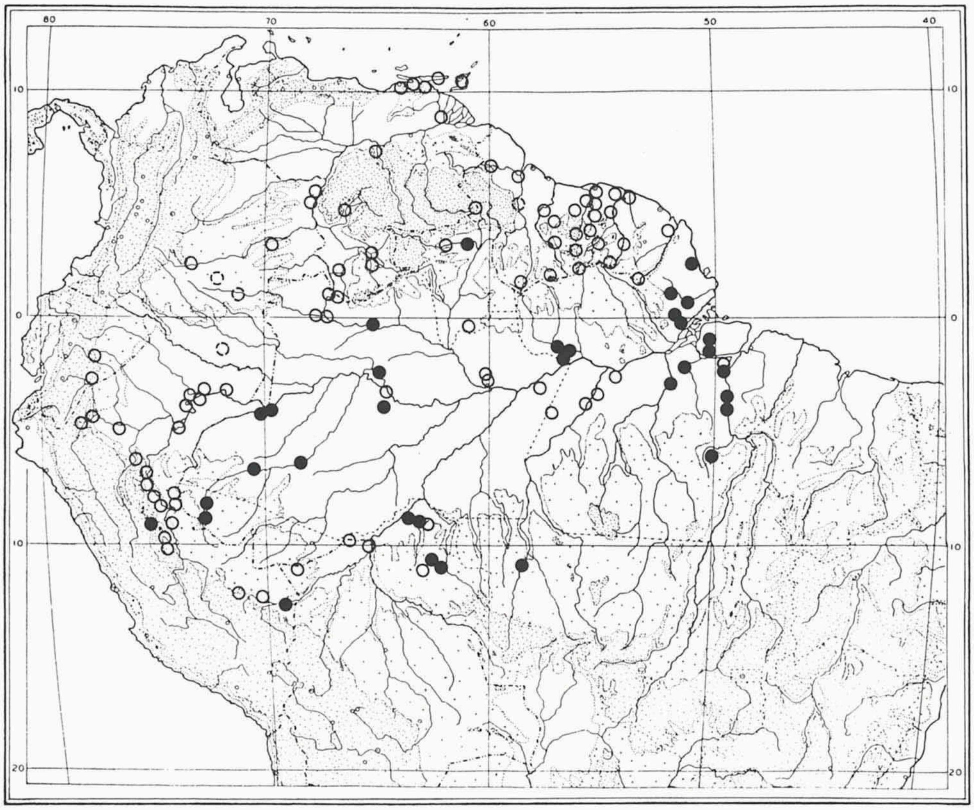


Fig. 51. Distribution of *Plica plica*. Closed circles = material studied; open circles = data from literature (Spix, 1825; Parker, 1935; Beebe, 1944b; Schmidt & Inger, 1951; Donoso-Barros, 1968; Etheridge, 1970; Vanzolini, 1972, 1986a; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976; Meede, 1984; Dixon & Soini, 1986; Fugler, 1988c; O'Shea, 1989; Rodriguez & Cadle, 1990; Zimmerman & Rodrigues, 1990); dashed circles = general localities (reference to Colombian states by Ayala, 1986, and to "Essequibo river" by Parker, 1935).

It is remarkable that *P. plica* has not yet been collected in the easternmost part of Amazonia, in Pará and Maranhão. Accepting its absence as real, two possibilities have to be considered - its absence has a natural cause, or it disappeared from the area in recent times due to human influence. Part of this area, especially the Bragantina region, has been relatively well collected since the sixties by O.R. Cunha and F.P. Nascimento (at least regarding medium and large sized squamates). At the same time, it has a long history of colonization, and at present is mostly covered by secondary vegetation (see Cunha & Nascimento, 1978 and Cunha, 1981b). Although individuals of *P. plica* have been reported from capoeira and even plantation sites, this always was in areas where original forests still existed. It may be that *P. plica* cannot survive in areas with secondary vegetation only (which might be due to the absence there of its preferred microhabitat on large tree trunks), and that might have caused its disappearance from eastern Pará/Maranhão. On the other hand, the area now flooded by the reservoir of the hydroelectric dam Tucuruí, in the Rio Tocantins, was surveyed prior to its flooding. The area was then still covered by large tracts of primary forest. Only one *P. plica* was found, on the left bank of Rio Tocantins. That seems to indicate that the species is not common on either side of the Tocantins, and it strengthens the idea that the absence of *P. plica* from eastern Pará has a natural cause.

Vanzolini (1986a), based on his finding individuals of *P. plica* in areas outside the forest (on rock outcrops and in termite nest in a plantation site), stated that possibly this species would have a "granted future", whatever happened in Rondônia. For the reasons stated in the preceding paragraph, I doubt that. Rondônia is a place subjected to recent deforestation, and presents a mixture of forested and deforested areas. The presence of forested areas may be essential for the survival of the species. Contrary to some other lizards (e.g., *Gonatodes humeralis, Anolis punctatus, Polychrus marmoratus*), *P. plica* is not known from moderately large urban agglomerates in places of older settlement in Amazonia.

Plica umbra (Linnaeus, 1758)

Lacerta umbra Linnaeus, 1758: 207 (3 syntypes, NRM 111 (2 ex.) and UUZM 73 (1 ex.), type-locality: "Meridionalibus", restricted by Etheridge (1970c: 247) to the vicinity of Paramaribo, Suriname).
Uperanodon ochrocollare; Duméril & Bibron, 1837: 248; Guichenot, 1855: 23.
Hyperanodon ochrocollaris; Cope, 1876: 170.
Hyperanodon peltigerus Cope, 1876: 170 (holotype ANSP 13095, type-locality: middle and upper Amazon).
Uraniscodon umbra; Boulenger, 1885b: 179 (part); Goeldi, 1902: 514, 521 (part); Müller, 1912: 14, 23; Cott, 1926: 1160.
Plica umbra; Burt & Burt, 1933: 40; Vanzolini, 1972: 98; Hoogmoed, 1979: 278.
T[ropidurus] umbra; Frost, 1992: 51.

The species comprises two subspecies. A general synonymy, diagnosis and description will be given, followed by data specific to each subspecies. Habitat, notes on natural history, and remarks refer to both subspecies.

Diagnosis.— As generic diagnosis, and in addition the following features: body roughly cylindrical, no tufts of spinose scales on neck, scales around midbody 43-69. Maximum SVL c. 100 mm. Mottled green and brown, one or the other colour predominating; transverse dark, spotted bands may be present.

Description.— Tropidurid with maximum SVL between 90 mm and 100 mm. Head 0.20-0.25 times SVL, 1.1-1.3 times as long as wide, 1.1-1.4 times as wide as high. Snout round, canthus rostralis posteriorly distinct, anteriorly round. Neck narrower than head and body. Body approximately cylindrical. Limbs well developed, forelimbs 0.48-0.56 times SVL, hind limbs 0.64-0.84 times, tibia 0.20-0.25 times. Tail long, round in cross section, tapering toward tip; 1.9-2.5 times SVL.

Tongue villose, tip round. Anterior teeth conical, posterior teeth tricuspid. Anterior maxillary teeth longest.

Rostral either band-like, hardly seen from above, or with a median area extending dorsally. Postrostrals 4-9, occasionally including nasals. Scales on snout variable in shape and size, usually larger posteriorly, subimbricate (directed anteriorly), slightly convex, surface smooth or rugose; some scales may present a broad keel. Scales across snout between first (or single) canthals 4-9, mostly 5-7. Nasal large, undivided, mostly separated from rostral and supralabials by one row of scales, occasionally in contact with rostral. Nostril exposed dorsolaterally, in upper part of nasal, medial of canthus rostralis. One or two canthals at each side, posterior large, anterior small or absent. Supraorbital semicircles formed by 7-11, exceptionally six, relatively large, convex, and smooth to rugose scales, in contact medially and with interparietal. Supraoculars 4-7, exceptionally eight, transversely enlarged. Supraciliaries 6-11, elongate, anteriorly the anterior ones overlapping the more posterior ones, posteriorly the posterior ones overlapping the more anterior ones. Interparietal extremely large, slightly convex, parietal eye distinct; interparietal surface variably sculptured, especially posteriorly where a transverse ridge and/or two latero-posterior conical elevations may occur. Interparietal surrounded anteriorly by the scales of the supraorbital rows; on its latero-posterior corner there may be, at each side, a distinctly conical scale, and along its posterior margin may occur scales with transversely elevated ridges (possibly these postero-lateral scales are fused in some specimens with the interparietal, corresponding to the interparietal posterior sculptures mentioned above). Scales on parietal region juxtaposed to subimbricate, either irregularly polygonal or with exposed borders rounded or oval, convex and mostly with a distinct, broad keel. Scales on loreal region polygonal, longer than wide, smooth or keeled (keels usually nearer lower margin of scale), in approximately longitudinal rows; 3-7 scales in a transverse row below first canthal. Subocular series variable, in some specimens with only one or two moderately enlarged, keeled scales below centre of eye, in other specimens forming a distinct series of up to nine keeled scales. Supralabials 4-5, exceptionally three or six, posterior one below centre of eye; followed by small scales or by one or two scales slightly larger than adjacent ones. Temporal scales relatively small, roundish to polygonal, juxtaposed to subimbricate, slightly convex to conical, and smooth to broadly keeled. Ear-opening large, round to oval, with a short auditory meatus; anterior margin smooth or with slightly prominent scales, posterior margin smooth.

Mental usually narrower and slightly longer than adjacent infralabials, lateral margins from about parallel to each other, to widely diverging anteriorly. Postmentals 1-6, mostly 3-5. Infralabials 4-7, last or last but one below centre of eye. Scales on chin mostly subimbricate to imbricate, medially smaller and irregular, laterally larger, elongate, polygonal, in oblique rows. Scales on gular region small, rhomboid, sharply pointed, imbricate. A strong antegular fold, which may conceal the shallow gular fold. Antehumeral fold (continuous with gular fold) well developed, oblique neck fold (continuous with antegular fold) short. Most scales on dorsal part of head, infralabials and part of the scales on chin with minute tubercles (scale organs) widespread on their surface.

Scales on nape like dorsals, similar but much smaller on sides of neck. A vertebral crest from nape to approximately middle of body. It may continue as a low vertebral crest until base of tail, or turn into a row of non-prominent vertebral scales which may or may not continue up to base of tail. Dorsals and laterals rhomboid, imbricate, sharply keeled, mucronate, in oblique and approximately transverse rows. Ventrals mostly narrower than dorsals, faintly to distinctly keeled and mucronate, in transverse rows, ventro-laterally merging into laterals. Scales on preanal plate similar to ventrals, faintly keeled, either homogeneous in size or central ones larger, peripherally smaller. Adult males with glandular areas under thighs and on preanal plate, with scales lighter than adjacent ones and more feebly keeled to smooth.

Scales on base of tail similar to dorsals, distally rhomboid to rectangular, keeled, in transverse rows. Scales under tail larger, keeled, distally in transverse and longitudinal rows. Tail divided into indistinct verticils, each verticil with 4-5 rows of dorsals and three rows of ventrals.

Forelimbs mostly with rhomboid, imbricate, distinctly keeled and mucronate scales, larger than dorsals, except on ventro-posterior aspect of upper arm where the scales are distinctly smaller and feebly keeled, and on ventro-posterior aspect of forearms where they are slightly smaller and feebly keeled. Hind limbs with scales similar to those on forelimbs on antero-dorsal aspect of thighs and on lower legs; smaller scales toward posterior aspect of thighs, and smooth or with feebler keels ventrally. Subdigital lamellae single, proximally uni- or multicarinate, distally unicarinate; 17-25 lamellae under fourth finger, 24-33 under fourth toe.

Colour in life described under each subspecies. Descriptions of colour in life also presented by Beebe (1944b), Vanzolini (1972), Hoogmoed (1973), Duellman (1978), Meede (1984).

In preservative, general dorsal colour dark brown, reddish-brown or olive-brown, with 5-7 transverse dark bands along nape and body. Mostly the bands are covered by blackish dots of several sizes, and the space between bands is slightly to distinctly narrower than the band width. A similar pattern of transverse bands continues on tail. In darker specimens bands may not be very distinct. Limbs with dark spots which may form transverse bands. A whitish, short, wide stripe on junction of thigh with base of tail. Ventral region light, uniformly coloured or mottled. Underside of head either entirely darker than belly, or with dark oblique bands, or darker only ventrolaterally. A light area on ventral aspect of thighs may be present in adult males. Some specimens present dorsally a lighter area sharply distinguished from rest of body, which may comprise the head and shoulders, the body between limbs, only a posterior band on body, or part of hind limbs and the area of the body between them. The two smaller specimens examined (MPEG 2629, MPEG 15819) present a light, black-margined band on top of head, across the supraocular regions, and another "V"-shaped band on anterior part of interparietal (this second band may be indicated also in some adult specimens).

Plica umbra umbra (Linnaeus, 1758)
(figs. 52, 53, 55, 56, 248)

Plica umbra umbra; Etheridge, 1970c: 252, 1970d: 231; Hoogmoed, 1973: 167; Hoogmoed & Avila Pires, 1989: 168.
Plica umbra; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.

Material.— **Brazil**. AMAPA. Município de Mazagão, Rio Camaipi (affluent left side of Rio Maracá): 3 ♀♀, MPEG 2629, 2631, 2633, 09-14.vi.1969, leg. F.P. Nascimento. Serra do Navio: 1 ♀, MPEG 15050, 07.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Rio Uatumã, Município Presidente Figueiredo, area of hydroeletric plant Balbina: 1 ♀, MPEG 14694, xii.1987, leg. D. Peccinini-Seale & C.F. Rocha. Approx. 100 km N of Manaus, 2000 m trail

at Camp Gavião: 1 ♂, MCZ 168979, 13.iii.1984, leg. W.D. Allmon. Manaus, Campus INPA/V-8: 2 ♀, RMNH 26285, MPEG 15819, 19.vii.1989, leg. M.S. Hoogmoed. Manaus: 1 ♂, AMNH 64859. Reserva Florestal Ducke, 25 km N of Manaus: 1 ♂, INPA 23, 17.ix.1983, leg. W.E. Magnusson & A. Lima. Rio Negro, Tapurucuara: 1 ♀, MPEG 1903, vii.1962, leg. F.M. Oliveira. Lago Amanã, Igarapé do Tupé: 1 ♂, INPA 244, 06.viii.1981, leg. R.C. Best. Município de Maraã, Santa Rita (left side Lago Paricá): 1 ♀, MPEG 15214, 08.xi.1988, leg. F. Braga & S. Ramos.

PARA. Rio Paru de Oeste, Missão Tiriós (near Serra de Tumucumaque): 2 ♀♀, MPEG 910-11, 1962, leg. E. Fittkau; 2 ♂♂, MPEG 1900-901, vi.1960, leg. J. Hidasi. Município de Almeirim, Distrito Monte Dourado, São Raimundo Agroindustrial Ltda. ("Projeto Jari"): 1 ♀, MPEG 12817, 25.ix.1980, leg. F.P. Nascimento & R.J.R. Moraes. Oriximiná, Rio Sararacazinho, km 43: 1 ♂, MPEG 16403, 01.iv.1980, leg. Instituto Evandro Chagas. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 1 ♂, RMNH 26286, 06.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Oriximiná, surroundings of Cruz Alta, c. 8 km S of Rio Trombetas: 1 ♀, MPEG 15377, 09.xii.1988, leg. M.S. Hoomgoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Rio Nhamundá, Faro: 1 ex., ZSMH 91/1960, 10.i.1912, leg. E. Snethlage. Rio Trombetas, hydroeletric plant Cachoeira Porteira, MAP.1 road, rio Mapuera: 1 ♂, INPA 006, 08.v.1985, leg. R.C.Best

Guyana. Essequibo, Queenstown: 1 ♀, RMNH 26234, 04.iii.1986, leg. L.G. Hoevers. West Demerara, Kamuni river: 1 ♂, RMNH 26235, 12.iii.1986, leg. L.G. Hoevers.

Suriname. District Nickerie. Kabalebo area, airstrip Amotopo: 3 ♂♂, RMNH 26291-293, 23.v.1981, leg. M.S. Hoogmoed, D.G. Reeder & J. Toto. Kabalebo area, road to Amatopo, 100-120 m: 3 ♂♂, RMNH 26294-296, 08.v.1981, leg. M.S. Hoogmoed; 1 ♂, RMNH 26297, km 212, 24.v.1981, leg. M.S. Hoogmoed & J. Toto; 1 ♀, RMNH 26298, km 217.5-215, 25.v.1981, leg. M.S. Hoogmoed & J. Toto. District Saramacca. Tafelberg, 6.5 km NNW from airstrip Rudi Kappel, 200 m: 1 ♂, RMNH 26239, 2 km NW, vi.1979, leg. M.S. Hoogmoed & W.N. Polder; 1 ♂, RMNH 26237, 17.vi.1979, leg. M.S. Hoogmoed. Tafelberg, 13 km NW airstrip Rudi Kappel, 170 m: 1 ♀, RMNH 26238, 23.vi.1979, leg. M.S. Hoogmoed & W.N. Polder. Tafelberg, top of plateau, 600 m: 1 ♀, RMNH 26240, 08.viii.1979, leg. M.S. Hoogmoed & W.N. Polder.

Diagnosis.— A low vertebral crest from nape to anterior part of body, posteriorly continuing as a non-prominent row of vertebral scales or becoming indistinguishable; no conical scales at the posterolateral corners of the interparietal; scales on sides of neck very small; ventral scales feebly keeled. For body proportions and scale counts see table 4. Maximum SVL 100 mm in males, 94 mm in females (Etheridge, 1970c).

Colour in life in MPEG 15050 (♀): head dorsally olive-green (46), laterally yellow-green (58) to lime-green (159), with vandyke-brown spots; under eyes and posterior part of lip robin's egg blue (93). Midventrally head greenish-white. Back lime-

Table 4. Comparison between body proportions and scale counts in *P. umbra* (vertebral and paravertebral scales counted from occiput to anterior margin of hind limbs; ventral scales from anterior margin of forelimbs to anterior margin of hind limbs):

	P. u. umbra	*P. u. ochrocollaris*
tail/svl	2.0-2.3 (2.01 ± 0.09)	1.9-2.5 (2.2 ± 0.13)
head/svl	0.21-0.25 (0.22 ± 0.01)	0.20-0.25 (0.23 ± 0.01)
tibia/svl	0.21-0.25 (0.23 ± 0.01)	0.20-0.25 (0.23 ± 0.01)
midbody	47-69 (60.0 ± 4.9)	43-56 (49.9 ± 3.5)
vertebral	46-65 (56.1 ± 5.3)	35-51 (41.8 ± 3.1)
paravertebral	66-93 (80.1 ± 6.8)	50-73 (60.4 ± 5.2)
ventral	52-71 (60.5 ± 4.4)	42-64 (48.7 ± 4.4)

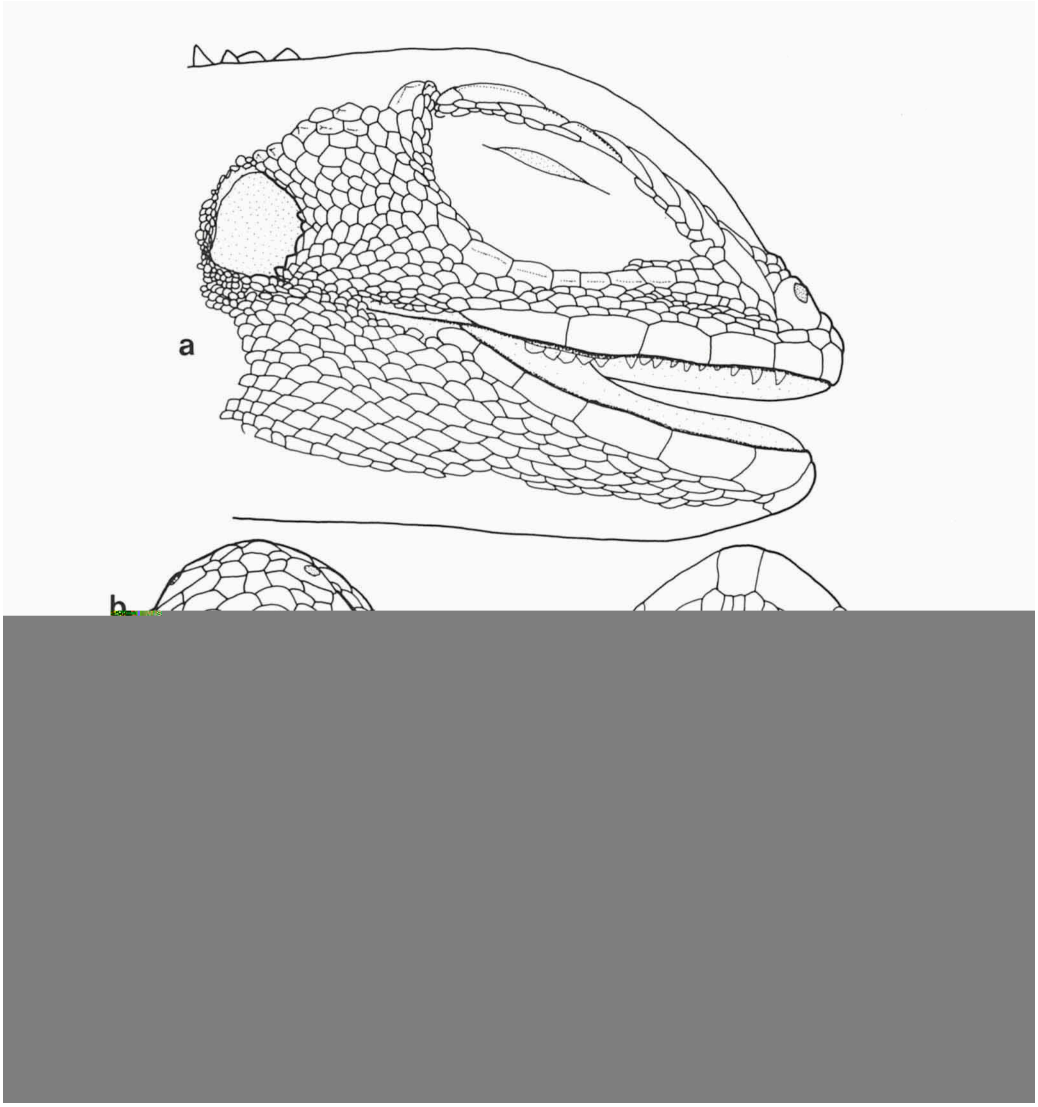


Fig. 52. *Plica umbra umbra*, MPEG 15214; a, b, c: lateral, dorsal, and ventral views of head.

green (159) and vandyke-brown (121). Belly pale pinkish buff (121D). Tail pattern similar to that on body. Tongue pale orange. Iris bluish-grey in the anterior part, brown in the posterior part, with a lighter rim around pupil.

In RMNH 26286 (♂), dorsal surface of head vandyke-brown (221), back olive-brown (28) with black spots. Sides of head, posteriorly, and neck with a warm buff (118) hue. Ventral surface of head vandyke-brown (221) on infralabials, changing gradually into orange-yellow (18) toward the centre of the gular region. Antehumeral fold bordered anteriorly by warm buff (118), posteriorly by black. Belly light drab (119C) to drab-grey (119D), with a light yellow hue on chest. A ventral area on thigh and preanal plate orange-yellow (18). Dorsal aspect of hind limbs with an olive-

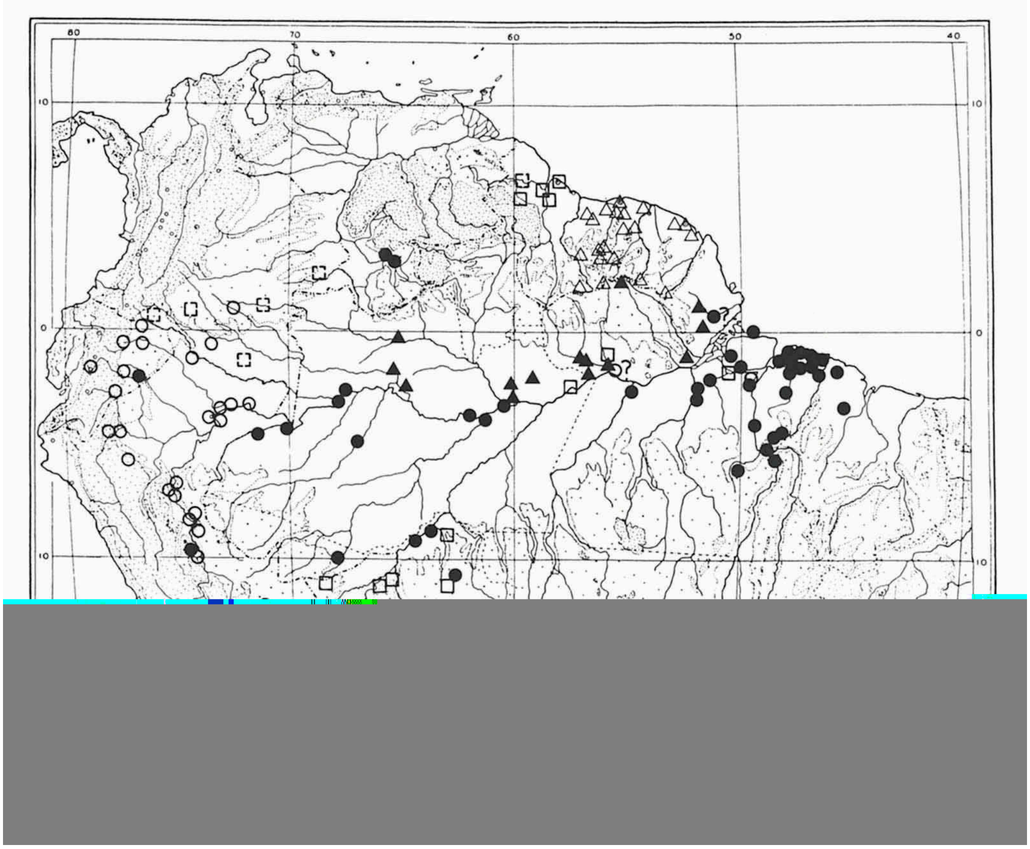


Fig. 53. Distribution of *Plica umbra*. Closed symbols = material studied; open symbols = data from literature (Burt & Burt, 1931; Parker, 1935; Beebe, 1944b; Etheridge, 1970; Vanzolini, 1972, 1986a; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976; Duellman, 1978, 1987; Ayala, 1986; Dixon & Soini, 1986; Lescure & Gasc, 1986; Fugler, 1988b, 1989; Rodriguez & Cadle, 1990; Henle & Ehrl, 1991). Triangles = *P. u. umbra*. Circles = *P. u. ochrocollaris*. Squares = subspecies not mentioned. Dashed squares = reference to Colombian states by Ayala (1986), and to "Upper Cuyuni River" by Parker (1935). Localities with question mark refer to MPEG 2470 and ZSMH 92/1960 (see remarks).

green (47) hue. Ventral surface of tail salmon colour (106).

MPEG 15377 (♀) was completely yellow-green (58) with black bands on the dorsal surface, ventral surface pale pinkish buff (121D) with a greenish hue under the head. Sides of neck greenish-yellow. Tongue trogon-yellow (153).

Distribution (fig. 53).— South America north of Rio Amazonas/Solimões and Rio Japurá, in Brazil, French Guiana, Suriname and Guyana. In Brazil in the states of Amapá, Pará and Amazonas, westward reaching up to the lower Rio Japurá.

Plica umbra ochrocollaris (Spix, 1825)
(figs. 53-56, 250)

Lophyrus ochrocollaris Spix, 1825: 10 (lectotype, designated by Hoogmoed & Gruber, 1983: 385, RMNH 2899; type-locality: "sylvis fluminis Amazonum", Brazil).

Plica umbra; Cunha, 1961: 80; Rand & Humphrey, 1968: 5; Crump, 1971: 19; Vanzolini, 1986a: 14; Rodriguez & Cadle, 1990: 414.
Plica umbra ochrocollaris; Etheridge, 1970c: 254, 1970d: 231; Hoogmoed & Gruber, 1983: 385; Vanzolini, 1986b: xxi (related to *Lophyrus ochrocollaris*, not *Lophyrus Panthera*); Nascimento et al., 1988: 32.
Plica umbra umbra; Cunha et al., 1985: 27 (corrected in Nascimento et al., 1987: 43).

Material.— **Brazil.** Rio Amazonas: lectotype (♂), RMNH 2899.
ACRE. Rio Branco, Parque Zoobotânico UFAC: 1 ♂, RMNH 26491, 03.i.1990, leg. M.S.Hoogmoed & T.C.S.Avila Pires.
[?] AMAPA. Rio Amapari, Picada do Cinturinha: 1 ♀, MPEG 2470, 24.x.1968, leg. P.F. Buhrnhein.
AMAZONAS. Rio Solimões, Manacapuru: 2 ♂♂, SMF 11196-197. Rio Solimões, Paraná do Jacaré, Canabouca (mouth of Rio Iça): 1 ♂, ZMB 36945, leg. W. Ehrhardt. Rio Tonantins (left side Rio Solimões): 1 ♂, 1 juv, ZMB 30975, ix.1926, leg. W. Ehrhardt. Mouth of Rio Purus, Beruri: 1 ♂, MPEG 2283, iv.1967, leg. M. Golçalves. Rio Solimões, Codajás: 1 ♀, BM 1965.1315, 1964, leg. Guy's Hosp.Exp.Brazil". Rio Juruá, Carauari: 1 ♀, BM 1979.140, 21.viii.1978, leg. Wallace Exp. to Amazonia". Rio Solimões, W of Benjamin Constant: 1 ♀, RMNH 26492, 1 ♂, 1 ♀, MPEG 15936-937, 12.xii.1989; 2 ♂♂, RMNH 26493-494, 1 ♂, MPEG 15947, 13.xii.1989; 1 ♂, MPEG 15999, 19.xii.1989; all leg. M.S.Hoogmoed & T.C.S.de Avila Pires. Rio Javari, Estirão do Equador: 1 ♀, MPEG 1902, vii.1962, leg. J. Hidasi.
PARA. Ilha Mexiana, Fazenda Santana: 3 ♂♂, MPEG 16339, 16342, 16353, 1-14.xii.1992, leg. R. Rodrigues, L.M.P. Henriques, J. Roma & D. Pimentel. Ilha de Marajó, Município de Breves, km 6 road Breves-Anajás: 1 ex., MPEG 14719, 23.xi.1987; 3 ♂♂, MPEG 14725, 14727, 14728, 26.xi.1987; 1 ♂, MPEG 14746, 01.xii.1987; 2 ♂♂, MPEG 14762, 14764, 05.xii.1987; all leg. I.F. Santos, R.J.R. Moraes & S. Ramos. Ilha do Marajó, Município de Breves, km 10 road Breves-Anajás: 1 ♀, MPEG 14788, 10.xii.1987, leg. I.F. Santos & S. Ramos. Augusto Correa, Cacoal: 1 ♂, 1 ♀, MPEG 6050-51, 12.i.1973; 1 ♂, 1 ♀, MPEG 6458-59, 24.v.1973; all leg. O.R. Cunha & F.P. Nascimento; 2 ♂♂, MPEG 9003, 9007, 26.vi.1975, leg. O.R. Cunha & R.S. Pereira. Viseu, km 224 road BR-316 (Pará-Maranhão): 1 ♂, 2 ♀♀, MPEG 5214-16, 30.xi.1971; 1 ♂, MPEG 5796, 20.ix.1972; all leg. O.R. Cunha & F.P. Nascimento. Ananindeua, E.F.B. (Estrada de Ferro Bragança): 1 ♂, ZSMH 93/1960, 02.v.1912, leg. F. Lima. Lower Rio Tocantins: 1 ex., ZFMH 94/1960, x-xi.1912, leg. F. Lima. Rio Tocantins, present reservoir area of hydroeletric dam Tucuruí: 3 ♂♂, MPEG 13371, 13393, 13401, Chiqueirão, 29.iii.1984-11.iv.1984, leg. R.J.R. Moraes. Carajás, Serra Norte: 3 ♂♂, MPEG 12974, 12979, 12980, Manganês do Azul, 17-18.viii.1983; 1 ♂, MPEG 12982, Rio Gelado, 19.viii.1983; all leg. T.C.S. Avila Pires & R.J.R. Moraes. Município de Melgaço, Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S 51°27'11.3"W): 1 ex., MPEG 16406, 27.x.1992; 1 ex., RMNH 26495, 29.x.1992; 1 ex., MPEG 16421, 30.x.1992; 1 ex., RMNH 26496, 04.xi.1992; 1 ♂, MPEG 16460, 09.xi.1992; 1 ex., RMNH 26497, 10.xii.1992; all leg. M.S. Hoogmoed, T.C.S.Avila Pires & R.A.T. Rocha. Lower Rio Xingu, Baía de Souzel, Ilha de Santa Tereza (near Senador José Porfírio): 1 ex., MPEG 13149, 16.xii.1983, leg. T.C.S. Avila Pires & J.M. Rosa.
RONDONIA. Ouro Preto d'Oeste: 1 ♂, MPEG 14495, Reserva Ecológica do INPA, 25.viii.1986, leg. T.C.S. Avila Pires & R.J.R. Moraes; 1 ♂, MPEG 14498, Ig. Santa Helena (line 212), 03.ix.1986, leg. T.C.S. Avila Pires. Km 74 of road BR-364 (Porto Velho-Cuiabá), beginning of road to Areal Pataga, 10 km E of Porto Velho: 1 ♂, RMNH 26498, 01.xii.1985, leg. M.S.Hoogmoed. Jaci-Paraná, km 85-88 of road BR-364 (Porto Velho to Rio Branco): 1 ♂, MPEG 14335, 14.iii.1986, leg. R.J.R. Moraes.
Ecuador. PASTAZA. Pozo Balsaura, 6 km NE (50°) of Shiona, which is 55 km E of Montalvo: 1 ♂, RMNH 26499, 12.viii.1983, leg. M.S. Hoogmoed.
Peru. HUANUCO. Panguana, lower Rio Llullapichis, branch of Rio Pachitea, alt. 260 m: 1 ♀, RMNH 26500, W of village, 09.iii.1983; 1 ♂, RMNH 26501, 12.iii.1983; both leg. M.S. Hoogmoed.
Venezuela. AMAZONAS. Upper Rio Orinoco, La Esmeralda: 1 ♂, MCZ 101748, 03.iii.1968, leg. J.A. Rivero. Upper Cunucunuma River, La Culebra: 1 ♂, MCZ 101749, 05.iii.1968, leg. J.A. Rivero.
In addition to specimens listed above, the MPEG has specimens from the following localities: MARANHAO. Road BR-316 (Pará-Maranhão), Município Santa Inês, São Raimundo. Road BR-316, Nova Vida (25 km from Rio Gurupi). PARA. Ilha de Marajó, Rio Aramá, Vila Nova do Aramá. Viseu,

Fazenda Real. Viseu, Bela Vista. Viseu, Curupati. Road BR-316, Colônia Nova (Gurupi). Km 224 road BR-316. Município Acará, road to Acará (km 16; Igarapé Parajauara). Santa Luzia, Capitão Poço. Ourém, road to Limão Grande, Puraquequara. Peixe-Boi. Bragança, Bom Jesus. Km 23 road to Maracanã. Inhangapi, Arraial do Carmo. Santarém Novo, Trombetinha. Castanhal, Rio Apeú, Boa Vista. Castanhal, Macapazinho. Road to Vigia, Santa Rosa. Road to São Caetano de Odivelas. Santo Antônio do Tauá. Benevides, Pratinha (km 9 road to Açucareira). Belém (Bosque Rodrigues Alves; Utinga). Ilha do Mosqueiro. Vila Nova (Paraiso), km 71 road Tomé-Açu - Paragominas. Road Belém-Brasília, km 75. Rio Moju, Itacuã (near Rio Jambuaçu). Rio Moju, mouth of Rio Jambuaçu, road Malafaite. Rio Tocantins, Mangabeira (below Baião). Rio Tocantins, present reservoir area of hydroeletric dam Tucuruí (2-5 km S of [old] Vila de Jacundá; Igarapé Saúde, between Jacundá and Ilha das Cobras). Road to Cipal, Rondon do Pará. Km 72 road to Marabá (PA-332), c. 22 km before Vila Rondon. Km 135 road PA-332, Sítio Bela Vista. Km 198 road PA-332 (11 km from Rio Tocantins). Rio Araguaia, Município São Raimundo do Araguaia, km 3-4 of a side road of Transamazônica, 7 km from Porto Jarbas Passarinho. Carajás, Serra Norte (Pojuca; surroundings N1; road N1-N5). Road Altamira-Marabá (Transamazônica), left side of Rio Xingu. Road Santarém-Palhão, 35 km from Santarém, near Igarapé Curupira.

Diagnosis.— Vertebral crest from nape to base of tail, relatively prominent on neck, low on posterior part of body; a pair of enlarged conical scales on the posterolateral corners of the interparietal; scales on sides of neck decreasing gradually in size, small ventrolaterally; ventral scales distinctly keeled. For body proportions and scale counts see table 4. Maximum SVL 93 mm in males (MPEG 14495), 90 mm in females (Etheridge, 1970c: 252).

Colour in life in MPEG 15937 (♀): Dorsal surface predominantly green (apple-green [61] to lime-green [159]) when alive, olive-brown when dead (before fixation). A beige (219D) spot on sides of neck, followed by a black collar. A whitish band with dark brown margins from base of hind limbs (posterior aspect) to base of tail. Ventral surface of head light drab (119C) anteriorly, army-brown (219B) posteriorly, gular fold dark orange-yellow. Belly and ventral surface of limbs cinnamon-drab (219C) to beige (219D) (darker on chest and hind limbs). Tail pale sepia (219) and army-brown (219B) on its dorsal surface, fawn colour (25) on its ventral surface. Iris mahogany-

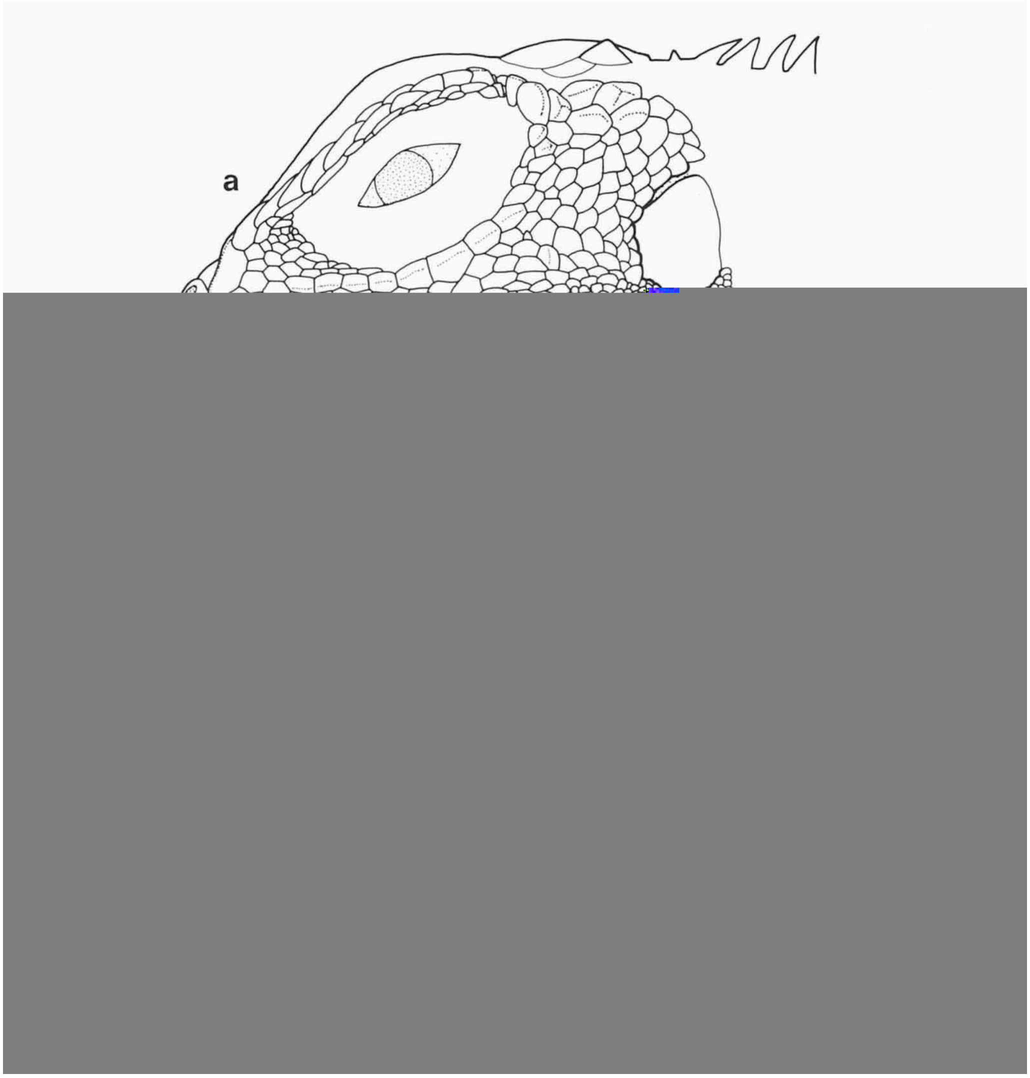


Fig. 54. *Plica umbra ochrocollaris*, MPEG 15936; a, b, c: lateral, dorsal, and ventral views of head.

Distribution (fig. 53).— Amazonian region outside the Guianan area, in Venezuela (Territorio Amazonas), Peru, Ecuador, Bolivia, and Brazil. In Brazil it occurs in the states of Pará, Amazonas, Rondônia and Acre, spread in all Brazilian Amazonia south of Rio Amazonas/Solimões, and north of it in the area west of Rio Negro (a record for the state of Amapá is considered doubtful; see remarks).

Habitat of the species *P. umbra*.— It is a forest dweller, mostly found on thin to medium sized tree trunks (30-40 cm in diameter, according to Vanzolini, 1972; less than 20 cm in diameter in Cuzco Amazonico, Peru, according to Duellman, 1987). Individuals are most commonly found in primary, terra firme forest, but they may also be found in varzea and igapó forests, edge situations, and in secondary vegetation, even in parks with trees inside cities (Belém, Manaus). Both Hoogmoed (1973) and Gasc (1977) observed animals in isolated trees. Among 30 animals first seen on tree trunks, 15 (50.0%) were up to 2 m above the ground, 13 (43.3%) were above 2 m and up to 4 m, and 2 (6.7%) were above 4 m and up to 6 m. Other specimens were found on a vine, 2 m above ground; on a palm stem, 2 m above ground; on a bush, 1.5 m above ground; on partially felled bamboos; on a fence; on a pile of sawn logs; and three specimens were on the ground. Most specimens found not on a tree fled onto one when disturbed. One specimen was collected at night (between 20:30-23:00 h) sleeping on a vertical sapling 3 m above ground. Duellman (1978) reported individuals sleeping horizontally on branches, palm fronds, and bamboo twigs, and one head-up on a tree trunk; most were less than 1.5 m above ground. Gasc (1990) remarked that juveniles are found on fallen tree trunks.

Notes on natural history of the species *P. umbra*.— Individuals were seen active between 08:00-17:00 h. All animals observed where in the shadow, in agreement with the classification of *P. umbra* as a nonheliothermic by Rand & Humphrey (1968). Duellman (1978) reported one lizard sunning at the edge of the forest. Most specimens were seen alone, but MPEG 15936, ♂, and 15937, ♀, were on the same tree trunk; and MPEG 13149 was together with another individual that was not collected. MPEG 12979 and 12980, ♂♂, were also collected on the same tree trunk. MPEG 12979 was first seen on the ground, it then ran toward a stem, went up, and from there jumped toward a large tree trunk, and finally toward the one where it was collected; there it went up to 2-3 m, then up to 5-6 m, and then down again to c. 3 m. MPEG 12980 was seen just after the first was collected, at 5-6 m above the ground on the same tree.

Lizards in breeding conditions were reported from several months (Beebe, 1944b; Hoogmoed, 1973; Dixon & Soini, 1986), indicating a long, if not continuous, breeding season. Clutch size of two eggs was mentioned by Beebe (1944b), Hoogmoed (1973), Duellman (1978), and Dixon & Soini (1986); Rand (1982) reported 2-3 eggs per clutch. Magnusson & Lima (1987) showed evidences that females of *P. umbra* either reuse nest sites, or they nest communally. Dixon & Soini (1986) reported a hatchling of 36 mm SVL, Magnusson & Lima (1987) another of 38 mm SVL.

Food seems to be predominantly ants, but other arthropods may also be ingested (Beebe, 1944b; Hoogmoed, 1973; Duellman, 1978; Gasc, 1981; Martins, 1991). RMNH 26496 was collected on a small tree, 2 m above ground, while it was eating ants.

Hoogmoed (1973) reported *P. umbra* from the stomach of the owl *Ciccaba virgata* (Cassin) and from that of a *Bothrops* snake. Meede (1984) reported as predators mainly snakes like *Pseustes poecilonotus* (Günther) and *Chironius* spec.

Remarks.— Besides differences mentioned in the diagnoses of each subspecies, there are several characteristics that show different trends in each taxon (table 5). Moreover, *P. u. ochrocollaris* commonly shows a contrasting pattern on sides of head and neck, with a wide black band from the lower margin of orbit to labials, which may continue midventrally toward neck; some other radiating lines from orbit; and a wide transverse black band on collar region. Such a pattern is not found in *P. u. umbra*, but in both subspecies specimens with a lighter or less developed variation of it may occur.

Etheridge (1970c) reviewed the genus *Plica*, recognising two distinct groups in *P. umbra*, which he "tentatively" considered as subspecies, since specimens from inter-

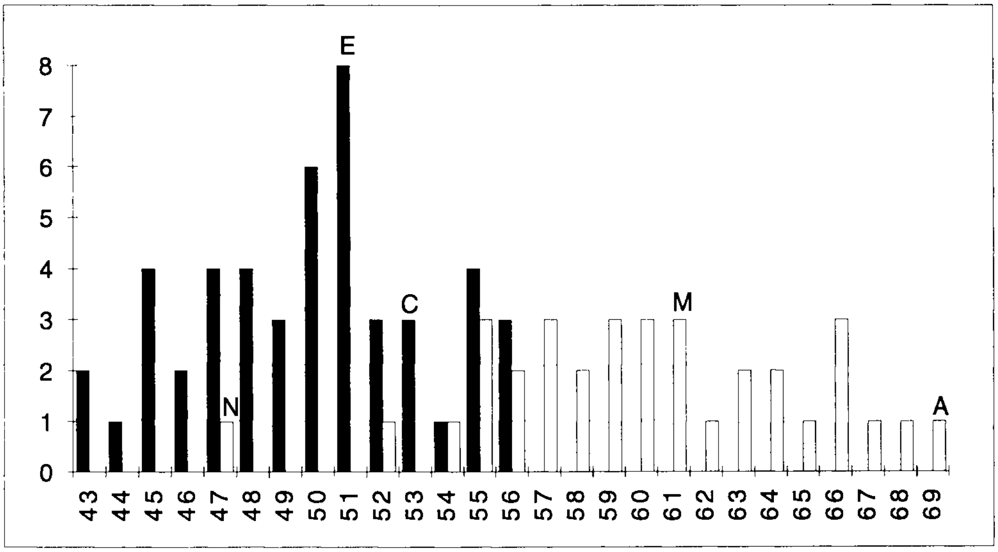
Table 5. Characteristics that show some difference in trend between P. *u. umbra* and P. *u. ochrocollaris:*

	P. *u. umbra*	P. *u. ochrocollaris*
postrostrals	mainly 6 (in 24 out of 34 specimens)	mainly 5-7 (in resp. 17,13,10 out of 42 specimens)
supralabials	mainly 4	4-5
canthals	mainly 1	1-2
supraoculars	5-8, more frequently 6	4-7, more frequently 5
supraciliaries	7-11, more frequently 9	6-10, more frequently 8
preanal plate	scales usually larger centrally than peripherally	scales about homogeneous in size
general appearance	smoother	more spinose
dorsal head scales	less swollen	more swollen

mediate localities were unavailable. Several authors followed Etheridge (1970c), but none presented any evidence in favour or against the subspecific status of the two taxa. The data I have are still inconclusive, but point to a possible contact zone in the area covering the NW of Amazonas state in Brazil and the Territorio Amazonas in Venezuela. There is some indication this may be an area of (limited) intergradation between the two taxa.

Before analyzing the data I have, some clarifications should be made concerning some localities. Etheridge (1970c) considered as P. *u. umbra* only specimens from the Guianas. He identified as P. *u. ochrocollaris* some specimens in areas of Brazil which I consider now as falling within the distribution of P. *u. umbra.* I re-examined some of the specimens from these areas which he studied (AMNH 64859, from Manaus; ZSMH 91/1960, from Faro), and they agreed with the characteristics of P. *u. umbra.* USNM 83567, from Salto do Hua, on the Venezuelan border, is a specimen of *Uranoscodon superciliosus* (according to the identification of R. Crombie, 1972, confirmed by R.P. Reynolds, 1990). Besides, he mentioned from Manacapuru four specimens AMNH 4484, but I was informed that this number is from a snake, thus I suppose there was a mistake in the number. I didn't check the identification of ZSMH 92/1960 from Colonia do Veado, Obidos, Para; I assume here that it is also P. *u. umbra.* A different matter is that related to MPEG 2470. It is registered as coming from Amapa and it has all characteristics of P. *u. ochrocollaris.* I think the presence of this taxon in Amapa is extremely doubtfull, and until any contrary evidence I assume the specimen is mislabelled.

Concerning the area of possible contact zone between the subspecies mentioned above, we have the following specimens: (1) MPEG 1903, from Tapurucuara, Rio Negro; (2) INPA 244, from Lago Amana (close to Rio Japura); (3) MPEG 15214, from Santa Rita, Maraa; (4) SMF 11196-197, both from Manacapuru, Rio Solimoes; (5)4)



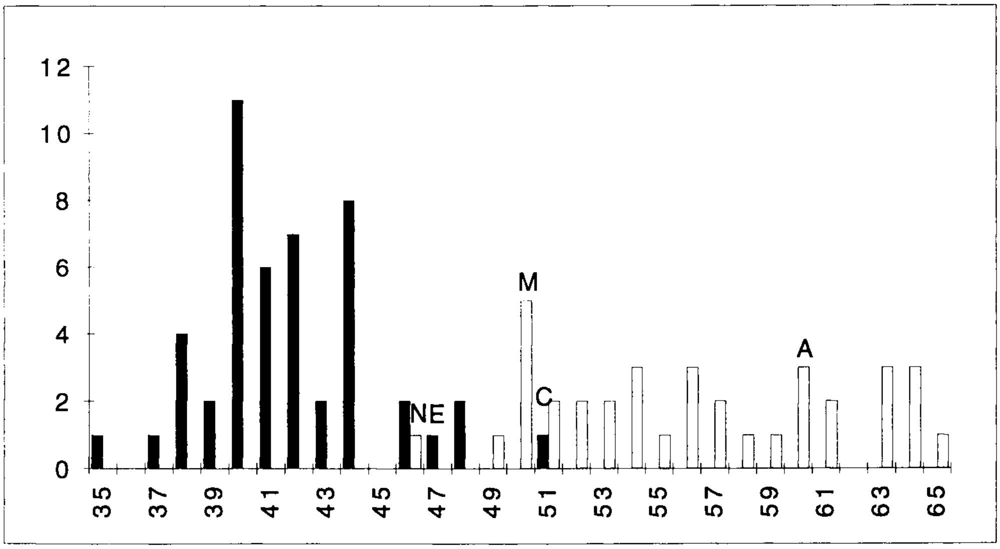


Fig. 55. Comparison of number of scales around midbody (upper graph), and of vertebral scales (lower graph) in *Plica umbra* (X-axis represents number of specimens). Black bars = *P. u. ochrocollaris*. White bars = *P. u. umbra*. The letters stand for: A= INPA 244; C= MCZ 101749; E= MCZ 101748; M= MPEG 15214; N= MPEG 1903 (see text).

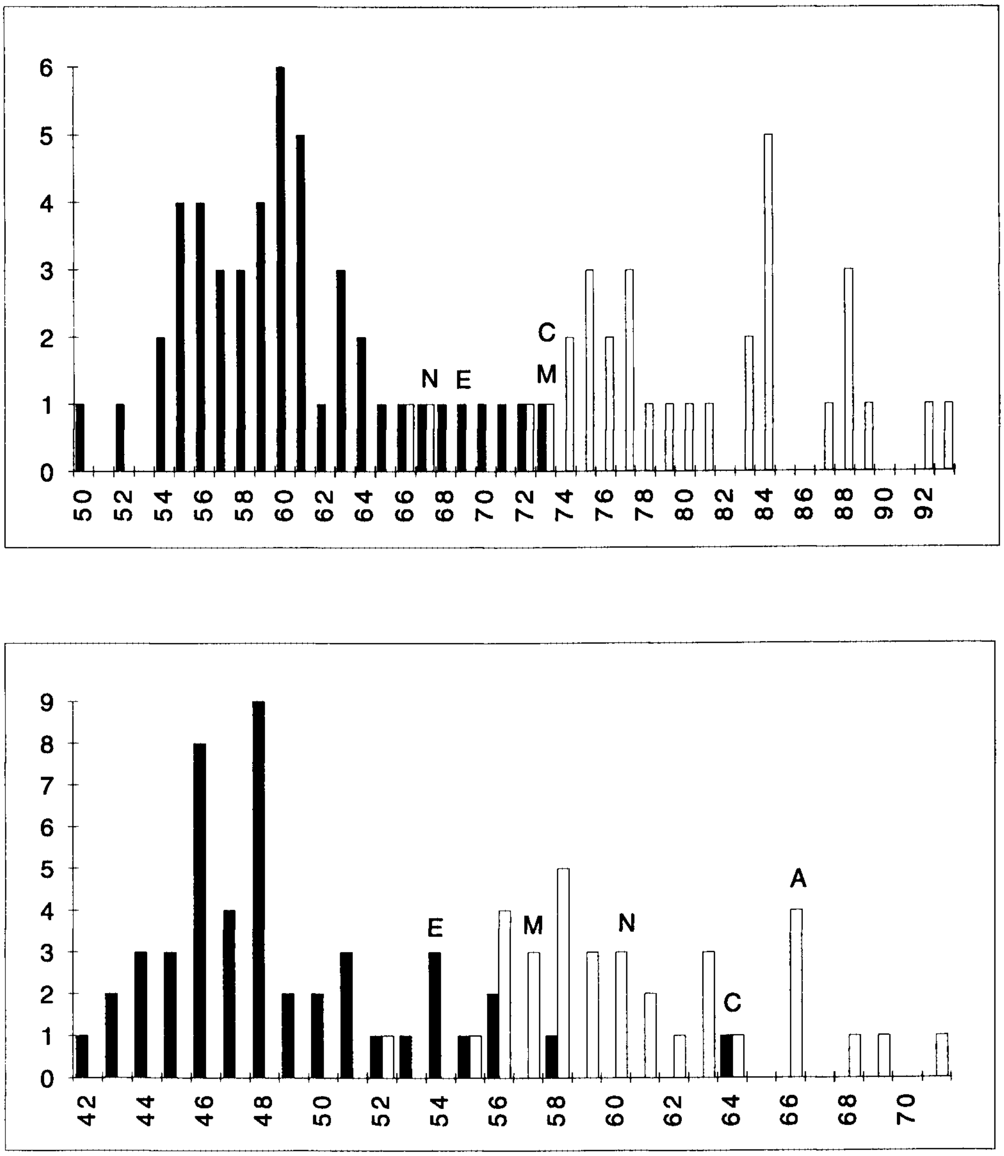


Fig. 56. Comparison of number of paravertebral (upper graph) and ventral (lower graph) scales in *Plica umbra*. For explanation see fig. 55. No count of paravertebral scales is available for INPA 244 ("A").

counts where the two subspecies differ, its counts are in the upper range for *P. u. ochrocollaris* (see figs. 55-56 for this and the following remarks). The specimen from La Culebra is more dubious, with numbers of vertebral and ventral scales above those of other *P. u. ochrocollaris*, and in the range of *P. u. umbra*. The other two counts are in the area of overlap between the ranges of the two subspecies. Regarding the specimens identified as *P. u. umbra*, those from Lago Amanã and Maraã agree well with other specimens of this subspecies, the former with scale counts in the middle/upper part of the range for the subspecies (thus more distinct from *P. u. ochrocollaris*), the latter with lower counts. The specimen from Rio Negro showed numbers of scales [illegible]

paravertebral scales also low, but a specimen from Amapá (MPEG 15050) had a value even lower, and a number of ventral scales in the range of *P. u. umbra*. From the above I conclude that (1) the distribution of the two taxa in the area here discussed suggests the possibility of a contact zone in part of the area; (2) there is no indication of character displacement, which could be expected in the contact zone of two closely related species; (3) the presence of some specimens of each taxon with characteristics that come close to those of the other taxon may indicate some intergradation between them; (4) the presence of specimens which can undoubtedly be attributed to one of the two taxa indicates that the intergradation, if it does occur, is limited, and the two taxa tend to keep their integrity.

Etheridge (1970c) presented a complete list of synonyms.

Etheridge (1970d) presented a key for the subspecies, but it is inverted, so that

Description.— Tropidurid with maximum SVL in males of 122 mm (Hoogmoed, 1973), in females of 95 mm (lectotype, RMNH 2912). Head 0.22-0.26 (0.24 ± 0.01, n= 59) times SVL; 1.1-1.3 (1.25 ± 0.04, n= 59) times as long as wide; 1.2-1.6 (1.38 ± 0.08, n= 59) times as wide as high. Snout round, canthus rostralis posteriorly angulate, anteriorly round. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.40-0.50 (0.44 ± 0.02, n= 50) times SVL, hind limbs 0.59-0.76 (0.68 ± 0.04, n= 44) times, tibia 0.19-0.25 (0.22 ± 0.01, n= 58) times. Tail 1.4-1.7 (1.56 ± 0.09, n= 32) times SVL, distinctly widened at base, distally from slightly compressed to round in cross section, tapering toward tip.

Tongue wide, villose, with round, nicked tip. Anterior teeth conical, posterior teeth tricuspid with lateral cuspids very small.

Rostral pentagonal, two to three times as wide as high, visible from above. Postrostrals 4-8, of which 2-4 dorsally, two laterally (one at each side), and in some specimens they include also the nasals. Scales on snout variable in size, irregularly polygonal, convex, smooth, juxtaposed. Scales across snout between posterior canthals 4-7, mostly 6-7. Nasal large, undivided, medial in relation to canthus rostralis; nostril in its posterior part, directed dorsolaterally. Canthals two, exceptionally one or three. Supraorbital semicircles with 5-11, mostly 8-9, convex, smooth, juxtaposed scales, larger anteriorly. In contact medially and with the interparietal, or sometimes separated from the interparietal by one row of scales. Supraocular region with three, rarely two or four, more or less regular, curved, longitudinal rows of scales, with 5-8 transversely elongate scales in medial row, 3-7 medium-sized scales, about as wide as long, in intermediate row, and 1-8 small scales in lateral row. The most common numbers are, respectively, 6-7, 5-6, and 3-4. Additional small scales anteriorly, and sometimes posteriorly, are present. The region is surrounded by small, longer than wide scales. Supraciliaries 6-8, mostly seven, elongate, anterior ones overlapping posteriorly, one to three (mostly two) posterior ones overlapping anteriorly, plus one scale between them overlapped by the two series. Interparietal very large, slightly convex, wider posteriorly; parietal eye distinct mid-anteriorly. A few enlarged parietal scales, anteriorly in contact with supraorbital semicircle. Occipital region with scales similar to those on nape, with a short transitional zone from the scales adjacent to interparietal. Loreal region with a few irregularly polygonal, flat, smooth scales, plus a row of lorilabials; 2-4, mostly three, scales in a transverse row below posterior canthal. One elongate, keeled, subocular, preceded by one shorter, keeled, preocular, rarely both being fused. Subocular usually separated from supralabials by lorilabials, occasionally they form a short suture. Supralabials 4-6, mostly five, to below centre of eye; between them and commissure of mouth 1-3 elongate scales. Temporal scales approximately rhomboidal or hexagonal, imbricate, slightly keeled. Ear-opening vertically oval, large, anterior margin he 1.025 0.376 T.203 Tw (an)Tj0 511ing.014 Tw (On)Tj0 Tc (e)T105uc -0.

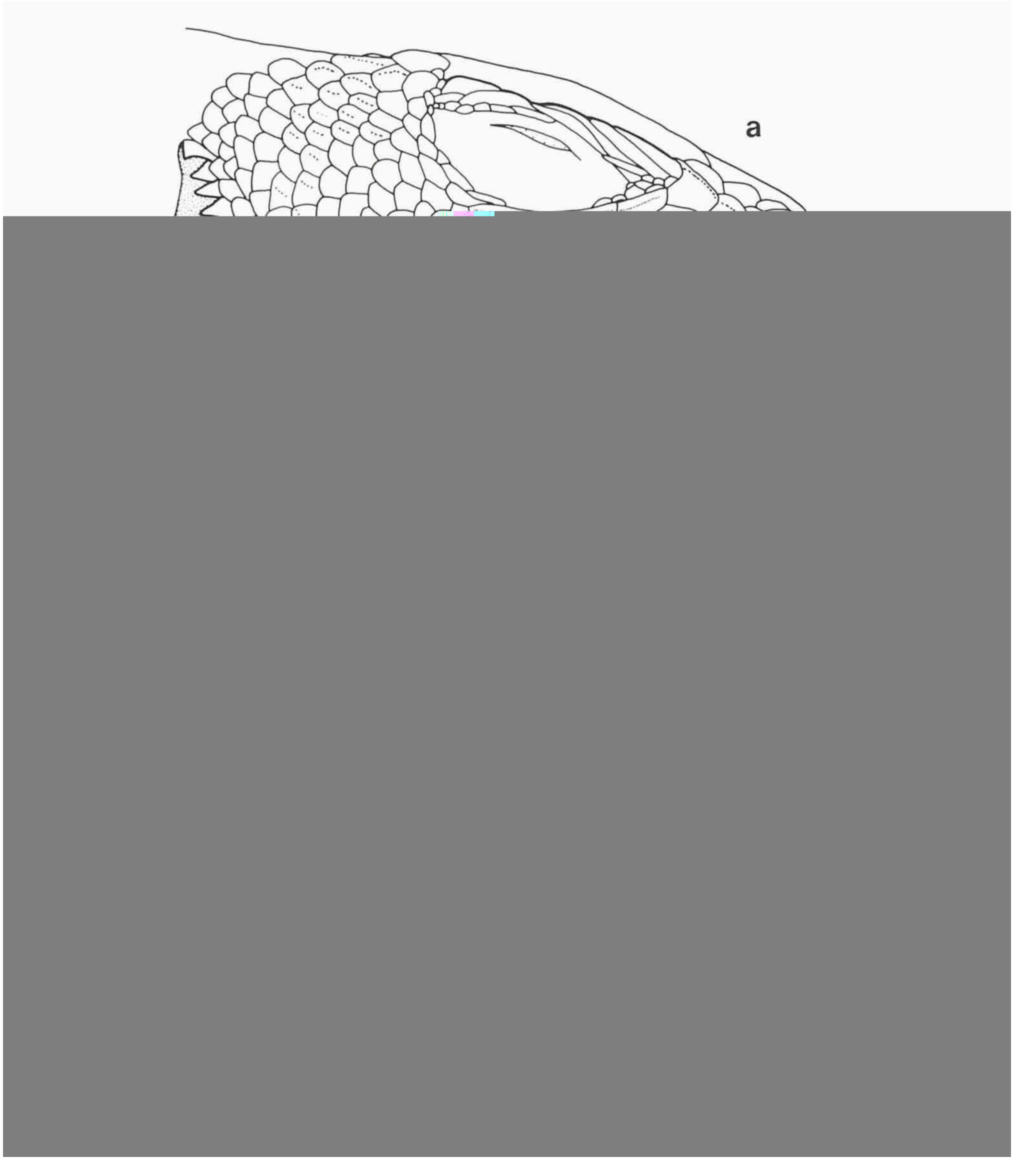


Fig. 57. *Tropidurus hispidus*, MPEG 16156; a, b, c: lateral, dorsal, and ventral views of head.

grade into flat, rhomboidal, imbricate, smooth scales, more elongate toward the sides, in longitudinally oblique rows. Gulars similar to posterior scales on chin, arranged in a combination of oblique and transverse, curved rows. Posterior gulars shortly to distinctly mucronate, some may be keeled.

Scales on nape rhomboidal, flat, imbricate, distinctly keeled and with a long mucro (less developed in juveniles). Sides of neck with similar but smaller scales. An oblique, relatively deep, mite pocket, covered by granules, present under oblique neck fold. Antehumeral fold distinct.

Dorsals and scales on flanks similar to those on nape, except for the mucro which is distinct but less developed; in oblique rows. Keels approximately aligned, forming several low ridges along body, convergent toward the vertebral line. Sixty-nine to 97 (77.4 ± 6.3, n= 59) middorsal scales between nape and posterior margin of hind limbs. Ventrals smaller than dorsals, rhomboidal, imbricate, smooth, in 55-76 (63.2 ± 5.1, n= 59) transverse rows from anterior margin of forelimbs to that of hind limbs. Transition between ventral and lateral scales gradual. Scales around midbody 59-87 (71.8 ± 6.8, n= 59). A well developed mite pocket is present under the axil, covered by granules and bordered anteriorly and posteriorly by distinctly larger scales. No mite pocket or granular area in groin. Scales on preanal plate similar to ventrals, though blunter (and black) in adult males. No clear distinction was observed between scale counts in males and females.

Tail with rhomboidal, imbricate, keeled and distinctly to strongly mucronate scales dorsally. A middorsal row of scales is distinct in its proximal half. On the sides the scales form oblique rows. Underside of tail, near the base, with rhomboidal, imbricate, smooth scales. Distally scales bluntly lanceolate, keeled and slightly mucronate, in longitudinal rows. Scales form transverse rows around tail. There is no division in verticils.

[illegible]

aspect of hind limbs, and in some specimens on posterior aspect of forearms. Ventrally the scales become smooth and not or shortly mucronate, blunter in the black areas under the thighs in adult males. Subdigital lamellae single, distinctly keeled and mucronate medially; one or two lateral, weaker keels present or absent; 17-23 (19.4 ± 1.4, n= 114, 59 specimens) under fourth finger, 24-32 (26.4 ± 1.6, n= 112, 59 specimens) under fourth toe.

Colour in life, as described by Hoogmoed (1973) and Donnely & Myers (1991), dorsally grey or dark brown, marked with black, ventrally bronzy pink to white. A black, complete or incomplete collar. Throat mottled or completely black in adults, bluish with light spots in juveniles (at least in individuals from Suriname). In adult males preanal plate and ventral surface of thighs black.

In preservative, general dorsal colour dark brown or olive-brown, greyish or plumbeous in areas where the scales lost the external horny layer. A black collar, bordered posteriorly by a light line, links the two antehumeral folds, in some specimens leaving a short vertebral gap. A series of transverse, continuous or spotted, dark bands, posteriorly bordered by a dotted light line, and mostly interrupted along the vertebral line, is conspicuous along the back in juveniles, rather inconspicuous in adults. Limbs with small, light and dark spots in juveniles, with blurred, variably conspicuous spots, in adults. A whitish line with black borders may be present along

[illegible]

that the species is a habitat generalist. In northern South America rocky areas seem to be its preferred habitat. MPEG 16179, from Maranhao, was collected in a **iDaba**^u-al' (open formation with a predominance of the palm *Orbignya phalerata* Mart.). In Roraima, O'Shea (1989) found the species on rocks along the river's edge, on a deserted house in a field station, and on wooden bridges along a road. In southern French Guiana it is mentioned to occur on granitic inselbergs (Gasc, 1976), and in Suriname both in sandy savannas, on rockslates and on boulders (Hoogmoed, 1973). Donnely & Myers (1991) reported it from Cerro Guaiquinima, Venezuela, on rocks in open savanna and along stream beds, while between Maracay and Choroni Pass it was found on stone walls along the road (Test et al, 1966). Donoso-Barros (1968) reported it from Venezuela in "arid zone, occasionally entering into the forest whenever there are no *Plica"*. In Colombia the species is again found in rocky areas (Medem, 1969).

Notes on natural history.— A diurnal, heliothermic lizard, frequently seen basking. Donnely & Myers (1991) noted that body temperature in two individuals, during midday, were distinctly higher than the substrate temperature. T. *hispidus,* as other congeners, is usually abundant, and not difficult to notice, in places where it occurs.

Olson (1993) reported on an individual (as T. *torquatus)* which fled into the water, swimming in a "salamander-style" for two or three meters.

Food consists of a variety of arthropods, among which Hymenoptera, Orthoptera, Coleoptera, and Lepidoptera seem to form an important part of the diet (Hoogmoed, 1973).

Cunha & Nascimento (1994) reported *Chironius multiventris* Schmidt & Walker and *Oxyrhopus melanogenys orientalis* Cunha & Nascimento as preying upon *Tropidurus* (species not specified).

Reproduction was studied in a population from Venezuela (Prieto et al., 1976). A significantly higher number of females, both juveniles and adults, was observed. Reproduction was cyclical, occurring mainly during the rainy season. Females apparently were able to reproduce at least threen

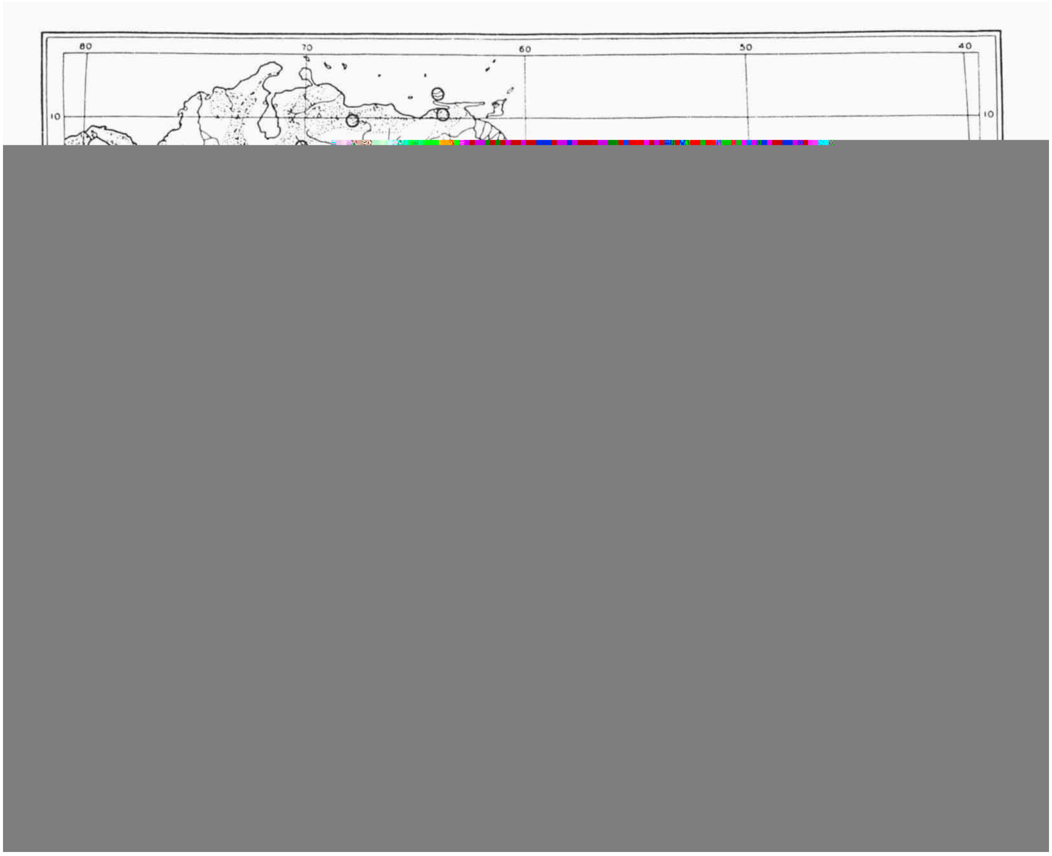


Fig. 58. Distribution of *Tropidurus hispidus* (circles), *T. insulanus* (square), and *T. oreadicus* (stars) in Amazonia. Asterisk (Macapazinho, Castanhal, Pará) = *T. hispidus* and *T. oreadicus* in sympatry. Closed symbols = material studied; open symbols = data from literature (Donoso-Barros, 1968; Test et al., 1966; Medem, 1969; Gasc, 1976; Rodrigues, 1987; Donnely & Myers, 1991). The apparently isolated locality of *T. oreadicus* in Porto Velho, Rondônia, is because most of the distribution area is not shown in the map. For a complete distribution of *T. hispidus* and *T. oreadicus* south of the Amazon see Rodrigues (1987).

savanna, on the border of Suriname and Brazil, and Gasc (1981) reported its absence on Mont Saint-Marcel, upper Oyapock, and on a large inselberg between the Comté and Arataye river basins, both in French Guiana.

Remarks.— Rodrigues (1987) made a revision of the *Tropidurus torquatus* group. Although the emphasis of his analysis was with specimens from south of the Amazon river, he did examine specimens from north of it. I here follow his conclusions, both in relation to this species and to the following two, although more studies are still necessary for further clarification of the group, especially in relation to the more widespread species, as *T. hispidus* and *T. oreadicus*. For identification of species Rodrigues (1987) primarily used the presence or absence, and position, of mite pockets, and these are indeed the only characteristics that separate the three species here studied. Other characteristics listed by him either do not separate the species here involved, or the differences are very subtle, and variable to a certain extent within a species. In western Maranhão and eastern Pará *T. hispidus* and *T. oreadicus* come in close contact, and in some cases it seems doubtfull whether the presence of an axillary pocket versus the presence of just a fold with small but not granular scales would represent a distiction between two distinct taxa. The possibility of genetic interaction between these two species in the contact area should be investigated. Moreover, as already shown by Rodrigues (1987), geographical variation exists within each of these widespread species, and they may turn out to consist of more than one taxon.

With reference to *T. hispidus*, Rodrigues (1987) observed a higher number of scales, especially of dorsals and scales at midbody, in the lizards from north of the Amazon in relation to those from the south. The material studied here corroborates these results: 27 specimens from Maranhão and eastern Pará have 59-74 (66.8 ± 4.2) scales at midbody, 69-81 (74.7 ± 3.7) dorsals, and 55-66 (59.6 ± 3.5) ventrals; in 32 specimens from north of the Amazon these counts are, respectively, 69-87 (76.0 ± 5.6), 71-97 (79.7 ± 7.1), and 58-76 (66.1 ± 4.4). Besides such differences, southern and northern populations are rather similar in their external characteristics.

Some variation among the material from north of the Amazon is also observed: dorsals range from 71 to 87 in specimens from Roraima, Guyana and Venezuela, but specimens from Suriname have 85-97 dorsals; ventrals range from 55 to 72 in all specimens, except the only one from Guyana, which has 76. These observations are anecdotal, and need confirmation, but considering that these populations inhabit mostly isolated enclaves of open vegetation, the existence of geographical variability could be expected.

Until Rodrigues (1987) the concept of the nominal species *T. torquatus* and *T. hispidus* has been very confused, and both names have been applied to *T. hispidus* and *T. oreadicus* as considered here. In the synonymy of these two species citations are mainly based on reference to localities, e.g., if material from Belém is mentioned, I consider it as being *T. oreadicus*, reference to the Guianas indicates *T. hispidus*, and so on. Reference to the state of Pará with no further specification may represent any of the two species, or both.

Tropidurus insulanus Rodrigues, 1987
(figs. 58, 59)

Tropidurus torquatus hispidus; Cunha, 1961: 76 (part).
Tropidurus insulanus Rodrigues, 1987: 181 (holotype MZUSP 6742, type-locality: Cachimbo, Pará, Brasil); Frost, 1992: 51.

Material.— **Brazil.** PARA. Serra do Cachimbo: 2 ♂♂, 1 ♀, MPEG 583-85, xi.1958; 1 ♂, MPEG 1469; 2 ♀♀, MPEG 152, 1228 (both labeled as from Goiás: Goiânia, respectively iv.1958 and 1960, but most probably wrong); all leg. J. Hidasi.

Diagnosis.— *Tropidurus* with an oblique, elongate, deep mite pocket in neck. A well developed mite pocket present under, and a short distance behind, the axil; scales anterior to pocket distinctly smaller than those posterior to it. No mite pocket in groin.

Description.— Tropidurid with maximum SVL, among material studied, of 86 mm in males, 75 mm in females. Head 0.23-0.25 (0.24 ± 0.01, n= 5) times SVL, 1.2-1.3 (1.28 ± 0.06, n= 5) times as long as wide, 1.2-1.3 (1.28 ± 0.03, n= 5) times as wide as high. Snout round, canthus rostralis posteriorly angulate, anteriorly round. Neck slightly narrower than head and body. Body cylindrical, slightly depressed. Limbs well developed, forelimbs 0.4-0.5 (0.44 ± 0.03, n= 5) times SVL, hind limbs 0.6-0.7 (0.68 ± 0.02, n= 5), tibia 0.20-0.23 (0.21 ± 0.01, n= 6) times. Tail 1.4-1.5 (n= 3) times SVL, distinctly widened at base, distally round in cross section, tapering toward tip.

Tongue wide, villose, with round, nicked tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral roughly semicircular or pentagonal, just visible from above. Postrostrals 4-6, in four specimens including the nasals, in one specimen not. Scales on snout variable in size, irregularly polygonal, convex, smooth, juxtaposed. Scales across the snout between posterior canthals 5-7. Nasal relatively large, undivided, medial in position in relation to canthus rostralis; nostril posteriorly, directed dorsolaterally. Canthals two, occasionally one. Supraocular semicircle with 6-10, mostly 8-9, convex, smooth, juxtaposed scales, larger toward the extremities. In contact medially and with the interparietal, or separated from interparietal by one row of scales. Supraocular region with three more or less regular, curved, longitudinal rows of scales, with 5-7 transversely elongate scales in medial row, 4-6 narrower scales in intermediate row, and 1-5 small scales in lateral row. The most common numbers are, respectively, 6, 5 and 3-5. Additional small scales are present anteriorly, and the whole region is surrounded by small scales which are longer than wide. Supraciliaries 6-9, mostly 7, elongate, anterior ones overlapping posteriorly, two or three posterior ones overlapping anteriorly, plus one scale between them overlapped by the two series. Interparietal very large, slightly convex, wider posteriorly; parietal eye distinct mid-anteriorly. A few enlarged parietal scales, anteriorly in contact with the supraorbital semicircle. Occipital region with scales similar to those on nape, with a short transitional zone from scales adjacent to interparietal. Loreal region with a few irregularly polygonal, flat, smooth scales, plus a row of lorilabials; 3-4 scales in a transverse row below posterior canthal. One elongate, keeled, subocular, preceded by one shorter, keeled, preocular, in some specimens the two scales fused. Four supralabials to below centre of eye; between them and commissure of mouth a few scales, of which the anterior one may be larger. Temporal scales approximately rhomboidal or hexagonal, imbricate, most with a short, posterior keel. Ear-opening vertically oval, large, anterior margin with a fringe of slightly prominent scales, posterior margin smooth. Tympanum recessed in a relatively short auditory meatus.

Mental relatively large, pentagonal, about as wide as deep. Postmentals three, lateral ones large, each starting a short row of chinshields, median postmental small. Infralabials five, last below or starting below centre of eye; between them and commissure of mouth 2-3 scales, of which first may be larger. Scales on chin anteriorly irregular, subimbricate, slightly convex, posteriorly imbricate, rhomboidal, flat, smooth, in longitudinally oblique rows. Laterally scales slightly more elongate. Gulars similar to posterior scales on chin, posteriorly they may be mucronate (especially toward sides).

Scales on nape rhomboidal, flat, imbricate, distinctly keeled and mucronate. At the sides of neck scales gradually decrease in size toward ventral region. An oblique,

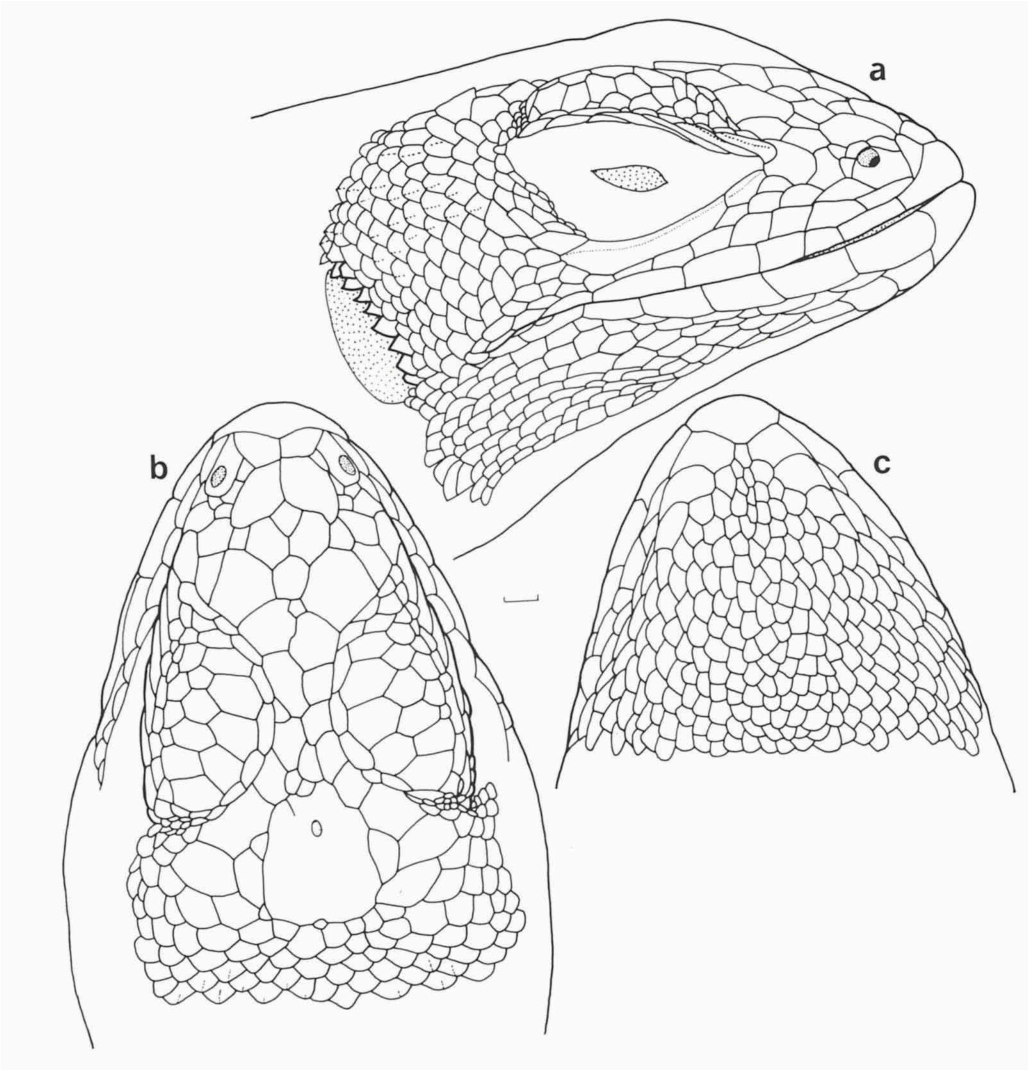


Fig. 59. *Tropdidurus insulanus*, MPEG 1469; a, b, c: lateral, dorsal, and ventral views of head.

elongate, deep mite pocket, covered by granules, present under oblique neck fold. Antehumeral fold distinct.

Dorsals and scales on flanks similar to those on nape, except that the mucro slightly decreases in size posteriad; in oblique rows. Keels approximately aligned, forming several low, more or less conspicuous, ridges along body, convergent toward the vertebral line. Males with 74-78 (n= 3) middorsal scales from nape to posterior margin of hind limbs, females with 80-86 (n= 3). Ventrals smaller than dorsals, rhomboidal, imbricate, smooth, in 61-71 (66.6 ± 3.8, n= 5) transverse rows from anterior margin of forelimbs to that of hind limbs. Transition between ventral and lateral scales gradual. Scales around midbody 64-73 (n= 3) in males, 75-77 (n= 2) in females. A well developed mite pocket, covered by granules, is present under, and a short distance behind, the axil; the area between the pocket and the axil is covered by scales distinctly smaller than those posterior to the pocket. No mite pocket or granular area in groin. Scales on preanal plate similar to ventrals.

Tail with rhomboidal, imbricate, distinctly keeled and mucronate scales dorsally. A middorsal row of scales is distinct on its proximal half. On the sides the scales form oblique rows. Ventrally, near the base, scales rhomboid, imbricate, smooth, not or shortly mucronate. Distally they become bluntly lanceolate, slightly keeled and shortly mucronate, in longitudinal rows. The scales form transverse rows around the tail. No division in verticils is observed.

Scales on limbs mostly similar to dorsals, mucro better developed on hind limbs. Ventrally the scales become smooth and not mucronate. Subdigital lamellae single, distinctly keeled and mucronate medially; one or two lateral, weaker keels may be present; 18-21 (19.3 ± 1.1, n= 10, 5 specimens) lamellae under fourth finger, 24-28 (26.1 ± 1.7, n= 10, 6 specimens) under fourth toe.

No description of colour in life is available.

According to Rodrigues (1987), general dorsal colour in preservative dark tan with irregular yellow spots. Sides of neck dark tan punctuated with yellow. A black semicollar is present, dorsally complete or not, bordered by a narrow yellow band. Throat posteriorly black, anteriorly dark tan with yellow dots. Body and tail ventrally yellowish, variably blurred with dark tan. Adult males with black areas on ventral aspect of thighs and on preanal plate, never on belly. Colour pattern not well preserved in the specimens studied, but in general it agrees with the above description.

Habitat.- No direct observation on habitat of *T. insulanus* is available. Serra do Cachimbo, where it occurs, has an open vegetation, growing on sand, identified by Lleras & Kirkbride (1978) as a type of "campina"; the altitude varies between 380-570 m. It is surrounded by Amazonian forest, though close to its southern limit.

Distribution (fig. 58).— Known only from Serra do Cachimbo, southern Pará.

Remarks.— MPEG 152 and 1228 are labelled as coming from Goiânia, Goiás, which is most probably wrong. The collector, José Hidasi, has also collected in Serra do Cachimbo, and more of his material is known to be mislabelled. Another specimen also collected by J. Hidasi, MPEG 586, has as original locality Serra do Cachimbo, but it represents *T. itambere* Rodrigues, 1987. This is also most probably a mistake.

For general remarks about the genus, see under *T. hispidus*.

Tropidurus oreadicus Rodrigues,1987
(figs. 58, 60, 252)

Tropidurus oreadicus Rodrigues, 1987: 188 (holotype MZUSP 9465, type-locality: Buritis, Minas Gerais, Brasil); Rocha & Bergallo, 1990: 263; Vitt, 1993: 2371.
Tropidurus torquatus; Goeldi, 1902: 514, 518 (part); Rand & Rand, 1966: 1; Rand & Humphrey, 1968: 4; Müller, 1969: 120 (probably); Crump, 1971: 20; Vanzolini, 1972: 99 (part).
Tropidurus hispidus; Müller, 1912: 16; Cott, 1926: 1160.
Tropidurus torquatus hispidus; Amaral, 1949: 110 (part); Cunha, 1961: 76 (part).
Tropidurus torquatus torquatus; Cunha, 1961: 74 (part).
Tropidurus grupo *torquatus-hispidus*; Cunha et al., 1985: 28.
Tropidurus grupo *torquatus* sp. A; Nascimento et al., 1988: 32.
Tropidurus gr. *torquatus*; Nascimento et al., 1991: 33 (probably).

Material.— **Brazil.** PARA. Ananindeua, Seminário Pio X: 1 ♀, MPEG 4555, iii.1971. Belém, park of Museu P.E. Goeldi: 1 ♂, MPEG 21, 25.ii.1958; 1 ♀, MPEG 24, 03.iii.1956; 1 ♂, MPEG 1995, 20.iv.1966, leg. F.C. Novaes. Belém, IPEAN: 2 ♀♀, MPEG 10266-267, 13.xii.1974; 4 ♂♂, 1 ♀, MPEG 10270-273, 10275, 15.xii.1974; all leg. Hassinger. Rio Tocantins, reservoir area of hydroeletric dam Tucuruí: 2 ♂♂, 1 ♀, MPEG 13382, 13384-385, island in front of igarapé São Miguel, 06.iv.1984, leg. R.J.R. Moraes; 2 ♂♂, 2 ♀♀, MPEG 13451-54, 08.v.1984; 1 ♂, 1 ♀, MPEG 13466-467, 12.v.1984; all 2-3 km S of Jacundá, leg. T.C.S. Avila Pires & I.J. Lopes; 1 ♂, MPEG 13502, 15.v.1984, c. 3 km S of Jacundá, leg. T.C.S. Avila Pires, I.J. Lopes & R. Santana; 1 ♂, 2 ♀♀, MPEG 13792-794, Remansão, 24.vii.1984, leg. R.J.R. Moraes & I.J. Lopes; 1 ♂, MPEG 13795, Ilha Tocantins, 25.vii.1984, leg. L.C. Bruno. Carajás, Serra Norte: 3 ♂♂, 1 ♀, MPEG 13082, 13087, 13089-090, N-1, 15.xi.1983, leg. F.P. Nascimento, T.C.S. Avila Pires & R. Bittencourt N.; 7 ♂♂, 3 ♀♀, MPEG 13246-255, N-1, 14.iii.1984, leg. T.C.S. Avila Pires, M.I.S. Assunção, J.C.S. Pinto & L.P.S. Portugal; 2 ♂♂, 2 ♀♀, MPEG 13689-692, N-1, 20.vii.1984; 1 ♀, MPEG 13712, limits N-4, igarapé do Fogo, 25.vii.1984; all five leg. T.C.S. Avila Pires, E. Faria & M.G.M. Nery; 1 ♂, 1 ♀, MPEG 13766-767, N-3, 05.viii.1984, leg. T.C.S. Avila Pires & J.C.S. Pinto; 1 ♂, 1 ♀, MPEG 14044-045, road N1-Caldeirão, 15.ii.1985, leg. F.P. Nascimento & R. Bittencourt N.; 1 ♂, MPEG 14141, N-1, 08.ix.1985, leg. R. Bittencourt N. & Walter; 1 ♀, MPEG 14196, N-1, 21.ix.1985, leg. F.P. Nascimento & M.G.M. Nery; 2 ♂♂, 1 ♀, MPEG 14557-559, N-1, 03.xi.1986, leg. T.C.S. Avila Pires & M.G.M. Nery.
RONDONIA. Porto Velho, 5° BEC, Projeto Rondon: 1 ♂, 2 ♀♀, MPEG 13866-868, 22.v.1984, leg. M. Zanuto.
In addition to specimens listed above, the MPEG has specimens from the following localities: MARANHAO. Road BR-226, Aldeia Sapucaia (reserve of Guajajara Indians), c. 60 km from Barra do Corda. PARA. Vigia, Santa Rosa. Benevides, Genipaúba, Fazenda Morelândia. Peixe-Boi. Santo Antônio do Tauá. Castanhal, Rio Apeú (Macapazinho, Boa Vista). Capanema. Rio Tocantins (left bank), Mangabeira. Rio Tocantins (right bank), Muru (below hydroeletric plant of Tucuruí).

Diagnosis.— *Tropidurus* with an oblique, deep mite pocket in neck. No mite pockets under the axil or in groin (areas covered by small, but distinct, non-granular scales).

Description.— Tropidurid with maximum SVL in males of 104 mm (MPEG 1995), in females of 85 mm (MPEG 13384, 13867). Head 0.22-0.25 (0.24 ± 0.01, n= 40) times SVL, 1.1-1.4 (1.26 ± 0.07, n= 40) times as long as wide, 1.2-1.5 (1.37 ± 0.06, n= 40) times as wide as high. Snout round, canthus rostralis posteriorly angulate, anteriorly round. Neck slightly narrower than head, slightly narrower than, to as wide as, anterior part of body. Body cylindrical, slightly depressed. Limbs well developed, forelimbs 0.41-0.49 (0.45 ± 0.02, n= 33) times SVL, hind limbs 0.61-0.86 (0.70 ± 0.04, n= 34) times, tibia 0.20-0.24 (0.22 ± 0.01, n= 40) times. Tail 1.2-1.8 (1.50 ± 0.14, n= 22) times SVL, distinctly widened at base, distally from slightly compressed to round in cross section, tapering toward tip.

Tongue wide, villose, with round, nicked tip. Anterior teeth conical, posterior teeth tricuspid with small lateral cuspids.

Rostral triangular or pentagonal, two to three times as wide as high, hardly or well visible from above. Postrostrals 4-10, mostly six, usually including nasals and a scale lateral to each nasal. Scales on snout variable in size, irregularly polygonal, slightly convex, smooth, juxtaposed. Scales across snout between posterior canthals 4-8, mostly 6-7. Nasal large, undivided, medial in position in relation to canthus rostralis; nostril posteriorly, directed dorsolaterally. Canthals two, occasionally one or three. Supraorbital semicircle with 7-10, mostly 8-9, convex, smooth, juxtaposed scales, larger anteriorly. In contact medially and with the interparietal, or separated from the interparietal by one row of scales. Supraocular region with three, occasion-

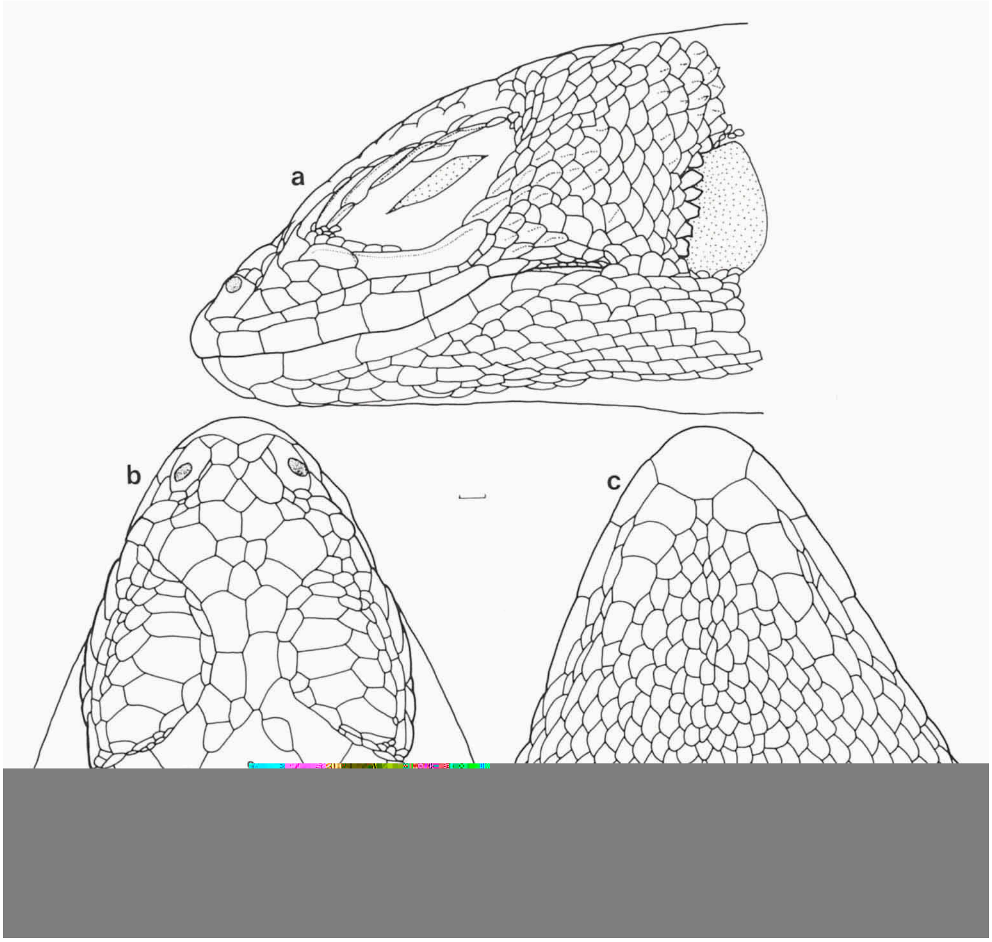


Fig. 60. *Tropidurus oreadicus*, MPEG 13795; a, b, c: lateral, dorsal and ventral views of head.

ally four, more or less regular, curved, longitudinal rows of scales, with 5-8 transversely elongate scales in medial row, 4-7 medium-sized scales, about as wide as long, in intermediate row, and 1-6 small scales in lateral row. Most common numbers are, respectively, 6-7, 5-6, and four. Additional small scales are present anteriorly, and the whole region is surrounded by small scales, longer than wide. Supraciliaries 6-9, mostly seven, elongate, anterior ones overlapping posteriorly, one to three (mostly two) posterior ones overlapping anteriorly, plus one scale between them overlapped by the two series. Interparietal very large, slightly convex, wider posteriorly; parietal eye distinct mid-anteriorly. Parietal scales irregular, medium-sized to relatively large. Occipital region with scales similar to those on nape, with a short transitional zone to the scales adjacent to interparietal. Loreal region with a few irregularly polygonal, flat, smooth scales, plus a row of lorilabials; 2-4, mostly three, scales in a transverse row below posterior canthal. One elongate, keeled, subocular, preceded by one, rarely two, shorter, keeled, preocular(s). Occasionally preocular and subocular are fused. Subocular either in narrow contact with supralabials, or separated from them by lorilabials. Supralabials 3-6, mostly 4-5, to below centre of eye; between them and commissure of mouth 1-3 elongate scales. Temporal scales approximately rhomboidal or hexagonal, imbricate, smooth or partially with a short, posterior keel. Ear-opening vertically oval, large, anterior margin with a fringe of slightly prominent scales, posterior margin smooth. Tympanum recessed in a relatively short auditory meatus.

surface of tail was deep orange, in two other males and one female it was pale orange, and in remaining three specimens (including the smallest male and female, plus one female) it was dirty-white. An adult male observed in the campus of MPEG, in Belém (not collected) was predominantly olive-brown (28) dorsally, with lighter and darker spots, and a pale flesh colour (5) tinge on nape and proximal part of tail dorsolaterally; chin laterally and belly pale flesh colour, gular area olive-brown; posterior part of lips and middle part of temporal area light sky blue (168D); escutcheon area on thighs and preanal plate orange-yellow (18), with a few scales peripherally to escutcheon area on thighs dark grey.

In preservative, general dorsal colour dark olive-brown or dark greyish-brown, bluish-grey in areas where the scales lost their external horny layer. A black collar, bordered posteriorly, and sometimes anteriorly, by a light line, links the two antehumeral folds; middorsally it is usually paler, or totally interrupted. Irregular, light and dark spots scattered along back, limbs, and in some specimens on part of tail. Ventral surface varies from predominantly cream with only gular region greyish-brown, to completely greyish-brown, darker on gular region. Intermediate stages also occur, with chest and belly, limbs and tail progressively darkening. Adult females and juveniles tend to be lighter, adult males darker. Some specimens with light spots on a dark chest. Preanal plate and a wide band along ventral aspect of thighs black in adult males.

Habitat.— As *T. hispidus*, it occurs in a variety of areas with savanna-like vegetation. In Belém, it is found in areas of open vegetation with isolated trees, and also in the areas of the park of MPEG and the Bosque Rodrigues Alves, where the trees are closer together but still there are plenty of open areas. Individuals are usually seen on tree trunks, and in some places on walls and fences. Most commonly they are 1-2 m above the ground, but they may reach heights of 4-5 m. They also come frequently

Table 6. Comparison between number of middorsal scales (DORS), of midventrals (VENTR), and of scales around midbody (SAB) in specimens of *T. oreadicus* from Pará (18 ♂♂, 16 ♀♀) and from Rondônia (1 ♂, 2 ♀♀).

	Pará	Rondônia
DORS, ♂♂	67-81 (73.3 ± 3.3)	84
DORS, ♀♀	71-82 (77.0 ± 2.9)	89/93
VENTR, ♂♂	53-69 (60.9 ± 4.7)	72
VENTR, ♀♀	56-70 (62.9 ± 4.0)	72/74
SAB, ♂♂	62-74 (68.8 ± 3.4)	78
SAB, ♀♀	70-81 (75.3 ± 3.4)	84/86

gallo, 1990). Flight distance was also studied by Rocha & Bergallo (1990), and a negative correlation with body temperature was observed.

Adult males show some territoriality, and it is not rare to see one male chasing away another male. Head bobbing to another male, or to someone that gets closer, is also a characteristic behaviour of these lizards. Male and female may be seen together on the same perch. Rand & Rand (1966) and Rand & Humphrey (1968) reported up to three females and several juveniles associated with one adult male.

Food consists of a variety of arthropods. In 71 stomachs examined of animals from Carajás, Hymenoptera (especially ants) were present in 80% of the stomachs, Coleoptera in 55%, Araneae in 38%, Isoptera in 31%, insect larvae (mainly Lepidoptera) in 27%, and Orthoptera in 22%. Other items included, besides insects, Chilopoda (in six stomachs) and Diplopoda (one). Vegetable matter was found in five stomachs (Avila-Pires & Pimentel, unpublished). Rand & Rand (1966) described the foraging behaviour in this species.

Cunha & Nascimento (1994) reported *Chironius multiventris* Schmidt & Walker and *Oxyrhopus melanogenys orientalis* Cunha & Nascimento as preying upon *Tropidurus* (species not specified).

Reproduction seems to follow an annual cycle. In Carajás, juveniles predominate in March (rainy season), during May there are individuals of all sizes, with predominance of individuals of intermediate sizes, and in September-November only adult or subadult specimens are found (Avila Pires & Pimentel, unpublished).

See also Vitt (1993) for ecological and life-history data on a population of *T. oreadicus* in the Rio Xingu, Pará (as well as on three populations of *Tropidurus* sp(p). in Rondônia).

Distribution (fig. 58).— Brasil, in the cerrados of Mato Grosso, Mato Grosso do Sul, Minas Gerais, Goiás, and Maranhão. Along the lower Tocantins river until Belém (Pará). Some enclaves of open vegetation in the Amazonian region south of the Amazon (e.g., in Serra dos Carajás, southern Pará). Rondônia.

Remarks.— Rodrigues (1987: 190) stated that populations from Porto Velho (Rondônia) and other enclaves of open formation south of Rio Amazonas should provisorily be considered as *T. oreadicus*, implying that they might be a different species. Among the material studied, specimens from Rondônia have higher numbers of scales at midbody, dorsals and ventrals (table 6), which agrees with Rodrigues (1987: 213). Number of lamellae under both fourth finger and fourth toe smaller in specimens from Carajás (respectively 13-18, 20-25) than in specimens from along the Tocantins (18-21, 25-30), while specimens from Rondônia have intermediate values (17-18, 23-26).

See also remarks under *T. hispidus*.

Uracentron Kaup, 1826

Diagnosis.— Tropidurids with an enlarged interparietal; supraorbital semicircle distinct (although it may be inconspicuous); supraoculars enlarged; supraciliaries elongate, overlapping; one enlarged subocular (plus 1-5 smaller ones), in contact with supralabials; scales on frontonasal region juxtaposed or slightly imbricate anteriorly; nostril directed anterodorsally; postrostrals and lorilabials form a continuous row. Gular and antegular folds present, continuous respectively with antehumeral and oblique neck folds. No vertebral crest. Dorsals smooth or keeled, increasing in size posteriad. Ventrals smooth or slightly keeled. Fourth finger longer than third. Tail short (0.5-0.7 times the SVL), depressed, spinose.

Distribution.— Northern South America east of the Andes, especially in Amazonia and coastal Guiana.

Content.— Two species, *U. azureum* and *U. flaviceps*.

Uracentron azureum (Linnaeus, 1758)

Lacerta azurea Linnaeus, 1758: 202 (2 syntypes, NRM 113, type-locality: Africa, corrected by Etheridge, 1968: 50 to the vicinity of Paramaribo, Suriname, and further restricted by Hoogmoed, 1973: 194 to the confluence of the Cottica River and the Perica Creek, Suriname).

T[ropidurus] azureus; Frost, 1992: 51.

The species comprises three subspecies. A general synonymy, diagnosis and description will be given, followed by data specific to each subspecies. Habitat, notes on natural history, and remarks refer to the species as a whole.

Diagnosis.— In addition to the generic characteristics, it has a moderately depressed tail with 19-22 transverse rows of scales; 87-129 scales around midbody; 116-147 middorsal scales between nape and posterior margin of hind limbs. Predominantly green in life (in some cases with a brown phase), either with a black pattern of crescent-shaped bands, a reticulated pattern, or uniformly coloured.

Description.— Tropidurid with maximum SVL in males of 87 mm, in females of 86 mm (Etheridge, 1968). Head 0.22-0.27 times SVL; 1.2-1.4 times as long as wide; 1.1-1.4 times as wide as high. Snout broad, round, canthus rostralis anteriorly round, posteriorly angulate. Neck, due to presence of a gular fold which extends laterally, as broad as, or slightly broader than, head and anterior part of body. Body cylindrical to moderately depressed. Limbs well developed, forelimbs 0.4-0.5 times SVL, hind limbs 0.5-0.6 times, tibia 0.15-0.18 times. Tail short, depressed, spinose, 0.5-0.7 times SVL.

Tongue arrowhead-shaped, villose, with round, nicked tip. Anterior teeth conical, posterior teeth conical to tricuspid; tricuspid teeth with a large median cusp and two very small lateral ones.

Rostral bandlike, three to four times as wide as deep, hardly seen from above. Postrostrals 3-5, mostly four, flat, forming a continuous series with lorilabials. Scales on snout relatively large, but with some variation in size, irregularly polygonal, juxtaposed or slightly imbricate anteriorly, with a slightly to moderately convex, smooth or rugose surface. Scales across snout between first (and mostly single) canthals 4-8. Nasal large, undivided, in the anterior corner of canthus rostralis and extending toward postrostral/lorilabial series, with which it may form a relatively narrow or a broad suture (occasionally they are not in contact). Nostril directed anterodorsally, in the upper posterior part of nasal. Mostly one canthal, sometimes two, in contact with or separated from nasal. Supraorbital semicircles in many cases inconspicuous, or with 8-13 scales, in contact or separated medially. Supraoculars variable, with scales in approximately longitudinal rows, either subequal or some of the scales moderately to much larger than the others; small scales may be present anteriorly, and in one or more peripheral rows; a row of rectangular, flat scales is present adjacent to supraciliaries. Supraciliaries 7-10, exceptionally six, elongate, anteriorly the anterior ones overlapping the posterior ones, posteriorly the posterior ones overlapping the anterior ones. Interparietal much larger than adjacent scales, irregular in shape. No parietal eye. Parietal region with moderately small, irregularly polygonal, juxtaposed to imbricate, and slightly to moderately convex scales. Loreal region with a few relatively large, irregular scales, bordered ventrally by a row of lorilabials. Suboculars 2-4, rarely 5-6, with a keel along their upper margin. Posterior subocular distinctly larger and in contact with supralabials, marking the end of lorilabial series. Supralabials 4-7, mostly posterior one higher and below the eye (occasionally one before the last). They are followed by small scales not differentiated from adjacent temporals. Temporal scales small, mostly hexagonal, slightly convex. Ear-opening large, with smooth margin.

Mental from about as wide as, to narrower than, adjacent infralabials, and a little longer. Postmentals 2-3, either subequal in size or median one distinctly narrower. Infralabials 5-7, last or last but one below centre of eye. Scales on chin irregularly polygonal, smooth, juxtaposed, distinctly larger near infralabials, small medially. A midventral sulcus is distinct in most specimens. Gular region anteriorly with swollen ventrolateral areas, with hexagonal and subimbricate scales. Posteriorly demarcated by antegular and gular folds, with small, rhomboid, imbricate scales between them. Gular fold deeper than antegular one. They extend laterally, respectively, into the oblique neck- and antehumeral folds. All dorsal head scales, infralabials, and part of the scales on chin with minute but distinct tubercles (scale organs) widespread on their surface.

Scales on nape rhomboid, hexagonal or round, relatively small, juxtaposed, convex; smooth or broadly keeled, gradually changing into dorsals. Dorsals anteriorly granular, smooth or broadly keeled, posteriorly grading into larger, rhomboid (toward flanks) or irregular (middorsally), subimbricate, smooth or keeled scales; 116-147 middorsal scales from nape to posterior margin of hind limbs. Scales on flanks similar to anterior dorsals. Between some of the scales, both on back and flanks, minute, irregular granules may be present. Ventrals rhomboid anteriorly, quadrangular posteriorly (except along midventral line, where they are mostly trapezoid or irregularly polygonal), smooth, imbricate; in 50-72 transverse rows from posterior gular fold to anterior margin of hind limbs. Transition between scales on flanks and ventrals gradual. Scales around midbody 87-129. Scales on preanal plate imbricate, smooth, mostly rhomboid, as large as to slightly larger than ventrals, and separated from them by smaller scales.

Scales on dorsal surface of tail large, imbricate, strongly mucronate, in 19-22 transverse rows. Widest rows with 7-8 scales in a row. Underside of tail proximally with small, quadrangular, smooth, imbricate scales. Distally they become large, imbricate, pointed and/or shortly mucronate, in transverse rows; most scales smooth, but nearer the tip some are keeled. Except on base of tail, dorsal and ventral rows are continuous and partition the tail in distinct whorls.

Forelimbs with rhomboid, imbricate, smooth or slightly keeled scales; smallest on ventral aspect of upper arms. Hind limbs with similar scales, but generally a bit larger than scales on forelimbs, with smooth to distinctly keeled scales on dorsal aspect of thighs, weakly to strongly keeled scales on antero-dorsal aspect of lower legs, and smooth scales elsewhere. Posterior aspect of thighs with much smaller scales. Subdigital lamellae single, proximally multicarinate, distally mostly unicarinate (sometimes with very faint extra keels, sometimes almost smooth); 26-36 lamellae under fourth finger, 28-39 under fourth toe.

Uracentron azureum azureum (Linnaeus, 1758)
(figs. 61-63, 66, 253)

Urocentron azureum; Boulenger, 1885b: 182; Goeldi, 1902: 16, 24; Procter, 1923: 1064; Cott, 1926: 1169; Burt & Burt, 1931: 299, 1933: 48; Amaral, 1937a: 1737, 1937b: 16, 1949: 110; Beebe, 1944b: 215; Schmidt & Inger, 1951: 452.

Uracentron azureum; Cunha, 1961: 82; Etheridge, 1968: 50, 1970g: 273; Vanzolini, 1972: 101; Hoogmoed, 1973: 192, 1979: 278; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Hoogmoed, 1992: 72.

Uracentron azureum azureum; Greene, 1977: 257; Nascimento et al., 1991: 33.

Material.— **Brazil**. AMAPA. Município de Amapá, Rio Amapari: 2 ♂♂, MPEG 3680-81, x.1969, leg. F.P. Nascimento. Mazagão, Rio Maracá, Cachoeira da Pancada: 1 ♂, MPEG 2666, 31.v.1969, leg. F.P. Nascimento. Serra do Navio: 1 ♀, MPEG 1784, Rio Amapari, Porto Terezinha 1961, leg. W. Rodrigues; 1 ♂, MPEG 6467, 1970, leg. Carlos Bicelli. Município de Calçoene, Lourenço: 1 ♂, MPEG 15011, ix.1988, leg. J.C.S. Pinto.

AMAZONAS. Município Presidente Figueiredo, Rio Uatumã, reservoir area of hydroeletric dam Balbina: 1 ♀, INPA 258, iii-iv.1988, leg. Operação Muiraquitã; 1 ♀, MPEG 14927, 24.iii.1988, leg. F.P. Nascimento & rescue team. Manaus: 1 ♂, INPA/Ecol. (no number), Conjunto Tiradentes; 1 ex., INPA 379, Cidade Nova II, núcleo II, 13.iv.1989, leg. Gentil; 1 ex., ZUEC 480, Reserva Campina, viii.1978, leg. W. Vieda & J. Vasconcelos N.; 1 juv., BM 1922.6.15.1, don. R.M. Gordon; 1 ex., AMNH 36316, 17.viii.1927, leg. G.H.H. Tate & T.D. Carter.

MARANHAO. 1 ♀, SMF 11202, 1924, leg. W. Ehrhardt, don. W. Schluter.

PARA. 2 ♂♂, 2 ♀♀, MPEG 003-006. Eastern Pará: 4 exs., MNRJ 1432, x.1937, leg. Green. Ilha de Marajó: 3 ♂♂, 3 ♀♀, MNRJ 1433, Soure, 1940, leg. A.L. Carvalho; 3 ♂, 2 ♀, BM 1923.11.9.68-72, Caldeirão, xii.1922/i.1923, leg. W. Ehrhardt; 1 ♂, BM 1926.5.5.5, leg. H.B.Cott. Belém: 1 ♂, 1 ♀, MPEG 010, 011, 08.v.1921. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 1 ex., MPEG 16605, 13.vii.1993, leg. M.S. Hoogmoed, R.J.R. Moraes & R.R. Silva. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 1 ♂, RMNH 26654, 21.vii.1993, leg. M.S. Hoogmoed. Northern part of the state, second savanna of upper Rio Paru, 30 km above its mouth: 2 ♂♂, 1 ♀, MNRJ 3501, rec. v.1965, leg. M. Rauschert. Faro, Fazenda Aibi (Agropecuária do Rio Nhamundá Ltda.): 1 ♀, RMNH 26287, ix.1987, leg. J. Vermeulen. PERNAMBUCO. City limits of Recife, test farm of South American Castor Oil Co.: 1 ex., UIMNH 35780, 10.v.1943, leg. E.T. Willis.

Description.— It agrees with the general description, and in addition presents the following characteristics:

(1) Body moderately depressed.

(2) Tail mostly wide (fig. 62).

(3) Ventrals relatively numerous (57-72).

(4) Dorsal surface of tail mostly with eight (20 exs.), rarely seven (1 ex.), scales in a transverse row at its widest point.

(5) Suture of nasal with postrostral/lorilabial series anterolateral or lateral (fig. 63).

(6) Supraoculars with 3-4 rows of scales of similar width, or some of the scales moderately to much larger than the others; laterally there are mostly three rows of small scales anteriorly, diminishing to two or one posteriorly; row adjacent to supraciliaries with rectangular, flat scales.

(7) Scales on nape smooth or broadly keeled. Dorsals, in some specimens, smooth

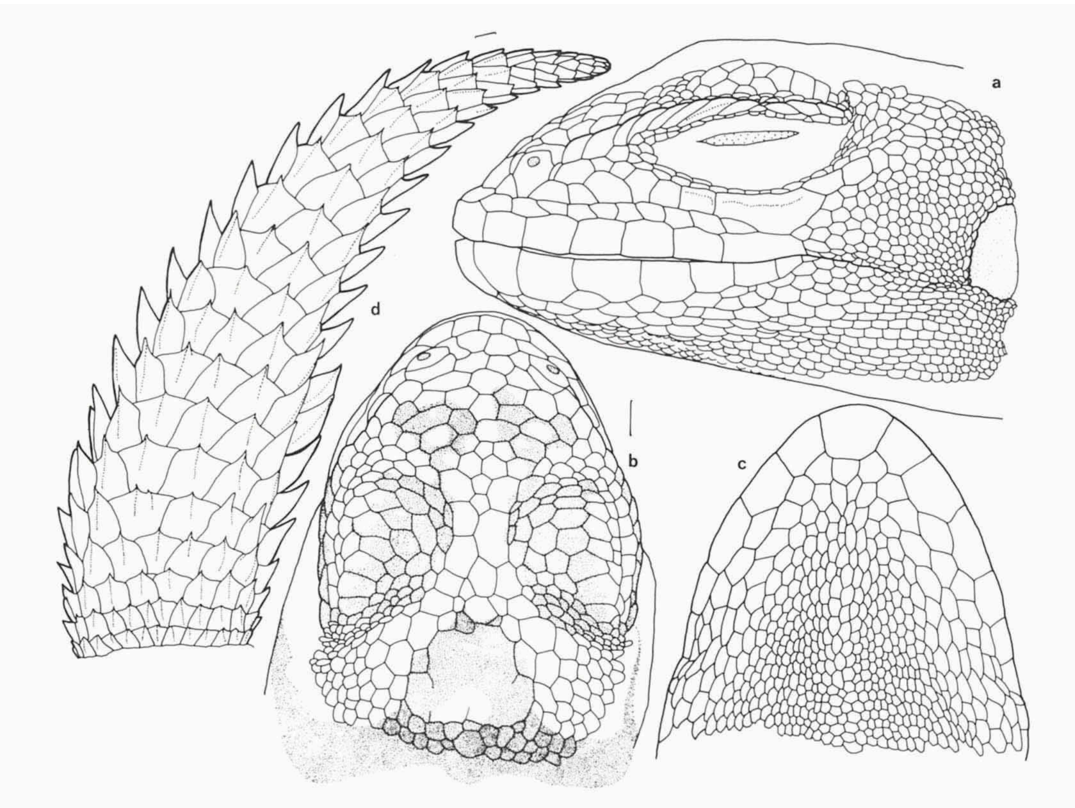


Fig. 61. *Uracentron a. azureum*, MPEG 14927; a: lateral view of head; b: dorsal view of head (dots on scales represent pattern of black spots on head); c: ventral view of head; d: dorsal view of tail.

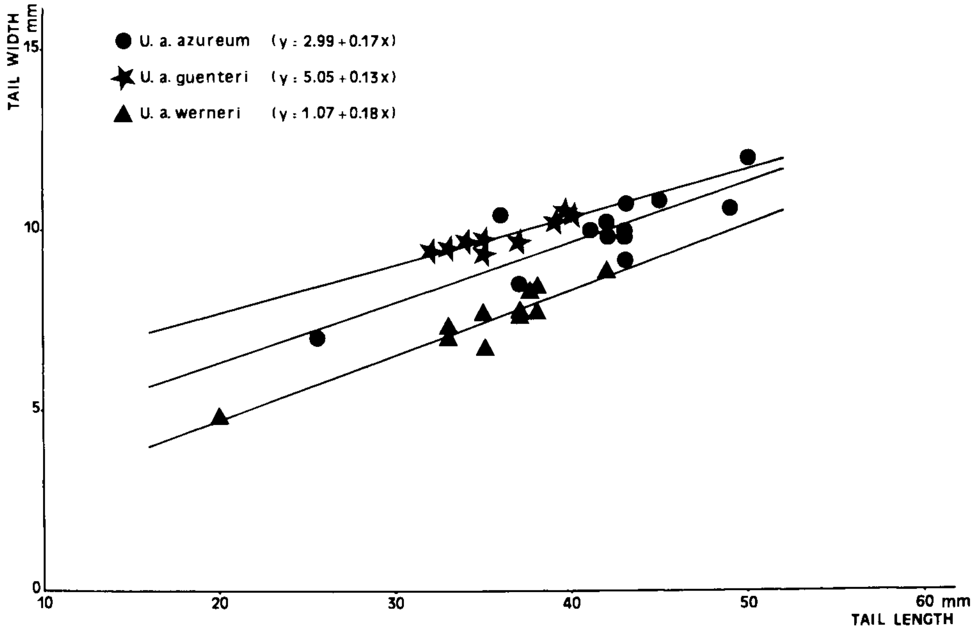


Fig. 62. Tail width versus tail length in *U. azureum*, showing the regresion line and the linear equation that represents the relation between these two measurements in each subspecies.

in the light areas, keeled in the black bands, keels larger toward sacrolumbar region. In other specimens dorsals become keeled posteriorly, irrespective of colour of scales, and either all posterior scales, or only the scales in middorsal area are keeled.

(8) Scales on antero-dorsal aspect of upper arms very feebly keeled (almost smooth) to slightly keeled; on posterior aspect of forearms (at least near elbow) slightly keeled; on dorsal aspect of thighs very feebly, slightly, or distinctly keeled; on antero-dorsal aspect of lower legs distinctly to strongly keeled; elsewhere smooth.

(9) Body with several crescent-shaped dark bands, from posterior margin of head to at least middle of body. One large dark spot on each supraocular area. An anteriorly oriented dark arc on interparietal, in contact with an arc along posterior margin of head.

Colour in life, in RMNH 26287, lime-green (159) with a black pattern which included several spots on head; transverse, crescent-shaped bands along neck and body; an irregular reticulation on limbs, coarser on hind limbs; and a black margination on the scales of tail. Anterior transverse bands solid, with a sinuous contour, the three posterior ones with internal irregular openings and some longitudinal extensions, some of which reached the neighbouring bands. Turquoise-blue (65) spots along a narrow ventrolateral area, in the groin, ventrolaterally on proximal part of tail, on parts of thighs, and a few on lower legs. Limbs with some yellowish-green areas, digits trogon-yellow (153). Head ventrally lime-green, belly and underside of limbs trogon-yellow. Dorsal surface of tail predominantly lime-green, scales with black margins and some of them with spectrum-yellow (55) tips. Toward the sides

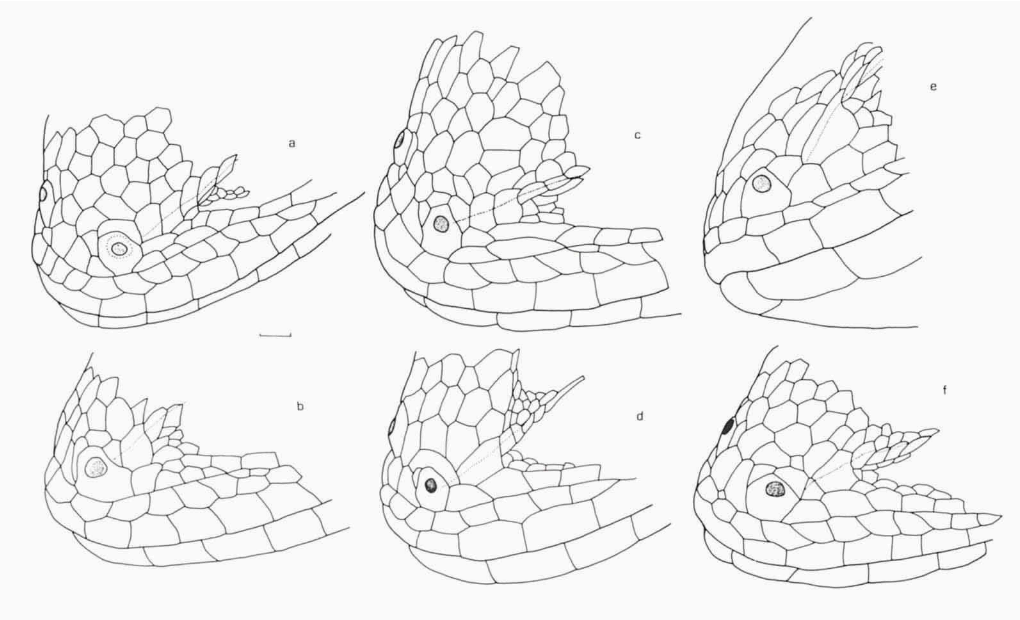


Fig. 63. Comparison between the position of nasal/lorilabial suture in *U. a. azureum* (a, MPEG 14927; b, RMNH 26287), *U. a. guentheri* (c, MPEG 15853; d, MPEG 16244), and *U. a. werneri* (e, MPEG 1782; f, UTACV R3424).

many scales with an spectrum-yellow area occupying almost half of their surface. Ventral surface of tail with scales predominantly lime-green toward the sides, predominantly spectrum-yellow medially. Iris bluish-grey with a dark brown anterior band. Tongue light pink.

In MPEG 16605, back lime green (159) with black transverse bands in which there was a narrow lime green area; belly pale horn colour (92), sides of neck with green tinge; underside of tail medially chamois (123D). In RMNH 26654, back apple green (61) with black bands, forelimbs with indistinct darker margins, tail dorsally Paris green (63). Ventral surface predominantly pale horn colour (92), with sides cyan (164); chin and anterior part throat pistachio (161), transverse band across throat apple green (161). Tail with tips of spines at sides sulphur-yellow (157), and a few lime green (159) scales on underside, medially. Iris brown (both descriptions M.S. Hoogmoed).

Observations of colour in life were also presented by Etheridge (1968), Hoogmoed (1973), and Vanzolini (1972). Colour plates were given by Cott (1926), Hoogmoed (1968, 1992), and Gasc (1990).

In preservative the green changes into blue or, in some relatively old specimens, into brown, but the black pattern remains distinct. Head dorsally with variably shaped black spots on snout. Scales may be bordered by black, or there may be a black line along the upper border of supralabials. A large, black spot on medial and posterior parts of supraoculars, which may continue along supraciliaries. Another large black spot on interparietal, which may have an anterior narrower extension, and which is continuous with a black arc bordering the head posteriorly and extending on each side toward the lower margin of the eye. A second black arc between ear-openings, and a third one, which forms a crescent-shaped band, just anterior to insertion of arms and extending laterally toward the swollen gular area. Fourth black arc, also a crescent-shaped band, starting in front of forelimbs. From here to posterior part of body there may be 3-5 other crescent-shaped black bands, or up to four of the posterior ones may be modified to a lesser or larger degree, into a reticulate pattern (caused by the appearance of large ground-colour holes in the black bands, and/or the disruption of the bands, plus the appearance of narrow "bridges" between bands). Limbs with a black reticulate pattern over the blue or brown ground-colour, with lines on forelimbs narrower. Tail with blue (or brown) scales bordered by black, tips of spines blue or white. One or two black bands may be present toward tip of tail. Ventral region light brown, light to whitish blue, or head light blue and body, limbs and tail light brown. Ventral surface of tail lighter medially than laterally.

Distribution (fig. 66).— Eastern Amazonia, in Guyana, Suriname, French Guiana, and Brazil. In Brazil it is known from Amapá, Maranhão, Pará on both sides of the Amazon, and Amazonas north of the Amazon, westward reaching Manaus. UIMNH 35780 is registered as coming from Recife, Pernambuco (see remarks).

Uracentron azureum guentheri Boulenger, 1894
(figs. 62-64, 66, 251)

Uracentron guentheri Boulenger, 1894: 729 (holotype BM RR-1946.8.29.85, type-locality: Iquitos, Peru [questioned by Dixon & Soini, 1975, 1986]); Etheridge, 1968: 53, 1970g: 274.
Uracentron azureum guentheri; Greene, 1977: 258; Vanzolini, 1986b: 25.

Material.— **Brazil.** AMAZONAS. Rio Madeira, Municipio de Borba: 1 ♂, MNRJ 4435, v-x.1943. Rio Solimões, Lago Calado: 1 ex., SMF 30304, 17.ii.1934, leg. W. Praetorius. Rio Solimões, Lago Tefé: 1 ♀, MPEG 16244, 01.vi.1979. Rio Urucu, E of Porto Urucu, Petrobras base: 1 ♂, MPEG 15853, 23.xi.1989, RUC-4 station, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 2 ♀♀, INPA 345-46, iv-v.1991, leg. M. Martins. Rio Jutai: 1 ex., ZMB 30974, viii.1926, leg. Ehrhardt.
PARA. Oriximina: 1 ♀, MCZ 154236, 17.x.1977, Exp. DZ, ix.1959, exch. MZUSP.
Peru. Iquitos: 1 ex. (holotype), BM 1946.8.29.85, leg. A.E. Pratt. Rio Ucayali Valley, Roaboya, 525': 1 ex., AMNH 57204. Contamana Region, Rio Sahuaya Valley, Rian Rian: 1 ♂, AMNH 57205. Eastern Peru: lower Rio Cushabatay, tributary of Rio Ucayali, 750": 1 ex., AMNH 56410, leg. H.Bassler.

Description.— It agrees with the general description, and in addition presents the following characteristics:

(1) Body moderately depressed.

(2) Tail wide (fig. 62), and tending to be slightly shorter than in *U. a. azureum* and *U. a. werneri* (table 7).

(3) Ventrals relatively numerous (57-68).

(4) Dorsal surface of tail with seven (6 exs.), eight (4 exs.) or nine (1 ex.) scales in a transverse row at its widest point.

(5) Suture of nasal with postrostral/lorilabial series anterolateral (fig. 63).

(6) Supraocular region with 3-4 longitudinal rows of larger scales; one of these

Table 7. Body proportions and scale counts in *Uracentron azureum* (no. exs.= number of specimens examined; max. svl= maximum snout-vent length; head/svl= rate head length/svl; hl/hw= rate head length/head width; hw/hd= rate head width/head depth; tibia/svl= rate length of tibia/svl; tail/svl= rate tail length/svl; tl/tw= rate tail length/tail width; dorsals= number of dorsals along a middorsal line, between nape and posterior margin of hind limbs; ventrals= number of ventrals along a midventral line, between posterior gular fold and anterior margin of hind limbs; midbody= number of scales around midbody; lam4fg= number of lamellae under 4th finger; lam4toe= number of lamellae under 4th toe).

	azureum	*guentheri*	*werneri*
no. exs.	35	11	12
max. svl	86 mm	77 mm	75 mm
head/svl	0.22-0.27 (0.24 ± 0.01)	0.23-0.26 (0.24 ± 0.01)	0.21-0.27 (0.24 ± 0.02)
hl/hw	1.21-1.40 (1.31 ± 0.06)	1.20-1.41 (1.33 ± 0.05)	1.30-1.45 (1.39 ± 0.05)
hw/hd	1.09-1.39 (1.27 ± 0.06)	1.07-1.37 (1.24 ± 0.07)	1.15-1.31 (1.22 ± 0.06)
tibia/svl	0.15-0.18 (0.16 ± 0.01)	0.15-0.17 (0.16 ± 0.01)	0.15-0.18 (0.16 ± 0.01)
tail/svl	0.49-0.67 (0.58 ± 0.04)	0.49-0.55 (0.52 ± 0.03)	0.53-0.59 (0.56 ± 0.02)
tl/tw	3.46-4.73 (4.18 ± 0.35)	3.40-3.85 (3.67 ± 0.18)	4.17-5.22 (4.71 ± 0.29)
dorsals	116-147 (129.9 ± 7.8)	127-147 (134.6 ± 6.0)	121-147 (132.1 ± 9.0)
ventrals	57-72 (66.1 ± 3.4)	57-68 (64.4 ± 3.5)	50-63 (57.4 ± 4.0)
midbody	96-129 (108.8 ± 7.0)	101-129 (109.7 ± 7.8)	87-112 (102.5 ± 7.2)
lam4fg	26-36 (30.4 ± 2.2)	27-33 (30.7 ± 1.8)	27-36 (32.2 ± 2.0)
lam4toe	28-39 (33.0 ± 2.7)	30-36 (33.1 ± 1.9)	30-38 (34.0 ± 2.1)

rows may have very wide scales occupying most of supraocular area, or anteriorly two of the rows have scales slightly wider than, to twice as wide as, those in the other rows, and some much wider scales are present only posteriorly. Row of rectangular, flat scales adjacent to supraciliaries totally or partially separated from the large supraoculars, anteriorly, by small, irregularly polygonal scales; posteriorly mostly in contact with the large supraoculars.

(7) Scales on nape smooth or with a broad, weak keel; posterior dorsals smooth to distinctly keeled.

(8) Scales on antero-dorsal aspect of upper arms smooth to very feebly keeled; on postero-dorsal aspect of forearms feebly to slightly keeled (stronger toward elbow); on dorsal aspect of thighs slightly keeled; on antero-dorsal aspect of lower legs distinctly keeled; elsewhere smooth.

(9) Body with a reticulate pattern; some crescent-shaped dark bands may be present on neck and anterior part of body. Head irregularly spotted.

MPEG 15853, in life, dorsally grass green with black markings. Ventrally, head and chest yellowish-green, belly with a pinkish hue, underside of forelimbs and tail similar to belly, underside of hind limbs greenish. Iris dark. Tongue whitish.

In preservative, basic colour most commonly blue, sometimes brown, with dark brown or black markings. Rostral, supraocular, loreal, and supralabial regions with some dark spots, or dark marginated scales. A pattern of irregular lines and spots on parietal and occipital regions, extending toward temporal region, but not forming a nice, regular arc as described for *U. a. azureum*. Between ear-openings either a more or less regular arc, a double transverse line, or a transverse series of irregular spots.

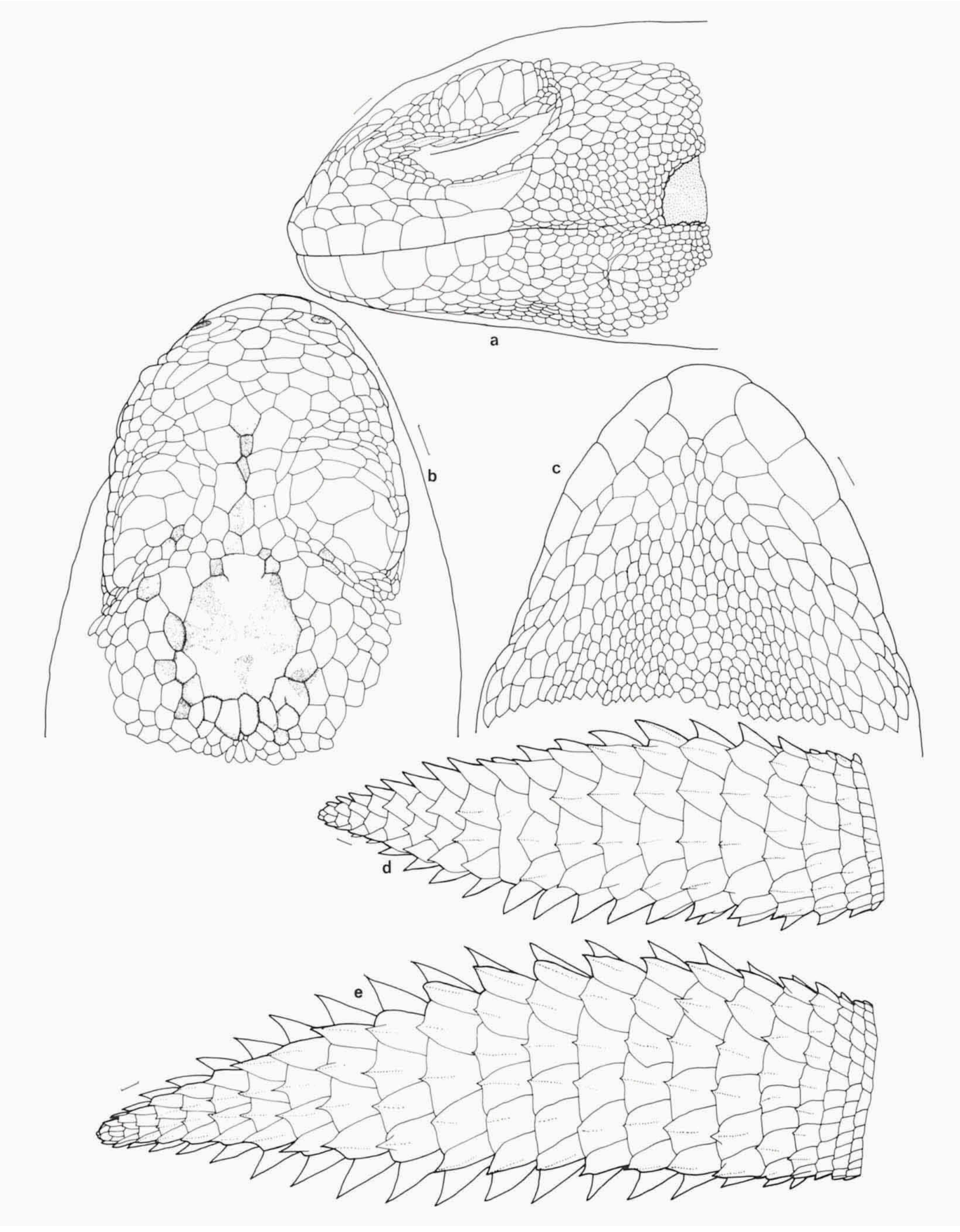


Fig. 64. *Uracentron azureum guentheri*; a: lateral view of head; b: dorsal view of head (dots on scales represent pattern of black spots on head); c: ventral view of head; all in MPEG 15853; d: dorsal view of tail in MPEG 16244 (with 7 scales in a transverse row on widest part of tail); e: dorsal view of tail in MPEG 15853 (with 8 scales in a transverse row on widest part of tail).

Between it and level of forelimbs or slightly beyond, two transverse arcs formed by double, relatively narrow lines, or else forming single, crescent-shaped bands. Back and flanks with a reticulate pattern, formed by dark circles over the background colour. A transitional anterior area, where the transverse arcs gradually change into a reticulate pattern is variably evident (in one of the extremes a rather well defined crescent-shaped band is present anteriorly, in the other extreme a trace of transverse band is hardly seen). The dark lines of the reticulation may consist of dots, or may be continuous and relatively thick. In MPEG 15853 and MCZ 154236 a double, dashed, vertebral line, more visible in the anterior half of the body, is present. Limbs with a suffused reticulate pattern. Tail uniformly coloured or some of the scales with dark lateral margins. Head ventrally light blue, light brownish-blue, or light brown, belly bluish-white or light brown.

Distribution (fig. 66).— Southwestern Amazonia, in Peru and Brazil. In Brazil it is known from the state of Amazonas, south of the Amazon, eastward reaching the Rio Madeira (right bank), and north of the Amazon in the locality Lago Calado (between Rios Negro and Manacapuru). The locality Oriximiná, Pará, seems out of the expected area of distribution of this subspecies, and it is discussed in the remarks.

Uracentron azureum werneri Mertens, 1925
(figs. 62, 63, 65, 66, 254)

Uracentron werneri Mertens, 1925: 75 (holotype SMF 11203, type-locality: upper Orinoco, Venezuela); Etheridge, 1968: 55, 1970g: 274; Hoogmoed, 1979: 278.
Uracentron azureum werneri; Greene, 1977: 258; Vanzolini, 1986b: 25.

Material.— **Brazil**. AMAZONAS. Rio Negro, Tapurucuara: 1 ♂, MPEG 1783, vii.1962, leg. F.M. Oliveira. Rio Uaupés, Jauareté: 1 ♂, MPEG 1782, 1960, leg. J. Lomata. Municipio de Uaupes, Rio Uaupes: 1 ex., SMF 62418, 12.iii.1952, leg. Padre João Falco.
Colombia. VAUPES. Rio Vaupés, Timbó, E. Mitu: 1 ♀, UTACV R-3424, 22.viii.1971; 1 ♂, UTACV R-3928, 02.iii.1974; 1 ♀, UTACV R-3929, 26.ii.1974; 1 ♂, UTACV R-5174, 17.xi.1974; all leg. J.K. Salser. Wacara: 1 ♂, UTACV R-3630, 01.ix.1972, leg. J.K. Salser. Yapima: 1 ♀, UTACV 5869. META. Near Macarena: 1 ex., AMNH 91755, 1960.
Venezuela. AMAZONAS. Alto Orinoco, southern Venezuela: 1 ex. (holotype), SMF 11203, v.1985, leg. G. Hubner. Rio Mavaca, near Mrakapiwei, 2°10'N 65°10'W, alt. 130 m: 1 hatch., ZSM 69/1989, ii.1989, leg. H. Mägdefrau.

Description.— It agrees with the general description, and in addition presents the following characteristics:

(1) Body cylindrical to slightly depressed.

(2) Tail relatively narrow (fig. 62).

(3) Ventrals less numerous (50-63) than in *U. a. azureum* and *U. a. guenteri*.

(4) Dorsal surface of tail mostly with 7 (11 exs.), in ZSM 69/1989 with eight, scales in a transverse row at its widest point.

(5) Suture of nasal with postrostral/lorilabial series mainly anterior (fig. 63).

(6) Supraocular region with scales in 4-6 approximately longitudinal rows, of which one or two, especially in the posterior half of supraocular area, with slightly to distinctly wider scales. Rectangular, flat scales adjacent to supraciliaries in contact

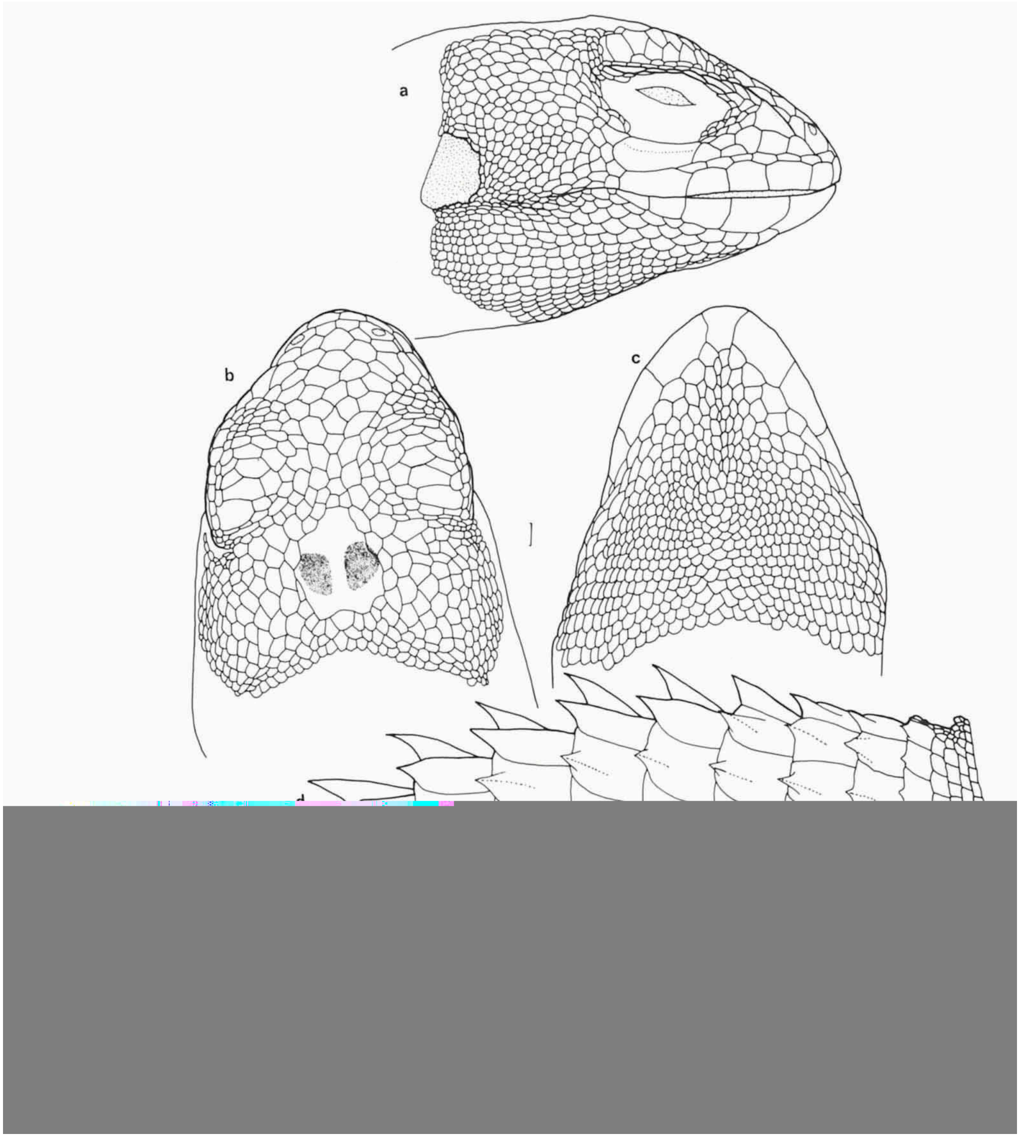


Fig. 65. *Uracentron azureum werneri*, MPEG 1782; a: lateral view of head; b: dorsal view of head (dots on scales represent pattern of black spots on head); c: ventral view of head; d: dorsal view of tail.

with posterior wide supraoculars, and partially or totally separated from anterior supraoculars by small, irregularly polygonal scales.

(7) Scales on nape mostly convex and smooth, broadly keeled in UTACV 3928, slightly but distinctly keeled in SMF 62418. Posterior dorsals from smooth and flat, to slightly convex with a very weak, broad keel.

(8) Scales on postero-dorsal aspect of forearms and on antero-dorsal aspect of thighs smooth to weakly keeled; on antero-dorsal aspect of lower legs weakly to distinctly keeled; elsewhere smooth.

(9) Body, in preservative, uniformly coloured or with a (usually faint) reticulate or mixed pattern, in the latter case partially reticulate, partially with broken, irregular, transverse lines. Head dorsally spotless, except for a pair of dark spots (usually approximately oval, occasionally irregular) on interparietal.

Some notes on colour in life of specimens from Vaupés, Colombia, were mentioned by Greene (1977: 257): "According to the collector's field notes, the lizards were bright green in life. One (UTACV R3424) was observed to become darker after capture, and "the dark circles (...) that are present on the body began to show up better". Another (UTACV R3929) "turned brownish and dark green blotched from time to time, depending on its moods". Valdivieso & Tamsitt (1963) mentioned a specimen from Colombia as bright green in life. I examined slides by Dr. H. Mägdefrau of two hatchlings from the same litter (one ZSM 69/1989, the other deposited in Estación Biológica de Rancho Grande-MBRG, Maracay, Venezuela), from Rio Mavaca, Venezuela. Both hatchlings had most of the body dorsally green, but the posterior part, as well as tail and most of limbs, brownish-grey. One of them (MBRG specimen) had irregular black spots on interparietal, and a reticulate pattern on body. ZSM 69/1989 had a pair of black oval spots on interparietal; one transverse arc across neck, followed by another immediately anterior to forelimbs; and body anteriorly with a number of strongly sinuous, and partially broken, transverse lines, which posteriorly tended to form a reticulation.

In preservative, general dorsal colour dark bluish-grey or brown, almost uniform. The most conspicuous feature are large black spots (usually a pair of oval spots) on the interparietal, present in all specimens observed. In ZSM 69/1989, seen in preservative, the pattern described above is still visible. In UTACV R3928 some smaller black spots are present on nape and anterior part of body, and a few more posteriorly. A few spots also appear in UTACV R3424 and R3929. At closer look, a very faint reticulation is seen on dorsum, flanks and hind limbs of UTACV R3424, R3928, and R5869, and on hind limbs of UTACV R3623 and R3929. On the posterior aspect of thighs there may be a median smudged white stripe, bordered or not by a black band. MPEG 1783 with whitish isolated scales scattered along the flanks. Ventral region bluish-grey or light-brown, with light areas variably distributed in each specimen. Tail dorsally either uniformly coloured, or with black-margined scales, or else with scales with black-tipped spines. Underside of tail mostly with a light median area.

Distribution (fig. 66).— Northwestern Amazonia, in eastern Colombia, southern Venezuela, and Brazil. In Brazil known from the valleys of the Uaupés and Negro rivers, eastward reaching Tapurucuara.

Habitat of the species *U. azureum*.— Most data available refer to *U. a. azureum*. It is predominantly an arboreal forest inhabitant. Probably it mainly lives in the canopy, which could explain why it is only rarely observed, and also why it occasionally appears in open environments like perianthropic situations or open savanna forest. Cott (1926) noted its occurrence on mangrove trees along tidal waterways, in the region of 'campos' in the northeast interior of Marajó Island. Some specific observations follow. In Serra do Navio, Amapá, an individual was seen in the backyard of a hospital, an area with grass and several trees, more or less continuous with rainforest (Dr. P.C.M. Amorim, pers. com.). MPEG 16605, from Caxiuanã, Pará, was at edge of sandy beach with swamp, 6 m above ground, on a tree trunk with smooth bark, and

Fig. 66. Distribution of *Uracentron azureum*. Circles = *U. a. azureum*; triangles = *U. a. guentheri*; squares = *U. a. werneri*. Closed symbols = material studied. Half-open symbols = 'general' localities (Ilha de Marajó, upper Rio Orinoco, Rio Jutaí). Open symbols = data from literature (Beebe, 1944b; Medem, 1969; Vanzolini, 1972; Hoogmoed, 1973; Zimmerman & Rodrigues, 1990; Hoogmoed & Avila-Pires, 1991). Dashed square = non-specified locality in Caqueta state, Colombia (Ayala, 1986).

RMNH 26654, from same locality, was in open camp area surrounded by terra firme forest, 12 m above ground on dead tree with smooth bark (field notes M.S. Hoogmoed). RMNH 26287, from Faro, Pará, was in secondary forest, on high ground between a plateau and the Nhamundá river; it ran up a tree when the forest was being felled (J. Vermeulen, pers. com.). Vanzolini (1972) reported one individual on the wall of a house, another one in a *Manihot* plantation recently burnt. Zimmerman & Rodrigues (1990) and Martins (1991) reported the species from terra firme forest. In Manaus, AMNH 36316 was observed to have been "taken 100 feet up in forest tree", while two other individuals kept in a terrarium in INPA (INPA 379 one, the other without number) were in residential areas, one of them on a tree in a garden (T.R.J. Gasnier, pers. com.). Hoogmoed & Avila-Pires (1991) reported a specimen sunning on the trunk of a fallen tree, in rainforest. Hoogmoed (1973) found an individual in open savanna forest, while others were on tree trunks at heights of 2-5 m, in rainforest. Beebe (1944b) reported an individual among rocks near the shore of a river at Kartabo, Guyana.

MPEG 15853, *U. a. guentheri* from Urucu, Amazonas, was on the trunk of an isolated tree at the edge of an open (deforested) area, about 5 m above ground, near disturbed primary forest.

Notes on natural history of the species *U. azureum*.— Observations by Cott (1926) of a specimen feeding continuously on ants, and of four stomach contents by Hoogmoed (1973) suggests that *U. a. azureum* is predominantly an ant-eater. In the four stomachs analyzed, Hoogmoed (1973) found nine species of ants, and also two Coleoptera and one spider. No data are available regarding *U. a. guentheri* and *U. a. werneri*.

Greene (1977) reported the UTACV specimens (*U. a. werneri*) to be fast climbers, and to bite and lash from side to side with their spiny tails when handled.

Some anecdotal data on reproduction in *U. a. azureum* are given by Hoogmoed (1973). Mägdefrau (1991 and in lit. to M.S. Hoogmoed) mentioned two eggs of *U. a. werneri* which were collected between roots at the base of a tree, in February 1989, and which hatched in the laboratory after two weeks of incubation.

Remarks.— Etheridge (1968) observed that *azureum*, *guentheri*, and *werneri* were "very similar in the form of their body and tail, and in scalation", adding that "with the acquisition of more specimens from intermediate areas it may become possible to determine whether or not any two, or all three of these species intergrade". Greene (1977), examining some specimens of *werneri* from Vaupés, Colombia (also studied here), concluded that "each of the characters used to distinguish *azureum*, *guentheri*, and *werneri* varies within populations of these taxa, and that these nominal forms are less distinctive than previously thought", proposing that all be considered as *U. azureum*. From the material examined, the following figures emerge (see also table 7):

1. Body proportions: there seems to be a tendency of *werneri* to be relatively narrower than *azureum* and *guentheri*, both in the body, which is less depressed, and in the tail (fig. 62); the head also tends to be slightly narrower (table 7).

2. Scale counts: the number of ventrals tends to be lower in *werneri* (57.4 ± 4.0, n= 12) than in *azureum* (66.1 ± 3.4, n= 34) and *guentheri* (64.4 ± 3.5, n= 11).

3. Scale characteristics: (a) Etheridge (1968) used the supraoculars to separate *guentheri* from *azureum* and *werneri*, but Greene (1977) already showed that there is variation in this character, and it does not completely separate the three forms. (b) Another characteristic mentioned by Etheridge (1968), to separate *werneri* from the other forms, was the presence or absence of keels on the scales of the sacrolumbar region; this difference was also argued by Greene (1977) as not being very consistent. Though there is indeed some variation in this character in each of the three forms, the degree of keeling in *werneri*, taking into account both body and limb scales, generally is distinctly less than in the other two forms. (c) In 21 specimens of *azureum* studied for scutellation of tail, 20 had eight scales on the widest transverse rows of the tail, one had seven; among 11 *guentheri*, six had seven, four eight, one nine; and among 12 specimens of *werneri*, 11 had seven scales, one had eight. (d) Contact between nasal and lorilabials tends to be more lateral in position in *azureum* and *guentheri*, directed more anteriorly in *werneri*, though all three forms show some degree of variation (fig. 63).

4. Colour pattern: colour pattern of living specimens of *werneri* seems to be rather similar to that of *guentheri*, though *werneri* is apparently able to change into a more

uniform colour state. Colour pattern in *azureum* is more distinct, but all forms show a relatively high degree of variation, and it is not difficult to imagine the possibility of any one pattern changing into one of the others, as already pointed out by Et693c 0.38 T8Lizard Et693c.20

more specimens become known from the region.

Dixon & Soini (1975: 54, 1986: 61) doubt the occurrence of *U. a. guentheri* in Iquitos, the type-locality of the taxon. They suggest that Iquitos may have been the shipping point of the holotype, not the actual collecting place.

Uracentron flaviceps (Guichenot, 1855)
(figs. 67, 68, 255)

Doryphorus flaviceps Guichenot, 1855: 26 (holotype MHNP 6882, type-locality: mission de Sarayacu, Peru).
Doryphorus castor Cope, 1871: 556 (holotype ANSP 11303, type-locality: Pebas, Peru).
Urocentron flaviceps; Boulenger, 1885b: 183; Goeldi, 1902: 514, 523.
Urocentron castor; Boulenger, 1885b: 184; Goeldi, 1902: 514, 523.
Uracentron flaviceps; Etheridge, 1968: 55, 1970g: 274; Greene, 1977 (2): 256; Vanzolini, 1986a: 14.
T[ropidurus] flaviceps; Frost, 1992: 51.

Material.— **Brazil.** 1 ex., MHNP 92.291, leg. d'Anthonay. Western Brazil, Rio Madeira, 33 m: 1 ♀, AMNH 57207, leg. H. Bassler. AMAZONAS. Rio Solimões: 1 ♀, NRM NNN/1926.809.5342, 1926, leg. Bezerra de Souza. Rio Japurá, Município Maraã, Lago Amanã: 1 ♂, MPEG 13857, xi.1983, leg. R.C. Best. Rio Jutaí: 1 ♂, ZMB 30973, viii.1926, leg. Ehrhardt. Município Benjamin Constant, Rio Itecoahy, 30 km from Rio Javari: 1 ♂, MNRJ 3557, vi.1942, leg. A. Parko. W of Benjamin Constant: 1 ♀, MPEG 15988, 17.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Ecuador. NAPO. Lago Agrio: 1 ♂, 1 ♀, ZFMK 40661,40662, leg. Patzelt. Rio Napo, Limón Cocha (0°25'S, 76°37'W): 1 ♂, UIMNH 79943, 14.viii.1965; 1 ♂, 2 ♀♀, UIMNH 80494-496, 21-25.vii.1965; 1 ♂, UIMNH 91712, 06.viii.1965; all leg. C. Fugler. PASTAZA. Rio Copotazas, about 400 m from its mouth on the Rio Pastaza: 1 ♂, GNM 3618.
Peru. LORETO. Mission de Sarayacu: holotype, MHNP 6882, leg. Castelnau & Deville. Colonia, right bank Rio Zumun, Rio Ampiyacu basin: 1 ex., MHNP 1978-2160, leg. M.T. Rodrigues; 1 ex., MHNP 1988-285, leg. M.T. Rodrigues & Razon. Rio Yubineto, affluent of southern bank Rio Putumayo: 1 ex., MHNP 1978-2410, leg. M.T. Rodrigues & J.P. Gasc.

Diagnosis.— In addition to the generic characteristics, it has a strongly depressed from above. Postrostrals 3-5, usually four, flat; they form a continuous row with lorilabials. Scales on snout relatively large, but with some variation in size, irregularly polygonal, juxtaposed, with a slightly to moderately convex, rugose surface. Scales across snout between posterior (or single) canthals 4-6. Nasal large, undivided, medial to canthus rostralis, and extending toward the postrostral/lorilabial series, with which it may have a relatively narrow to a broad contact. Nostril directed anterodorsally, in the upper posterior part of nasal. Canthals 1-2, anterior one, when present, usually extending toward loreal region and in contact with lorilabials. Supraorbital semicircles inconspicuous or with 8-12 scales, in contact or separated medially. Supraoculars 4-7, transversely enlarged, bordered medially by two rows of scales about as long as wide, and laterally by an incomplete row of scales which are wider than long and, in some specimens, another incomplete row of small scales; a group of small scales is present anteriorly; adjacent to supraciliaries, a row of rectangular, flat, small scales. Supraciliaries 7-11, anterior ones moderately elongate and each overlapping the scale posterior to it, posterior supraciliaries juxtaposed or slightly overlapping the scale immediately anterior. Interparietal much larger than adjacent scales, irregular in shape. Parietal eye absent. Parietal region with moderately small, irregularly polygonal, juxtaposed to slightly imbricate scales, with a rugose and sharply convex surface. Loreal region with a few relatively large, irregular, rugose and sometimes keeled scales, bordered ventrally by the row of lorilabials. Suboculars 2-4, mostly three, with a keel along their upper margin. Posterior subocular distinctly larger and in contact with supralabials; it marks the end of lorilabial series. Supralabials 5-6, rarely four, posterior one longest and below centre of eye. They are followed by scales similar to adjacent temporal scales, or by two to four enlarged scales. Temporal scales relatively small, conical to trihedral, with a distinct keel. Ear-opening large, in larger specimens bordered anteriorly by transversely compressed and sharply keeled scales.

Mental from about as wide as, to narrower than, adjacent infralabials, and a little longer. Postmentals three (two, asymmetrical, in AMNH 57207). Infralabials 5-6, exceptionally seven, last or one but last below centre of eye. Scales on chin juxtaposed, medially small, elongate, polygonal to oval, convex to broadly keeled; near infralabials distinctly larger, polygonal, slightly convex. A midventral sulcus may be distinct. Posteriad scales change gradually into gulars. Gular region anteriorly with swollen ventrolateral areas, with slightly imbricate, quadrangular to hexagonal, convex, and sometimes feebly keeled scales, which become flatter medially and smaller posteriorly. Gular and antegular folds present, with relatively small, rhomboid, flat, imbricate scales between them. They extend laterally into, respectively, the oblique neck and the antehumeral folds. All dorsal head scales, infralabials, and part of the scales on chin with very minute tubercles (scale organs) widespread on their surface.

Scales on nape small, conical to trihedral, keeled; in some specimens (especially larger ones) shortly mucronate. They gradually change into dorsals. Dorsals distinctly keeled and slightly imbricate, anteriorly smaller and low-trihedral to flat, posteriorly slightly larger and flat; 81-98 (92.1 ± 4.8, n= 15) middorsal scales from nape to posterior margin of hind limbs. Toward the flanks scales decrease slightly in size. Ventrals flat, imbricate, smooth to slightly keeled, on chest rhomboid, posteriorly quadrangular; in 51-67 (59.8 ± 4.8, n= 15) transverse rows (from posterior gular fold

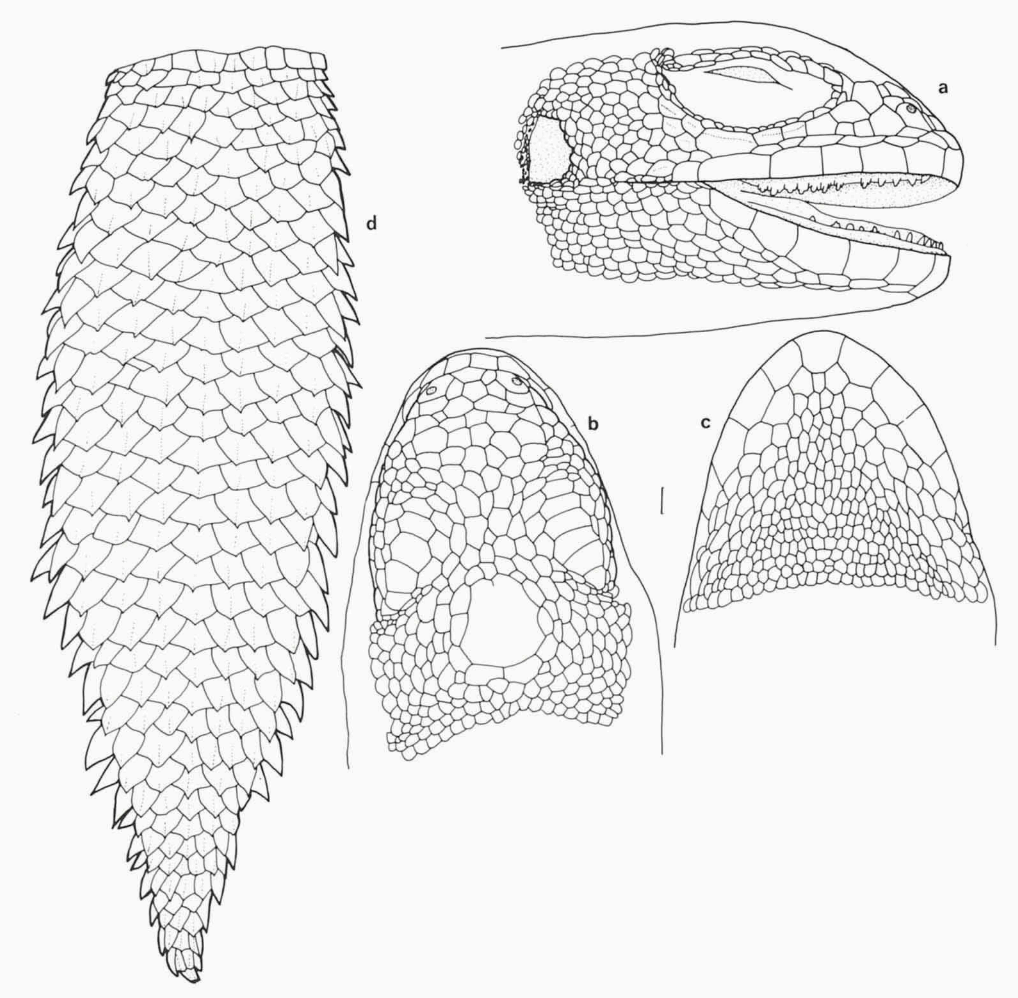


Fig. 67. *Uracentron flaviceps*, MPEG 15988; a, b, c: lateral, dorsal, and ventral views of head; d: dorsal view of tail.

to anterior margin of hind limbs). Transition between scales on flanks and ventrals gradual. Scales around midbody 68-85 (79.1 ± 5.1, n= 15). Preanal plate mostly with rhomboid, imbricate, smooth scales, about as large as ventrals and separated from them by smaller scales.

Scales on dorsal surface of tail relatively large, imbricate, keeled and mucronate, in longitudinal and 31-37 (35.3 ± 1.8, n= 10) distinct transverse rows. At edge of tail the keels develop into spines. On ventral surface, scales near base of tail small, rhomboid to quadrangular, smooth, imbricate. Distally they become larger and slightly keeled (distinctly keeled near tip), arranged in transverse rows continuous with the dorsal ones. Nine to 11 scales dorsally, 11-14 ventrally, across widest section of tail.

Forelimbs with rhomboid, imbricate scales, smooth on posterior and part of ventral aspects of upper arms, and ventral aspect of forearms, keeled elsewhere. Hind limbs with similar scales, smooth on ventral aspect of thighs, and ventral and posterior aspects of lower legs, keeled elsewhere. Subdigital lamellae proximally multicarinate, distally tending to be uni- or tricarinate; 29-35 (31.5 ± 1.6, n= 30, 15 specimens) lamellae under fourth finger, 31-36 (33.2 ± 1.5, n= 29, 15 specimens) under fourth toe.

Some variation in colour pattern exists, which in part seems to be sexual/age linked (Etheridge, 1968: 56; Fugler & Schwaner, 1968: 253), in part geographically determined (Dixon & Soini, 1975: 36, 1986: 42). MPEG 15988, a juvenile or halfgrown female, in life had dorsal part of head salmon (106) with black spots; a black collar, followed by a buff-yellow (53) one; body and limbs dusky-brown (19), densely covered with buff-yellow (53) flecks. Ventral region cream-colour (54) under head and chest, changing into pale salmon (106) on posterior part of belly; under head with some brown spots. Tail dorsally dusky-brown, ventrally peach-red (94). Iris very dark, difficult to distinguish from pupil. Tongue pinkish.

Descriptions of colour in life were given by Etheridge (1968), Fugler & Schwaner (1968; based partially on specimens in alcohol, partially on alive material), and Dixon & Soini (1975, 1986). Guichenot (1855: pl. III) presented a colour plate of the holotype.

In preservative, most specimens with dorsal surface of head bluish-grey, buff-yellow or dark tan, with dark (blackish) spots; a dark collar (of the same basic colour as back) is present on nape, bordered anteriorly and posteriorly by a light band, the anterior one narrower (colour similar to that of head, or whitish); the light bands may be bordered anteriorly (in part) by a blackish stripe, posteriorly by a narrower dark band. Body and limbs dark (dark brown, dusky-brown or dark bluish-grey), either uniform (♂♂), or with whitish or bluish dots (♀♀); tail uniformly dark brown. Ventrally, head bluish-white, bluish-grey or tan, with or without dark spots (fewer than dorsally); body, limbs and tail from as dark as, to distinctly lighter than dorsally; in MPEG 15988, underside of tail reddish.

In UIMNH 79943, UIMNH 91712 (♂♂), and AMNH 57207 (♀), no collar is present. Dorsal surface of head dark greyish-brown, with clay-colour or light bluish-grey irregular bands and spots. Body and limbs dark greyish-brown, covered with clay-colour or bluish-grey round spots (in UIMNH 79943 the spots are very pale, the back tending to an almost uniform brown). Tail dark greyish-brown, in AMNH 57207 with larger clay-colour spots, in the other two specimens uniformly brown. Ventrally, AMNH 57207 with dark head, and light body, limbs and tail, all immaculate; UIMNH 79943 and UIMNH 91712 with dark bluish-grey head, with an irregular brown reticulation, and light brown body, limbs and tail.

Habitat.— MPEG 15988 was collected in terra firme forest, c. 4 m above the ground on a tree. Other data also indicate that the species is a forest dweller, found high above the ground on large tree trunks or in the canopy (Fugler & Schwaner, 1968; Duellman, 1978; Dixon & Soini, 1986; Lescure & Gasc, 1986; Vanzolini, 1986b). Trees with relatively rough bark seem to be preferred (Dixon & Soini, 1986; Vanzolini, 1986a).

Notes on natural history.— Dixon & Soini (1986) reported a number of observations on *U. flaviceps*. Pair formation occurs, and the eggs are deposited in tree holes from 8 to 20 m above the ground. Eggs were reported from April, August and September, and a hatchling from December. Clutches of two eggs were reported (also by Rand, 1982), as well as a communal nest with 14 eggs. Tree holes are also used as nocturnal retreat.

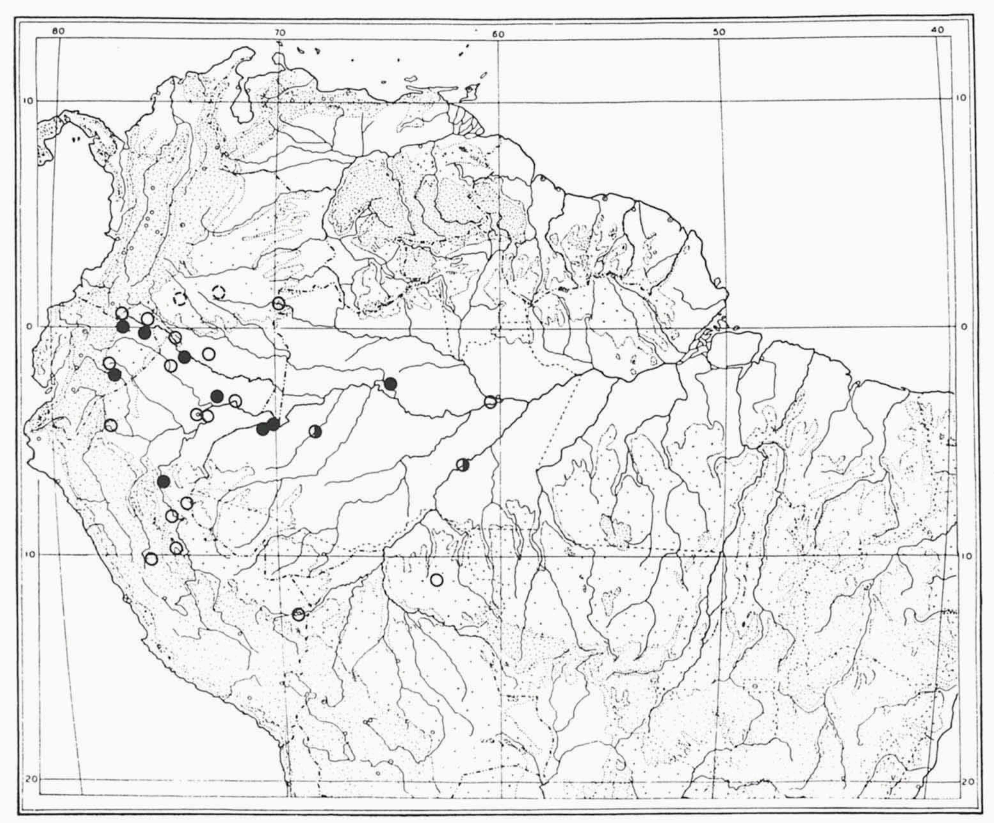


Fig. 68. Distribution of *Uracentron flaviceps*. Closed circles = material studied. Half-open circles = general localities (Rio Madeira, Rio Jutaí). Open circles = data from literature (Etheridge, 1968; Medem, 1968; Greene, 1977; Meede, 1984; Dixon & Soini, 1986; Lescure & Gasc, 1986; Vanzolini, 1986a; Duellman & Salas, 1991). Dashed circles = non-specified localities in Caquetá and Guaviare states, Colombia (Ayala, 1986).

Large tree ants, Coleoptera, Diptera, Orthoptera, Isoptera, and Chilopoda were reported as food items (Fugler & Schwaner, 1968; Duellman, 1978; Dixon & Soini, 1986).

Distribution (fig. 68).— Western Amazonia, in Brazil, Colombia, Ecuador, and Peru. In Brazil in the states of Amazonas (both north and south of Rio Amazonas) and Rondônia.

Remarks.— Among the material studied, specimens from Ecuador tend to present higher scale counts in relation to those from Amazonas, Brazil, especially in number of scales around midbody (respectively, 81-85 versus 68-79; dorsals 88-98 versus 81-95; ventrals 58-67 versus 51-59). The only specimen examined from Peru (MHNP 6882, holotype), agreed in number of scales around midbody (77) with specimens from Brazil, in number of dorsals (97) and ventrals (66) with specimens from Ecuador.

Etheridge (1968) mentioned the type-locality of *U. flaviceps* as "Sarayacu, Peru", but under "material examined" listed the holotype under "Ecuador: Sarayacu".

Though both countries have localities with this name, Guichenot (1855) clearly mentioned that the specimen came from "Pérou, mission de Sarayacu", collected during the expedition of Castelnau. According to Papavero (1971: 156 & map 12), Castelnau followed the Urubamba/Ucayali rivers down stream, in Peru, reaching the "village of Sarayacu (SB-18, 7-75a)" on the 28th of September 1846, from where he left again on the 30th of October. The expedition went through Brazil, Bolivia, Peru, and again entered Brazil, never reaching Ecuador. The Gazetteer of Peru (Anonymous, 1955) mentions two villages called Sarayacu: one at 6°44'S 75°06'W, the other at 7°05'S 74°04'W. The former corresponds to the locality mentioned by Papavero (1971), and thus is the type-locality of *U. flaviceps*.

Etheridge (1968) mentioned MHNP 92.291 as coming from Manaus, Amazonas, but no specific locality data are mentioned for this specimen in the MHNP collection, except that it comes from Brazil. There is therefore no record of specimens of *U. flaviceps* from Manaus.

Uranoscodon Kaup, 1825

Diagnosis.— See diagnosis of the species.

Distribution.— Northern South America east of the Andes, in Amazonia and the northeastern coast.

Content.— Genus monotypic.

Uranoscodon superciliosus (Linnaeus, 1758)
(figs. 69, 70, 256)

Lacerta superciliosa Linnaeus, 1758: 200 (3 syntypes, NRM 109-110, UUZM Linnean collection no. 69; type-locality: 'Indiis', restricted by Hoogmoed, 1973 to the confluence of the Cottica River and the Perica Creek, Suriname).

Lophyrus xiphosurus Spix, 1825: 9 (lectotype, designated by Hoogmoed & Gruber, 1983: 382, ZSMH 3189/0 B; type-locality: Rio Solimões, Brazil).

Lophyrus aureonitens Spix, 1825: 12 (holotype ZSMH 113/0, probably lost according to Hoogmoed & Gruber, 1983: 383; type-locality: Rio Amazonas, Brazil).

Ophryoessa superciliosa; Guichenot, 1855: 22; Duméril & Bibron, 1837: 238; Boulenger, 1885b: 111; Goeldi, 1902: 514, 527; Müller, 1912: 23; Procter, 1923: 1064.

Uranoscodon superciliosa; Burt & Burt, 1931: 298, 1933: 48; Amaral, 1949: 110; Cunha, 1961: 70; Rand & Humphrey, 1968: 5; Peters & Donoso-Barros, 1970: 275; Crump, 1971: 20; Hoogmoed, 1973: 200, 1979: 278; Hoogmoed & Gruber, 1983: 382; Nascimento et al., 1988: 34, 1991: 33; Martins, 1991: 182.

Uranoscodon superciliosum; Vanzolini, 1972: 101, 1986a: 14, 1986b: xx-xxi; Cunha et al., 1985: 30; O'Shea, 1989: 69; Zimmerman & Rodrigues, 1990: 449; Howland, Vitt & Lopez, 1990: 1366.

Uranoscodon superciliosus; Frost, 1992: 44; Gascon & Pereira, 1993: 181; Vitt, 1993: 2375.

Material.— **Brazil.** AMAPA. Município Amapá, Cujulim, road BR-156: 1 ♂, MPEG 3507, 18.xi.1969, leg. F.P. Nascimento.

AMAZONAS. Rio Uatumã, hydroeletric plant Balbina: 2 exs., INPA 041, 055, mouth igarapé Agua Branca, 20-23.iii.1985, leg. R.C. Best; 1 ex., INPA 100, 5 km SW mouth of Rio Pitinga, 09.ix.1985; 1 ex., INPA 231, igarapé Caititu, 07.xii.1985; both leg. A.S. Queiroz; 1 ex., INPA 169, igarapé Caititu, 29.iv.1987, leg. M. Martins; 3 exs., MPEG 14689, 14695, 14696, xii.1987, leg. D. Peccinini-Seale & C.F. Rocha; 1 ex., MPEG 14914, 11.ii.1988, leg. rescue team; 1 ex., MPEG 14925, 26.iii.1988, leg. F.P. Nasci-

mento. Reserva Florestal Ducke, 25 km N of Manaus: 1 ex., MPEG 14401, 07.xi.1985, leg. M.S. Hoogmoed & M. Hero. 2 exs., MPEG 14446-447, 26.vii.1986, leg. A. Lima. Rio Negro, Arquipélago de Anavilhanas: 1 ex., MPEG 16198, Ilha de São Sebastião, Reserva da SEMA; 3 exs., INPA 265-267, ii.1988 & v.1988. Rio Urucu, 3 km S of headwaters (Petrobras area): 2 exs., INPA 323-24, v.1989, leg. C. Gascon.
PARA. Santa Rosa, road to Vigia: 1 ♀, MPEG 7084, 05.x.1973, leg. O.R. Cunha; 1 ♀, MPEG 7371, 19.iii.1974, leg. O.R. Cunha & Barata; 1 ♀, MPEG 9223, 19.ii.1975, leg. O.R. Cunha & F.P. Nascimento. Apeú: 1 ♂, 1 ♀, MPEG 4480-81, v.1970, leg. F.P. Nascimento. Município Ourém, Patauateua: 2 ♀♀, MPEG 16313-314, Fazenda Urubu, 18-20.viii.1992; 9 hatchlings, MPEG 16315-323, born 16-20.xii.1992 (in captivity); 1 ♂, MPEG 16312, Fazenda Gavião Real, 21.viii.1992; all leg. R.R. Silva. Rio Tocantins, reservoir area of hydroeletric plant Tucuruí, Vila Bela (S of Jacundá): 1 ex., MPEG 13407, 17.iv.1984, leg. R.J.R. Moraes. Carajás, Serra Norte: 1 ex., MPEG 13078, Rio Parauapebas, 14.xi.1983, leg. J.C.S. Pinto; 1 ♀, MPEG 13694, Pojuca, 21.vii.1984, leg. T.C.S. Avila Pires, E. Faria, M.G.M. Nery & J.C.S. Pinto. Município de Portel, Rio Caxiuanã, Floresta Nacional de Caxiuanã, IBAMA Post (1°47'32.3"S 51°26'01.5"W): 11 ex., MPEG 16453, 16501, 16504-505, 16507-508, RMNH 26267-271, 06-19.xi.1992, leg. E.S.B. Ribeiro. Rio Trombetas, hydroeletric plant Cachoeira Porteira: 2 exs., INPA 072-073, 67 km NNE Rio Mapuera, viii.1985, leg. R.C. Best; 2 exs., INPA 129-30, igarapé Ricardão, 03-07.xi.1985, leg. A.L. Queiroz. Município de Oriximiná, Cruz Alta, 6 km S Rio Trombetas: 2 ♂♂, 2 ♀♀, MPEG 15351-352, RMNH 26272-273, 06.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, about midway of road from Sítio Céu Estrelado to Cruz Alta, between Rio Nhamundá and Rio Trombetas: 1 ♀, MPEG 15404, 12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; Município de Faro, Rio Nhamundá, Sítio Céu Estrelado, 15 km N Faro: 1 ♀, MPEG 15322, 04.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ♀, CEPB 0224, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr. Fazenda Rio Candeias, km. 28-30 of road BR-364 (Porto Velho-Cuiabá): 2 ♂♂, 1 ♀, MPEG 12917-919, 13-21.iv.1983, leg. R.J.R. Moraes.
Suriname. District Nickerie, Kabalebo area, road to Amotopo: 1 ♂, RMNH 26264, km 39, 01.vi.1981; 1 ♂, 1 ♀, RMNH 26261-262, km 212, 17.v.1981; all leg. M.S. Hoogmoed & J. Toto; 1 ♂, RMNH 26263, km 212, 22.v.1981, leg. G.M. Nachenius & K.L. Stikker.
Guyana. Demerara, Madewini creek: 1 ♀, RMNH 26265, 10.vii.1986, leg. L.G. Hoevers.
Peru. Rio Cayarú, Paraná Yahú, W of Puerto Alegria (close to the Colombian/Brazilian border): 1 ♂, RMNH 26266, 05.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Cayarú: 1 hgr., MPEG 16267, v.1987, leg. B. Pinto.
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Município de Amapá, Rio Tracajatuba (affluent left side Rio Araguari), Reserva DNERu, post 2. Município de Amapá, Igarapé Ariranha (affluent right bank Rio Tartarugal Grande), Reserva DNERu, post 4. Município de Amapá, road BR-156, igarapé Agua Branca. Upper Rio Maracá. Município de Mazagão, Rio Maracá, Cachoeira Pancada. Município de Mazagão, Rio Camaipi (affluent left bank Rio Maracá), Cachoeira Italoca & Cachoeira Amapá. Município de Mazagão, Rio Maracanã, Cachoeira Caranã. AMAZONAS. Mouth of Rio Purus. Rio Solimões, Tefé. MARANHAO. Paruá, road BR-316 (Pará-Maranhão). Nova Vida, road BR-316, 25 km E of Rio Gurupi. PARA. Ilha de Marajó, Município Aramá, Vila Nova do Aramá. Ilha de Marajó, Município de Breves, km 6 road Breves-Anajás. Viseu, road BR-316, Colonia Nova (close to Rio Gurupi). Viseu, Fazenda Real. Rio Piriá, Curupati (road to Viseu). Km 224 of road BR-316. Parada Bom Jesus, road PA-242, 11 km from Brangança. Tracuateua. Município Augusto Correa, road to Arari from PA-242, Fazenda Cacoal (27 km from Bragança). Ourém, Puraquequara. Santa Luzia, road PA-253, 15 km from Capitão Poço. Road to Acará, Rio Pirajauara. Km 16 of road PA-252, from BR-010 to Acará. Capanema, igarapé Urucuri. Rio Guamá, Boca Nova, 18 km from Capitão Poço. Road PA-136, Curuçá, Vila Marauá. Santarém-Novo, Trombetinha (road to Salinópolis). Peixe-Boi. Rio Inhangapi, Arraial do Carmo. Castanhal, Rio Apeú, Boa Vista. Rio Apeú, Macapazinho (close to Castanhal). Município de Benevides, São João da Pratinha, km 9 road to Açucareira. Belém (Utinga; park of Museu Goeldi). Ilha do Mosqueiro. Km 26 road Belém-Brasília. Cairari, between Moju and Tocantins rivers. Vila Nova, km 71 road Tomé-Açu to Paragominas. Rio Tocantins, Mangabeira, S of Baião. Rio Tocantins, area of hydroeletric dam Tucuruí (left bank of Rio Arapari; between Arapari and Pucuruí rivers; Canoal; Ilha

Tocantins; 2 km S of Jacundá). Km 135 of road PA-332, Sítio Bela Vista. Rio Araguaia, Porto Jarbas Passarinho. Rio Paru de Oeste, Missão Tiriós (near Serra de Tumucumaque).

Diagnosis.— Head relatively small, body and tail compressed. Scales on upper surface of head small, subequal, except for some enlarged scales on parietal region. Interparietal several times larger than adjacent scales. Supraorbital semicircle indistinct. Supraciliaries elongate, overlapping. Subocular series formed by 3-9 subequal scales. Scales on frontonasal region slightly overlapping posteriorly. Nostril directed laterally. A distinct row of lorilabials. Gular and antegular folds present, continuous respectively with the antehumeral and oblique neck folds. Vertebral crest from nape to tip of tail. Dorsals homogeneous in size, smaller than ventrals, both keeled, mucronate. Third and fourth fingers subequal. General colour in shades of brown.

Description.- Tropidurid with maximum SVL in males of 156 mm (RMNH 26261), in females of 152 mm (MPEG 13694). Head 0.19-0.23 (n= 23) times SVL (proportionally larger in juveniles than in adults); 1.1-1.4 (1.20 ± 0.07, n= 23) times as long as wide; 1.0-1.2 (1.09 ± 0.05, n= 23) times as wide as high. Snout round, short, rising steeply toward top of head; canthus rostralis distinct. Neck slightly narrower than head and body. Body compressed. Limbs well developed, forelimbs 0.42-0.48 (0.45 ± 0.02, n= 7) times SVL, hind limbs 0.73-0.82 (0.78 ± 0.03, n= 5) times, tibia 0.19-0.23 (0.21 ± 0.01, n= 23) times. Tail long, compressed, tapering toward tip, 1.9-2.6 (n= 16) times SVL. The data I have suggest that tail is about twice the SVL in small specimens, reach a proportion of up to 2.6 times the SVL in specimens sith SVL 80-90 mm, and becomes again proportionally shorter - down to 2.1-2.2 times the SVL - in larger specimens (in all numerical figures above hatchlings were not considered).

Tongue villose with round tip. Anterior teeth conical, posterior teeth tricuspid. Anterior maxillary teeth slightly longer.

Rostral band-like, about four times as wide as high, hardly seen from above. Postrostrals 5-8, mostly 5-6. Scales on snout irregularly polygonal, mostly longer than wide, juxtaposed, keeled, with surface raised toward the keel (from medially arched to triangular in cross section). Nasal large, undivided, separated from rostral. Nostril directed laterally, approximately in centre of scale, at level of canthus rostral-ones, until below centre of eye, larger; not in contact with supralabials. Supralabials 4-5, exceptionally six, posterior one below centre of eye; followed by small scales. Temporal scales polygonal, juxtaposed, keeled, surface arched toward keel, in rows following approximately the curve of the ear-opening. Scales similar but slightly larger on supratemporal area. Ear-opening large, vertically oval, tympanum superficial; mostly with a smooth margin, except upper-anteriorly, where the marginal scales are slightly prominent.

Mental about as wide as first infralabials, extending posteriorly. Postmental 2-5, mostly 3-4, median ones small, lateral ones (one or sometimes two at each side) distinctly larger. Infralabials 5-7, 4-6 to below centre of eye. Scales on anterior part of chin polygonal, juxtaposed and convex; some may be broadly keeled. A short row of chinshields may be present, not in contact with infralabials. Posteriorly chin scales polygonal, juxtaposed, elongate and keeled toward the sides, medially slightly longer than wide, keeled, low-pyramidal, subimbricate, changing gradually into the gular scales. Gular scales anterior to the folds short, pyramidal, sharply keeled and mucronate, slightly imbricate. Between gular folds scales rhomboid, flat except for a median keel, mucronate, imbricate; in some specimens the keels form longitudinal rows. Antegular fold broader than gular fold, continuous with oblique neck fold. Gular fold sharper, its inner side with very small scales; extending laterally as an antehumeral fold. Anterior to oblique neck fold some other small, irregular, transverse neck folds.

Scales on nape small, pyramidal or with a high, prominent keel, gradually changing into dorsals. On sides of neck similar to scales on anterior part of nape; one or two protuberances with slightly larger scales are present dorsolaterally in most adult specimens. A distinct vertebral crest from nape to tip of tail, higher on nape; 48-58 (52.7 ± 3.1, n= 23) vertebral scales from nape to posterior margin of the hind limbs. Dorsals and laterals rhomboid, imbricate, flat, sharply keeled and slightly mucronate, in oblique and transverse rows, homogeneous in size. Ventrals larger than dorsals, imbricate, distinctly keeled, mucronate, anteriorly rhomboid, posteriorly quadrangular with oblique keel; in 50-62 (55.2 ± 3.5, n= 23) distinct transverse rows (from posterior gular fold to anterior level of hind limbs), and in approximately oblique rows; ventrolaterally grading into laterals. Scales around midbody 86-112 (100.3 ± 6.6, n= 23). Scales on preanal plate similar to ventrals.

Scales on tail rhomboid to quadrangular, imbricate, flat, sharply keeled, mucronate, in transverse rows; vertebral crest distinct all along tail. On ventral surface scales increase gradually in size distally, with a more prominent keel and mucro, which form longitudinal ridges. Tail distally divided into indistinct verticils, each verticil mostly with three vertebral scales, five or six rows of dorsals and laterals, and three rows of ventrals.

Upper arms with scales similar to dorsals but larger. Scales on anterior, dorsal and posterior aspects of forearms similar but with a distinct, sharp mucro, and on its ventral aspect progressively smoother toward the wrist. Hind limbs with scales similar in shape to dorsals, from similar in size (posterior and ventral aspects of thighs) to slightly larger (anterodorsal aspect of thighs and lower legs). Subdigital lamellae single, with a sharp median keel; 21-30 (25.0 ± 2.1, n= "44", 22 specimens) lamellae under fourth finger, 29-39 (34.7 ± 2.3, n= "43", 23 specimens) under fourth toe. Toes,

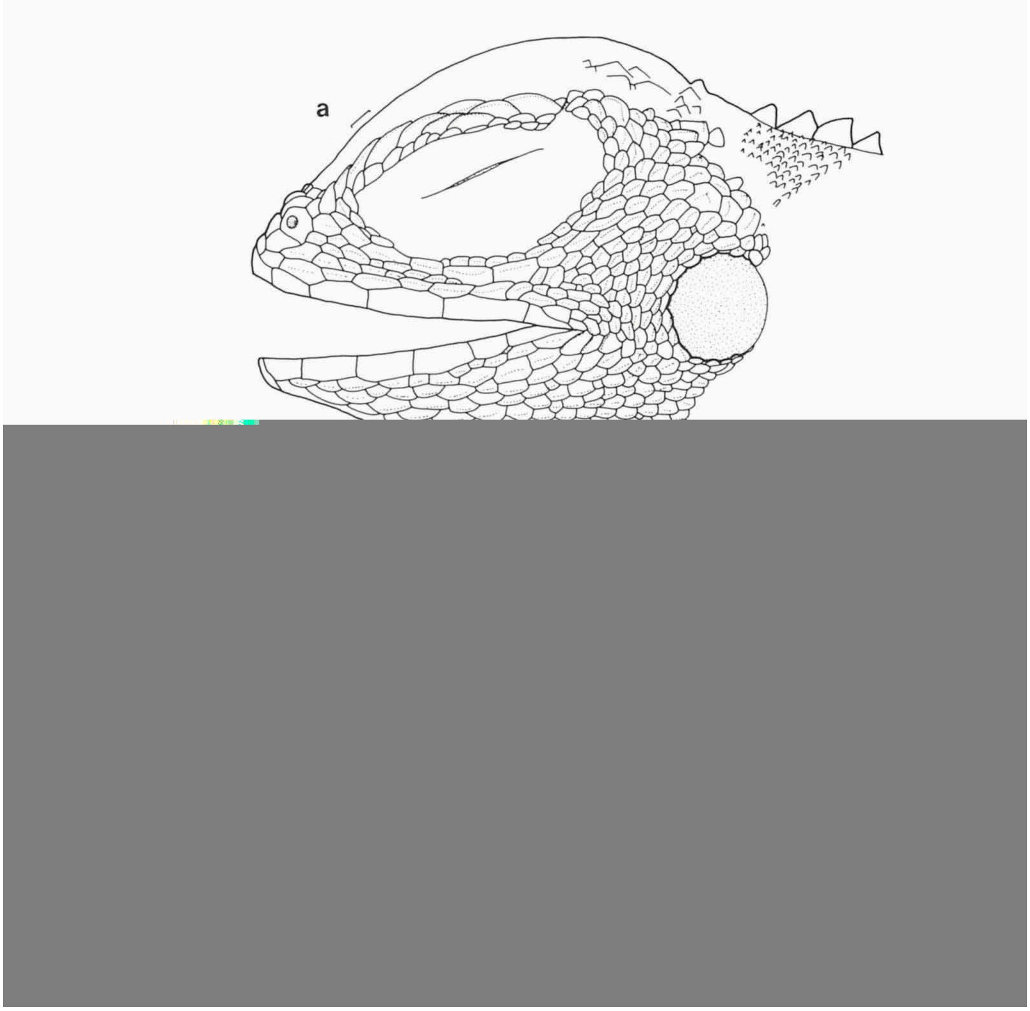


Fig. 69. *Uranoscodon superciliosus*, MPEG 13078; a, b, c: lateral, dorsal, and ventral views of head.

especially fourth and fifth, with prominent serrate lateral (inner) margins.

Colour in life in MPEG 15351 (♀), dorsal surface of head dark olive-brown; eyelids with borders gold-yellow. Back brownish-olive (29) with vertebral crest buff-yellow (53) and black. Flanks with a red band on anterior part of body. Spots on body buff-yellow (53) on flanks, cream colour (54) dorsally and near ventral region. Gular pouch yellow to orange-yellow. Belly pale horn colour (92). Iris orange around pupil, peripherally grading into pale gold. Tongue pale horn colour (92). In RMNH 26272-273 (♂, ♀) no red bands were present on flanks; vertebral crest yellow to orange, plus black; orange-yellow (18) spots present all over on body, limbs and tail. Borders of eyelids spectrum-yellow; gular pouch yellow to orange-yellow; iris light greyish-brown with a pale gold rim around pupil. The juvenile MPEG 15352 had the iris reddish-brown with very narrow gold rim around pupil.

RMNH 26266 (♂) was dark greyish-brown to dark olive-brown dorsally. Vertebral crest sepia (119) and straw-yellow (56). Flanks with straw-yellow (56) spots. Ventral surface of head sulphur-yellow (157). Iris salmon colour (6).

MPEG 16312 (♂) was brownish-olive (29) with black transverse stripes on head, smoke-grey (44) spots on neck, and orange-yellow spots (18) on back, anterior part of flanks, and tail. On posterior part of flanks spots got a spectrum-orange (17) tinge, and on limbs they were paler orange-yellow. On the ventral surface, head and chest light greyish-citrine (51), sides of the head brick red (132A), other areas drab-grey (119D). A brick red colour on sides of head also observed in RMNH 26271 (♂) and, less intense, in MPEG 16507 (♂). No crimson area existed in MPEG 16508 (♀), collected together with the previous two specimens.

In preservative general dorsal colour dull brown, with transverse dark stripes on head (dorsally and laterally), elsewhere peppered with dark scales and light spots. Light spots formed by one to three scales, either rather inconspicuous or very abundant and distinct. A light band on the lower part of flanks is usually present, separated from the upper, darker colour of the back by a sharp, undulating line. Ventral surface of head and belly tan to cream, spotless or scarcely spotted. Flanks and belly may be separated by a darker area, or their colours may merge into each other. Limbs dull brown with dark, or dark and light, spots dorsally, light with isolated dark scales ventrally. Body pattern continues on tail. In juveniles a darker, festooned band runs along the upper part of flanks.

Habitat.— *U. superciliosus* is found most commonly in igapó forest and along creeks and rivers, although it may also be found further away from water, in primary or secondary forest. Crump (1971) found it around Belém in all kinds of habitats - terra firme, varzea, igapó, capoeira, and "open & edge". Howland et al. (1990) reported, among 54 individuals, 85.2% in river forest (varzea) within 5 m of water, 9.3% in terra firme forest within 5 m of water, the remaining more than 20 m from water, either in varzea or terra firme forest. Individuals are usually on tree trunks, branches, or vines, over water or dry ground, at heights varying from a few centimetres to about 2.5 m. More rarely they are seen on the ground. Howland et al. (1990) reported moreover a few animals on rocks and on a floating log. MPEG 15351 and RMNH 26272-273 were collected between 21:00-23:20 h. sleeping on branches over a creek, c. 1.5 m above water surface; MPEG 15352, a juvenile, was on the leaves of a small bush, 15 cm above water surface.

Notes on natural history.— A diurnal lizard. Based on available data, active animals were collected between 08:00 and 17:30 h. Rand & Humphrey (1968) reported the species to be a nonheliotherm.

Frequently *U. superciliosus* tries to escape from predation by jumping into the water, as was the case with MPEG 16504. It was on a branch at about 1.6 m above the surface of water and when it was tried to catch it, it jumped (or better, it apparently let itself fall down), immediately disappearing into the water. A few minutes later it was found again, head up on a tree trunk, c. 1.3 m above water. Also MPEG 13694 was first seen on a tree trunk, c. 2 m high, at the margin of a river. It jumped into the water and it was later found 1.5-2.0 m high on a vine, horizontal in position. Hoogmoed (1973) reported an individual to run over the water surface on the hind limbs for a short distance; in the water the specimen made undulating movements with the tail. Running over water was also mentioned by Howland et al. (1990). Beebe (1944b) noted bipedal running on the ground.

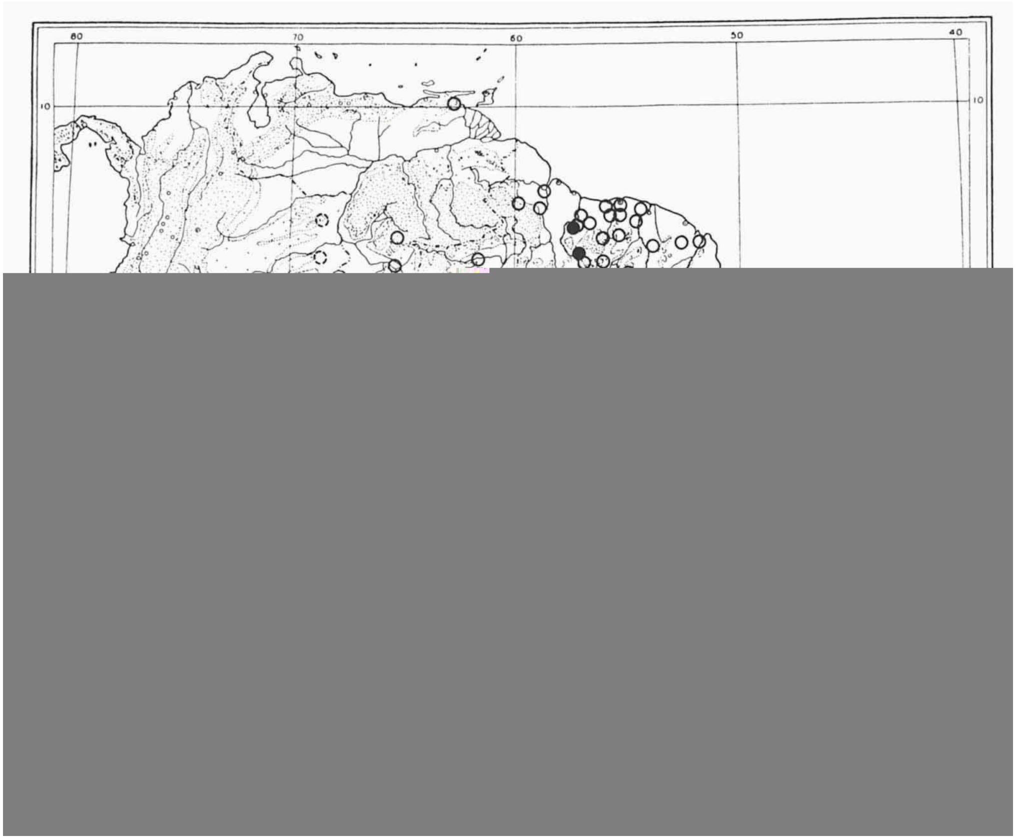


Fig. 70. Distribution of *Uranoscodon superciliosus*. Closed circles = material studied (Urucu, Amazonas: pers. comm. C. Gascon and M.S. Hoogmoed). Open circles = data from literature (Burt & Burt, 1931; Parker, 1935; Beebe, 1944b; Donoso-Barros, 1968; Vanzolini, 1972; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976; O'Shea, 1989; Zimmerman & Rodrigues, 1990). Dashed circles = data by Ayala (1986) for Colombian states.

As already reported by Beebe (1944b) and this was the predominant behaviour observed by Howland et al. (1990), *U. superciliosus* may also stay motionless when collected, and it tends to stay so when handled.

MPEG 13407 was eating an earthworm when collected. Food items reported were millipedes, diplopods, earthworms, arachnids, and a variety of insects, among which ants, beetles, orthopterans, and eruciform larvae were among the most common (Beebe, 1944b; Hoogmoed, 1973; Howland et al., 1990; Martins, 1991).

One of two females, MPEG 16313 (SVL = 127 mm) or MPEG 16314 (SVL = 130 mm), was collected already pregnant (perceptible from its enlarged belly) between 18 and 20.viii.1992. It was kept in a terrarium, and on 06.ix.1992 oviposited at least 10, maybe 12, eggs (unfortunately no precise number of eggs is available due to conditions under which eggs were laid in a communal terrarium). Nine eggs hatched between 16 and 20.xii.1992, thus after an incubation period of 101-105 days. Hatchlings (MPEG 16315-323) had SVL 34-39 mm (37.2 ± 1.7), tail length 1.5-1.9 (1.63 ±

0.17) times SVL, head length 0.23-0.26 (0.24 ± 0.01) times, forelimbs 0.5-0.6 (0.53 ± 0.02) times, and hind limbs 0.8-0.9 (0.88 ± 0.04) times SVL. Weight varied between 1.3 and 2.0 (1.73 ± 0.27) g. Beebe (1944b) reported two clutches of respectively six and 11 eggs, Hoogmoed (1973) mentioned 3-8 eggs per clutch, Rand (1982) 6-8 eggs, and Howland et al. (1990) 3-9 eggs. Hoogmoed (1973) and Rand (1982) found evidence of a relation between clutch size and SVL, not so clear in the data by Howland et al. (1990). Nest sites are cavities either in wood (Beebe, 1944b) or in the ground (Hoogmoed, 1973).

Howland et al. (1990) made a detailed study on the ecology and life history of *U. superciliosus*, and their paper should be consulted for more information on the natural history of this species.

Distribution (fig. 70).— Northern South America east of the Andes, in Brazil, French Guiana, Suriname, eastern Venezuela, eastern Colombia, and northeastern Peru. In Peru only known from a locality close to the Colombian/Brazilian border (this paper). In Brazil throughout all or almost all of Amazonia (Maranhão, Pará, Amapá, Amazonas, Roraima, Rondônia); it has not yet been reported from Acre.

Remarks.— Considering the known distribution of *U. superciliosus*, its presence in Bolivian Amazonia could be expected as well. In Peru some localities (Iquitos region, in the north, and Cocha Cashu, Cuzco Amazonico and Panguana, in the south) have been subjected to more detailed surveys and in none of these areas *U. superciliosus* was found, indicating that its absence there probably is real.

Frost (1992) noted that the generic name, *Uranoscodon*, is masculine, and therefore the specific epithet also should be in the masculine form.

Family Gekkonidae Gray, 1825

Classification follows Kluge (1967, 1991). Diagnostic characteristics were given by Estes et al. (1988).

Content.— Six genera in Amazonia. Subfamily Gekkoninae characterized by pupil vertical with lobed margins; digits strongly dilated at least proximally;

Hemidactylus mabouia (Moreau de Jonnès, 1818)
(figs. 71, 72, 258)

Gecko Mabouia Moreau de Jonnès, 1818: 138 (holotype MHNP 6573, type-locality: Antilles, restricted to St. Vincent Island, Lesser Antilles, by Stejneger, 1904).

Hemidactylus mabouia: Guichenot, 1855: 12; Boulenger, 1885a: 122; Goeldi, 1896: 420, 1902: 507; Griffin, 1917a: 307; Procter, 1923: 1064; Cott, 1926: 1160; Burt & Burt, 1931: 247, 1933: 4; Amaral, 1937a: 1734, 1937b: 170, 1949: 108; Beebe, 1944a: 155; Schmidt & Inger, 1951: 450; Cunha, 1961: 52; Wermuth, 1965: 79; Vanzolini, 1968: 60, 1978b: 328, 1986a: 13, 1986b: 10; Müller, 1969: 120; Crump, 1971: 19; Kluge, 1969: 28; Peters & Donoso-Barros, 1970: 142; Hoogmoed, 1973: 46, 1979: 277; Nascimento et al., 1988: 28; 1991: 33.

Material.— **Brasil.** ACRE. Rio Branco: 1 ex., RMNH 26440, 31.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila-Pires.

AMAPA. Serra do Navio, around building CCH/ICOMI: 5 ♀♀, 4 ex., MPEG 15022-15027, RMNH 26441-443, 05.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila-Pires. Vila Nova, 86 km SW of Serra do Navio: 1 juv., MPEG 15114, 14.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila-Pires.

AMAZONAS. Manacapuru, 87 km W of Manaus: 1 ♀, RMNH 26444, 26.xi.1985, leg. M.S. Hoogmoed. Anavilhanas: 1 ex., INPA 290, iv.1987, leg. R. Nonato. Porto Urucu, Rio Urucu, S of Tefé: 1 ex., MPEG 15848, inside a trailer transported by helicopter to the area, 22.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila-Pires. Rio Negro: NMW 17775.2-3, leg. Natterer; NMW 17775.5, 1889, leg. Staudinger. Tabatinga, Rio Solimões (northern bank): 3 ♂♂, 1 ♀, RMNH 26445-449, 09.xi.1985, leg. M.S. Hoogmoed. Benjamin Constant, Rio Solimões (southern bank): 1 ex., RMNH 26625, 1 juv., MPEG 15883, 06.xii.1989; 2 juv., MPEG 15960, RMNH 26450, 12-13.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila-Pires.

PARA. 1 ♂, BM 50.4.8.14, purch. Mr. Bagalay; 1 juv., BM 51.2.3.14, purch. Mr. Stevens. Ilha de Marajó: 4 ♂♂, 1 ♀, BM 1923.11.9.46-50, 1 ♂, BM 1924.2.28.4, all purch. W. Ehrhardt; 1 ♂, BM 1974.5500, 13.xii.1925, leg. H.B. Cott. Belém: 11 ex., MPEG 641-650, MPEG 15562, 1955, leg. O.R. Cunha. Belém, Parque do MPEG: 13 ex., MPEG 1953-65, 22.xi.1966, leg. F.P. Nascimento; 1 ♂, MPEG 2265, 11.iii.1967, leg. F.P. Nascimento; 2 ex., MPEG 2343-44, 11 & 28.viii.1967, leg. F.P. Nascimento. Belém, Utinga, IPEAN: 7 ex., MPEG 1853-59, 1962. Cametá, Rio Tocantins: 1 ex., NMW 17774, 1912, Museum Pará, Brasilien Expedition. Carajás, Serra Norte, N-1: 1 ♀, MPEG 13301, 21.iii.1984, leg. T.C.S. Avila Pires, M.I.S. Assunção & J.C.S. Pinto; 2 ex., MPEG 14245-246, 06.xi.1985, leg. T.C.S. Avila Pires & R. Moraes. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 5 exs., MPEG 16356, 16386, RMNH 26638-639, 26649, 21-24.x.1992, leg. M.S.Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Santarém: 1 ♂, BM 56.3.25.4, leg. H.W. Bates. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 2 ♂♂, 1 ♀, 7 ex., MPEG 15340, 15350, 15376, 15387-391, RMNH 26451-452, 05-10.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila-Pires & R.A.T. Rocha. Município de Faro, Sítio Céu Estrelado, Rio Nhamundá, 15 km N of Faro: 5 ex., MPEG 15307, 15318, RMNH 26453-455, 30.xi-14.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila-Pires & R.A.T. Rocha.

In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Rio Tracajatuba, Amapá (city). Rio Araguari, between Porto Platon and Porto Grande. ESPIRITO SANTO. Linhares, Sooretama. RIO GRANDE DO NORTE. Maçaranduba, São Gonçalo. PARA. Seminário S. Pio X, Ananindeua. Bujaru. Ajuruteua, Bragança. Boa Vista, Apeú. Puraquequara, Limão Grande, Ourém. Km 74 of road BR-316 (Pará-Maranhão), Viseu. Fazenda Real, Viseu. Rio Tocantins, Eletronorte permanent village, hydroeletric dam Tucuruí. Rio Tocantins, Tucuruí reservoir, area of Caraipé. Altamira. RONDONIA. Porto Velho.

Diagnosis.— *Hemidactylus* with lamellae under fourth toe starting at some distance from base of toe, which is covered by granules; fourth and fifth toes form a right angle; dorsal tubercles heterogeneous, with conical and trihedral tubercles interspersed among small scales; distance between dorsal tubercles larger than width of tubercles; males with a continuous row of 28-34 obliquely oval pores, absent in females; auricular scales absent.

Description.— Geckonine gecko with maximum SVL of 67.9 mm (Kluge, 1969, cT). Head 0.24-0.31 (0.27 ± 0.01, n= 24) times SVL, 1.4-1.6 (1.46 ± 0.05, n= 24) times as long as wide, and 1.4-1.8 (1.61 ± 0.10, n= 24) times as wide as high. lip of snout round, snout slightly elongate, gently sloping toward top of head. Neck narrower than head and body. Body distinctly depressed. Limbs well developed, forelimbs 0.28-0.33 (0.31 ± 0.02, n= 11) times SVL, hind limbs 0.39-0.47 (0.43 ± 0.02, n= 11) times. Tail depressed proximally, round in cross section distally, 1.0-1.3 (1.18 ± 0.08, n= 10) times SVL.

Tongue villose, relatively wide, narrowing anteriorly; tip round, with a short median cleft. Teeth small, conical, subequal.

Rostral relatively large, rectangular, about twice as wide as deep, visible from above; with a long median cleft extending from the posterior margin. Three postrostrals, lateral ones (supranasals) distinctly larger than median one; median one about the same size as adjacent scales on snout. Nostril bordered by rostral, first supralabial, two or three postnasals and lateral postrostral; postnasals larger than, or as large as, adjacent loreal scales. Scales on snout roundish, convex, juxtaposed; very small posteriorly, distinctly larger anteriorly. Scales on loreal region similar in shape to those on snout, relatively large on the upper part, smaller below; in some specimens there are a few larger, conical, scales near upper anterior corner of eye; adjacent to supralabials, two to three parallel rows of elongate, polygonal, flat scales. Loreal scales 10-18 in a longitudinal line between nostril and orbit. Upper and posterior parts of head with granular scales, smaller than those on posterior part of snout; with interspersed enlarged scales, although not as conspicuous as the enlarged ones on body. Supraorbital region with scales similar to those on top of head. Supraciliary flap with a double row of slightly enlarged scales along anterior and antero-dorsal border of eye; postero-dorsally, a few spines may be present. Pupil four-lobed, vertically elongate. Ear-opening much smaller than eye, vertically oval. Supralabials 9-14, decreasing smoothly in size posteriorly, 8-11 to below centre of eye.

Mental large, triangular or pentagonal, with an acute angle posteriorly. Two large postmentals, each one followed latero-posteriorly by another large scale. Scales

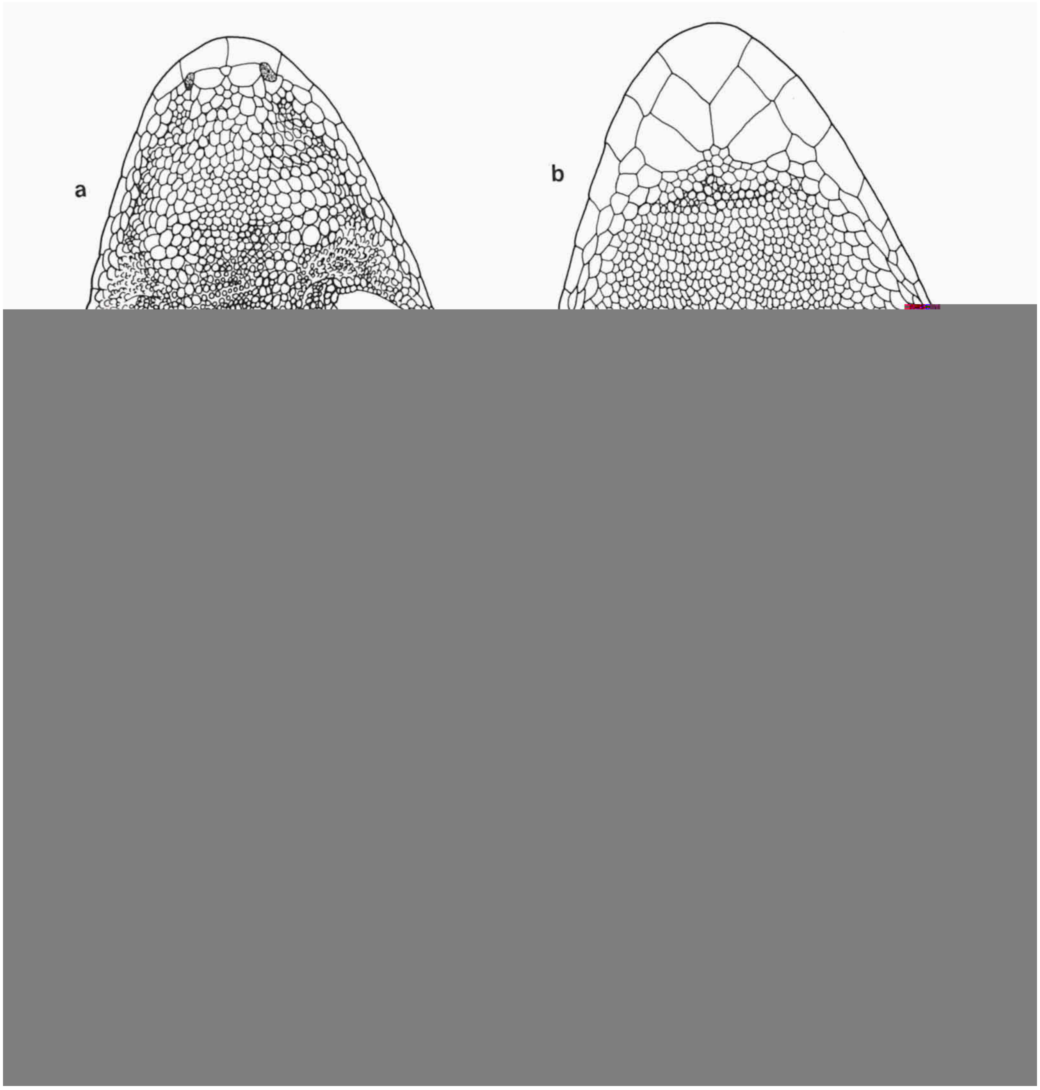


Fig. 71. *Hemidactylus mabouia*, RMNH 26625; a, b: dorsal and ventral views of head; c: tubercles on the back, approximately at midbody; d: ventral view of left foot (only fourth toe draw in detail);

of row of pores (not included); about 34-43 (39.1 ± 2.2. n= 21) ventral scales in a transverse line at midbody, but delimitation from contiguous lateral scales not sharp. Scales around midbody 113-134 (125.3 ± 4.6, n= 23). A continuous series of 28-34 (30.9 ± 2.1, n= 10) obliquely oval pores in males, absent in females, although a distinct series of scales similar to the pore bearing scales in males is present. Preanal plate with scales similar to ventral scales, except for a short zone of small scales near vent.

Scales on tail mostly small, squarish to rhomboid, smooth or striated, slightly imbricate, in transverse rows; with six longitudinal rows of enlarged, posteriorly directed, spines. A midventral row of transversely enlarged scales, with a repetitive sequence of one midventral scale in contact latero-distally with one scale per side, followed by one slightly larger midventral, which latero-distally is in contact with two scales per side. Ventrolateral scales increasing in size toward mid-ventral row.

Scales on dorsal and anterior surfaces of forelimbs, anterior surface of thighs, and anterior and posterior surfaces of lower legs moderately large, imbricate, with round posterior margin; similar scales, but larger, on ventral surface of hind limbs; other surfaces with small, granular scales, on posterior surface of forearms and dorsal surface of hind limbs intermixed with enlarged tubercles. Fingers and toes with a dilated basal portion, from within which the distal phalanges rise angularly; underside of dilated part with a series of enlarged, villose lamellae, mostly paired, except for the distal one, and in some specimens the proximal one. Eight or nine subdigital lamellae in the dilated portion, both under fourth finger and fourth toe. Lamellae under fourth toe starting at a certain distance from base of toe, which is covered by granules. Fourth and fifth toes form a right angle.

Colour in life (MPEG 15848, RMNH 26440), dorsally, from very pale neutral grey (86), through smoke-grey (44), to smoke-grey (45) and olive-brown (28) in the darker phase. Ventrally paler than dorsally, almost white or pale horn colour (92). Iris golden, or flesh-ochre (132D) with some golden reflex and dark brown lines.

Colour in preservative greyish-white to brownish-grey, with dark-brown transverse bands present or absent dorsally on body, always present on tail. Head slightly darker than body. Ventral surface white, immaculate, semi-translucent. Juveniles can show a darker, brown colour, with dark-brown transverse bands present dorsally on body, and tail with alternating light and dark brown bands; ventral region as in adults.

Habitat.— In Amazonia it is mainly found in perianthropic situations, on internal and external walls of buildings, on street poles, etc. In Serra do Navio it was also found (at night) on isolated trees, in the garden around some buildings, and running through grass and leaves on ground, between the buildings and trees. Vanzolini (1978b) mentioned that "in many places, from the Amazons to the caatingas, *H. mabouia* has also been found in environments very little disturbed", suggesting that it can colonise natural environments. Kluge (1969) referred to the "naturalness" of most of the Ecuadorian and Peruvian records. I myself have no record of *H. mabouia* in natural environments, but exclusively in perianthropic situations. Crump (1971), studying the herpetofauna in some remaining forests and their surroundings, in Belém, registered *H. mabouia* only in the 'open & edge' (a category where she included all non-forest study sites). O.R. Cunha (pers. com.) remarked that it used to be commonly found, in Belém, hidden in wood fences around houses, and in walls made of hollow bricks. Up to the present the species is common on the walls of buildings, in the city. Dixon & Soini (1975, 1986) also recorded it, around Iquitos (Peru), as restricted to areas of human habitation. In Suriname, Hoogmoed (1973) reported it from "the walls of brick-houses in Paramaribo and Nieuw Nickerie and in some human dwelling places in the forest". Gasc & Lescure (1981) mentioned *H. mabouia* as strictly antropophile, that is, linked to human habitations.

Notes on natural history.— It is a nocturnal gecko, at night frequently seen near lights, which attract insects. During the day these geckos hide in crevices or behind several kinds of objects (like curtains, paintings hanging on the wall, furniture, etc.).

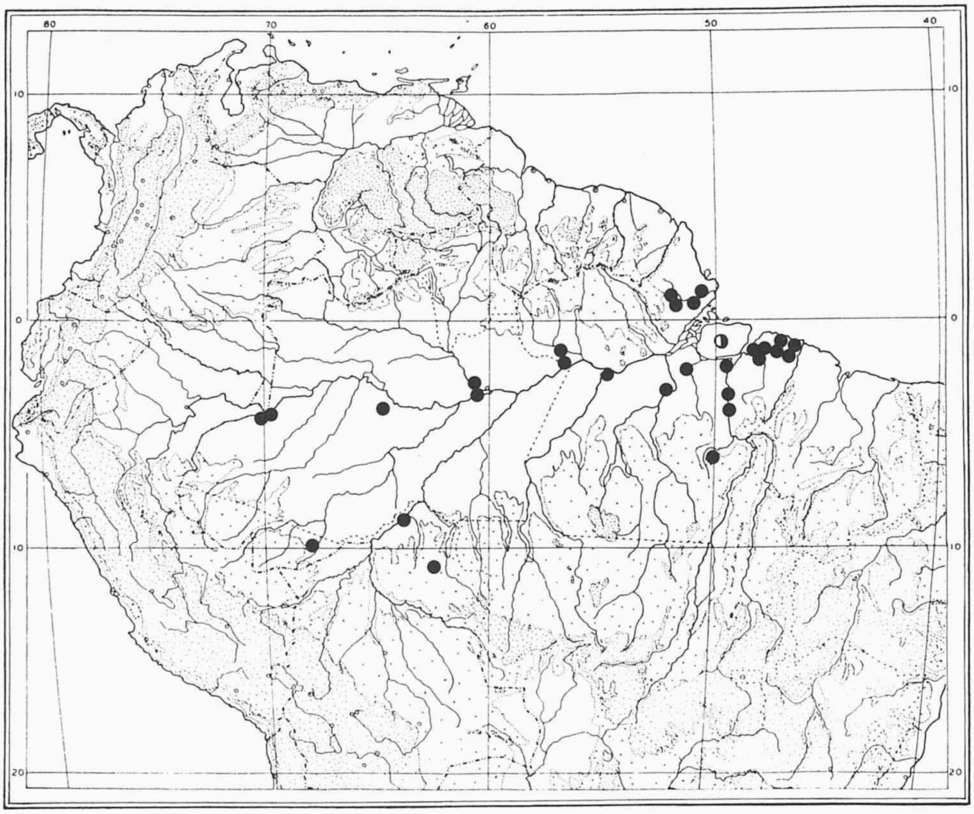


Fig. 72. *Hemidactylus mabouia*, distribution of material studied (for general distribution in South America see Vanzolini, 1978b: map 2); the half-open circle represents Marajó Island, without further specification.

Like other geckos, they are able to produce a sound, as described by Goeldi (1902) and Cunha (1961). Dixon & Soini (1975, 1986) gave some data on reproduction.

Distribution (fig. 72).— A widespread species, occurring in Africa south of 10°N, Madagascar, the Antilles (mainly the Lesser Antilles, and a few localities in the Greater Antilles), and South America. In South America it occurs along the coastal region in Brazil and the Guianas, along most of the Amazon river, its head waters in Ecuador and Peru, and several of its tributaries, and in some localities in central Brazil. Vanzolini (1978b) discussed the distribution of *H. mabouia* in continental South America. He suggested that the southern limit of the species is probably Rio Grande do Sul, doubting an existing record for the species in Uruguay; he also suggested that the species is associated with relatively wet climates, which would explain its scarce presence in central Brazil, largely covered by 'cerrados', with drier conditions than in forested areas.

Remarks.— Goeldi (1902) suggested that the presence of *H. mabouia* both in Africa and South America could be explained by its transport during the slave trade (without being sure in which direction that had occurred). Cunha (1961) and others accepted the idea of the introduction of *H. mabouia* into the Neotropics by these means. Vanzolini (1968), although not accepting this idea as granted, presented some data in favour of it. Kluge (1969) argued, on the contrary, that the species more likely had been transported from Africa by natural rafting, presenting evidence in support of his hypothesis. Vanzolini (1978b) suggested that both natural rafting and transport by man may have occurred, but he argued against some of the evidence given by Kluge (1969). In any case, the distribution of *H. mabouia* in Amazonia is clearly one of expansion following man, and if it can at all colonise natural environments, at least in Brazilian Amazonia it seems to be to a quite low extent. Clear cases of relatively recent invasions, due to transport by man, are the records of *H. mabouia* in Serra Norte, Carajás, where it was only found in wooden buildings in a campsite, and in the Petrobrás base in Urucu, where animals were found in containers transported to the area by helicopters. Hoogmoed (1981) argued in favor of a recent (possibly mid nineteen sixties) invasion of the species in Suriname.

Kluge (1969) presents a complete synonymy of this species, and Vanzolini (1968) a detailed one for South America.

The species is the common 'osga', as it is popularly known in the northern part of Brazil, or, in the southeastern, the common 'lagartixa' or 'lagartixa-de-parede' (although these names may be also variably applied to other geckos).

Hemidactylus palaichthus Kluge, 1969
(figs. 73, 74, 259)

Hemidactylus palaichthus Kluge, 1969: 39 (holotype AMNH 60931, type-locality: Kurupukari, Guyana, 4°N 59°25'W); Hoogmoed, 1973: 53; Vanzolini, 1978b: 317, 1986b: 10; Cunha, 1981a: 4; O'Shea, 1989: 68.

Material.— **Brazil.** AMAZONAS. Borba, Rio Madeira: 2 ♂♂, 1 ♀, MNRJ 3668-70, i-iii.1943, leg. A. Parko; 1 ♂, MNRJ 4430, v-x.1943. Rio Negro: 1 ♂, 1 ♀, NMW 17775.1,4, leg. Natterer; 2 ♂♂, NMW 17775.6-7, 1888, leg. Steindachner. Paricatuba, Rio Negro: 1 ♂, 2 ♀♀, BM 1977.2263-2265, 9-10.xi.1972, leg. P.E. Vanzolini & A.F. Stimson, 'Expedição Permanente da Amazônia'; 2 ♀♀, MCZ 154208-209, 11-14.xi.1972, leg. 'Expedição Permanente da Amazônia'.
RORAIMA. Município de Boa Vista, Fazenda Bom Intento: 7 ♂♂, 7 ♀♀, MPEG 5134-35, 4139-40, 4142, 4298, 4307, 4330, 4401, 4474-78, 01-15.vii.1970, leg. F.P. Nascimento. Município de Boa Vista, Colônia Coronel Mota, Região do Taiano: 3 ♂♂, 3 ♀♀, MPEG 3950, 5048, 4070, 4082, 4083, 4102, 16-25.vi.1970, leg. F.P. Nascimento. Ilha de Maracá: 2 ♀♀, 2 juv., MR 051, 03.vii.1987; MR 548-549, casa Maracá, 12.ii.1988; MR 554, casa Maracá, 15.ii.1988; all INPA/RGS/SEMA "Projeto Maracá", leg. M. O'Shea. Frechal, Rio Surumu: 1 ♀, paratype, AMNH 36306, 09.vii.1927, leg. Tate-Carter Exped.
Guyana. DEMERARA. Lama Conservancy, NE Guyana: 1 ♂, RMNH 26456, 27.xii.1985; 1 ♀, RMNH 26627, 02.ii.1986; 1 juv., RMNH 26464, egg collected 02.ii.1986, hatched 12.iv.1986, all leg. L.G. Hoevers.
Venezuela. SUCRE. E of Güiria: 2 ♂♂, 1 ♀, 1 juv., GNM 4658, 26-29.vii.1980, leg. U. Svensson.
"Haut Orénoque, Brésil": 1 ♀, KNMB 1093E, 1935, leg. Marquis de Wavrin.

Diagnosis.— *Hemidactylus* with lamellae under fourth toe reaching the sole; fourth and fifth toes form an acute angle; dorsal tubercles heterogeneous, with conical or trihedral tubercles interspersed among small scales; distance between dorsal tubercles as large as, to smaller than, width of tubercles; males with a continuous row of 32-46* obliquely oval pores, absent in females; auricular scales absent. (*also considering data by Kluge, 1969 and Vanzolini, 1978b)

Description.— Gekkonine gecko with maximum SVL in males of 71 mm (NMW 17775.6), in females of 67 mm (BM 1977.2264). Head 0.25-0.29 (n= 46) times SVL, proportionally larger in smaller specimens; 1.3-1.5 (1.38 ± 0.07, n= 46) times as long as wide; 1.4-1.9 (1.59 ± 0.10, n= 46) times as wide as high. Tip of snout round, snout slightly elongate, gently sloping toward top of head. Neck narrower than head, almost as wide as body. Body depressed, less so in adults than in juveniles. Limbs well developed, forelimbs 0.25-0.31 (0.28 ± 0.03, n= 5) times SVL, hind limbs 0.36-0.43 (0.39 ± 0.03, n= 4) times. Tail depressed proximally, round in cross section distally, 0.9-1.2 (n= 12) times SVL, relatively shorter in smaller specimens.

Tongue villose, relatively wide; tip round, with a short median cleft. Teeth small, conical, subequal.

Rostral relatively large, rectangular, about twice as wide as high, visible from above; with a long median cleft extending from posterior margin. Three, occasionally two or four, postrostrals, lateral ones (supranasals) distinctly larger than median one(s), median one(s) approximately as large as adjacent scales on snout. Nostril bordered by rostral, first supralabial, two to five (mostly two) postnasals and lateral postrostral. Postnasals as large as, or slightly larger than, adjacent loreal scales. Scales on snout roundish, convex, juxtaposed; very small posteriorly, distinctly larger anteriorly. Scales on loreal region similar in shape to those on snout, relatively large on the upper part, smaller below; adjacent to supralabials, one or two rows of elongate, polygonal scales, larger than scales immediately above on snout. Because of variation in size, counting of loreal scales is not very consistent; adding individual variation, it can range from nine up to twenty, in a longitudinal line between nostril and orbit. Upper and posterior part of head with granular scales, smaller those on posterior part of snout; with interspersed enlarged scales, although much smaller than enlarged ones on body. Supraorbital region with scales similar to those on top of head. Supraciliary flap with a double row of slightly enlarged scales along anterior and antero-dorsal border of the eye; postero-dorsally, a few small spines may be present. Pupil four-lobed, vertically elongate. Supralabials 8-12, decreasing smoothly in size posteriorly, 7-10 to below centre of eye. Ear-opening much smaller than eye, vertically oval or triangular.

Mental large, triangular, forming an acute angle posteriorly. Two large postmentals (three, asymmetrical, in MCZ 154208), each followed latero-posteriorly by one, occasionally two, relatively large scale(s). Scales on chin small, polygonal, juxtaposed; adjacent to infralabials a few rows of larger, elongate scales, juxtaposed anteriorly, subimbricate posteriorly. Infralabials 8-10, decreasing in size posteriorly, 6-9 to below centre of eye. Scales on neck similar to dorsals; on throat, scales transitional between those on chin and chest.

Dorsal scales heterogeneous, with very small, variably shaped scales, some with striated surface, and much larger, conical (anteriorly) or trihedral, striated tubercles, approximately equidistant from each other, except for a gap along the vertebral area; general distance between tubercles smaller than, to as large as, width of tubercles. Ventral scales hexagonal, flat, smooth, imbricate, with smooth or finely indented posterior margin, in oblique and approximate longitudinal rows; 49-80 (57.9 ± 6.3, n=

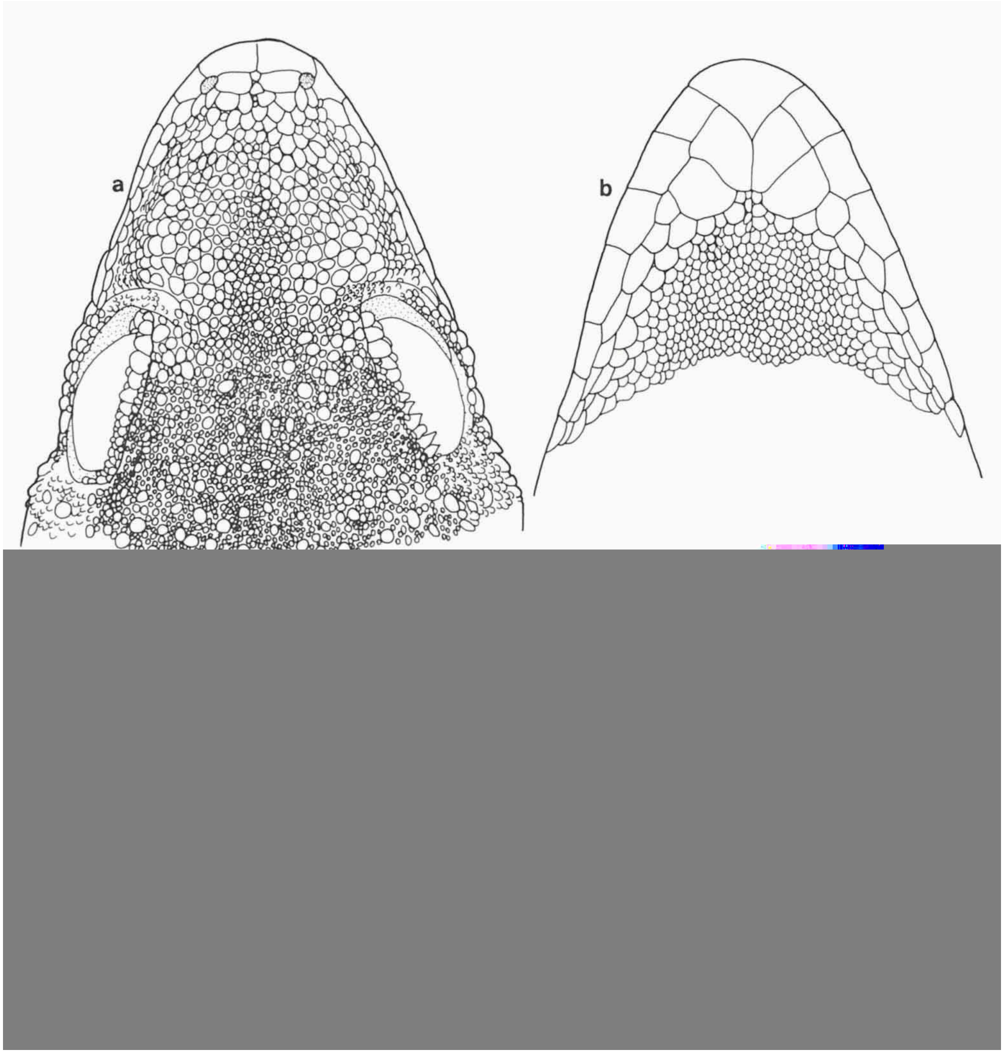


Fig. 73. *Hemidactylus palaichthus*, MPEG 4135; a, b: dorsal and ventral views of head; c: tubercles on the back, approximately at midbody; d: ventral view of left foot (only fourth toe draw in detail);

43) scales along the midventral line between the anterior margin of forelimbs and level of row of pores (not included); 30-38 (34.0 ± 2.2, n= 42) scales in a transverse line at midbody. Scales around midbody, considering only the small dorsals, 111-139 (123.7 ± 7.7, n= 21). Males with a continuous series of 33-40 (36.2 ± 2.2, n= 18) obliquely oval pores; females without pores, although an equivalent series of scales is recognizable. Preanal plate with scales similar to ventrals, except for a short zone of small scales near the vent.

Scales on tail mostly small, striated, subimbricate, posteriorly blunt or pointed, in approximate transverse rows; with six (proximally eight in some specimens), longitudinal rows of enlarged, posteriorly directed, tubercles. A midventral row of transversely enlarged scales, with a repetitive sequence of one midventral scale in contact latero-distally with one scale per side, followed by one slightly larger midventral, which latero-distally is in contact with two scales per side. Ventrolateral scales increasing in size toward the midventral row.

Scales on dorsal surface of upper arms and thighs, postero-dorsal surface of forearms, and anterior, dorsal and posterior surfaces of lower legs similar to dorsal scales, with interspersed tubercles; other surfaces with smooth, imbricate scales, with round posterior margin, very small ventro-posteriorly on upper arms, on ventral surface of forearms and posterior surface of thighs; about same size as ventrals elsewhere. Fingers and toes with a proximal part transversely expanded, from within which rises angularly the distal phalanges; underside of widened part with a series of enlarged, villose lamellae, mostly paired, but frequently one or two proximal ones, and always the distal one, single. From eight to ten lamellae, in the widened part, under fourth finger; from nine to eleven, under fourth toe. Lamellae under fourth toe starting at base of toe. Fourth and fifth toes form an acute angle.

Data on colour in life is not available.

In preservative, general colour greyish-brown or, more rarely, yellowish-brown, with dark brown drawings, which basically consist of (1) two longitudinal stripes at each side, from rostral, through eyes, above fore- and hind limbs (inferior stripe through or above hind limbs), onto base of tail; more straight on head, wavering along body; (2) other irregular spots on head; (3) transverse, wavering stripes along body, linking the superior longitudinal stripe at each side; (4) irregular transverse stripes on both fore- and hind limbs; and (5) transverse stripes on tail, approximately straight all along it, or U-shaped on dorsal surface, proximally. In some specimens, this pattern is not complete. Ventral surface cream, under tail peppered with brown ventro-laterally, medially with brown spots.

Habitat.— Near Boa Vista, Roraima, Cunha (1981) reported specimens found on rocks in natural grasslands ("campos"), on fences of farms, and possibly in the vicin-

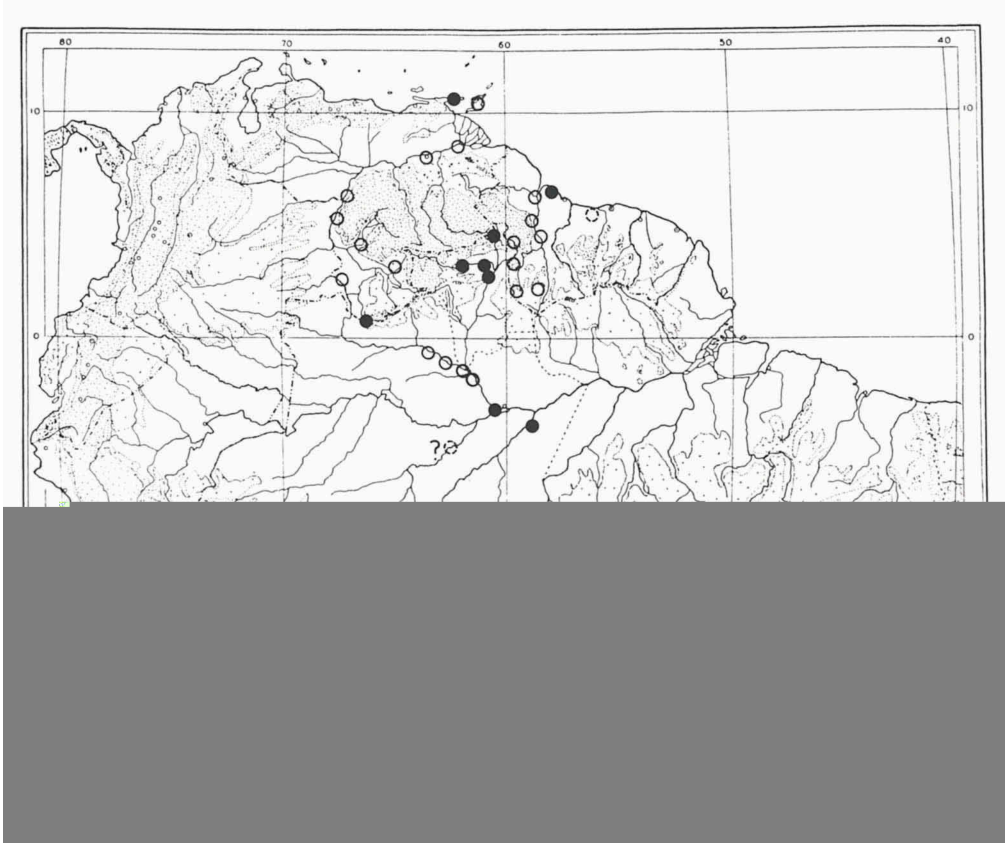


Fig. 74. Distribution of *Hemidactylus palaichthus*. Closed circles = material studied; open circles = data from literature (Kluge, 1969; Vanzolini, 1978b; Hoogmoed, 1973; the locality St. Lucia Is. is outside the area represented in the map); dashed circle in Suriname represents coastal Suriname (Hoogmoed, 1973); dashed circle with a question mark represents Rio Purus, with no further specification (Vanzolini, 1978b, who considered the locality doubtful).

Remarks.— Vanzolini (1978b) reported a specimen (MZUSP 4224) from Rio Purus (with no other data), which locality he considered 'extremely doubtful'. In the collection of MNRJ I found four specimens of *H. palaichthus* (MNRJ 3668-70, MNRJ 4430) from Borba, Rio Madeira. This second record of specimens from south of the Amazon reinforces the possibility that they are correct.

H. palaichthus is at present at least partially sympatric with *H. mabouia*, and in some localities specimens of both species have been collected near each other (Chacachacare Island, Trinidad, (Kluge, 1969); some localities along the Rio Negro, Vanzolini, 1978b; inside lodge in Lama Conservancy, Guyana, *H. palaichthus* RMNH 26456, *H. mabouia* RMNH 26457-463).

Thecadactylus Oken, 1817

Diagnosis.— See diagnosis of the species.

Distribution.— From Mexico, through Central America and the Antilles, to northern South America.

Content.— Genus monotypic.

Thecadactylus rapicauda (Houttuyn, 1782)
(figs. 75, 76, 260)

Gekko Rapicauda Houttuyn, 1782: 323 (holotype unknown, but possibly still preserved in the Zoological Museum Amsterdam (pers. comm. M.S. Hoogmoed); type-locality: West-Indies, restricted to Chichén Itzá, Yucatan, Mexico, by Smith & Taylor, 1950; changed and restricted to Paramaribo, Suriname, by Hoogmoed, 1973).

Platydactylus theconyx; Guichenot, 1855: 11.

Thecadactylus rapicaudus; Goeldi, 1902: 511; Hagmann, 1910: 491; Procter, 1923: 1064; Cott, 1926: 1160; Burt & Burt, 1933: 11; Amaral, 1937b: 172; Cunha, 1961: 54; Peters & Donoso-Barros, 1970: 261; Crump, 1971: 19; Cunha et al., 1985: 23; Martins, 1991: 182.

Thecadacrylus [sic!] *rapicaudus*; Amaral, 1949: 109.

Thecadactylus rapicauda: Miranda-Ribeiro, 1955: lxxvii; Vanzolini, 1968: 65, 1972: 90, 1986a: 13; Hoogmoed, 1973: 55, 1979: 277; Museu de Zoologia/USP, 1985: 86; O'Shea, 1989: 68; Zimmerman & Rodrigues, 1990: 449; Nascimento et al., 1991: 33.

Material.— **Brazil.** ACRE. Mâncio Lima: 1 ex., ZUEC 219, 11.iv.1981, leg. J. Lescure & A.J. Cardoso.
AMAPA. Macapá: 1 ♂, MPEG 2905, 20.v.1967, leg. 'Sacaca'. Serra do Navio: 1 ♀, MPEG 1851, 1965, leg. L. Gomes; 1 ♀, MPEG 15099, creek west of the 'barragem de rejeitos do igarapé Baixinho', 12.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Rio Uatumã, Município Presidente Figueiredo, present area of Balbina reservoir: 3 ♂♂, MPEG 14903, 14907, 14912, 9-11.ii.1988, leg. 'rescue team'; 1 ♂, 1 ♀, MPEG 14921-922, 26.iii.1988, leg. F.P. Nascimento & rescue team; 2 exs., INPA 219, 223, igarapé Caititu, respectively 16.ix.1986 and vi.1986, leg. R. Gribel. Maués: 3 ex., AMNH 101935-937, ii-viii.1965, leg. D. Cooper. Reserve WWF-INPA, Cidade de Pau, Manaus: 1 ex., INPA 224, 26.ix.1987, leg. A. Queiroz. Santa Rita, left margin Rio Japurá (Lago Paricá), Município de Maraã: 1 ♀, MPEG 15279, 22.xi.1988, leg. S. Ramos.
PARA. Ilha de Marajó, Município de Breves, 'Sítio Castanha' on the left margin of igarapé Caruaca, road PA-159, km 6 road Breves-Anajás: 2 ♀♀, MPEG 14861, 14871, 21.ii-01.iii.1988, leg. I.F. Santos, R. Moraes & S. Ramos. Bela Vista, Viseu: 1 ♀, MPEG 6977, 25.x.1973, leg. O.R. Cunha; 1 ♀, MPEG 7511, 28.iii.1974, leg. O.R. Cunha & F.P. Nascimento; 1 ♂, 1 ♀, MPEG 8634-35, 04.iii.1975, leg. O.R. Cunha & F.P. Nascimento. Cametá: 1 ♀, NMW 17621, 1912, leg. 'Brasilien Expedition'. Rio Tocantins, present area of Tucurui reservoir: 1 ex., MPEG 13177, left margin Rio Tocantins, 35 km from the dam, between rivers Arapari and Pucuruí, 06.iii.1984, leg. W.L. Overal, M. Zanuto & R.B. Neto; 2 ♂♂, 2 ♀♀, MPEG 13214-215, 13220-221, left margin of Rio Tocantins, between rivers Arapari and Cocal, 12-16.iii.1984, leg. W.L. Overal, R.B. Neto & M. Zanuto; 1 ♂, 2 ex., MPEG 13491, 13499-500, right margin of Rio Tocantins, c. 2 km S of (old) Vila Jacundá, 13-14.v.1984, leg. MPEG Entomology team; 1 ♂, 2 ♀♀, MPEG 13675, 13679, 13681, left margin Rio Tocantins, area of Igarapé Saúde, camp 'Bagagem', 20-22.xi.1984, leg. R.S. Pereira. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S

RONDONIA. Beginning of the road to Areal Pataga, km 74 of road BR-364 (Porto Velho-Cuiabá), 10 km E Porto Velho, 120 m: 1 ♀, RMNH 26476, 30.xi.1985, leg. M.S. Hoogmoed. Rio Jamari, reservoir area of hydroeletric plant Samuel: 2 ♀♀, CEPB 0097-98, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr. Alto Paraíso: 1 ex., AMNH 130236, 1985, leg. C.W. Myers. Santa Cruz da Serra: 1 ex., AMNH 130237, 1985, leg. C.W. Myers.
Ecuador. NAPO. Taracoa: 1 ♂, RMNH 26477, ii.1983, leg. J. Schoorl. Reserva Cuyabeno: 1 ♂, MHNG 2356.6, iii.1986, leg. M. Garcias. San Pablo Kantesiya: 1 ♂, MHNG 2356.7, 17.xi.1986, leg. J.M. Touzet.
French Guiana. R. Sinnamary, Petit Saut: 1 ex., RMNH 26632, 08.xi.1989; 1 ex., MPEG 15844, 15.xi.1989; both leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Peru. Loreto, Samiria, Estacion biologica Pithecia: 1 ♂, MHNG 2072.50, 05-07.xi.1980, leg. C. Vaucher.
Suriname. Paramaribo: 1 ♀, RMNH 26478, 11.viii. 1966, leg. G.van Vreden.
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAZONAS. Estirão do Equador, right margin Rio Javari. MARANHAO. Nova Vida (25 km from Rio Gurupi), BR-316. São Raimundo (near Santa Inês), BR-316. Fazenda Cachimbo, Coroatá. PARA. Ilha de Marajó, Município de Chaves, Fazenda Tijucaquara. Tapera, Jacarequara, Município de Acará. Km 16 of road to Acará. Bela Vista, Viseu. Colônia Nova (BR-316). Km 74 of road BR-316 (Pará-Maranhão). Cacoal, Município de Augusto Correa. Bom Jesus, Bragança. Gurupá. Boa Vista, Apeú. Belém (Utinga; campus of MPEG in Av. Perimetral). Km 11 of road PA-70 (to Marabá). Village of Mangabeira, S of Baião, Rio Tocantins. Serra Norte, Carajás (areas of Manganês do Azul, Fofoca, and Pojuca; margins of Rio Itacaiunas). Rio Jari.

Diagnosis.— A relatively large gekkonine gecko, with the entire digits strongly dilated, connected by a basal web. Subdigital lamellae forming two transversely enlarged rows, divided by a median sulcus, at the distal extremity of which there appears a retractile claw. Pupil vertical. Dorsal lepidosis homogeneous, small. Pores absent. Postcloacal slits present or absent. One to three conical postcloacal scales at each side. Tail, when regenerated, with a very typical shape, swollen, wider than base of tail proximally, tapering posteriorly.

Description.— Gekkonine gecko with maximum SVL, both in males and females, of 121 mm (Hoogmoed, 1973). Head 0.24-0.29 times SVL, relatively smaller in larger specimens; 1.2-1.5 (1.36 ± 0.06, n= 40) times as long as wide; 1.4-1.8 (1.62 ± 0.09, n= 40) times as wide as high. Snout round, relatively short, gently sloping toward top of head. Neck distinctly narrower than head, less so in relation to body. Body distinctly depressed. Limbs relatively short, forelimbs 0.22-0.32 (0.28 ± 0.03, n= 7) times SVL, hind limbs 0.32-0.39 (n= 3) times. Original tail round in cross section, with approximately the same diameter along about two thirds of its length, distally tapering toward a pointed tip. In the only four specimens (snout-vent 60-110 mm), among 42, with original tail, tail length 0.56-0.72 times SVL, smallest ratio corresponding to largest specimen. Regenerated tail, which appears in most of adult specimens, slightly depressed, proximally distinctly wider than the short part of original tail that is left, distally tapering toward a pointed tip. Well-grown regenerated tail, in specimens with SVL 80-120 mm, 0.56-0.78 times SVL, tending to be proportionally slightly shorter in larger specimens.

Tongue villose, relatively wide; tip round, with a short median cleft. Teeth small, conical, subequal.

Rostral large, rectangular, about twice as wide as deep, visible from above; with a long median cleft extending from posterior margin. Two, occasionally three, postrostrals, relatively large, rectangular, smooth. Nostril bordered by rostral, first supralabial, three to six small postnasals and one postrostral. Scales on snout and on loreal region small, round to oval, convex, juxtaposed; 16-29 (22.2 ± 2.6, n= 67, 35 specimens) loreal scales in a longitudinal line between nostril and orbit. On upper and posterior parts of head, scales smaller than on snout. Supraorbital region with scales equal to those on upper part of head. Supraciliary flap bordered by a double row of scales, 15-23 in outer row between anterior border of flap and a point above centre of eye; with 3-9 small spines posteriorly. Pupil four-lobed, vertically elongate. Supralabials 8-12, 7-11 to below centre of eye. Most supralabials subequal in size, below eyes decreasing in size; posteriorly lips curl upward and are bordered by small scales. Ear-opening distinctly smaller than eye, obliquely to horizontally oval.

Mental larger than adjacent scales, triangular or pentagonal. Two relatively large postmentals, at each side followed by a row of smooth, polygonal scales, decreasing in size posteriorly, and in contact with anterior infralabials. Scales on chin small, polygonal to roundish, convex, juxtaposed, slightly larger anteriorly. Infralabials 8-12, 6-9 to below centre of eye. Infralabials mostly large, smooth, quadrangular to pentagonal, posterior ones smaller. Scales on nape and sides of neck transitional between scales on posterior part of head and on body. Scales on throat smooth, flat, imbricate, with round posterior margin, increasing in size posteriorly; with a zone of transition with scales on chin.

Dorsal scales roundish, convex, juxtaposed to subimbricate, approximately as large as scales on snout. Ventrals larger than dorsals, rhomboid to hexagonal, smooth, imbricate, forming oblique rows; 101-130 (117.7 ± 7.9, n= 35) scales along the midventral line, between anterior margin of forelimbs and zone of small scales on preanal plate. A gradual transition between ventrals and laterals. Scales around midbody 135-175 (159.6 ± 8.8, n= 41). Preanal plate with scales similar to ventrals, except for a narrow zone of small scales bordering the vent.

Scales on tail smooth, imbricate, round posteriorly; slightly larger ventrally. Regenerated tail with scales more irregular in shape, smooth to broadly keeled on dorsal and lateral surfaces; smooth, slightly larger and more roundish ventrally. Postcloacal slit present or absent (absent in most specimens from Brazil, present in RMNH 26476 from Rondônia, and in specimens from Peru and Ecuador); one or two, rarely three, enlarged, conical postcloacal scales at each side.

Scales on limbs mostly smooth, imbricate, with round posterior margin, equal to, to larger than the dorsals; on posterior surface of forelimbs and on posterior and upper surfaces of hind limbs small, granular. Fingers and toes depressed, paddle-shaped, with a middorsal elevation; connected by a basal web. Subdigital lamellae forming two transversely enlarged rows, divided by a median sulcus; 18-23 (20.7 ± 1.1, n= 83, 42 specimens) under fourth finger, 18-24 (21.9 ± 1.6, n= 79, 40 specimens) under fourth toe. Claw on distal extremity of midventral sulcus, retractile.

Colour in life variable, some examples of which are here given. MPEG 15099 dorsally smoke-grey (44), olive-brown (28) and sepia (119); ventrally cream-colour (54), mostly immaculate under the head, densely peppered with olive-brown (28) elsewhere (less so under hind limbs; tail missing); iris gold-colour, with brown reticulation and a narrow orange rim around pupil; tongue medium to dark neutral grey (83-84) anteriorly, white with yellow lateral spots posteriorly. MPEG 15341 variegated dorsally, with a predominantly smoke-grey (44) dorsal band, and at each side two predominantly citrine (51) longitudinal stripes, with some transverse connec-

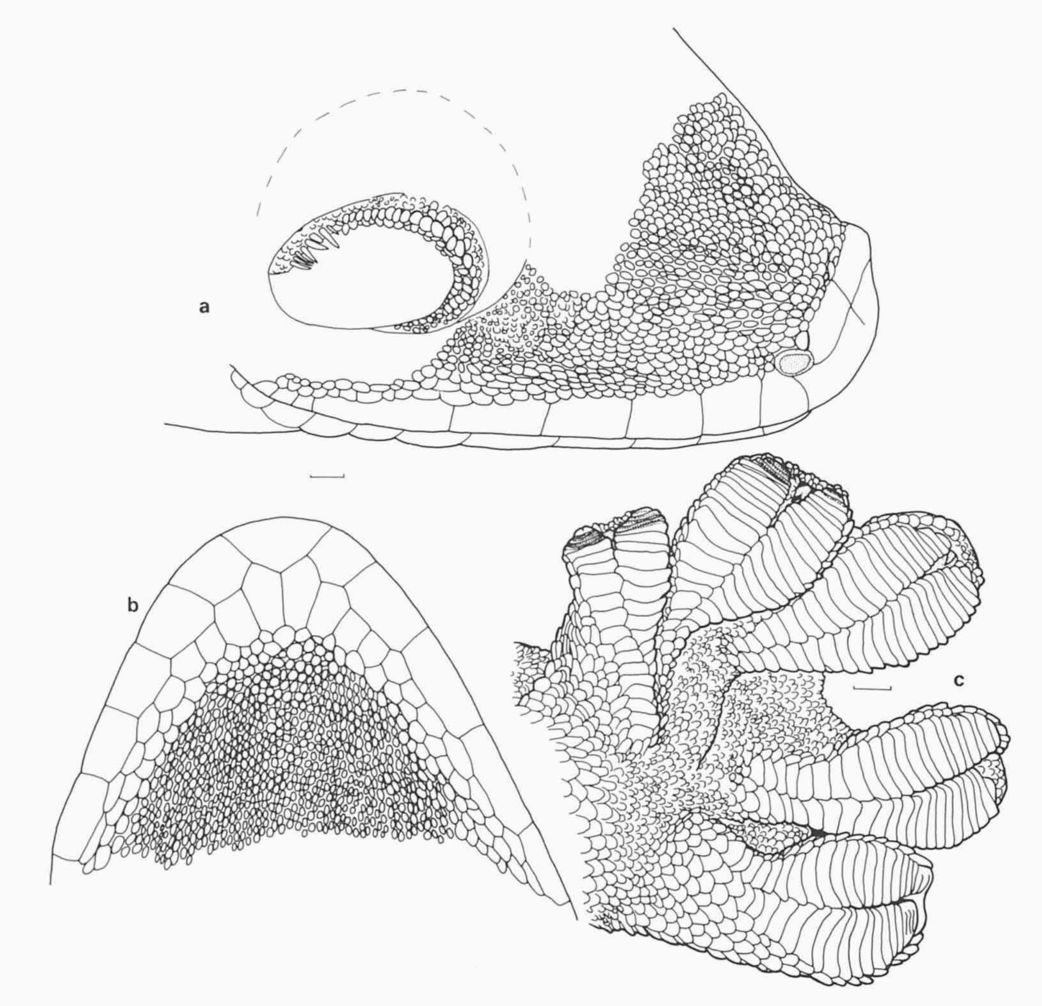


Fig. 75. *Thecadactylus rapicauda*, RMNH 26475; a, b: dorsolateral and ventral views of anterior part of head; c: ventral view of left foot.

tions between them; with some black spots, mainly along the borders of the stripes, and along a vertebral line. Labials and ventral region straw-yellow (56). Body pattern continued on tail. Iris gold with brown reticulation. MPEG 15359 predominantly fuscous (21) with black spots, the vertebral area tawny-olive (223D) peppered with brown; with a cream-colour (54) stripe behind the eye. Ventral region sayal-brown (223C). Tail dorsally light russet-vinaceous (221D), light drab (119C) and black, ventrally predominantly straw-yellow (56) and black. Iris gold with brown reticulation.

Beebe (1944a) presented some examples of colour changes in specimens of *T. rapicauda*, both due to 'temperamental change' and to day-night rhythm. Hoffman (1993) reported colour of iris in males golden, in females and juveniles silver.

Colour in preservative varying from light or dark grey, to pale brown; with dark, irregular stripes on head dorsally and along back; with or without a wide light vertebral band, or back lighter than flanks. Ventral region lighter, immaculate or speckled. Tail proximally with relatively large, roundish to rhomboid, dark-brown spots along the middorsal line; distally with alternating greyish-brown and whitish wide rings.

Habitat.— An arboreal lizard, in primary or secondary forest, sometimes also in open areas with scattered trees, or inside houses, in both cases frequently not far from patches of forests. In forest, during the day, it is usually found under loose flaps of bark, in hollow trees or fallen tree trunks, or behind the leaf stalks of palms, in heights varying from close to the ground to at least 3-4 meters (Hoogmoed, 1973 refers to 6 meters). In Tucuruí, Pará, four specimens were collected on 'babaçu' palms (*Orbignya phalerata* Mart.) when these were searched thoroughly for insects; in Ilha de Marajó, a specimen was collected on a 'buriti' palm (*Mauritia flexuosa* Linnaeus), about 3 m from the ground. Among individuals collected in more open situations, MPEG 15386 was under a branch of a fallen tree, in open grassy area near a creek and surrounded by forest; RMNH 26632 was under the bark of a large, isolated tree, in secondary growth mainly of *Cecropia*; others (from Carajás, Caxiuanã, and Cruz Alta, all Pará state) were on the walls and ceilings of houses, in open sites not far from forest. Meede (1984), studying lizards from Panguana, Peru, referred to *T. rapicauda* as being found very often in houses, rarely in primary forest; besides, in houses, females would be found mainly under the floor (1.2 m high), males mainly in the roof made of palm leaves (6 m high). Marcuzzi (1954) and Donoso-Barros (1968) reported the species to occur also in xerophytic environments, in Venezuela; Test et al. (1966) reported an individual on a fence row in cattle pasture, also in Venezuela. Other notes on habitat are found in Ruthven (1922), Valdivieso & Tamsitt (1963), Vanzolini (1972), Hoogmoed (1973), Dixon & Soini (1975, 1986), Gasc (1981, 1990), Fugler (1986), Duellman (1987).

Notes on natural history.— *T. rapicauda* is mainly a nocturnal species, during the day usually found hidden (see above). However, a few records of it being active, or at least out in the open, in daytime, exist. E.g., MPEG 15844, from French Guiana, mentioned by Hoogmoed & Avila-Pires (1989; as TCAP 1431), was in an open type of forest, exposed on the base of a tree with stilt roots; Vanzolini (1972) reported a juvenile (SVL 38 mm) collected "active during the day" on a large tree, in 'igapó'; Hoogmoed (1973) reported two specimens "basking on the lower part of treetrunks". Zimmerman & Rodrigues (1990) classified *T. rapicauda* as "nocturnal and diurnal", but no observational data is mentioned.

Dixon & Soini (1975, 1986) reported adult females with one oviductal egg collected in the months of March, May, July, August, and December; the largest oviductal egg reported measured 13.8 × 17.0 mm. Almendariz (1987) mentioned an egg, in the abdomen of a female, measuring 17.5 mm in length. Beebe (1944a) mentioned an egg laid in a terrarium, which measured 13.4 × 11.4 mm, and weighed 1 g; the egg had a hard, white shell, which was "completely covered with a fine mosaic of débris". According to Beebe (1944a), "the débris was sunk deep into the shell structure and firmly fixed, as if the surface had been soft when the egg was laid, perhaps also mucilaginous, and the egg had been rolled about until thoroughly encrusted".

Food seems to be variable, consisting mainly of arthropods, among which grasshoppers, moths, and spiders seem to be common (Beebe, 1944a; Hoogmoed, 1973; Meede, 1984); Martins (1991) registered in two stomachs one scorpion, one cricket,

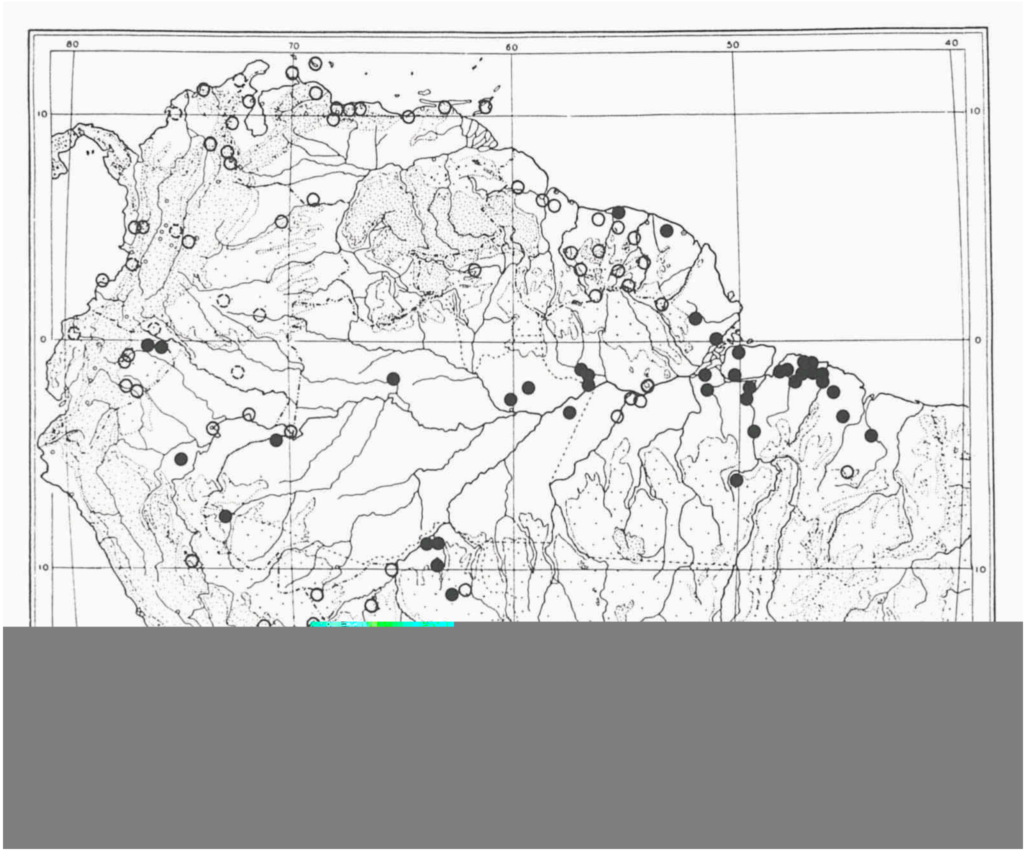


Fig. 76. Distribution of *Thecadactylus rapicauda*. Closed circles = material studied; open circles = data from literature (Valdivieso & Tamsitt, 1963; Peters, 1967; Medem, 1969; Vanzolini, 1968, 1972, 1986a; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Meede, 1984; Dixon & Soini, 1986; Almendariz, 1987; Duellman, 1987; Fugler, 1989; O'Shea, 1989; Rodriguez & Cadle, 1990); dashed circles = data by Ayala (1986) for Colombian states.

and one cockroach; besides arthropods, Beebe (1944a) reported a mollusc shell found in one stomach.

Known predators are snakes and Phyllostomidae bats (Meede, 1984), the snake *Siphlophis cervinus* (Laurenti) (Cunha & Nascimento, 1994), and capuchin (*Cebus*) monkey (Beebe, 1944a, observed in a cage). Hero & Magnusson (1987) reported an individual of *Leptophis ahaetulla* (Linnaeus) preying upon a *T. rapicauda* during the day. Olson (1993) observed an individual grabbed by a large centipede.

The capacity of vocalization by this species was recorded, among others, by Beebe (1944a), Cunha (1961), and Meede (1984). According to Beebe (1944a), the call is heard "now and then in the night", which agrees with my own observation on individuals living in a wooden house close to forest, in Caxiuanã, Pará. Beebe (1944a) suggested it to be a sexual call, and maybe ("possible but not probable") also to serve to attract insects (working as a mimetic call to that of insects). Meede (1984) observed that males inhabiting the roof of houses vocalised not rarely by day, in response to some other sound. In other geckos, vocalization has been suggested to be territorial, and in some cases also to discourage predators (Kluge, 1967). Territorial behaviour was observed by Beebe (1944a) and Meede (1984), both of whom reported on the response to encounters among individuals. According to these reports, the tail seems to have an important role in communication; only in one case was vocalization observed. Beebe (1944a) made a detailed description of the way of locomotion by this species.

Distribution (fig. 76).— Northern South America, in Venezuela, Guyana, Suriname, French Guiana, Brazil, on both sides of Andes in Ecuador and Colombia, on eastern side in Peru and Bolivia; Central America north to Mexico; Lesser Antilles. In Brazil it occurs throughout Amazonia (Amapá, Pará, Amazonas, Roraima, Rondônia and Acre).

Remarks.— Duellman (1978) reported as distinctive characteristic of *T. rapicauda* the body "covered with minute granular scales with larger tubercles interspersed", which is not correct. His fig. 116, however, seems to picture a real *T. rapicauda*.

Coleodactylus Parker, 1926

Diagnosis.— Small sphaerodactyline geckos with claws enclosed in an ungual sheath composed of two ventral, and one to three dorsal, more or less asymmetrical scales. Digits short, cylindrical, with smooth, transversely enlarged subdigital lamellae. Dorsal head scales mostly small; rostral large, posteriorly depressed and with a median cleft; supraciliary flap present, with some flat, enlarged scales anteriorly. Pupil round. Body with flat, imbricate, non-granular scales. Males without escutcheon.

Distribution.— Northeastern South America.

Content.— Four species, of which *C. amazonicus* (Andersson) and *C. septentrionalis* Vanzolini occur in Amazonia, *C. brachystoma* (Amaral) and *C. meridionalis* (Boulenger) occur south of it.

Coleodactylus amazonicus (Andersson, 1918)
(figs. 77, 78, 261)

Sphaerodactylus amazonicus Andersson, 1918: 1 (holotype NRM 3254, type-locality: Lago Poraquequare, Manaus, Brasil); Amaral, 1937a: 1734, 1937b: 5, 1949: 109.

Coleodactylus amazonicus: Vanzolini, 1957: 6, 1968: 33, 1970b: 35, 1972: 88, 1986a: 13, 15; Cunha, 1961: 47; Wermuth, 1965: 17; Peters & Donoso-Barros, 1970: 95; Hoogmoed, 1973: 67, 1979: 277; Ramos, 1981: 511; Cunha et al., 1985: 21; MZ/USP, 1985: 79; Nascimento et al., 1988: 26, 1991: 33; Hoogmoed & Avila-Pires, 1989: 168; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Gascon & Pereira, 1993: 181.

Coleodactylus zernyi Wettstein, 1928: 110 (holotype NMW 18810, type-locality: Taperinha, Pará, Brasil); Burt & Burt, 1933: 1; Amaral, 1937a: 1734, 1937b: 2, 1949: 108.

Coleodactylus guimaraesi Vanzolini, 1957: 8 (holotype MZUSP 3162, type-locality: Porto Velho, Rondônia, Brasil), 1968: 36; Cunha, 1961: 50; Wermuth, 1965: 18. **New synonym.**

Material.— **Brasil.** ACRE. Seringal Catuaba/UFAC, 23 km E of Rio Branco (BR-364): 1 ♂, 2 ♀♀, 1 juv., RMNH 25167-170, 5 ex., MPEG 16004-008, all 27.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. AMAPA. Serra do Navio: 1 ♂, 1 ♀, 2 ex., RMNH 25124-125, MPEG 15018-019, 05.ix.1988; 1 ♀, 1 ♂,

MPEG 15028-029, 06.xi.1988; 4 ♂, 4 ♀, RMNH 25126-127, MPEG 15063-066, MPEG 15101-102, igarapé Cancão, 09 & 13.xi.1988; 1 ♀, RMNH 25128, igarapé Piçarra, 10.xi.1988; 1 ♀, MPEG 15093, igarapé near Amapari river, 11.xi.1988; 1 ♂, 1 ♀, MPEG 15108, RMNH 25131, upper part of igarapé Piçarra, 14 & 20.xi.1988; 2 ♂♂, 1 ♀, 5 ex., RMNH 25132-134, MPEG 15191-195, Barragem de Agua Limpa do igarapé Jacaré, 21.xi.1988; all leg M.S. Hoogmoed & T.C.S. Avila Pires; 1 juv., MPEG 12168, 16.vii.1977, leg. J. Freire. Bank of Rio Araguari, end of road Serra do Navio - Araguari: 1 ♂, RMNH 25129, 18.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Igarapé Caneco, 1 km W of Rio Araguari, road Serra do Navio-Araguari: 1 ♂, 2 ♀, RMNH 25130, MPEG 15131-132, all 18.xi.1988, leg. M.S.Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Município Nhamundá, west bank of Rio Nhamundá, opposite Sítio Céu Estrelado, region of Matias, 15 km N of Faro: 1 ♂, 2 ♀, RMNH 25135, MPEG 15314-315, 02.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Puruzinho, Rio Madeira: 3 ex., BM 1977.2257-2259, leg. 'Expedição Permanente da Amazônia'. Reserva Florestal Ducke, 25 km N of Manaus: 2 ♂♂, 1 ♀, RMNH 25104, 25108, 25109, 1-24.xi.1985, leg. M.S. Hoogmoed & M. Hero; 6 ♂♂, 4 ♀♀, 3 juv., RMNH 25143-155, 7-10.vii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Reserva ZF-2/INPA, 60 km N of Manaus: 3 ex., RMNH 25156-158, 13-14.vii.1989, leg. M.S. Hoogmoed. Manacapuru: 2 ♂♂, 1 ♀, 1 juv., RMNH 25110-113, c. 5 km E, 26.xi.1985, leg. M.S. Hoogmoed; 2 ♂♂, RMNH 25114-115, 15 km NE of Manacapuru, 72 km W of Manaus, 27.xi.1985, leg. M.S. Hoogmoed. Rio Urucu, E of Porto Urucu, S. of Tefé: 1 ♀, MPEG 15849, RUC-2/Petrobras, 22.xi.1989; 4 ex., RMNH 25164-165, MPEG 15862-863, near RUC-2/Petrobras, 24-25.xi.1989; 1 ♀, RMNH 25166, 27.xi.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões (southern margin), south of Tefé: 1 ♂, 2 ♀♀, RMNH 25105-107, 17.xi.1985, leg. M.S. Hoogmoed.
PARA. Ilha de Marajó, Município de Breves, road PA-159 (Breves-Anajás): 1 ♀, MPEG 14732, km 6, left margin igarapé Caruaca, 27.xi.1987, leg. D. Neto; 1 ♂, MPEG 14751, km 6, 01.xii.1989, leg. I.F. Santos, R. Moraes & S. Ramos; 2 ♂♂, 1 ♀, MPEG 14865-866, 14879, km 6, Sítio Castanha, left margin igarapé Caruaca, 25.ii-03.iii.1988, leg. I.F. Santos, R. Moraes & S. Ramos; 2 ♂♂, MPEG 14883-884, km 7, 07.iii.1988, leg. I.F. Santos, R. Moraes & S. Ramos. Belém, Reserva do Mocambo (EMBRAPA): 1 ex., MPEG 15630, 21.vii.1989, leg. A.C.M. Lima & M.S. Hoogmoed. Bom Jesus, Bragança: 1 ex., MPEG 12902, 07.xi.1975, leg. O.R. Cunha & F.P. Nascimento. Bujaru: 1 ♀, MPEG 13234, 29.xii.1983, leg. J. Tadaiewsky. Rio Tocantins, present reservoir area of Hydroeletric dam Tucuruí: 1 ♀, MPEG 13153, 500 m up the Rio Arapari, left margin of R. Tocantins, 01.iii.1984, leg. F.P. Nascimento & R.B. Neto; 1 ♀, MPEG 13405, Chiqueirão, right margin of Rio Tocantins, 16.iv.1984, leg. R. Moraes; 1 ♂, MPEG 13428, ca. 3 km up the Rio Jacundá, right margin of Rio Tocantins, 06.v.1984, leg. T.C.S. Avila Pires & I.J. Lopes; 1 ♂, MPEG 13468, igarapé Altamira, 7-8 km S of (old) Jacundá village, right margin of R. Tocantins, 12.v.1984, leg. T.C.S. Avila Pires & I.J. Lopes; 1 ♀, MPEG 13536, igarapé Arapari, 3-5 km S of (old) Jacundá village, left margin of R. Tocantins, 06.v.1984, leg. T.C.S. Avila Pires & I.J. Lopes. Km 74 road Altamira-Itaituba (Transamazônica): 2 ♀♀, MPEG 2163, 2199, 22-26.vii.1971, leg. F.P. Nascimento. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 10 exs., MPEG 16378-382, RMNH 26681-685, 23.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 5 exs., MPEG 16359-361, RMNH 26634-635, 22.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Santarém, Taperinha: holotype *C. zernyi*, NMW 18810, leg. H.Zerny. Município de Oriximiná: 1 ♀, MPEG 14398, Porto Trombetas, 21.v.1986, leg. F.P. Nascimento & J.M. Rosa; 2 ♂♂, 2 ♀♀, 1 juv., RMNH 25137-141, 3 ♂♂, 1 ♀, 1 juv., MPEG 15347, 15357, 15382, 15392-393, all Cruz Alta, 6 km S of Rio Trombetas, 06-11.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Road from Sítio Céu Estrelado to Cruz Alta, between Nhamundá and Trombetas rivers: 1 ♂, RMNH 25136, ca. 10 km S of Cruz Alta, 05.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; 1 ♀, 1 ♂, MPEG 15336, 15400, ca. midway of the road, 05-12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; 1 ♀, RMNH 25142, 1 ♂, 1 ♀, MPEG 15406-407, ca. 35 km N of S. Céu Estrelado, 12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município Faro, Sítio Céu Estrelado, Rio Nhamundá, 15 km N of Faro: 1 ♀, MPEG 15321, 04.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Road BR-364: 1 ♂, RMNH 25116, 45 km E of Porto Velho, near Cachoeira Samuel, 120

m, 29.xi.1985, leg. M.S. Hoogmoed; 2 ♂♂, RMNH 25118-119, 19 km SW Porto Velho, in the direction of Rio Branco, 120 m, 30.xi.1985, leg. M.S. Hoogmoed; 1 ♂, 2 juv., RMNH 25121-123, 45 km SW Porto Velho, in the direction of Rio Branco, 120 m, 30.xi.1985, leg. M.S. Hoogmoed.

French Guiana. Petit Saut, Sinnamary river: 2 ♂♂, 2 ♀♀, 1 juv., RMNH 25159-163, 5 ex., MPEG 15835-837, MPEG 16086-087, all 13-15.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Mornes de Macouria, NW of Cayenne: 1 ♂, 2 ♀♀, RMNH 25171-173, 3 ex., MPEG 16017-019, all 17.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

In addition to specimens listed above, the MPEG has specimens from the following localities: PARA. Rio Tapajós, village Moreira, between Brasília and Itaituba. Rio Tocantins, area of Tucuruí reservoir (several localities). Road Tucuruí-Marabá, km 67. Serra Norte, Carajás. RONDONIA. Reserva Ecológica do Rio Jamari, Porto Velho. Fazenda Rio Candeias, km 28 of road BR-362 (Porto Velho-Cuiabá). Ji-Paraná. Ouro Preto d'Oeste.

Diagnosis.— A diurnal forest dweller, inhabitant of the leaflitter. Maximum SVL 22 mm in males, 24 mm in females. Body cylindrical, with short legs and tail. Claws enclosed by an ungual sheath composed of four asymmetrical, imbricate scales. Dorsal scales phylloid, imbricate, keeled. Ventral scales larger, smooth; 26-36 (30.2 ± 2.3) along midventral line, between anterior level of forelimbs and that of hind limbs. Scales around midbody 38-48 (42.7 ± 2.2). Mental with a posterior median cleft, bordered by four to eight postmentals; its width distinctly longer than length of first infralabial.

Description.— Sphaerodactyline gecko with maximum SVL in males of 22 mm, in females of 24 mm (Gasc, 1981, 1990). Head 0.20-0.25 (0.22 ± 0.01, n= 61) times SVL; 1.2-1.6 (1.34 ± 0.07, n= 61) times as long as wide; 1.2-1.8 (1.42 ± 0.10, n= 60) times as wide as high. Snout short, round, gently sloping toward top of head. Neck narrower than head, slightly so in relation to body. Body cylindrical. Limbs relatively short, forelimbs 0.23-0.31 (0.28 ± 0.02, n= 54) times SVL, hind limbs 0.34-0.44 (0.39 ± 0.02, n= 52) times. Tail round in cross section, tapering toward tip, 0.8-1.0 (0.91 ± 0.05, n= 25) times SVL.

Tongue wide, covered with imbricate, scale-like papillae; tip round, with a short median cleft. Teeth minute, conical, subequal.

Rostral very large, wider than high, well visible from above; posterior part, between level of nostrils, with a depression and a median cleft; bordered posteriorly by four or five, rarely six, scales, lateral ones (supranasals) largest, central ones slightly to distinctly smaller. Nostril bordered by rostral, first supralabial, one postnasal and lateral postrostral (supranasal); postnasal distinctly larger than, to as large as, adjacent loreal scales. Scales on snout polygonal, smooth, juxtaposed anteriorly; decreasing in size, weakly keeled, subimbricate, toward top of head. Loreal region with scales similar to those on anterior part of snout, decreasing in size posteriorly; two to four scales in a longitudinal line between postnasal and orbit. Scales on supraorbital region flat, keeled, imbricate anteriorly, granular posteriorly. A supraciliary flap is present, with 3-6 enlarged scales. Pupil round. Suboculars 1-5, mostly the first very long, others short. Posterior upper part of head with small, granular scales, slightly larger on temporal region. Ear-opening small, vertically oval. Supralabials 2-5, usually 3-4, decreasing in size posteriorly, reaching to below posterior half of eye; third supralabial, or suture between third and fourth (exceptionally second or fourth supralabial), below centre of eye.

Mental boomerang-shaped with straight lateral margins, posteriorly concave and indented by the postmental scales; a posterior, relatively long, median cleft. Postmentals 4-8, polygonal, smooth, juxtaposed, subequal in size. Scales on anterior part of chin similar to postmentals, gradually changing into cycloid, imbricate. Infralabials 3-5, decreasing in size posteriorly; 2-3 to below centre of eye. Midway on neck, both dorsally and laterally, there is a short transitional zone between an anterior region, with granular scales, and a posterior one, with phylloid, keeled, imbricate scales; ventrally scales larger toward body.

Dorsals phylloid, keeled, imbricate. Ventrals larger than dorsals, smooth, imbricate, with rounded to slightly angulate posterior margins; 31-42 (35.5 ± 2.5, n= 51) scales along the midventral line between anterior level of forelimbs and vent; 26-36 (30.3 ± 2.3, n= 51) to anterior margin of hind limbs. Both dorsal and ventral scales in approximately longitudinal and oblique rows. Scales around midbody 38-48 (42.7 ± 2.2, n= 55), dorsals grading into ventrals. Scales on preanal plate similar to ventrals, except for scales on border of vent, which are smaller. Escutcheon absent.

Scales on tail similar to dorsals and ventrals, respectively, posteriorly smooth all around the tail.

Scales on limbs phylloid, imbricate, mostly smooth, in some specimens slightly keeled on forelimbs; posterior surface of thighs with granular scales. Six, rarely five, lamellae under fourth finger; seven, occasionally six or eight, under fourth toe. Claws enclosed by an ungual sheath composed of four asymmetrical, imbricate scales, in the following sequence, where each scale is smaller and overlaps the one immediately preceeding it: the more internal, large, bulbous, inferolateral; a second inferolateral (mainly lateral); one superolateral; and a second superolateral, which is the smallest and more external of all. Both superolaterals are in contact with the larger inferolateral. Parker (1926) presented evidences that the external superolateral of *Coleodactylus* was homologous to the median dorsal of *Lepidoblepharis*. Vanzolini (1957) showed that the terminal scale which appears in other species of *Coleodactylus*, in *C. amazonicus* is fused with the internal inferolateral.

The colour in life of several specimens was described in the field. The general dorsal colour varies between sepia (219), raw-umber (223), mars-brown (223A), or

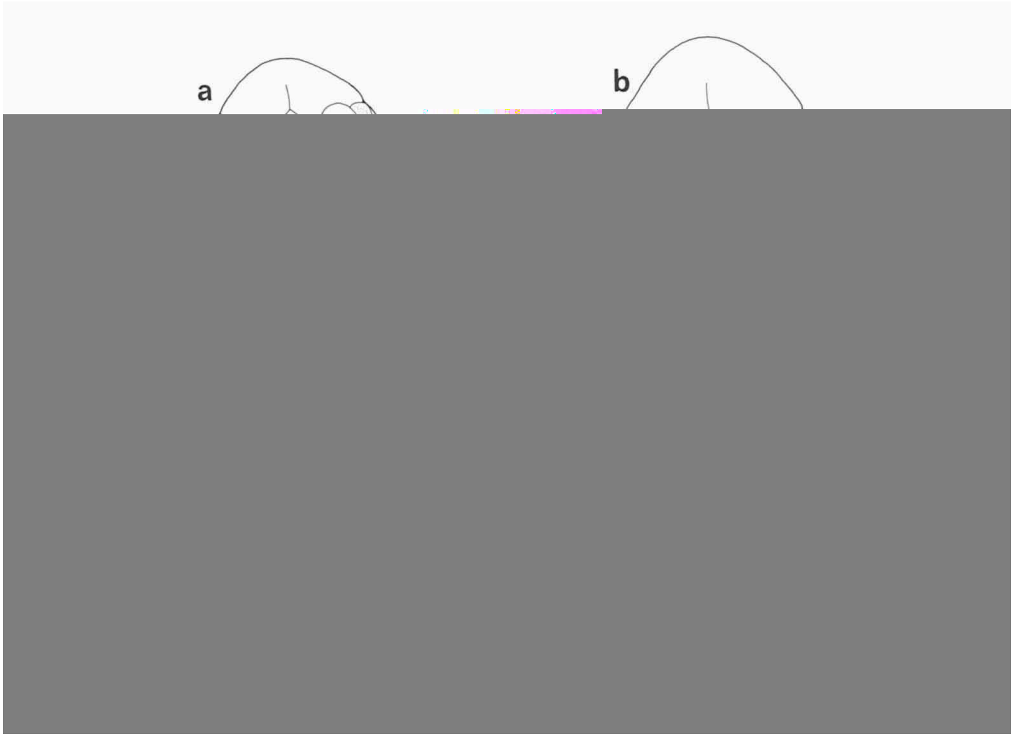


Fig. 77. *Coleodactylus amazonicus*, RMNH 25124; a, b, c: dorsal, ventral and lateral views of head; d, e: ventral view of left hand and right foot; f, g: ungual sheath of third and fourth right toes, in dorsal view.

and/or on nape (specimens from Faro and Cruz Alta, for instance, frequently present two transverse rows of three dots each, or else an anterior row of two or three dots and a posterior transverse line); small light dots may also be scattered over the body, or arranged in a dorsolateral row. Moreover, a dorsolateral light stripe may be present for a short distance above forelimbs and/or above hind limbs, the intermediate part rarely vaguely visible. A few specimens, especially among juveniles, present the back marbled, differing from the more uniformly coloured flanks. A whitish stripe, bordered by black, is apparently always present along posterior aspect of thighs and sides of tail, at least at base of tail, but in some specimens reaching about half its length. Ventral region white or cream. Demarcation between ventral and lateral regions rather sharp, in some cases with a darker brown line on the border.

Habitat.— *C. amazonicus* is an inhabitant of the leaflitter of the forest floor, in terra firme forest and, occasionally, varzea forest. Gasc (1986) reported this species and *Pseudogonatodes guianensis* as the most abundant lizards found at the base of *Astrocaryum* palms. The lizard occurs both in the interior of the forest, and in border situations (e.g., forest roads, open areas inside forest) where sparse dry leaves from the forest cover the ground. Hoogmoed (field notes) reported specimens from near Manacapuru, Amazonas, collected in a low type of forest on white sand, both in dry and wet areas, in the latter case with many palms in the undergrowth. It is also found in some areas of secondary growth, and in small, remaining patches of forest

(Vanzolini, 1972; Ramos, 1981; Gasc, 1981; Hoogmoed, field notes; pers. obs.).

In many localities, e.g. Serra do Navio (AP), Serra Norte (Carajás, PA), Tucuruí (PA), Faro (PA) (all pers. obs.), Rondônia (Vanzolini, 1986a; Nascimento et al., 1988), Suriname (Hoogmoed & Avila-Pires, 1991), the species appears to be very abundant. In other localities, however, it seems to be either restricted to parts of the forest, or scarce; e.g., in Petit Saut, French Guiana, it was found only in a relatively small patch of forest, with apparently dry conditions, along an elevated ridge (Hoogmoed & Avila-Pires, 1991); in Belém, only recently one specimen (MPEG 15630) was collected, in the area of Mocambo, a relatively small, remaining patch of forest in a rural area within the city limits; also in forests along the Urucu river, Amazonas, the species appears to have a relatively low density (pers. obs.).

Notes on natural history.— This is a diurnal gecko (although Hoogmoed & Avila-Pires, 1989 reported one specimen found active at night, in a relatively open area and under full moon light conditions). Adult females with one developed egg in the abdomen are commonly found throughout the year. According to Gasc (1990), females lay eggs (one at a time) several times during the year, among decomposing leaves. Ramos (1979), in a study in forested areas in and around Manaus (AM), showed that these animals feed exclusively on the soil fauna, among which Collembola are the most frequent item (both in volume and in number) in the stomach contents. Gasc et al. (1983) confirmed Ramos's (1979) results, analyzing in more detail the groups of Collembola ingested. MPEG 12902 was found in the stomach of the snake *Echinantera brevirostris* (Peters) (MPEG 10184).

Distribution (fig. 78).— Eastern and central Amazonia, including Brazil, French Guiana, Suriname, southern Guyana, and southern Venezuela (Amazonas). In Brazil it occurs in Amapá, Pará, Rondônia, Acre, and Amazonas, probably throughout all forested regions in the former three states. In Acre, it was cited by Vanzolini (1957) from Iquiri, and it is here registered to Seringal Catuaba, 23 km E of Rio Branco. In Amazonas, it is relatively common in the forests around Manaus; in forests along the Urucu river (southwest of Manaus), as mentioned above, the species occurs but appears not to be very abundant; in Tabatinga and Benjamin Constant, near the border with Colombia and Peru, it is apparently absent (pers. obs.). Ramos (1972) also reported not to have found the species along the Japurá river.

Remarks.— Vanzolini (1957) described *C. guimaraesi* on the basis of one specimen from Porto Velho, Rondônia, of which the main differences with *C. amazonicus* were the smooth dorsals and apparent differences in the ungual sheath. In 1968, Vanzolini corrected the first description, recognizing keeled dorsals in the specimen, thus stating (p.38): "Dessa maneira, resta como diferença entre *guimaraesi* e *amazonicus* a estrutura do estôjo ungueal e apresenta-se a incômoda hipótese de que a primeira seja apenas um variante da segunda", so recognizing the possibility of the two forms being synonymous. Faunistic surveys carried out recently in the state of Rondônia (Vanzolini, 1986a; Nascimento et al., 1988), showed *C. amazonicus* to be very abundant, while no additional *C. guimaraesi* was found. In MZ/USP (1985: 80) attention is called again to the possibility that *C. guimaraesi* might be an "anomalous" specimen of *C. amazonicus*. Vanzolini (1986a) did not make any further comment on *C. guimaraesi*, neither included it in a list of all the species from Rondônia found in the collection of the MZUSP (where the type of *C. guimaraesi* is), leading to the conclusion that

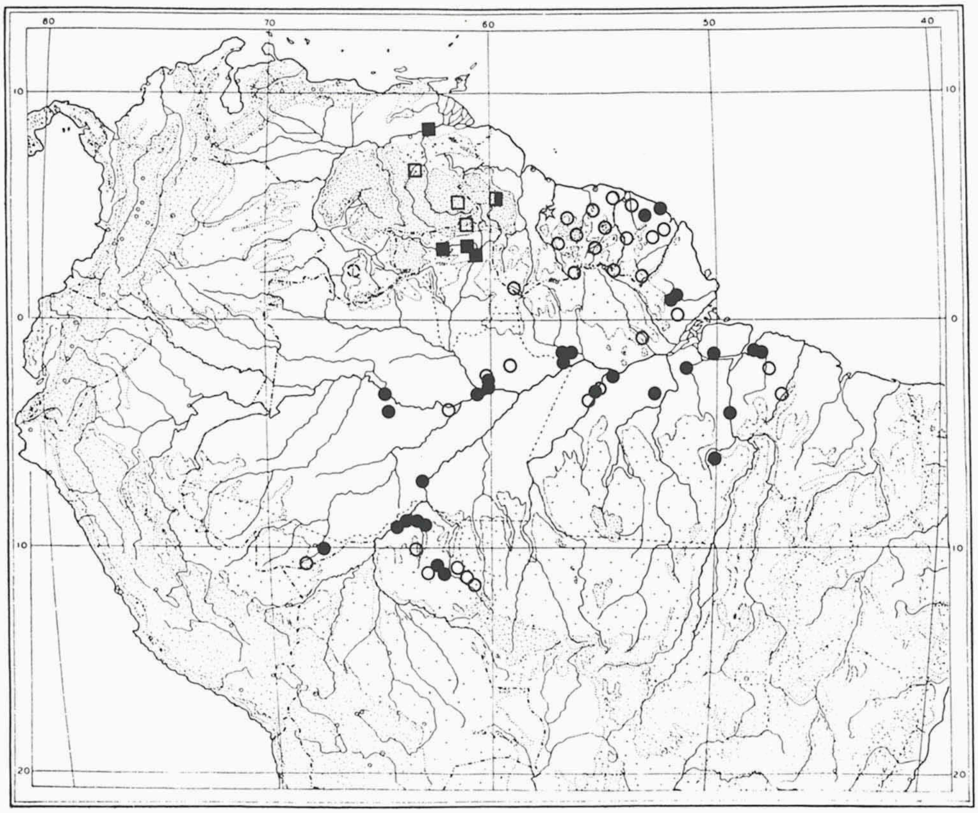


Fig. 78. Distribution of *Coleodactylus amazonicus* (circles) and *C. septentrionalis* (squares). Closed symbols = material studied; open symbols = data from literature (Vanzolini, 1970b, 1972, 1980, 1986a; Cunha, 1961; Donoso-Barros, 1968; Hoogmoed, 1985; Hoogmoed & Avila-Pires, 1991; Martins, 1991); half-open and dashed symbols = general localities from respectively material studied and literature; star = both species found in areas close to each other.

he no longer considered *C. guimaraesi* as a valid species. Judging from all these data, without having had the opportunity to see the holotype of *C. guimaraesi*, I have no doubt in including this name in the synonymy of *C. amazonicus*.

There seems to be a geographical component in the variability in colour pattern in this species, but it is not totally clear yet. Most specimens observed from eastern Pará and from French Guiana had a rather uniform colour, the same being true for the few specimens collected in Urucu, Amazonas. In contrast, specimens from Faro and Cruz Alta (PA), and from Manaus (AM), are usually richly spotted. In Acre some of the specimens are richly spotted, others mainly uniformly coloured.

Coleodactylus septentrionalis Vanzolini, 1980
(figs. 78-81, 262)

Coleodactylus septentrionalis Vanzolini, 1980: 2 (holotype MZUSP 52866, type-locality: Ilha de Maracá, Roraima, Brasil), 1986b: 7; Cunha, 1981a: 6; O'Shea, 1989: 68.

Coleodactylus meridionalis; Vanzolini, 1957: 2 (part), 1968: 38 (part), 1970b: 35 (part); Cunha, 1961: 47 (part); Wermuth, 1965: 18 (part); Peters & Donoso-Barros, 1970: 96 (part).

Material.— **Brazil.** RORAIMA. Município de Boa Vista, Colônia Coronel Mota, Região do Taiano: 2 ♂♂, 8 ♀♀, MPEG 3932, 3971, 3972, 3976, 3986, 4042, 4043, 4094, 4110, 4114, 15-24.vi.1970, leg. F.P. Nascimento. Município de Boa Vista, Fazenda Bom Intento, right bank of Rio Branco river: 9 ♂♂, 9 ♀♀, MPEG 4178, 4183, 4184, 4188, 4202, 4210, 4249, 4252, 4259, 4264, 4265, 4271, 4341-43, 4352, 4431, 4448, 6-14.vii.1970, leg. F.P. Nascimento. Ilha de Maracá: 1 ♂, 2 ♀♀, MPEG 14798-800, 28.vii.1987, leg. M. Santa-Brígida; 6 ♂♂, 4 ♀♀, 10 ex., MR 001, 18.vi.1987; MR 021, 26.vi.1987; MR 023, MR 025, 27.vi.1987; MR 027, 29.vi.1987; MR 030, 30.vi.1987; MR 036, MR 037, 01.vii.1987; MR 063, 06.vii.1987; MR 069, 12.vii.1987, MR 074, 13.vii.1987; MR 076, 14.vii.1987; MR 079, 14-16.vii.1987; MR 080, 16.vii.1987; MR 135, 02.vii.1987; MR 147, 07.viii.1987; MR 165, Cachoeira da Onça, W Maracá, 12.viii.1987; MR 197, 17.viii.1987; MR 289, 24.ix.1987; MR 297, MR 303, 28.ix.1987; all leg. M. O'Shea, INPA/RGS/SEMA "Projeto Maracá".
Guyana. Pacaraima foot hills: 1 ♀, BMNH 1933.6.19.50, leg. D.V. Fitzgerald.
Venezuela. T.F. Delta Amacuro, Castillos de Guayana, 32 km E of San Felix: 2 ♂♂, 7 ♀♀, 2 juv., RMNH 25174-185, 20.v.1978, leg. M.S. Hoogmoed & P. Gibbs.

Diagnosis.— A diurnal, ground dwelling, small gecko. Maximum SVL in males 26 mm, in females 28.5 mm. Body cylindrical, with short legs and tail. Claws enclosed by an ungual sheath composed of five asymmetrical, imbricate scales. Dorsal scales phylloid, imbricate, smooth. Ventral scales larger, smooth; 26-36 (31.2 ± 2.0) along midventral line, between anterior level of forelimbs and that of hind limbs. Scales around midbody 36-48 (42.8 ± 2.8). Mental without a median cleft, bordered by two to four postmentals; its width distinctly shorter than length of first infralabial.

Description.— Sphaerodactyline gecko with maximum SVL in males of 26 mm (MPEG 14800 and others), in females of 28.5 mm (MR 063). Head 0.17-0.23 (0.21 ± 0.01, n= 61) times SVL; 1.2-1.6 (1.40 ± 0.08, n= 59) times as long as wide; 1.2-1.6 (1.42 ± 0.09, n= 59) times as wide as high. Snout elongate, bluntly pointed, gently sloping toward top of head. Neck narrower than head, slightly narrower than body. Body cylindrical. Limbs relatively short, forelimbs 0.20-0.32 (0.26 ± 0.03, n= 49) times SVL, hind limbs 0.29-0.43 (0.34 ± 0.03, n= 45) times. Tail round in cross section, tapering toward the tip, 0.7-0.9 (0.78 ± 0.05, n= 15) times SVL.

Tongue wide, covered with imbricate, scale-like papillae; tip round, with a short median cleft. Teeth minute, conical, subequal.

Rostral very large, approximately as wide as high, distinctly visible from above; posterior part, between level of nostrils, with a shallow depression and a median cleft; bordered posteriorly by three or four, exceptionally five, scales, lateral ones (supranasals) by far the largest. Nostril bordered by rostral, first supralabial, two or three (rarely one) postnasals and lateral postrostral (supranasal); postnasals slightly to distinctly larger than adjacent loreal scales. Scales on snout smooth, flat, subimbricate, irregularly polygonal and relatively large anteriorly, gradually decreasing in size, imbricate, and with round posterior margin toward top of head. Loreal region with scales similar to those on anterior part of snout, but smaller; 4-7 scales in a longitudinal line between postnasal and orbit. Scales on supraorbital region and on top of head smooth, flat, imbricate, with round posterior margin in the anterior part, smaller posteriorly, and almost granular, subimbricate on posterior part of head. A supraciliary flap is present, with 3-6 (mostly 3 or 4) enlarged scales. Pupil round.

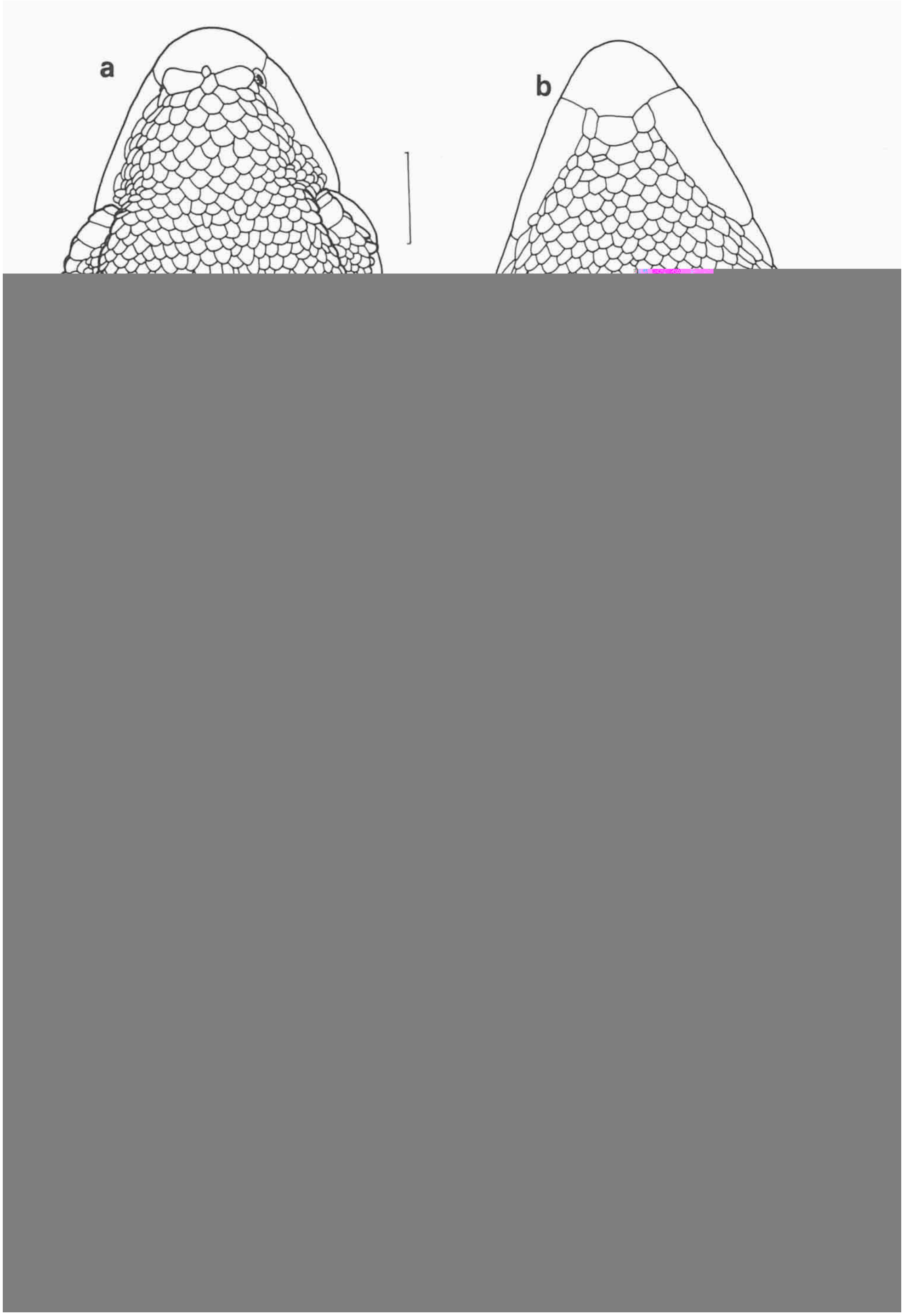


Fig. 79. *Coleodactylus septentrionalis*, MPEG 14799; a, b, c: dorsal, ventral and lateral views of head; d, e: ventral view of left hand and right foot; f, g: ungual sheath of third and fourth right toes, in dorsal view; h, i: same as f, g, but in a more apical view.

Suboculars 1-4, narrow, mostly one of them much longer than the others. Temporal region with small, smooth, imbricate scales, with round posterior margin. Ear-opening small, round to vertically or obliquely oval or subtriangular. Supralabials 4-5, exceptionally six, decreasing in size posteriorly, reaching approximately to below posterior margin of eye; most commonly fourth, occasionally third or fifth, supralabial below centre of eye.

Mental rhomboid or resembling an arrow-head, with blunt anterior and truncate posterior margins; its width distinctly shorter than length of first infralabial; no posterior median cleft. Postmentals 3, occasionally 2 or 4; generally median one several times larger than lateral ones, in some specimens all postmentals subequal. Scales on chin mostly hexagonal, anteriorly larger and juxtaposed, posteriorly smaller, imbricate. Infralabials 3-5, first very long, decreasing in size posteriorly; 2-4 to below centre of eye. Scales on neck forming a short transitional zone between those on head and those on body.

Dorsals smooth, imbricate, with round posterior margin. Ventrals similar, but larger; 31-42 (36.0 ± 2.2, n= 55) scales along the midventral line between anterior level of forelimbs and vent; 26-36 (31.2 ± 2.0, n= 55) to anterior margin of hind limbs. Both dorsals and ventrals in approximately longitudinal and oblique rows. Scales around midbody 36-48 (42.8 ± 2.8, n= 59), dorsals grading into ventrals. Scales on preanal plate similar to ventrals, except for scales on border of vent, which are smaller. Escutcheon absent.

Scales on tail similar to dorsals and ventrals, respectively.

Scales on limbs smooth, imbricate, with round posterior margin; posterior surfaces of upper arms, forearms and thighs with much smaller, almost granular, scales. Six, occasionally five or seven, lamellae under fourth finger; seven or eight, rarely six, under fourth toe. Claws enclosed by an ungual sheath composed of five asymmetrical, imbricate, scales, of which two infero-laterals, innermost slightly larger and swollen, and three smaller dorsals, of which one internal apical and two supero-laterals; one of the supero-laterals, which according to Parker (1926) is homologous with the median dorsal of *Lepidoblepharis*, occupies the most external position of the set.

The only colour description of living specimens available is that of O'Shea (1989: 55), "brown with a series of paired white dorsal spots and occasionally a pair of broken white dorso-lateral stripes". Vanzolini (1980), Cunha (1981a), and Hoogmoed (1985) give colour descriptions of recently fixated material. Among the specimens from Roraima I studied, three (MPEG 14798-800) show an apparently well preserved pattern, as follows. General dorsal colour dark brown. A transverse, relatively large, white band across posterior part of head, which is in contact with posterior border of eye through a less evident and narrower white line. Body with a series of dorsolateral white, irregular, spots, one pair at the level of forelimbs, a second approximately at midbody, and a third shortly before the level of hind limbs; in two of the specimens, the spots are connected by a paler dorsolateral stripe, which continues along anterior half of tail. The single specimen with complete original tail also shows three white spots on tail, first double, others single. Flanks uniformly brown in two specimens, with small white spots in the other. Ventral region mostly white, laterally peppered (in one specimen entire belly peppered); underside of tail mostly peppered.

Other specimens from Roraima show a reddish-brown colour, almost uniform,

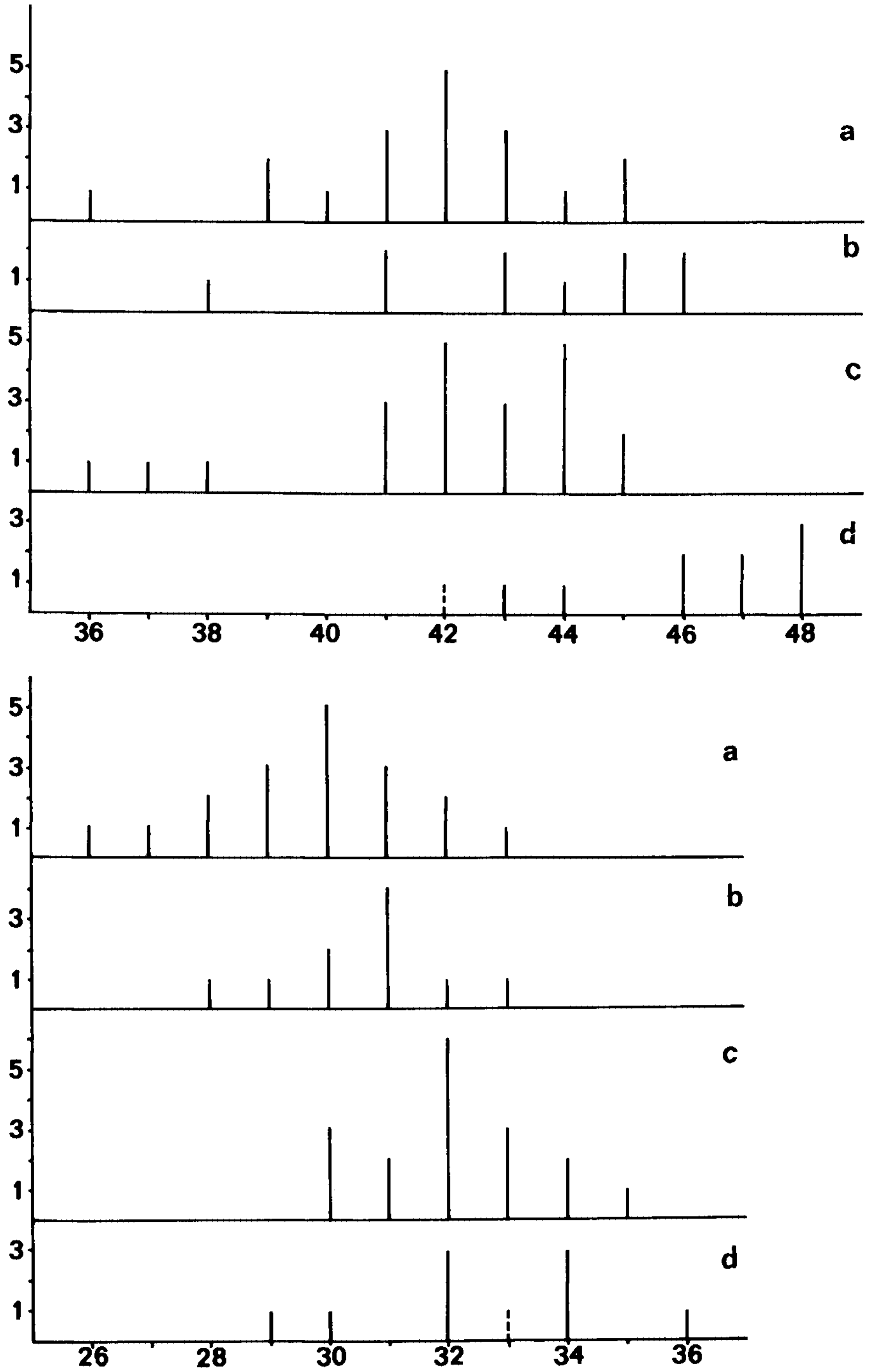


Fig. 80. *Coleodactylus septentrionalis*, comparison between samples from: a. Fazenda Bom Intento; b. Colônia Coronel Mota; c. Ilha de Maracá (all Roraima, Brazil); d. Guiana (one specimen indicated with broken bar) and Venezuela. Upper graph: number of scales around midbody; lower graph: number of midventral scales.

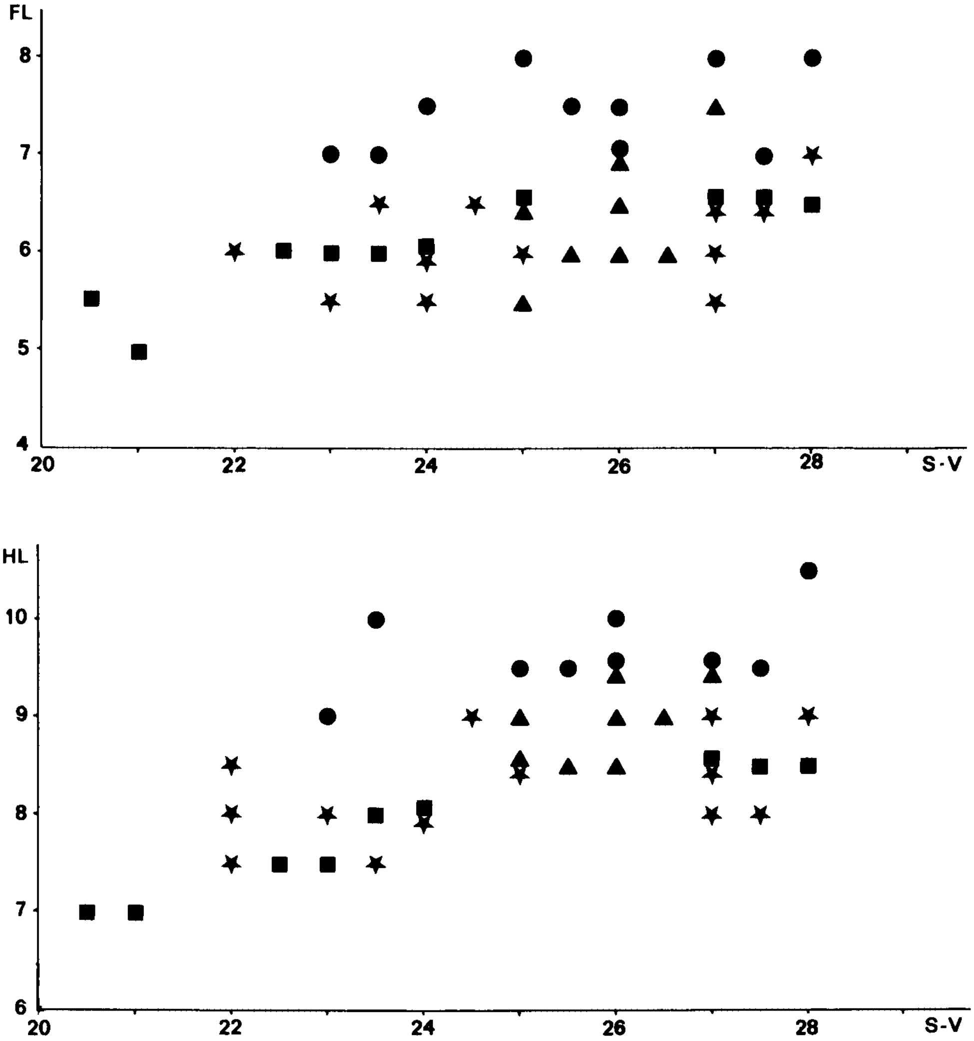


Fig. 81. *Coleodactylus septentrionalis*; upper graph: length of forelimbs versus svl; lower graph: length of hind limbs versus svl; specimens from Ilha de Maracá (circles), Colônia Coronel Mota (triangles), Fazenda Bom Intento (stars), Venezuela (squares).

only with the light band across head distinct; ventral region mostly cream, in some specimens with peppered areas.

In specimens from Venezuela, the white band across posterior part of head varies from absent to very conspicuous; the back may be uniformly brown, or with small, light, dark bordered spots irregularly dispersed, or else with a few similar but slightly larger spots, more or less dorsolateral in position. In any case, the pattern is much less conspicuous than in the three specimens from Roraima described above.

Habitat.— Vanzolini (1980) mentioned that the type-series was collected on the floor of primary or old secondary forest, in Ilha de Maracá. O'Shea (1989), who worked for seven months on this island, studying its herpetofauna, reported the species among the leaf-litter of dry, sandy 'terra-firme' forest; in the riverine forest; and, during the dry season, underneath fallen *Mauritia* palm fronds, in 'buritizais' (seasonally flooded areas with a dominance of *Mauritia* palm). Cunha (1981a) mentioned specimens found in isolated patches of forest, in areas of savanna. The only specimen registered from Suriname (Hoogmoed, 1985), was found in a dry area of shrub savanna, on white sand, surrounded by rather dry dakama forest on sandy soil, and rainforest (where *C. amazonicus* occurs). RMNH 25174-185, from Venezuela, were found between dry leaves on the forest floor, in dry and low forest on bank of lagoon (M.S. Hoogmoed field notes). In general, *C. septentrionalis* seems to occur in more open vegetation than *C. amazonicus*.

Distribution (fig. 78).— Northern part of Roraima, Brazil; western Suriname (district Nickerie, between Avanavero and Amotopo); Pacaraima foot hills, Guyana; Delta Amacuro, Venezuela.

Remarks.— The data obtained suggest some populational variation, although the number of specimens per area that was examined is not very large and does not give more than an indication. E.g., the number of scales at midbody seems to be higher in the specimens from Venezuela (fig. 80). In relation to ventral scales, the data suggest a cline from Bom Intento, through Coronel Mota and Ilha de Maracá, to Venezuela, with a slight increase in the number of scales (fig. 80). The proportions of the limbs show also some variation (fig. 81), the limbs apparently being larger in the sample from Ilha de Maracá; among specimens from other localities, the variation is not clear, which at least in part can be attributed to the imprecision of the measurements (especially due to different degrees of flexibility of the limbs - hind limbs more than forelimbs - in preserved material); the constantly higher numbers in the sample from Maracá, however, can not be explained by that. Some variation in colour pattern was already mentioned by Hoogmoed (1985), and is also observed among the specimens seen by me. Although Vanzolini (1980) suggested that absence of a pattern could be the result of a long time in preservative, which certainly can be true in some cases, there are striking differences among relatively recently preserved material, that does seem to correspond to a real difference in the specimens. A similar case of variability in colour pattern is observed in *C. amazonicus*.

Gonatodes Fitzinger, 1843

Diagnosis.— Sphaerodactyline geckos with free claws projecting from two or four basal scales. Dorsal head scales mostly granular. Dorsals granular, juxtaposed. Ventrals larger, flat, smooth, imbricate. Pupil round (mostly) or oval (*G. antillensis*). Males with escutcheon scales present on belly and under thighs. Colour pattern sexually dimorphic, males with a colourful or contrasting pattern, females with a predominantly brown pattern.

Distribution.— Central and northern South America, Central America and the Antilles.

Content.— Peters & Donoso-Barros (1970) mentioned a total of 17 species; Rivero-

Blanco (1979), in an unpublished manuscript, reduced them to 15 and described three new species; another species was described by Rodrigues (1980). This gives a total of 19 species, of which three not yet validly described. Five species are known in Brazilian Amazonia, four of them allopatric in relation to each other, the fifth (*G. humeralis*) widespread and sympatric with each of the other four.

Gonatodes annularis Boulenger, 1887
(figs. 82-85, 263, 264)

Gonatodes annularis Boulenger, 1887b: 154 (syntypes BM 1946.8.22.97-98, type-locality: Maccasseema, Pomeroon River, Guyana); Cunha, 1971: 113; Hoogmoed, 1973: 72, 1979: 277; Rivero-Blanco, 1979: 61; Hoogmoed & Avila-Pires, 1989: 168.
Gonatodes Boonii Lidth de Jeude, 1904: 87 (holotype RMNH 4462, type-locality: Coppename River basin, Suriname).
Gonatodes beebei Noble, 1923: 301 (holotype AMNH 21251, type-locality: Kartabo, Guyana).

Material.— **Brazil.** AMAPA. Cachoeira Inajá, Rio Camaipi, affluent of Rio Maracá (left margin), Município de Mazagão: 1 ♂, MPEG 2667, 23.vi.1969, leg. F.P. Nascimento. Serra do Navio: 4 ♀♀, 2 juv., MPEG 15080, 15087, 15100, 15148, RMNH 26391-392, all 10-19 .xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila-Pires.
PARA. Cruz Alta, 6 km S of Rio Trombetas, Município de Oriximiná: 1 ♂, 1 ♀, MPEG 15396, RMNH 26393, 11.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila-Pires & R.A.T. Rocha. Cachoeira Porteira, Rio Trombetas: 1 ♂, INPA/Ecol s/n, iv.1985, leg. T. Barrett.
French Guiana. Montagne du Mahury, SE of Cayenne, Ile de Cayenne, 120 m: 1 ♀, RMNH 26394, 02.iv.1975, leg. M.S. Hoogmoed. Montagne La Gabrielle, SE of Cayenne, 50 m: 1 ♂, 1 ♀, RMNH 26395-396, 03.iv.1975, leg. M.S. Hoogmoed. Lac des Americains, Mont Grand Matousy, SW of Cayenne, 30 m: 1 ♀, RMNH 26397, 26.vi.1975, leg. M.S. Hoogmoed. Petit Saut, Sinnamary River: 4 ♂♂, 5 ♀♀, 2 juv., RMNH 26398-403, MPEG 15826, 15830, 15838, 15841, 15842, 08-15.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Suriname. MAROWIJNE. Loëkreek, camp Hofwijks VII: 1 ♀, RMNH 1569, 06.viii.1975, leg. M.S. Hoogmoed. SARAMACCA. Coppename river basin: 1 ♂, RMNH 4462 (holotype of *Gonatodes boonii*), 1901, leg. Coppename Expedition. NICKERIE. Reynold's (Grassalco) Camp in Mozeskreek, 90 m: 1 ♀, RMNH 26404, 20.vii.1975, leg. M.S. Hoogmoed & W.N. Polder.

Diagnosis.— *Gonatodes* with proximal subdigital lamellae narrower than digits, in total 24-30 under fourth toe. Three or four lateral rows of scales on distal part of fingers and toes. Tail ventrally with moderately enlarged midventrals, tending to a repetitive sequence of two single midventrals (one after the other), each in contact with one latero-distal scale per side, followed by a divided midventral in contact with two latero-distal scales per side. Scales around midbody 90-99. Ventrals 41-49. Males in life usually with head and anterior part of body vividly covered with yellow spots (light spots in preserved specimens); in some specimens such spots are missing; iris blue.

Description.— Sphaerodactyline gecko with maximum SVL in males of 51 mm (RMNH 26399, 26401), in females of 55 mm (Hoogmoed, 1973). Head 0.23-0.27 (n= 26) times SVL, proportionally longer in smaller specimens; 1.3-1.5 (1.43 ± 0.05, n= 25) times as long as wide; 1.2-1.6 (1.40 ± 0.07, n= 25) times as wide as high. Snout round, moderately elongate, gently sloping toward top of head. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.32-0.43 (0.37 ±

[redacted]

cross section, tapering toward tip, 1.0-1.3 (1.11 ± 0.07, n= 13) times SVL.

Tongue villose, relatively wide; tip round, with an anterior median cleft. Teeth relatively small, conical, subequal.

Rostral large, convex, approximately rectangular; posterior part with a shallow depression medially and posterior margin indented by the median postrostral, with a long cleft extending anteriorly. Usually four or five, exceptionally six or seven, postrostrals, lateral ones (supranasals) distinctly larger than median ones, median ones equal to or slightly larger than contiguous scales on snout. Nostril bordered by rostral, first supralabial, three or four (exceptionally five) postnasals and lateral postrostral (supranasal); postnasals equal to or slightly larger than adjacent loreals. Scales on snout conical, juxtaposed, slightly decreasing in size posteriorly. Canthus rostralis distinct, round. Loreal region with scales slightly more elongate toward infralabials; adjacent to infralabials a row of larger, convex to broadly keeled scales. Loreal scales 10-14 in a line between postnasals and anterior margin of orbit. Top and posterior part of head, as well as supraorbital region, with granular scales. A short supraciliary flap projecting from the eye anteriorly, with a double row of slightly enlarged scales, of which one to three dorsal ones form small, conical spines. Pupil round. Scales on temporal region similar to those on upper part of head. Ear-opening much smaller

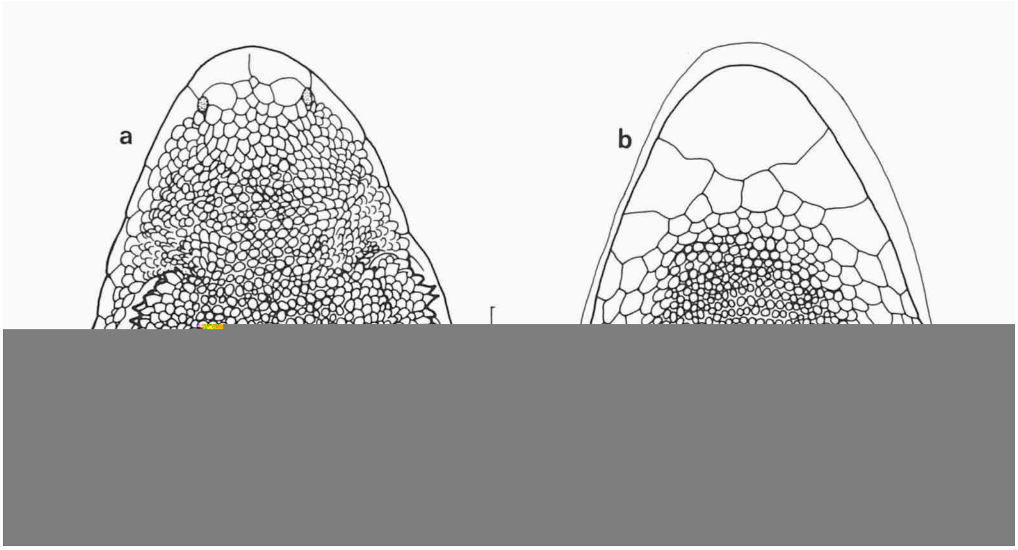


Fig. 82. *Gonatodes annularis*, RMNH 26393; a, b: dorsal and ventral views of head.

tral surface of hind limbs. Subdigital lamellae narrower than digits under third and fourth phalanges, distally approximately as large as digits (although narrower than those on basal phalanges); close to base of digit they may be divided into smaller scales; 20-25 (21.9 ± 1.1, n= 51, 26 specimens) lamellae under third finger, 21-27 (23.5 ± 1.3, n= 51, 26 specimens) under fourth finger, and 24-30 (27.1 ± 1.6, n= 50, 25 specimens) under fourth toe. Fingers and toes distally with three to four lateral rows of scales on each side. Claws exposed, non retractile, between two basal scales.

Sexual dichromatism evident, with males more colourful. Hoogmoed (1973: 78) discusses the variability in pattern in this species; two male patterns are known, and females can show a pattern similar to that of juveniles, or a derivation of it. The two males examined from Brazil (MPEG 2667, from Rio Camaipi, Amapá, and MPEG 15396, from Cruz Alta, Pará) exhibit the "boonii" pattern mentioned by Hoogmoed (1973). Cunha (1971: 114) describes the colour in alcohol of MPEG 2667. MPEG 15396 alive showed the following pattern: head black with orange-yellow (18) spots; body similar to head anteriorly, gradually changing to olive-green (48) spots posteriorly; between hind limbs, on hind limbs themselves and on base of tail, ground colour olive-green (48), with black and mars-brown (223A) spots; ventrally, head dusky-brown (19) with orange-yellow (18) spots, chest mostly with orange-yellow scales, belly peach-red (94) with scales narrowly bordered by dusky-brown (19); regenerated tail russet (34) and dusky-brown (19), underside of tail peach-red (94); iris vividly light blue; tongue anteriorly grey, posteriorly white.

Among adult females, RMNH 26393 alive had head and body dorsally vandyke-brown (121) and sepia (219), with olive-grey (42) spots and vertebral band; ventrally the head was drab (27) with bluish-white stripes, belly salmon (106) and drab; tail mars-brown (223A), with sepia and olive-grey (42) spots, and an olive-grey dorsal band bordered by sepia; underside of tail proximally peach-red (94), distally sepia and white. RMNH 26392 had head and body dorsally olive-brown (28), vertebral

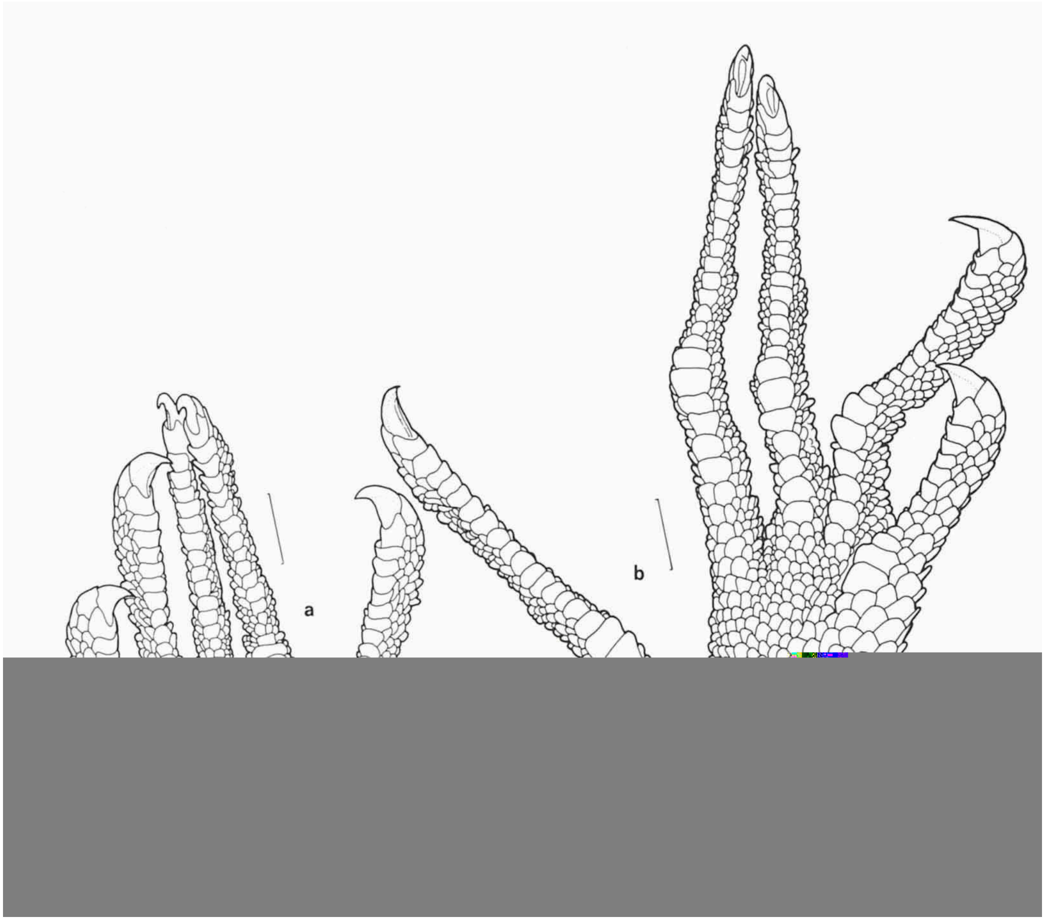


Fig. 83. *Gonatodes annularis*, RMNH 26393; a, b: ventral view of right hand and left foot.

stripe greyish-olive (43) partially bordered by sepia (119), and smoke-grey (44) spots both along the sides of the vertebral stripe, as in a dorsolateral row; at sides of head small trogon-yellow (153) spots; ventrally, head white to lavender (77) with light neutral grey (85) lines, chest light neutral grey, belly flesh colour (5); the original part of the tail followed body pattern, while a regenerated part was completely sepia (119). MPEG 15100 was similar to RMNH 26392 but for the ventral region, where the head was lavender (77) to lilac (76), with similar light neutral grey lines, and the anterior scales of the belly were light neutral grey centrally and flesh-colour peripherally, only posteriorly becoming completely flesh-colour; the tail, which was in a more advanced stage of regeneration, was vandyke-brown (121) with sepia (119) spots. In all cases, iris greenish-grey or greyish-brown with a narrow orange rim around pupil, and tongue anteriorly grey, posteriorly white.

Among juveniles, MPEG 15080 had head and body dorsally vandyke-brown (121) and sepia (119), with yellow-ochre (123C) spots on head, chamois (123D) on body; ventral region mostly light russet-vinaceous (221D); a white spot under tail, at

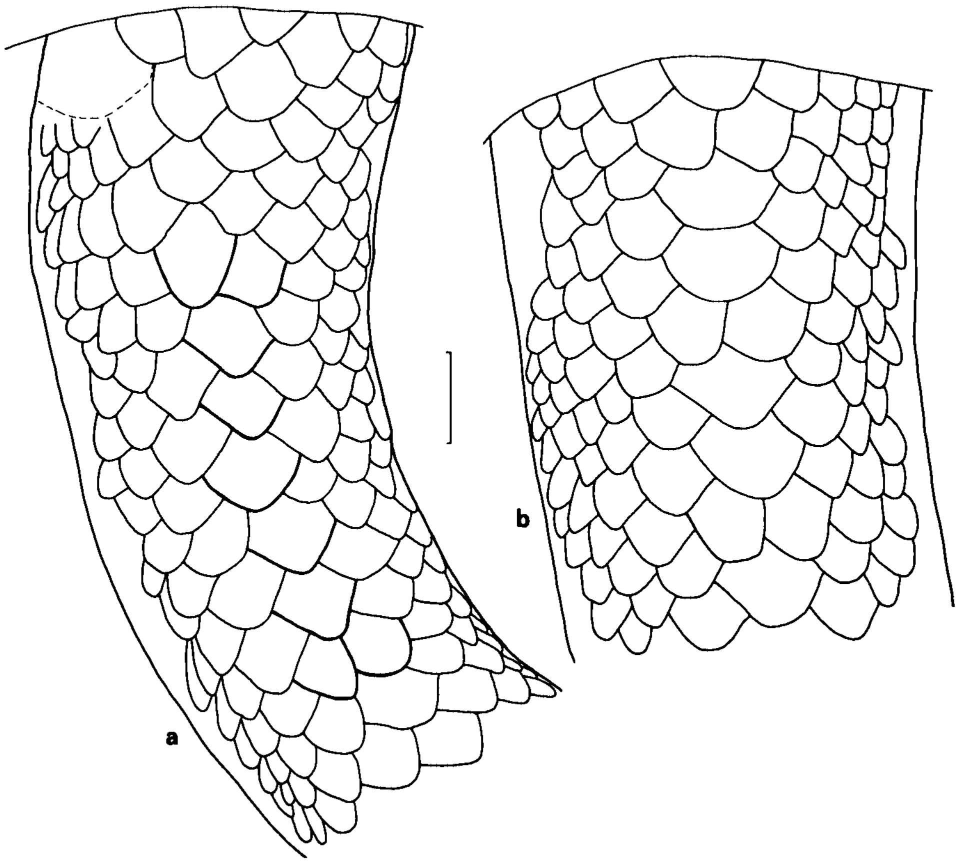


Fig. 84. *Gonatodes annularis*; a: ventral surface of tail of RMNH 26393 (the midventral scales, which are represented by a thicker line, are hardly recognizable; they form an irregular sequence 2"1'1'(1'")1'1'2"); b: ventral view of tail of MPEG 15830 (midventral scales in a regular series, 2"1'1'). See fig. 2 for codificiation of tail sequence.

about its midlength. RMNH 26391 and MPEG 15087 dorsally were, respectively, sepia (219) and warm sepia (221A), with an orange hue on the rostral region; on the back, several transverse series of black spots, and whitish to beige dorsolateral spots; ventral region grey, with dark and light stripes on gular region, extending to sides of neck; underside of tail with a series of distinct white spots; fingers and toes with orange spots. In MPEG 15148, back dark drab (119B), slightly lighter middorsally, with sepia spots; a series of small dorsolateral whitish spots at each side; head laterally and ventrally with light russet-vinaceous (221D) spots; ventral region otherwise grey with a light russet-vinaceous hue; tail proximally as body, distally with black rings which ventrally are separated by white areas, forming a contrasting pattern. Iris and tongue as in adult females.

In preservative, males predominantly dark brown, in some cases darker on head and anterior part of body, lighter posteriorly; covered all over with whitish, irregular, elongate spots, which are shorter and more distinct anteriorly, elongate, sinuous and more diffuse posteriorly, and relatively small on flanks; head ventrally dark brown with numerous whitish spots; ventral surface of body, limbs and tail predominantly beige or tan, the scales having brown margins; tail dorsally with a pattern similar to that of posterior part of body. Females brown, with a large, light brown vertebral band, with wavering margins, from the nuchal region to the proximal part of tail; some round, whitish spots may be present, either dorsolaterally or on flanks; head ventrally with light brown and beige bars, which start on infralabials; ventral surface of body, limbs and base of tail beige or tan, scales margined with brown; distally, underside of tail dark brown, with some irregular white spots.

In juveniles, a vertebral band is either present, but less evident than in adult females, or is absent, and there are two paravertebral series of dark brown spots, which fuse on tail into dark brown rings; tail distally shows a well defined pattern of black and white rings, especially evident on ventral surface.

Habitat.— A forest dweller, active on the lower part of tree trunks, on fallen tree trunks, or on rocks. In Serra do Navio (Amapá), specimens were found either in terra firme forest near a creek, or at the border of 'terra firme' forest and a swamp, or else in 'varzea' forest; in all cases on the base of trees, one of them in a hollow in a rotten tree trunk, the remaining ones between buttresses or stilt roots. All, except one, were collected in the afternoon, between 12:30 h and 15:30 h; the other one (MPEG 15148) was found between 22:00 h and 23:00 h, under moss, c. 30 cm above the ground on a tree trunk (which was isolated in a swampy area surrounded by 'terra firme' forest; see Hoogmoed & Avila-Pires, 1989); when disturbed it moved to the other side of the trunk, hiding itself under some roots that ran along the trunk, c. 150 cm above the ground. In Cruz Alta (Pará), a male and a female were found together in a rotten stump of tree, on the edge of 'igapó' and 'terra firme' forest. In Petit Saut, French Guiana, besides specimens found on the base of trees and on fallen tree trunks, several were captured on granite boulders with overhanging vegetation, near a creek in primary forest (Hoogmoed & Avila-Pires, 1991). These observations generally agree with those by Hoogmoed (1973) and Gasc (1976, 1981, 1990). Gasc (1981) also mentioned that the animal may be found at the base of *Astrocaryum* palms. Both Beebe (1944a) and Gasc (1981, 1990) reported specimens to take refuge in holes in the ground.

Distribution (fig. 85).— Rivero-Blanco (1979) reported the species for the wet tropical forests of eastern Venezuela (south of the Orinoco), Guyana, Suriname, French Guiana, and Amapá, Brazil. Here specimens are reported from the southern bank of Rio Trombetas, near Cruz Alta, close to Rio Amazonas. This agrees with the remark of Rivero-Blanco (1979) that the species would possibly occupy all the area of tropical forest on the northern side of the Amazon (and, possibly, north of Rio Negro, that is, the Guiana area of Hoogmoed, 1979). However, it should be remarked here that the species has not (yet?) been reported from such well studied areas like Ducke reserve, WWF reserves and Balbina from the southwestern part of Hoogmoed's Guiana area. Thus, it might be that it is not spread to the borders of the Rio Amazonas proper.

Remarks.— The species was reported from Brazil, for the first time, by Cunha (1971), based on a specimen from the upper Rio Camaipi, Amapá. The only other

Fig. 85. Distribution of *Gonatodes annularis* (squares), *G. eladioi* (star), *G. hasemani* (circles), and *G. tapajonicus* (triangle). Closed symbols = material studied; open symbols = data from literature (Hoogmoed, 1973; Rivero-Blanco, 1979; Gasc, 1981; Vanzolini, 1986a; Rodriguez & Cadle, 1990; Hoogmoed & Avila-Pires, 1991) and pers. comm. M. Martins for Rio Pitinga, AM (*G. annularis*); dashed circle = Rio Juruá, Amazonas state.

citation of specimens from Brazil seems to be that of Hoogmoed & Avila-Pires (1989). Thus, although the species apparently occurs in a rather large area of Brazilian Amazonia, only a few records do exist. If in part this may be due to a low population density and rather seclusive habits, it is quite probably also a consequence of undercollecting.

Gonatodes eladioi Nascimento, Cunha & Avila-Pires, 1987
(figs. 85, 86, 257)

Gonatodes eladioi Nascimento, Cunha & Avila-Pires, 1987: 35 (holotype MPEG 14385, type-locality: road N1-Caldeirão, near Igarapé Azul, Serra Norte, Carajás, Pará, Brasil, approximately 6°00'S, 50°22'W, 06.v.1986, leg. M.G. Nery & R. Moraes).

Material.— **Brazil.** PARA. Carajas, Serra Norte (5°50'-6°00'S, 50°20'-50°30'W). Road N1-Caldeirão, near Igarapé Azul: 3 ♂♂, 2 ♀♀, MPEG 14383-387, 06.v.1986, leg. M.G. Nery & R. Moraes; 1 ♀, MPEG

14133, 07.ix.1985, leg. F.P. Nascimento, M.G. Nery & R.B. Neto; 1 ♂, 1 ♀, MPEG 14367-368, 21.iii.1986, leg. F.P. Nascimento, M.G. Nery & R.B. Neto; 1 ♀, 1 juv., MPEG 14392-392, 21.v.1986, leg. M.G. Nery & R. Moraes. Area do Salobo-3 alfa: 1 juv., MPEG 13764, 04.viii.1984, leg. T.C.S. Avila-Pires & J.C.S. Pinto. Area do Fofoca: 1 juv., MPEG 13950, 28.vi.1984, leg. M. Zanuto. Area do Pojuca: 1 ♀, MPEG 14049, 17.ii.1985, leg. F.P. Nascimento & R.B. Neto; 1 ♂, MPEG 14232, 02.xi.1985, leg. T.C.S. Avila-Pires & R. Moraes. Area do Bahia: 1 ♀, MPEG 14165, 14.ix.1985, leg. F.P. Nascimento & M.F. Torres. All part of the type-series (holotype and paratypes).

Diagnosis.— *Gonatodes* with proximal subdigital lamellae as wide as digit, in total 14-16 under fourth toe. Two lateral rows of scales (on each side) on distal part of digits. Tail ventrally with a repetitive sequence of one single midventral scale in contact at each side (latero-distally) with one scale, followed by a slightly larger, single midventral in contact at each side with two scales. Scales around midbody 84-97. Ventrals 43-48. Male with pale vertebral stripe from snout to base of tail; dorsal pattern in life in different tones of brown and grey, vertebral stripe smoke-grey.

Description.— Sphaerodactyline gecko with maximum SVL of 34 mm (MPEG 14385, ♂; MPEG 14386, ♀). Head 0.23-0.29 (n= 15) times SVL, proportionally longer in smaller specimens; 1.4-1.7 (1.55 ± 0.07, n= 14) times as long as wide; 1.3-1.7 (1.48 ± 0.14, n= 14) times as wide as high. Snout round, moderately elongate, gently sloping toward top of head. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.30-0.36 (0.33 ± 0.02, n= 15) times SVL, hind limbs 0.39-0.47 (0.44 ± 0.02, n= 15) times. Tail round in cross section, tapering toward tip, 0.9-1.2 (1.13 ± 0.04, n= 6) times SVL.

Tongue relatively wide, slightly narrowing anteriorly, with a round tip; covered anteriorly by imbricate, scale-like papillae, posteriorly villose; tip with a short median cleft. Teeth small, conical, subequal.

Rostral large, nearly pentagonal, distinctly visible from above, with a median cleft extending from posterior margin, in a depressed area. Three or four postrostrals, lateral ones (supranasals) much larger than median ones, median ones about as large as adjacent scales on snout. Nostril bordered by rostral, first supralabial, three postnasals and lateral postrostral (supranasal); postnasals as large as, or slightly larger than, adjacent loreals. Scales on snout and on loreal region round to polygonal, slightly convex, juxtaposed to subimbricate. Loreal scales 8-9 in a line between postnasals and anterior margin of orbit. From between eyes toward posterior part of head the scales decrease in size and become granular. Scales on supraorbital region similar to and contiguous with those on top of head. Supraciliary flap with a smooth margin or with up to six slightly enlarged, prominent scales on anterior upper margin. Pupil round. Scales on temporal region small, granular, like those on posterior upper part of head. Ear-opening much smaller than eye, round to vertically or obliquely oval. Supralabials 5-8, mostly 6, decreasing in size, 5-6 to below centre of eye.

Mental large, roughly rhomboid, bordered posteriorly by two relatively large postmentals. Scales on chin anteriorly polygonal, gradually decreasing in size from postmentals, posteriorly round, relatively small; all juxtaposed. Infralabials 4-6, decreasing in size posteriorly; 3-4 to below centre of eye.

Scales on nape and on sides of neck granular, continuous with those on head and body. Scales on throat smooth, imbricate, with round posterior margin, with a short transitional zone with the granular scales on chin.

Dorsals granular, slightly larger than scales on top of head. Scales on flanks like the dorsals, latero-ventrally gradually changing into the ventrals. Ventral region with scales distinctly larger than the dorsals, smooth, hexagonal, imbricate, in longitudinal and oblique rows; 43-48 (45.9 ± 1.3, n= 14) along the midventral line between anterior margin of forelimbs and vent. Scales around midbody 84-97 (91.2 ± 3.9, n= 13). Scales on preanal plate similar to ventrals, except for border of vent, which has very small scales. Males with a relatively large escutcheon area on belly, and on two to three rows of scales on ventral surface of thighs.

Scales on tail dorsally smooth, roundish, imbricate, laterally increasing in size toward ventral surface. A mid-ventral row of transversely enlarged scales, with sequence 1'1" (figs. 2, 86).

Scales on antero-dorsal surface of forelimbs, on anterior and ventral surfaces of thighs, and on ventral surface of lower legs smooth, roundish, imbricate; on forelimbs similar in size to scales on dorsal part of tail, on hind limbs increasing in size toward ventral surface; on other surfaces of both fore- and hind limbs, scales granular. Lamellae under third finger 12-13 (12.3 ± 0.5, n= 30, 15 specimens), under fourth finger 12-14 (12.7 ± 0.7, n= 30, 15 specimens), in both cases with 3-4 slightly enlarged basal ones; under fourth toe 14-16 (15.3 ± 0.6, n= 29, 15 specimens), with 5-7 slightly enlarged basal ones. Fingers and toes, distally, with two lateral rows of scales on each side. Claws exposed, non retractile, between two basal scales.

Sexual dichromatism evident. Colour in life of holotype (Nascimento et al., 1987) as follows: general colour greyish-brown, darker (vandyke-brown, 121) on head and neck; a smoke-grey (44) vertebral band, 4-15 granules wide, from rostral to base of tail, with wavering, vandyke-brown (121) margins; two longitudinal, bluish-grey (near 88, Pratt's Payne's Gray) stripes, three granules wide, from posterior corner of eye to level of forelimbs; ventrally, head orange-yellow (18), with vandyke-brown (121) stripes, body sulphur-yellow (157); tail pale-pinkish-buff (121D), with four regularly spaced, vandyke-brown spots, dorsally; salmon colour (106) ventrally. Some notes on colour in life of females MPEG 14386-387 were made by M.G.M. Nery (field notes): head vandyke-brown (121), with two Pratt's Payne's Grey (88) lateral stripes, running from snout, through eye, till forelimbs; a vertebral, smoke-grey (44) band, from neck onto base of tail, with vandyke-brown (121) paired spots along it; vertebral band much less evident than in male; tail pale-pinkish-buff (121D) dorsally, salmon colour (106) ventrally.

In preservative, males with dark brown and dirty-white banded head, the dirty-white bands corresponding to a continuation of the vertebral band and two lateral stripes which run from posterior corner of eye to level of forearm; labials vertically banded. Body light greyish-brown, with a vertebral dirty-white band, bordered by a dark-brown band at each side; at regular intervals, at the border between the dirty-white and the dark-brown bands, a pair of blackish, subtriangular spots, giving the vertebral band a wavering appearance. A pair of such spots at base of tail delimits the end of the vertebral stripe; posteriorly, tail light greyish-brown, dark peppered, with a few, fused spots with large intervals in between. Ventral region dirty-white, head with a series of dark brown stripes.

Females and juveniles with a rather similar pattern, except for the absence of a dark brown band delimiting the vertebral band, so that the latter is almost indistinct,

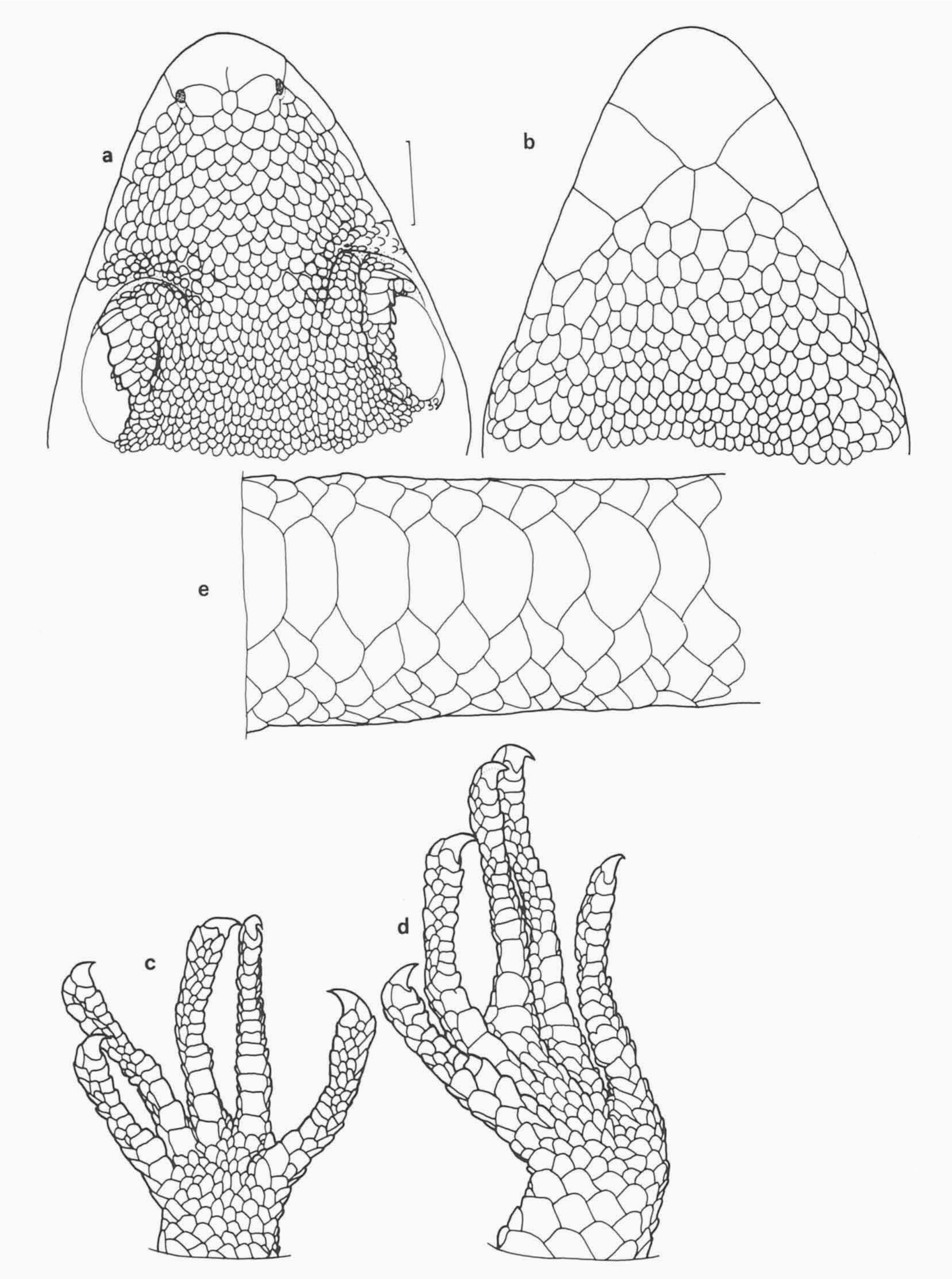


Fig. 86. *Gonatodes eladioi*, MPEG 14367; a, b: dorsal and ventral views of head; c, d: ventral view of left hand and left foot; e: ventral view of tail in MPEG 14019.

while a paired series of dark brown spots becomes more apparent. On base of tail there is one pair of such spots; posteriorly, the pairs of spots fuse with each other and, near the end of the tail, form rings around it, which are followed by contrasting white rings. Ventral region similar to that described for the male, except for the ringed tip of the tail.

Habitat.— A forest dweller. Nine of the 15 specimens were found up to 2 m high on the walls of a small, abandoned hut (with wooden walls, covered with palm leaves) inside the forest (where also *G. humeralis* was collected). Another one was in the surroundings of this same hut. Three others were collected on the base of tree trunks, in one case on an old ant nest built on the base of the trunk, in another case walking along a low buttress of a tree which was sticking out of a small ravine, at the side of a dirt road (two specimens were together, only one of which was collected). These data seem to indicate that *G. eladioi*, like *G. humeralis*, occurs in relatively low density in undisturbed forest (and/or it has very seclusive habits), but it may become more common in disturbed or marginal forest situations. All specimens were collected during the day, between 09:00 h and 17:10 h.

Distribution (fig. 85).— Up to now only known from Serra Norte, Carajás, Pará. In the area of Serra Norte, it was only collected in the lower forested area that goes down from the 'campo rupestre N-1' in direction of the Rio Itacaiunas, between 200-400 m of altitude (for a detailed map of the area see Cunha et al., 1985).

Remarks.— *G. eladioi* is sympatric with *G. humeralis*, but the males can be easily distinguished from it by the presence of a light vertebral band. As usual in *Gonatodes*, females and juveniles of both species have a quite similar pattern, except that in *G. eladioi* distinct dark & white rings are present on the distal part of the tail, which in *G. humeralis* are less conspicuous. Other differences between the two species are (Nascimento et al., 1987): postmentals larger in *G. eladioi*; lower number of ventrals (43-48/mean 45.9 in *G. eladioi*; 55-63/59.2 in *G. humeralis* from the area, 48-78/61.4 in the general sample here studied); escutcheon in males occupying 3-4 rows of scales on each thigh in *G. eladioi*, 4-5 in *G. humeralis*; subdigital lamellae narrower proximally, and less numerous in *G. eladioi* than in *G. humeralis* (under third finger 12-13/12.3 in *G. eladioi*, versus 13-15/13.8 in *G. humeralis* from Serra Norte, 12-17/14.7 in the general sample of *G. humeralis*; under fourth finger respectively 12-14/12.7 versus 14-16/14.6 and 12-18/15.7; under fourth toe 14-16/15.3 versus 14-18/16.1 and 15-21/17.7); subcaudal sequence, in *G. eladioi*, 1'1", in *G. humeralis* 1'1'1".

Gonatodes hasemani Griffin, 1917
(figs. 85, 87, 88, 265)

Gonatodes hasemani Griffin, 1917a: 304 (holotype CM 1040, type-locality: neighbourhood of Villa Bella, Rio Beni, Bolivia); Peters & Donoso-Barros, 1970: 133; Rivero-Blanco, 1979: 100; MZ/USP, 1984: 86; Vanzolini, 1986a: 13; Nascimento et al., 1988: 26.

Gonatodes spinulosus Amaral, 1933: 56 (holotype MZUSP 661, type-locality: Rio Juruá, Amazonas, Brasil), 1937a: 1734, 1937b: 169.

Gonatodes hasemanni; Vanzolini, 1953a: 73, 1968: 23; Cunha, 1961: 42; Wermuth, 1965: 44.

Material.— **Brazil.** ACRE. Rio Juruá (left bank), Porongaba: 1 juv., INPA 622, 03.iii.1992, leg. C. Gascon.

AMAZONAS. Maués: 1 ex., AMNH 91636, iv.1963, leg. D. Cooper. Rio Madeira, Puruzinho: 1 ♂, USNM 200667, 14-17.xi.1975, leg. 'Expedição Permanente da Amazônia'. Rio Madeira, Barreira do Matupiri: 1 ♀, USNM 200668, 09-12.xii.1975, leg. 'Expedição Permanente da Amazônia'. Rio Urucu, E of Porto Urucu, near RUC-2/Petrobras: 2 ♂♂, MPEG 15857, RMNH 26439, 24.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
RONDONIA. Presidente Médici: 1 ♂, MPEG 13876, 24.viii.1984, leg. W.L. Overal & R.B. Neto. Ji-Paraná: 1 ♂, MPEG 13869, 10.viii.1984, leg. R.B. Neto; 1 ♂, MPEG 13937, 17.xi.1984, leg. F.P. Nascimento & R.B. Neto; 3 ♀♀, MPEG 14513-515, 31.ix.1986, leg. B. Mascarenhas & M. Zanuto. Ouro Preto d'Oeste: 1 ♂, MPEG 13913, 11.xi.1984, leg. F.P. Nascimento & R.B. Neto; 3 ♂♂, 1 ♀, MPEG 14059-062, 18.iii.1985, leg. T.C.S. Avila Pires & R. Moraes; 1 ♀, MPEG 14065, 19.iii.1985, leg. T.C.S. Avila Pires & R. Moraes; 1 ♀, MPEG 14071, 20.iii.1985, leg. T.C.S. Avila Pires & R. Moraes; 1 ♀, MPEG 14072, 20.iii.1985, leg. M.F. Torres; 1 ♂, MPEG 14507, 26.viii.1986, leg. T.C.S. Avila Pires & R. Moraes. Jaci-Paraná: 1 ♂, MPEG 14352, 19.iii.1986, leg. R. Moraes. Rio Jamari, reservoir area of hydroeletric plant Samuel: 1 ♂, 1 ♀, CEPB 0095, 0112, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.
BOLIVIA. Ivon: 2 ex., AMNH 22539, 22542, ii.1922, leg. N.E. Pearson.
PERU. Rio Utoquinia region, Peru-Brazil frontier, 1000 ft: 1 ex., AMNH 56378, leg. H. Bassler, R. de los Rios Collection. Rio Tapiche, Bombo, 800 ft: 1 ex., AMNH 56379, leg. H. Bassler, R. de los Rios Collection. Upper Ucayali River: 1 ex., AMNH 71094, leg. H. Bassler, R. de los Rios Collection. Madre de Dios, 30 km (airline) SSW of Puerto Maldonado, Tambopata Reserve, Explorer's Inn, 280 m, 12°50'S, 69°17'W: 1 juv., USNM 222319, 12.xi.1979, leg. P. David; 1 ♀, USNM 222320, 15.xi.1979, leg. R.W. McDiarmid; 1 ♂, USNM 222321, 19.xi.1979, leg. R.W. McDiarmid. Rio Waykini: 1 ♂, ZFMK 38883, 24.i.1983, leg. A. Ehrl & K. Henle.

Diagnosis.— *Gonatodes* with proximal subdigital lamellae narrower than digits, in total 19-26 under fourth toe. Three or four lateral rows of scales on distal part of fingers and toes. Scales under tail not forming a distinct series of enlarged midventrals. An elongate supraciliary spine. Scales around midbody 78-102. Ventrals 41-55. Males, in life, with amber, brown and blackish colours dorsally, frequently with different colours on back and flanks, or with a pair of pale dorsolateral stripes; white spots present on neck and body, which coincide with groups of enlarged, spinelike scales.

Description.— Sphaerodactyline gecko with maximum SVL in males of 46 mm (MPEG 15857, RMNH 26439), in females of 40 mm (MPEG 14071 and others). Head 0.23-0.27 (n= 25) times SVL, proportionally smaller in larger specimens; 1.3-1.5 (1.39 ± 0.07, n= 25) times as long as wide; 1.3-1.8 (1.46 ± 0.12, n= 24) times as wide as high. Snout round, relatively wide, gently sloping toward top of head. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.29-0.35 (0.32 ± 0.02, n= 23) times SVL, hind limbs 0.41-0.50 (0.45 ± 0.03, n= 22) times. Tail round in cross section, tapering toward tip, 0.9-1.1 (1.02 ± 0.06, n= 11) times SVL.
Tongue relatively wide, slightly narrowing anteriorly, with a round tip; covered anteriorly by imbricate, scale-like papillae, posteriorly villose; tip with a short median cleft. Teeth small, conical, subequal.

Rostral large, rectangular to pentagonal, visible from above, with a median cleft extending from posterior margin. Three (mostly) to five postrostrals, lateral ones (supranasals) distinctly larger than median one(s), median one(s) slightly to distinctly larger than adjacent scales on snout. Nostril bordered by rostral, first supralabial, three (mostly) or four postnasals, and lateral postrostral (supranasal); postnasals as large as, or slightly larger than, adjacent loreals. Scales on snout and on loreal region roughly round, convex, juxtaposed. Loreal scales 9-13 (mostly 11-12) in a line between postnasals and anterior margin of orbit. Toward posterior part of head scales decrease slightly in size. Scales on supraorbital region similar to and continuous with those on top of head. Supraciliary flap with a series of slightly enlarged scales, forming a smooth or indented margin, with a long spine projecting from middle of upper margin. Pupil round. Supralabials 5-7, decreasing in size posteriorly, 4-6 to below centre of eye. Scales on temporal region similar to those on posterior upper part of head. Ear-opening much smaller than eye, obliquely oval or subtriangular.

Mental large, roughly trapezoid, with lateral margins slightly concave, anterior and posterior margins convex. Postmentals 2-4, distinctly larger than adjacent posterior scales. Scales on chin small and polygonal directly behind postmentals, granular posteriorly; a few series of larger, polygonal scales adjacent to infralabials; all juxtaposed. Infralabials 5-7, decreasing in size posteriorly, 3-5 to below centre of eye.

Scales on nape and on sides of neck granular, continuous with those on head and body. Scales on throat smooth, imbricate, with round posterior margin, with a short transitional area with the granular scales on chin.

Dorsals granular, on the vertebral area similar in size to scales on snout; dorsolaterally and on flanks slightly larger and, in males, with several groups of up to six (mostly two to four) larger, conical, scales all along body, including neck. Transition between scales on flanks and ventrals rather abrupt. Ventral region with scales distinctly larger than dorsals, smaller on chest than on belly, smooth, rhomboid to hexagonal, imbricate; in oblique rows, on belly also forming rather regular longitudinal rows; 41-55 (47.5 ± 4.0, n= 17) scales along the midventral line between anterior margin of forelimbs and vent. Scales around midbody 78-102 (90.1 ± 5.6, n= 23), of which 16-22 (18.6 ± 1.7, n= 18) ventrals. Scales on preanal plate similar to ventrals, except for border of vent, which has very small scales. Males with a small escutcheon area which hardly surpasses the preanal plate and extends onto part of thigh.

Scales on tail smooth, conical, transversely flattened, tips directed posteriorly. Underside of tail with smooth, flat, imbricate scales, increasing in size toward the midventral line; no midventral row of enlarged scales (consequently no formula can be given).

Scales on limbs granular, except on anterior and ventral surfaces of thighs, and on ventral surface of lower legs, where they are smooth, flat, roundish, imbricate. Lamellae under third finger 15-21 (17.7 ± 1.7, n= 41), of which 4-6 slightly enlarged basal ones; under fourth finger 16-22 (18.5 ± 1.3, n= 50), with 5-7 slightly enlarged basal ones; under fourth toe 19-26 (21.6 ± 1.6, n= 49), with 7-10 in the basal segment, of which the two to five distal ones enlarged. Fingers and toes with three or four lateral rows of scales distally. Claws exposed, non retractile, mostly between four basal scales, occasionally between two.

Sexual dichromatism evident. In RMNH 26439, ♂, alive, head and forelimbs dorsally amber (36); back raw-umber (23) anteriorly, and hair-brown (119A) posteriorly, with black dots; flanks black, with white dots anteriorly, glaucous (80) dots posteriorly. Ventrally, head and chest chrome-orange (16), belly glaucous with some orange scales; escutcheon scales mostly flesh colour (5). Iris brown with a yellow-orange rim. Tongue grey and white. MPEG 15857, ♂, was generally darker than RMNH 26439, with amber and sepia (119) pigments on posterior part of head, as well as on

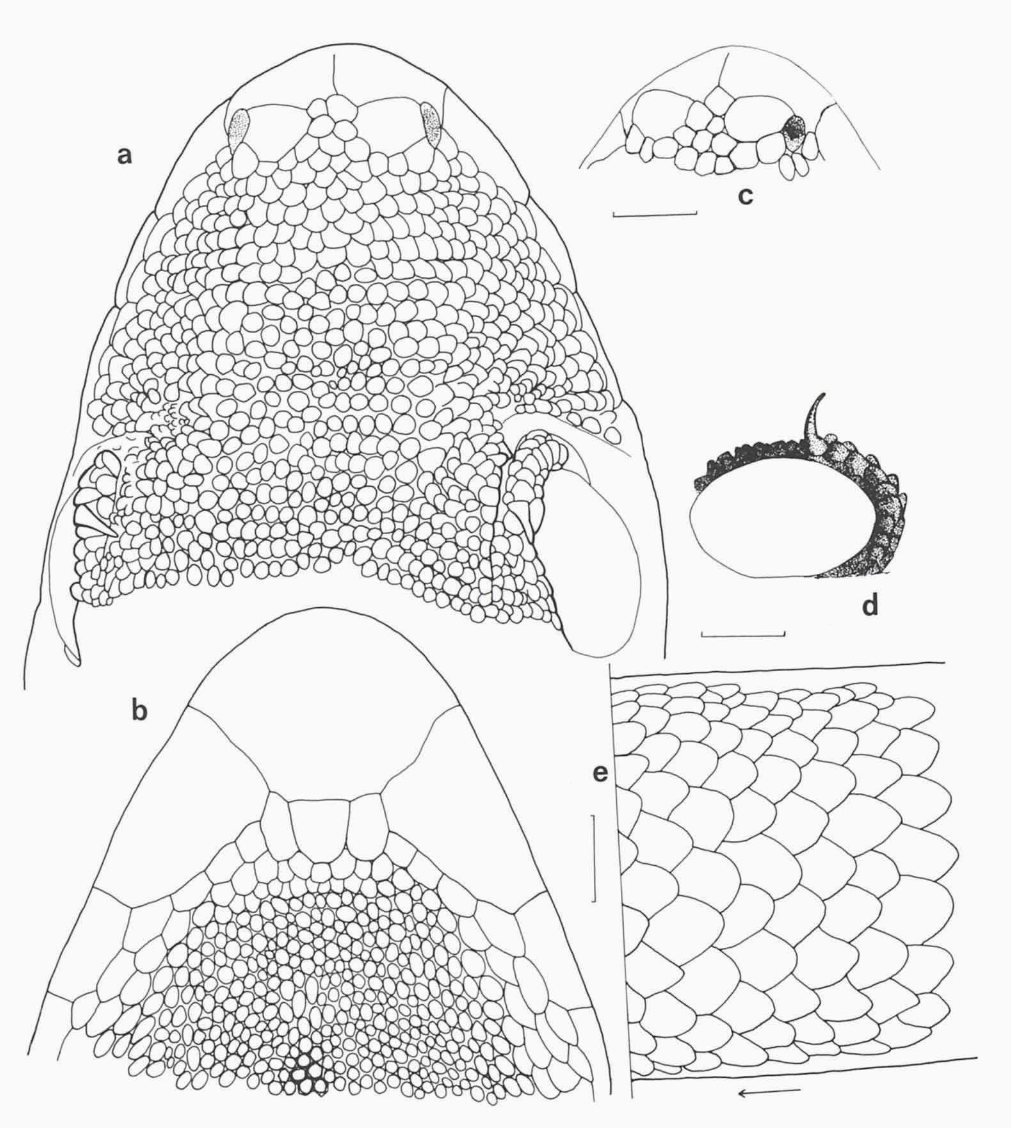


Fig. 87. *Gonatodes hasemani*; a, b: dorsal and ventral views of head of RMNH 26439; c: detail of snout, d: supraciliary scales with supraciliary spine, both in ZFMK 38883; e: ventral view of tail (proximally) of RMNH 26439.

forelimbs; back and flanks not so distinctly different in colour; ventral surface of head dark spectrum-orange (17).

In preservative, the majority of males from Rondônia have an almost uniformly brown head; a narrow, whitish stripe runs from the posterior corner of the eye posteriorly and slightly upwards, continuing as a dorsolateral stripe on body; in some specimens, the stripe seems to start on the nape, the head segment being absent; vertebral area between the stripes with same brown colour as head, and paired, black spots along it; outside the stripes, on neck and flanks, dark greyish-brown with sev-

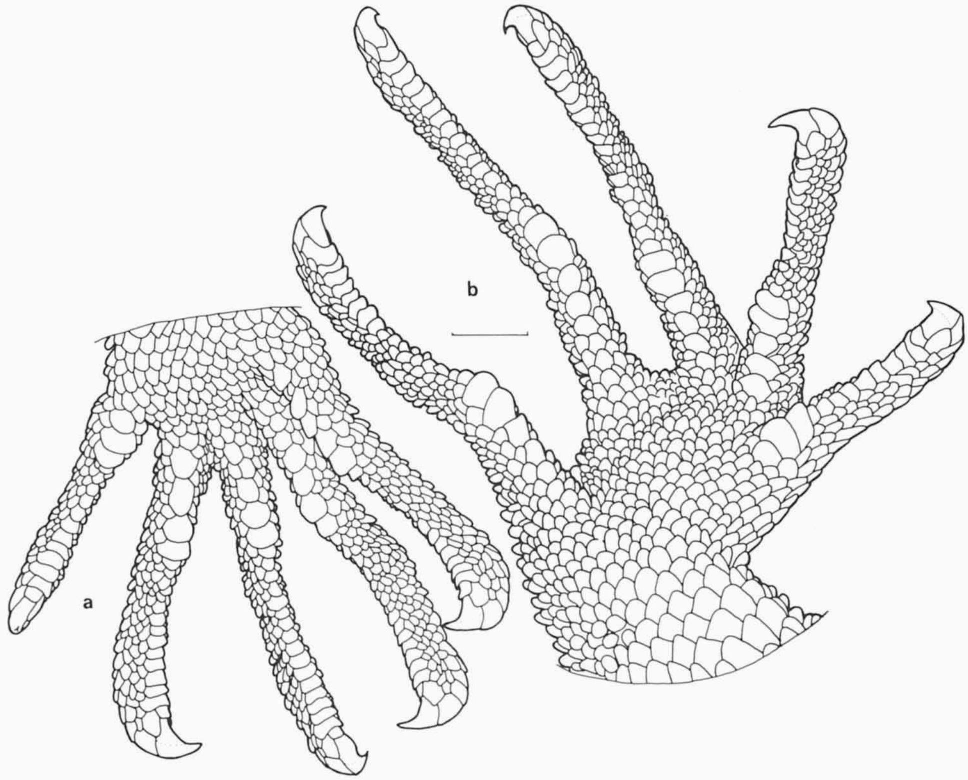


Fig. 88. *Gonatodes hasemani*, RMNH 26439; a, b: ventral view of right hand and right foot.

eral, irregularly distributed, white spots, which coincide with groups of larger scales; on posterior part of body the dorsolateral stripes fade out and the distinction between vertebral area and flanks is less evident. Tail brown, proximally with regularly spaced, paired, blackish spots immediately followed by whitish paired spots, or with irregular blackish and whitish shades all along. Ventrally, head with alternating light greyish-brown and cream stripes from infralabials to anterior level of forearms; belly cream, with scales bordered by light greyish-brown; underside of tail with alternating, irregular, dark greyish-brown and whitish spots, which posteriorly form regular transverse bands. The two males from Urucu have the colour pattern generally as described above, but the dorsolateral light stripe appears only as a faint trace in RMNH 26439, and is completely absent in MPEG 15857 which is generally darker (as mentioned in the life-colour description).

The dorsal pattern appears different in MPEG 14352 (Rondônia): head dark greyish-brown, with several wide, whitish bands; dorsolateral stripe distinctly wider than in other specimens, from posterior corner of eye to anterior level of hind limbs; between and outside the dorsolateral stripes, dark-greyish-brown, similar to head; the two dorsolateral stripes are linked by a transverse stripe on posterior part of head, by a second, narrower one, on anterior part of neck, and by a third, dashed stripe, on posterior part of neck; posteriorly, at both sides, along body, each dorsolateral stripe is paralleled by a series of round, whitish spots.

Female pattern similar to first male pattern described, except for head dorsally which is covered with fine, wavering stripes of different hues of brown; and flanks and lateral region of neck, which have the same ground colour as that of vertebral area, almost uniform or with a variable number of small, blackish and whitish spots. Proximal part of tail similar to that of male (distal part not seen).

Griffin (1917a) and Burt & Burt (1931) described the colour in preservative of specimens from Bolivia. The colour pattern of the male figured and described by Vanzolini (1968), from Rio Juruá, Amazonas (holotype of *G. spinulosus*), resembles that of MPEG 14352 mentioned above.

Habitat.— Both specimens from Urucu, Amazonas, were in heavily disturbed (-logged) primary, terra firme forest, among root-mass, bark litter and soil at base of a tree, between buttresses. Among the specimens from Rondônia, two were at about 0.5 m on tree trunks, three on or near fallen tree trunks, one in the leaf litter, one was probably behind the stalks of a palm, one inside a termite (*Cornitermes* sp.) nest, and another one in a pile of soil on a road, all inside terra firme forest, either dense forest or in rather open areas. INPA 622 was in varzea forest (C. Gascon field notes). Vanzolini (1986a) reported several specimens from Rondônia which were in yards of houses, while others were found in the forest, under trunks and rocks, active on the ground, or quiet on the lower part of tree trunks. Fugler (1986) reported two specimens from Bolivia collected under fallen tree trunks, in terra firme and varzea primary forests. In Cocha Cashu, Peru, the species was found in clearing within forest (Rodriguez & Cadle, 1990).

Notes on natural history.— A diurnal lizard. Among four females captured in March 1985, in Rondônia, three had developed eggs (one each) in the abdomen, while the fourth female was smaller (33 mm SVL in the latter, 38-40 mm in the former specimens) (Nascimento et al., 1988). The stomach contents of six specimens from Rondônia were examined (Nascimento et al., 1988); each specimen had from zero to two preys, among which spiders (three times), Hymenoptera, Blattariae and Coleoptera (one time each), and one specimen with pieces of a lizard exuvia (possibly its own).

Distribution (fig. 85).— Southwestern Amazonia, in Brazil (Amazonas state, south of Rio Amazonas; Acre; Rondônia); eastern Peru; and northern Bolivia.

Remarks.— Vanzolini (1953a), upon the examination of the type of *G. spinulosus*, established its synonymy with *G. hasemani*.

Gonatodes humeralis (Guichenot, 1855)
(figs. 89, 90, 267, 268)

Gymnodactylus humeralis Guichenot, 1855: 13, pl.III, fig.1a,b (6 syntypes, MHNP 6745, type-locality: Rio Ucayali, Mission de Sarayacu, Peru).

Gonatodes humeralis; Boulenger, 1885a: 62; Goeldi, 1902: 511; Hagmann, 1906: 307, 1910: 492; Procter, 1923: 1064; Burt & Burt, 1931: 246, 1933: 3; Amaral, 1937b: 169, 1949: 108; Beebe, 1944: 153; Schmidt & Inger, 1951: 450; Cunha, 1961: 40, 1981a: 5; Wermuth, 1965: 45; Rand & Humphrey, 1968: 3; Vanzolini, 1968: 20, 1972: 88, 1986a: 13; Müller, 1969: 118; Peters & Donoso-Barros, 1970: 133; Crump, 1971: 19; Hoogmoed, 1973: 83, 1979: 277; Rivero-Blanco, 1979: 105; Cunha et al., 1985:

22; Duellman, 1987: 492; Nascimento et al., 1988: 27, 1991: 33; Hoogmoed & Avila- Pires, 1989: 168; O'Shea, 1989: 68; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.

Material.— **Brazil.** ACRE. Serra da Moa: 1 ♀, RMNH 26406, iv.1971, leg. P.J.M. Maas. Rio Juruá, Cruzeiro do Sul, Seringal Iraci (three beaches below Paraná dos Moura): 1 ex., ZUEC 1006. 29 km N of Rio Branco, along road AC-010 (Rio Branco-Porto Acre), Projeto Humaitá, km 2 road RBR-304: 1 ♀, MPEG 16009, 31.xii.1989; 1 ♀, RMNH 26407, 01.i.1990, all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Branco, Parque zoobotanico UFAC: 1 ♂, 1 ♀, MPEG 16013- 014, 03.i.1990, 1 ♂, RMNH 26408, 04.i.1990, all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAPA. Município de Amapá, Reserva DNERu, posto no. 4, Igarapé Ariramba, affluent of Rio Tartarugal Grande: 2 ♂♂, 1 ♀, MPEG 2771, 2781, 2783, 16.vii.1969, leg. F.P. Nascimento. Município de Amapá, igarapé Agua Branca, road BR-156: 1 ♂, 2 ♀♀, MPEG 3152, 3154, 3163, 26.x.1969, leg. F.P. Nascimento. Porto Santana, Vila Amazonas: 1 ♀, MPEG 15013, 04.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Serra do Navio: 1 ♀, MPEG 15030, 06.xi.1988; 1 ♀, RMNH 26409, igarapé Piçarra, 16.xi.1988; 1 ♂, MPEG 15126, forest near the hospital, 17.xi.1988, all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, MPEG 1010, igarapé da Fossa, branch of lower part of igarapé Piçarra, 20.xi.1988, leg. P.R.N. Amorim. Cupixi, 50 km S of Serra do Navio: 1 ♀, RMNH 26410, 15.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Município de Nhamundá, west bank of Rio Nhamundá, opposite Sítio Céu Estrelado, region of Matias, 15 km N of Faro: 1 ♂, MPEG 15316, 1 ♀, RMNH 26411, 02.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Madeira, Município Borba: 8 ex., MNRJ 3671-78, i-iii.1943, leg. A. Parko. Itapiranga: 4 ♂♂, BM 1971.1046-1049, exch. P.E. Vanzolini. Rio Uatumã, Município Presidente Figueiredo, area of Hydroeletric dam Balbina reservoir: 3 ♂♂, 3 ♀♀, MPEG 14810, 14812, 14815-816, 14818-819, Base I, 26.i.1988, leg. F.P. Nascimento & F. Braga; 1 ♂, 1 ♀, MPEG 14898-899, Base II, 09.ii.1988, leg. 'equipe de resgate'; 1 ♀, MPEG 14909, Base I, 10.ii.1988, leg. 'equipe de resgate'; 1 ♂, MPEG 14917, Base I, 25.ii.1988, leg. 'equipe de resgate'; 4 ♂♂, 3 ♀♀, INPA 140-42, 146, 156-58, igarapé Caititu, 20-27.iv.1987, leg. M. Martins; 1 ♂, INPA 207, igarapé Caititu, vi.1987, leg. G. Moreira & J. Rocha; 5 ♂♂, 1 ♀, INPA 180, 183, 187-88, 193, 203, igarapé Caititu, 26-31.vii.1987, leg. M. Martins. Reserva Florestal Ducke, 25 km N of Manaus (road Manaus- Itacoatiara): 3 hatchlings (collected as eggs), MPEG 16220 (2), RMNH 26412, 08.vii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Anavilhanas: 2 ex., INPA 286, 287, 25.v.1988, leg. G. Moreira. South of Tefé (Lago Tefé, Rio Tefé), Rio Solimões: 1 ♀, RMNH 26413, 17.xi.1985, leg. M.S. Hoogmoed. Santa Rita, Município de Maraã, Rio Japurá: 5 ♂♂, 4 ♀♀, MPEG 15215-216, 15218, 15240, 15246, 15252, 15281, 15284, 15291, 08-24.xi.1988, leg. S. Ramos; 1 ♀, MPEG 15270, 20.xi.1988, leg. Adino R. Filho; 1 juv., MPEG 15461, Vila Maguari, 26.ix.1988, leg. J.M. Rosa. Carauari, Rio Juruá: 3 ♂♂, 4 ex., BM 1979.121-122, 1979.124-128, 30.vii- 02.ix.1978, Wallace Expedition to Amazonia, leg. W.H. Timmis. Jauareté, Rio Uaupés: 1 ♂, MPEG 627, iv.1960, leg. J. Hidasi. Tabatinga, Rio Solimões: 1 ♂, RMNH 26414, 10.xi.1985, leg. M.S. Hoogmoed; 1 ♀, RMNH 26415, 12.xi.1985, leg. M.S. Hoogmoed; 1 ♂, 1 juv., MPEG 15871-872, 1 hgr., RMNH 26416, all 02.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Benjamin Constant, Rio Solimões: 2 ♂♂, 3 ♀♀, RMNH 26417, 26628-631, 14.xi.1985, leg. M.S. Hoogmoed; 2 ex., MNRJ 1570, ii.1942, leg. A. Parko; 1 ♂, 1 ♀, MNRJ 3608-09, ii.1942, leg. A. Parko. W of Benjamin Constant, Rio Solimões: 1 ♀, MPEG 15890, 07.xii.1989; 5 ♂♂, 2 ♀♀, MPEG 15911-913, RMNH 26418-421, 10.xii.1989; 1 ♂, MPEG 15927, 1 ♀, RMNH 26422, 11.xii.1989; 4 ex., MPEG 15961-962, RMNH 26423-434, 12.xii.1989; 11 ex., MPEG 15953-958, RMNH 26425-429, 13.xii.1989; 1 ♀, RMNH 26633, 14.xii.1989; 1 ♂, MPEG 15973, 15.xii.1989, all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 2 ♀♀, 1 hgr., MPEG 15979, RMNH 26430-431, 16.xii.1989, leg. local children. Município Benjamin Constant, Rio Itecoahy, 30 km from Rio Javary: 3 ♂♂, 1 ♀, MNRJ 3571-74, vi.1942, leg. A. Parko.
MATO GROSSO. Barra do Tapirapé: 5 ex., MNRJ 1567, 1940, leg. A.L. Carvalho; 1 ex., MNRJ 2066, leg. A.L. Carvalho. Estação Ecológica Serra das Araras, Barra dos Bugres: 2 ♂♂, 3 ♀♀, 1 juv., 1 ex., MPEG 14293, 14295, 14301-304, 14322, 15-28.i.1986, leg. R. Moraes. Urucum, near Corumbá: 1 ♂, BM 1928.1.12.5, leg. C.L. Collenette.
PARA. Ilha de Marajó: 3 ♂♂, 3 ♀♀, 1 juv., BM 1923.11.9.36-39, 1924.2.28.1-3, purch. W. Ehrhardt. Ilha de Marajó, Município de Breves, road PA-159, Breves-Anajás: 2 ♂, 2 ♀, MPEG 14755, 14769, 14792,

14795, km 6-10, 02-11.xii.1987, leg. I.F. Santos, R. Moraes & S. Ramos; 2 ♂, MPEG 14863, 14869, km 6, Sítio Castanha, left margin igarapé Caruaca, 24-29.ii.1988, leg. I.F. Santos, R. Moraes, S. Ramos & J.A. Queiroz; 1 ♂, 1 ♀, MPEG 14873-874, km 6, Sítio Castanha, left margin igarapé Caruaca, 02.iii.1988, leg. A.P. Farias & M.P. Farias. Belém: 3 ♂♂, 1 ♀, MHNG 2107.29-32, IPEAN, 1969, leg. M.L. Crump; 3 ♂♂, 3 ♀♀, MPEG 3027, 3029, 3052, 3067, 3082, 3090, IPEAN, vii.1969, leg. M.L. Crump; 2 ex., MNRJ 1566, Aurá, v.1940, leg. A.L. Carvalho; 1 ♀, BM 1970.676, 1967, leg. R. Lainson; 1 ex., NMW 17511, Bosque, 27.vi.1903. Ilha do Mosqueiro: 3 ♂♂, 1 ♀, MPEG 2003, 2004, 2009, 2012, 12.v.1971, leg. O.R. Cunha & F.P. Nascimento; 2 ♀♀, 11.i.1967, leg. O.R. Cunha & F.P. Nascimento. Municio de Abaeté, Piratuba: 15 ex., MNRJ 1568, 1937, leg. A.L. Carvalho. Município Monte Alegre, Serra do Paituna: 1 ex., MNRJ 1565, viii.1940, leg. A.L. Carvalho. Município Monte Alegre, Serra do Ererê, viii.1940, leg. A.L. Carvalho. Rio Tocantins, present area of Tucuruí reservoir: 2 ♂♂, 2 ♀♀, MPEG 13367, 13370, 13372, 13379, Chiqueirão, right margin of Rio Tocantins, ca. 70 km upriver from the dam, 29.iii- 04.iv.1984, leg. R. Moraes; 1 ♂, 2 ♀♀, MPEG 13410, 13419, 13463, 1-5 km S of (old) Jacundá village, right margin of Rio Tocantins, 30.iv-10.v.1984, leg. T.C.S. Avila Pires; 1 ex., MPEG 13477, c. 2 km S of (old) Jacundá village, right margin of Rio Tocantins, 12.v.1984, leg. W.M. França; 2 ♂♂, MPEG 13429-430, Rio Jacundá, right margin of Rio Tocantins, 06.v.1984, leg. T.C.S. Avila Pires & I.J. Lopes; 1 ♀, MPEG 13443, ca. 12 km S of (old) Jacundá village, left margin of Rio Tocantins, 07.v.1984, leg. M. Santa Brígida; 1 ♂, MPEG 13788, Ilha Tocantins, 23.vii.1984, leg. I.J. Lopes. Serra Norte, Carajás: 1 ♀, MPEG 14134, road N1-Caldeirão, near igarapé Azul, 07.ix.1985, leg. F.P. Nascimento, M.G. Nery & R.B. Neto; 1 ♂, MPEG 14167, área do Caldeirão, 15.ix.1985, leg. F.P. Nascimento; 1 ♂, MPEG 14366, road N1-Caldeirão, near igarapé Azul, 21.iii.1986, leg. F.P. Nascimento, M.G. Nery & R.B. Neto. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 8 exs., MPEG 16370-377, 8 exs., RMNH 26640-647, 23.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 1 ♂, MPEG 16362, 1 ♀, MPEG 16363, 1 ♀, RMNH 26636, 22.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Santarém: 1 ♂, NMW 17510, vi-viii.1927, Taperinha, leg. H. Zerny; 1 ♂, BM 75.10.22.18, leg. Vickham. Missão Tiriós, Rio Paru do Oeste: 1 ♂, 2 ♀♀, MPEG 1868-70, vi.1960, leg. J. Hidasi; 2 ♂♂, MPEG 1871-72, vi.1960, leg. E. Fittkau. Rio Trombetas, hydroeletric dam Cachoeira Porteira reservoir, mouth igarapé Tramalhetinho: 1 ♂, 1 ♀, INPA 125-26, 04.xi.1985, leg. A.L. Queiroz. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 2 ♂♂, MPEG 15343, 15360, 1 juv., RMNH 26432, 06-07.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Road from Sítio Céu Estrelado to Cruz Alta, between Nhamundá and Trombetas rivers: 1 ♂, MPEG 15337, 05.xi.1988; 1 ♂, 2 ♀♀, MPEG 15423, 15425, RMNH 26433, 14.xii.1988, all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Sítio Céu Estrelado, Rio Nhamundá, 15 km N of Faro: 1 ♂, 1 ♀, MPEG 15305-306, 30.xi.1988; 1 ♀, MPEG 15319, 1 ex., RMNH 26434, 03.xii.1988; 2 ♂♂, MPEG 15325, RMNH 26435, 04.xii.1988, all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.

RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 3 exs., CEPB 0118, 0120-21, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.

RORAIMA. Município de Boa Vista, Colônia Coronel Mota, Região do Taiano: 2 ♂♂, 6 ♀♀, MPEG 3925-26, 3930-31, 3953, 3965, 4061-62, 12892, 15-17.vi.1970, leg. F.P. Nascimento.

Ecuador. NAPO. Coca: 1 ♂, MHNG 2356.57, vii. 1986, leg. G.Onore.

French Guiana. La Mana River, Saut Sabbat: 1 ♂, MHNG 1569.42, x.1971, leg. O. Miserez.

Peru. LORETO. Rio Cayaru, Paraná Yahú (or Jaú), W of Puerto Alegria (Peru/Brazil border): 1 ♂, 3 ♀♀, MPEG 15880, 15882, RMNH 26436, 26655, 05.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Ucayali, Mission de Sarayacu: syntypes, 4 ♂♂, 2 ♀♀, MHNP 6745, Castelnau, Deville. UCAYALI. Yarinacocha (Pucallpa), Rio Ucayla, 170 m: 1 ♀, RMNH 26437, 07.iii.1983, leg. M.S. Hoogmoed. HUANUCO. E. of Panguana, lower Rio Llullapichis, branch of Rio Pachitea, 260 m: 1 ♀, RMNH 26438, 09.iii.1983, leg. M.S. Hoogmoed.

In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA - Rio Maracá. Cachoeira da Pancada, Rio Maracá, Município de Mazagão. Rio Camaipi, affluent of the left side of Rio Maracá, Município de Mazagão (Cachoeiras Inajá, Amapá, Itaboca). Curiaú, Macapá. Reserva DNERu, posto no. 2, Rio Tracajatuba, Município de Amapá. AMAZONAS - Jauareté, Rio Uaupés. PARA - Ilha de Marajó: Ilha de Santa Cruz, Município de Cachoeira do Arari;

Vila Nova do Aramá (former Quinta do Aramá), Rio Aramá; Fazenda Tijucaquara, Município de Chaves. Bela Vista, Viseu. Cacoal, Município de Augusto Correa. Puraquequara, Ourém. Peixe-Boi. Road to Irituia, Irituia. Boa Vista, Rio Apeú. Road to São Caetano de Odivelas. São Francisco do Pará (former km 92). Capanema. Santa Bárbara, Benevides. Belém (Parque do MPEG; área do Mocambo/EMBRAPA). Ilha de Tatuoca. Km 16 of road to Acará. Itacuã, Rio Moju, near Rio Jambuaçu. Village of Mangabeira, Rio Tocantins. Carajás, Serra Norte (areas of Manganês do Azul, Fofoca, Pojuca, Rio Salobo). São Raimundo Agroindustrial Ltda. (Jari), Município de Almeirim. Ilha do Barreiro, Rio Fresco, São Felix do Xingu. Road Altamira-Marabá (Transamazônica), left margin of Rio Xingu. Santarém (Urumari; road to Cachoeira do Palhão). Reserva Florestal Sudam, 74 km SE of Santarém. Porto Trombetas, Município de Oriximiná. RONDONIA - Ouro Preto d'Oeste. Jaci-Paraná.

Diagnosis.— *Gonatodes* with proximal subdigital lamellae as wide as digit, in total 15-21 under fourth toe. Two lateral rows of scales at each side on distal part of fingers and toes. Tail ventrally with a repetitive sequence of two single midventrals (one after the other), each in contact latero-distally with one scale per side, followed by a slightly larger, single midventral in contact at each side (latero-distally) with two scales. Scales around midbody 100-137. Ventrals 48-78. Male, in life, with a red, yellow and brown vermiculated dorsal pattern; head with pale grey or yellow, and red stripes and spots; a white or yellow antehumeral bar is present, preceded by a round black spot.

Description.— Sphaerodactyline gecko with maximum SVL in males of 41.5 mm (MPEG 15284), in females of 40.5 mm (MPEG 15218). Head 0.21-0.28 (n= 111) times SVL, proportionally smaller in larger specimens; 1.4-1.8 (1.60 ± 0.08, n= 110) times as long as wide; 1.1-1.7 (1.32 ± 0.11, n= 110) times as wide as high. Snout round, moderately elongate, gently sloping toward top of head. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.29-0.41 (0.34 ± 0.02, n= 86) times SVL, hind limbs 0.38-0.52 (0.44 ± 0.03, n= 72) times. Tail round in cross section, tapering toward tip, 1.1-1.4 (1.30 ± 0.07, n= 29) times SVL.

Tongue relatively wide, slightly narrowing anteriorly, with a round tip; covered anteriorly by scalelike papillae, posteriorly villose; tip with a short median cleft. Teeth small, conical, subequal.

Rostral large, convex, distinctly visible from above, with a long median cleft extending from posterior margin. Postrostrals 2-6, mostly three, lateral ones (supranasals) much larger than median ones, median ones about as large as adjacent scales on snout. Nostril bordered by rostral, first supralabial, three postnasals and lateral postrostral (supranasal). Postnasals as large as, or slightly larger than, adjacent loreals. Scales on snout and on loreal region round to polygonal, slightly convex, juxtaposed. Loreal scales 7-12 (mostly 8-10) in a line between postnasals and anterior margin of orbit. From between eyes toward posterior part of head the scales decrease in size and become granular. Scales on supraorbital region similar to, and continuous with those on top of head. Supraciliary flap with a smooth margin, or with up to seven slightly enlarged, prominent scales on anterior upper margin, of which the posterior ones may form small spines over the eye. Pupil round. Supralabials 5-9, decreasing in size posteriorly; 4-7 to below centre of eye. Scales on temporal region small, granular, like those on posterior upper part of head. Ear-opening much smaller than eye, round to vertically oval or triangular.

Mental large, roughly trapezoid with convex anterior border, to rhomboid. Two, rarely three, postmentals. Scales on anterior part of chin polygonal, gradually decreasing in size from postmentals; posteriorly round, relatively small; all juxtaposed. Infralabials 5-8, decreasing in size posteriorly; 3-6 to below centre of eye.

Scales on nape and sides of neck granular, slightly larger posteriorly. Scales on throat smooth, imbricate, with round posterior margin, with a short transitional zone with the granular scales on chin.

Dorsals granular, slightly larger than scales on top of head. Scales on flanks mostly like the dorsals, ventrolaterally grading into ventrals. Ventral region with scales distinctly larger than dorsals, smooth, hexagonal, imbricate, in oblique rows; 48-78 (61.4 ± 4.7, n= 109) scales along the midventral line between anterior level of forelimbs and vent. Scales around midbody 100- 137 (117.4 ± 6.6, n= 107). Scales on preanal plate similar to ventrals, except for border of vent, which has very small scales. No preanal or femoral pores. Males with an escutcheon area covering posterior part of belly, and four to five rows of scales on ventral surface of thighs.

Scales on dorsal surface of tail smooth, roundish, imbricate, on the sides increasing in size toward ventral surface. A midventral row of transversely enlarged scales, with the sequence 1'1'1" (figs. 2, 89; some variation exists, but this sequence usually predominates).

Scales on anterodorsal surface of forelimbs, anterior and ventral surfaces of thighs and ventral surface of lower legs smooth, roundish, imbricate; on forelimbs similar in size to scales on dorsal part of tail, on hind limbs increasing in size toward ventral surface; on other surfaces of both fore- and hind limbs, scales granular. Lamellae under third finger 12-17 (14.7 ± 0.8, n= 217), of which four, rarely three or five, basal ones distinctly larger and flattened; under fourth finger 12-18 (15.7 ± 0.9, n= 217), with five, occasionally four or six, enlarged basal ones; under fourth toe 15-21 (17.7 ± 1.0, n= 211), with six or seven, occasionally five or eight, enlarged basal ones. Fingers and toes with two lateral rows of scales distally. Claws exposed, non retractile, between two basal scales.

Sexual dichromatism evident, with males much more colourful. In life, males dorsally with head variably ornamented on snout and top of head with pale or light neutral grey (85, 86), olive-grey (42), or yellow (spectrum-yellow, 55; sulphur-yellow, 157; yellow-green, 58); red (crimson, 108; poppy-red, 108A; scarlet, 14; geranium-pink, 13); and olive or brown (Prout's brown, 121A; hair-brown, 119A). A frequent pattern is that of a large light (grey, yellow) spot on snout, a rhomboid light spot on top of head, and a light arc posteriorly, at each side starting at posterior corner of eye, in some specimens continuing also anterior to eyes; between the light areas, predominantly red (especially on the snout), or red and brown. Nape and sides of head and neck yellow, red, and olive or brown. Antehumeral bar usually spectrum-yellow, occasionally greenish-yellow or whitish, preceded by a round black spot (a second, smaller, black spot may also be present dorsally). Back from predominantly brown or olive, to densely vermiculated with yellow, or yellow and red. Flanks similar to the back, or with the yellow vermiculation turning into white. Four longitudinal rows of round spots may be present along body, either all four with red spots, or the two lateral ones with black spots; in RMNH 26408 there were two series of paravertebral pale brown spots, more vivid at base of tail (tail regenerated posteriorly). Limbs coloured like body. Dorsal surface of tail, in MPEG 15871, olive (30) with smoke-grey

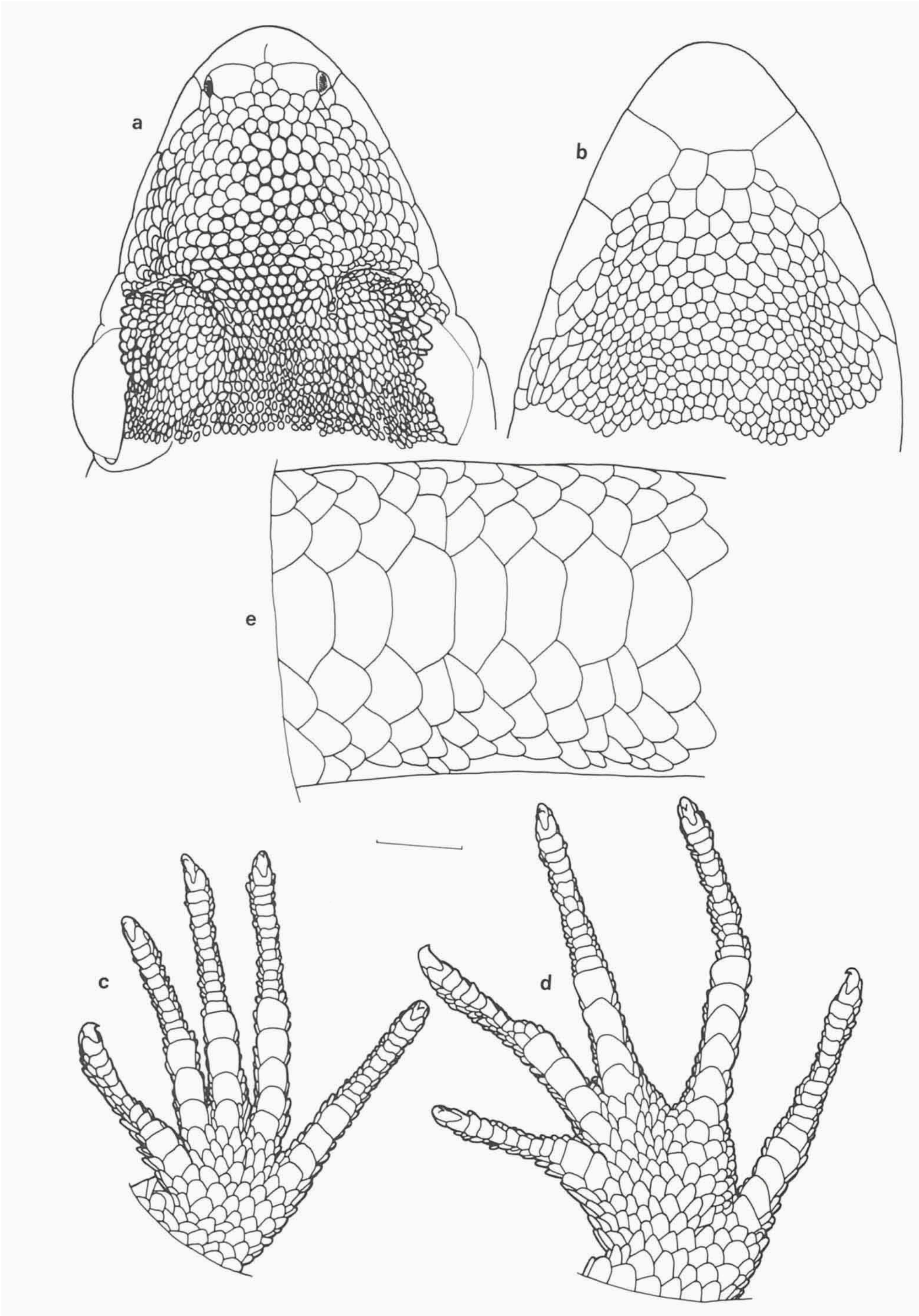


Fig. 89. *Gonatodes humeralis*; a, b: dorsal and ventral views of head; c, d: ventral view of left hand and left foot; all of MPEG 15925; e: ventral view of tail of MPEG 15924.

(45) spots at base, distally natal-brown (219A) and sepia (219), separated by narrow beige (219D) rings; in MPEG 16013 proximal part of tail marbled brown, distal part, which is regenerating, marbled brown and pale flesh-colour. Ventrally, head spectrum- yellow (55) or sulphur-yellow (57); belly lime-green (59), smoke- grey (44, 45), drab-grey (119D), or anteriorly white peppered with brown, posteriorly straw-yellow (56); escutcheon area similar in colour to belly, or yellowish, yellow-ocher (123C); tail spectrum-orange (17), salmon (106), flesh-ocher (132D), or pale flesh colour (5), in some specimens marbled (along all of it or posteriorly) with light grey or natal-brown (219A). Iris brown with a narrow orange-brown rim around the pupil. Tongue white with grey tip.

In females, dorsal region olive-brown (28) with black spots and smoke-grey (44) stripes (RMNH 26410); with a cinnamon-drab (219C) vertebral band bordered by sepia (219), flanks vandyke-brown (121) with irregular sepia spots (MPEG 15880); a mixture of brown and olive-brown, with a drab (27) vertebral band (RMNH 26407); or back smoke-grey (45) with brownish-olive (29) markings, and flanks olive (30) with smoke-grey (44) markings (RMNH 26416). A cream antehumeral bar, preceded by an olive-brown spot may be present (MPEG 15913). Tail on dorsal surface cinnamon-brown (33) with cinnamon (39) and warm-sepia (221A) spots (RMNH 26410), predominantly sepia (219) and mikado-brown (121C) (MPEG 15880), or flesh-ocher (132D) and dark brown (MPEG 16014). Ventrally, head smoke-grey (44) or cream colour (54), with or without olive- brown or greyish-brown spots; belly smoke-grey (44), cream colour (54), sulphur-yellow (157), or chamois (123D); tail spectrum-orange (17), flesh-ocher (132D), light-russet-vinaceous (221D), salmon (106), or beige (219D) and pale brown. Iris and tongue like in males.

In preservative, males with a characteristically antehumeral white bar, almost reaching the middorsal region and usually preceded by an oval, black spot; in some specimens, the black spot is preceded, in its turn, by another (shorter) white bar; in other specimens, a second, smaller black spot is present at the level of the dorsal end of the antehumeral bar. Head and body dorsally with a finer or coarser dark and light brown vermiculation; a "U"-shaped white band on posterior upper part of head, connecting the posterior corners of the eyes, may be present; on flanks there may be several oval dark spots, more or less arranged in two longitudinal rows. Females with a light and dark brown pattern, with radiating dark lines from the eyes, the dorsal ones meeting each other middorsally, while lateral ones may extend along the neck; antehumeral bar less conspicuous than in males; a vertebral light band, with irregular borders, is more or less evident; oval dark spots may be present on flanks. Tail, in males and females, with dark brown transverse bands dorsally; female RMNH 26417 with rather distinct dark and light brown rings distally on tail. Regenerated tail mostly uniformly brown. Juvenile pattern similar to that of females.

Habitat.— A forest dweller, inhabiting all kinds of forest, e.g., terra firme, varzea, or igapó; primary or secondary; gallery forests; patches of forest in savanna areas. Also in isolated trees in relatively large clearings, and in parks or gardens inside cities, where trees are left (like the park of Museu Goeldi and the 'Bosque', both in Belém). Dixon & Soini (1975, 1986) reported specimens in and around houses, in the vicinity of Iquitos, Peru. MPEG 15360 was collected on the leg of a table, in a campground with wooden houses, established in an open area surrounded by forest (Cruz

Alta, 6 km south of Rio Trombetas). It is most commonly found on the lower part (up to two meters high) of tree trunks or on the base of palms, sometimes also on fallen tree trunks, on leaves, and occasionally on the ground. Nunes (1984) studied the activity cycle and utilization of habitat by *G. humeralis*, in two areas in and near Manaus, Amazonas. She concluded that the animals had a preference for trees of median size (diameter at 30 cm above the ground around 30 cm), where they stayed during the day at a mean height of 72 cm, mostly in vertical position, head downward; after 17:00 h, the animals started moving up to the canopy, where they supposedly slept. These observations agree in general with those by other authors, as well as with my own, except about the sleeping site - many observations (Crump, 1971; Vanzolini, 1972; Hoogmoed, 1973; Meede, 1984; Hoogmoed & Avila-Pires, 1991; pers. obs., RMNH 26407, RMNH 26409) indicate specimens sleeping on low vegetation (-leaves or small branches); when mentioned, height from the ground varied from 0.5 m to 1.2 m. As observations in the canopy are scarce, the absence of more observations on animals sleeping in the canopy can not be taken as evidence that that does not occur in many more situations than the data suggest. Some daytime observations of specimens high up in the vegetation do exist. Beebe (1944a) reported two specimens (as *G. annularis*) found in a bromeliad at a height of thirty feet; M.S. Hoogmoed (field notes + pers. comm.) mentioned a specimen which he saw in orchids on a large branch that fell from the canopy just in front of his feet; MPEG 13788 was in the top of a palm when collected, and that was also probably the case of MPEG 13477, found when a babaçu palm (*Orbignya phalerata* Mart.) was cut down. Cunha (1961) and Gasc (1981) remarked that these animals prefer relatively dark places. Besides the above mentioned papers, habitat observations appear in a number of others, e.g., Rand & Humphrey (1968), O'Shea (1989), Gasc (1990).

Notes on natural history.— As already observed by several authors, *G. humeralis* is one of the most common lizards in Amazonia, especially abundant in disturbed forests and edge situations. It is a diurnal, nonheliotherm (Rand & Humphrey, 1968; Hoogmoed, 1973) gecko. Nunes (1984) observed the animals to be active from 07:00 h to 19:00 h; from 17:00 h on the animals started to move up, supposedly to their sleeping site; before 7:00 h data were scarce, not permitting any conclusion. I have data of animals collected active, in the wild, from 06:50 h to 17:30 h; MPEG 14293 was collected inside a camp house, at 19:10 h. Observations by other authors (e.g., Hoogmoed, 1973; Dixon & Soini, 1975, 1986; Meede, 1984) also point out that these animals are active all day. Dixon & Soini (1975, 1986), moreover, stated that, in the vicinity of Iquitos, Peru, *G. humeralis* was active "frequently at night where street or house lights are utilised", and they mentioned a few specimens which were observed feeding inside houses, between 20:00 h and 22:00 h.

A single animal, or up to three animals, of the same or of different sexes, may occupy the same tree. As observed by Vanzolini (1972), *G. humeralis* characteristically try to escape by running around the tree trunk, most commonly downward, eventually hiding on the ground, sometimes upward; if it is surprised on the ground, it tends to run toward a tree. Hoogmoed (1973) and Meede (1984) observed that specimens, when sleeping, have a whitish colour; the same was observed when RMNH 26407 was collected, at 22:00 h, sleeping on a horizontal leaf at about 60 cm above the ground.

Breeding seems to take place throughout the year (Hoogmoed, 1973; Dixon & Soini, 1975, 1986). One egg seems to be laid at a time, but up to four eggs may be found together, suggesting that the female may return to the same spot repeatedly to lay her eggs (Beebe, 1944a, under *G. annularis*; Hoogmoed, 1973; Meede, 1984). Meede (1984) observed a female which laid eggs at approximate intervals of 17 days, with a minimum interval of 13 days, and a larger interruption of 56 days (between May 1 and June 26). Henkel & Schmidt (1991) stated that *G. humeralis* may lay up to twelve eggs in a year, one at a time. Eggs are reported from behind loose flaps of bark on a tree trunk, or on the base of trees, between the roots and among dead leaves (Cunha, 1961; Hoogmoed, 1973); in termite nests, especially in old tunnels, near the surface (Hagmann, 1906); hidden below soft, fine débris well below the surface (Beebe, 1944a). In Serra Norte, Carajás, three eggs were found together on 23.iii.1984, in the forest, in a space between two stones, one above the other (the eggs were seen when the upper stone was removed); one of the eggs was broken and showed a live animal (MPEG 13312). In the area of Sítio Céu Estrelado, Rio Nhamundá, four eggs (one of which, MPEG 16088, hatched soon) were found on 30.xi.1988 in a hollow part of a partly rotten branch of tree, c. 1.5 m above the ground, at the edge of igapó forest. In Reserva Ducke (Amazonas), three eggs were found in low terra firme forest, in a deserted termite nest on small tree, 1 m above ground, on July 8, 1989. Two of the eggs were together in upper part of nest, and hatched on August 24 and on September 18; the third egg was by itself in the lower part of the nest, and hatched on October 11. This last date indicates an incubation period of at least 94 days. Hoogmoed (1973) recorded an incubation period, in laboratory (at about 25°C during day, 20°C at night), of 110 days. Meede (1984) reported periods of incubation, at 26°C-28°C, of about 83 days, at least 70 days. Under natural conditions, Beebe (1944a) observed an egg for 52 days until it hatched; the date the egg had been laid was unknown.

Food consists of a variety of arthropods. Stomach contents were studied by Hoogmoed (1973), Nunes (1984; unfortunaly part of Nunes' data, according to the text presented in a table, is missing), and Martins (1991). Nunes (1984) pointed out that the items ingested varied in size from 1.5 x 0.5 mm till 12 x 7 mm. Hagmann (1906) suggested that juveniles would have termites as a main component of their diet.

Dixon & Soini (1975, 1986) found specimens in the stomach of the snakes *Drymoluber dichrous* (Peters) and *Bothrops atrox* (Linnaeus), Cunha & Nascimento (1978) in the stomachs of *C. clelia plumbea* (Wied), *Mastigodryas bifossatus lacerdai* Cunha & Nascimento, and *Bothriopsis taeniata* (Wagler) (= *Bothrops castelnaudi* Duméril, Bibron & Duméril). Meede (1984) stated that *A. ameiva* was the main predator of *G. humeralis* in Panguana; besides, *Xenodon severus* (Linnaeus) was also mentioned as a predator, and possibly *Kentropyx calcarata* (an unsuccessful attempt of predation was observed). *Drepanoides anomalus* (Jan) was reported by Cunha & Nascimento (1978) to eat eggs of *Gonatodes*.

Distribution (fig. 90).— Widespread in Amazonia and lowland surroundings, in Brazil, French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru, and Bolivia. In the Guianas, including the eastern part of Venezuela, it reaches the coast, as well as the islands of Trinidad and Tobago (Rivero-Blanco, 1979). In Brazil, it occurs in all Amazonian states, including Maranhão to the east; also in Mato Grosso,

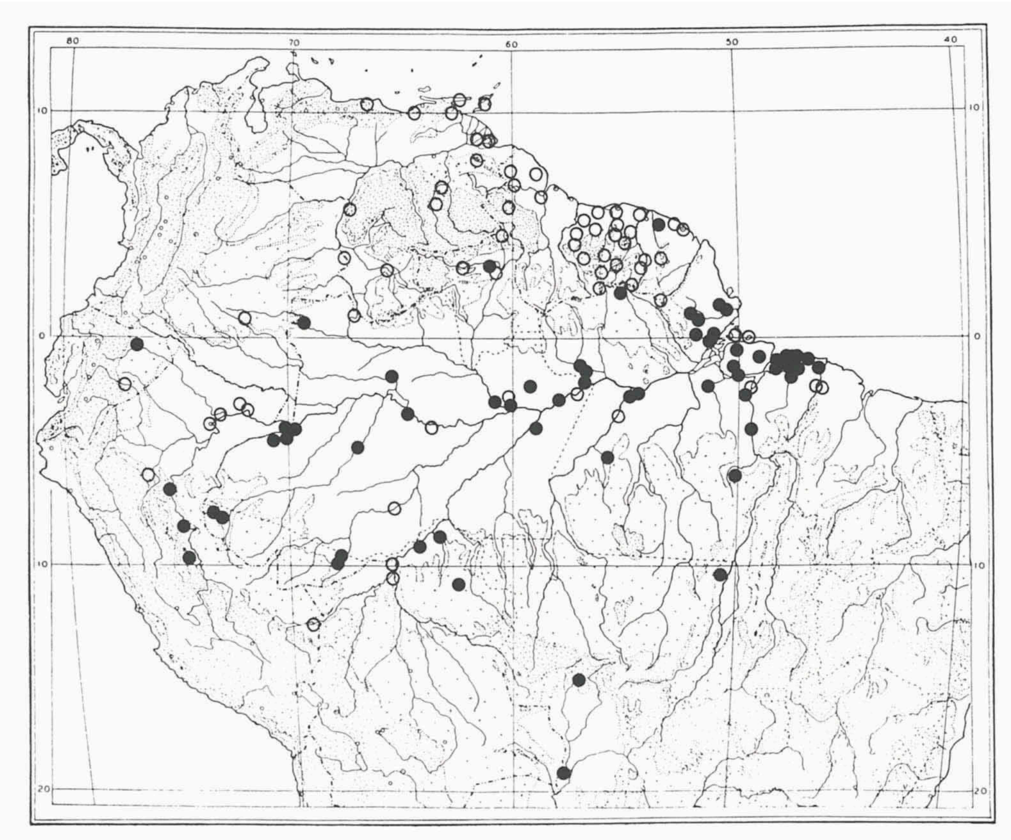


Fig. 90. Distribution of *Gonatodes humeralis*. Closed circles = material studied; open circles = literature (Vanzolini, 1968; Hoogmoed, 1973; Gasc, 1976; Rivero-Blanco, 1979; Cunha, 1981a; Dixon & Soini, 1986; Duellman, 1987; O'Shea, 1988; Fugler, 1989; Zimmerman & Rodrigues, 1990).

south of the Amazonian region, probably spreading through gallery forests and other types of arboreal vegetation.

Remarks.— The most noticeable variation among distinct populations of *G. humeralis* is related to the presence or absence, in males, of red, or red and black, round spots on the body, forming approximate longitudinal rows. Such spots (all red, or red and black) are present in all males examined (and also in some females) from Maraã, Tabatinga and Benjamin Constant (all Amazonas). Black (and red?) spots are also present in three males (the only ones seen) from Barra dos Bugres (Mato Grosso), and in the syntypes (Mission de Sarayacu, Peru). In RMNH 26413, from south of Tefé, in specimens from Rondônia (Nascimento et al., 1988), and in RMNH 26437-438, from Peru (respectively near Pucallpa and east of Panguana), no such spots are observed. Red spots were seen in some specimens from Amapá, Ilha do Marajó, Faro, Acre, and probably in some from Tucuruí (as whitish spots), whereas other specimens from these localities were without spots (seen alive or recently preserved; the absence of red spots in long preserved specimens can not be taken into account, since the red tends to disappear in alcohol). In eastern Amazonia and in the Guianas no specimen with black spots were observed.

G. humeralis is the most widespread species of *Gonatodes* in Amazonia, and it is sympatric with each of the other species from the region (although the data presented by Rodrigues (1980) suggest that *G. tapajonicus* and *G. humeralis* may occur close together, but in different habitats). Besides the four species mentioned here for Brazilian Amazonia, *G. humeralis* was reported by Rivero-Blanco (1979) as being in sympatry with six other species of *Gonatodes*. He observed that in most cases these species were larger than *G. humeralis*, suggesting that they would occupy different niches. Among the species occurring in Brazilian Amazonia, *G. annularis*, *G. tapajonicus*, and *G. hasemani* are larger in size than *G. humeralis*, while *G. eladioi* is smaller. *G. annularis* and *G. hasemani* are known from relatively broad areas in, respectively, northeastern and southwestern Amazonia, while *G. tapajonicus* and *G. eladioi* are up to now only known from restricted areas in southeastern Amazonia (fig. 85). From northwestern Amazonia, *G. concinnatus* (O'Shaughnessy) is known (which however has not yet been reported from Brazil).

Gonatodes tapajonicus Rodrigues, 1980
(figs. 85, 91, 92, 266)

Gonatodes tapajonicus Rodrigues, 1980: 309 (holotype MZUSP 53676, type-locality: Cachoeira do Limão, Rio Tapajós, Pará, Brasil).

Material.— **Brazil.** PARA. Rio Tapajós, Cachoeira do Limão: 1 ♂, 1 ♀, MCZ 157340-341 (paratypes), 30.i-05.ii.1979, leg. M.T. Rodrigues.

Diagnosis.— *Gonatodes* with proximal subdigital lamellae as wide as digits, in total 19-22 under fourth finger, 18-23 under fourth toe. Three lateral rows of scales on distal part of fingers and toes. Tail with midventral scales distinctly wider than long, anteriorly forming a repetitive sequence of two single midventrals (one after the other), each in contact with one latero-distal scale per side, followed by a divided midventral in contact with two latero-distal scales per side; in posterior part of tail the divided scale is substituted by a single one. Scales around midbody 116-126. Ventrals 54-60. Males in life predominantly vivid yellow and brown, forming an irregular reticulation; a conspicuous white spot, with black margins, on posthumeral region.

Description.— Sphaerodactyline gecko with maximum SVL in males of 47 mm, in females of 55 mm (Rodrigues, 1980). In the two paratypes studied (♂, ♀), head 0.23-0.24 times SVL, 1.4-1.5 times as long as wide, 1.3-1.4 times as wide as high. Snout round, moderately elongate, gently sloping toward top of head. Neck slightly narrower than head and anterior part of body. Body cylindrical. Limbs well developed. Tail round in cross section, tapering toward tip, about 1.3 times the SVL.

Rostral large, convex, approximately rectangular; posterior margin slightly to distinctly indented by median postrostral(s), with a median cleft extending anteriorly. Postrostrals 4-5, lateral ones (supranasals) distinctly larger than median ones; among median postrostrals, one is very small, the other one or two are about the same size as adjacent scales on snout. Nostril bordered by rostral, first supralabial, three postnasals, and lateral postrostral (supranasal); postnasals similar in size to

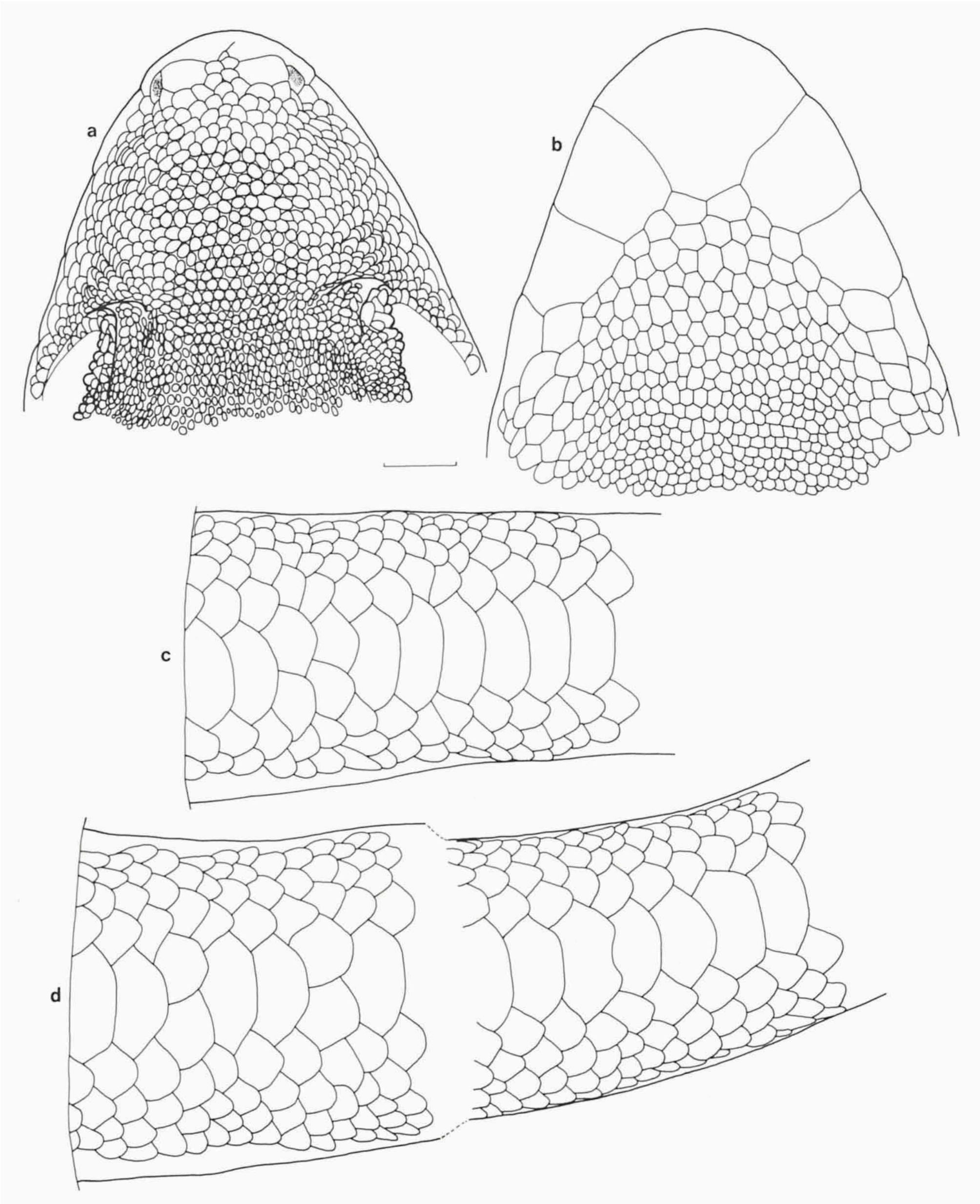


Fig. 91. *Gonatodes tapajonicus*; a, b: dorsal and ventral views of head; c: ventral view of tail; all of MCZ R-157340; d: ventral view of tail of MCZ R-157341.

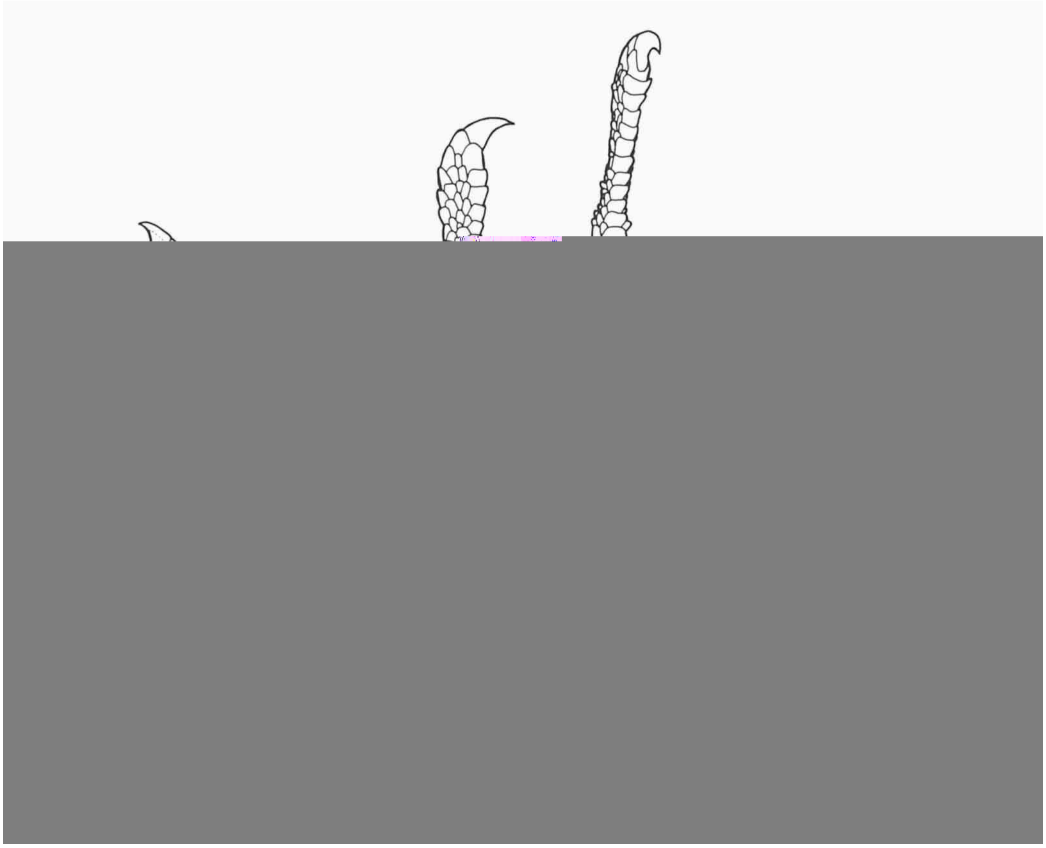


Fig. 92. *Gonatodes tapajonicus*, MCZ R-157340; a, b: ventral view of right hand and left foot.

adjacent loreals. Scales on snout sub-hexagonal to round, convex, juxtaposed, slightly decreasing in size posteriorly. Canthus rostralis distinct, round. Loreal region with scales slightly more elongate than those on snout, those on row adjacent to supralabials larger; 9-12 loreal scales in a line between postnasals and anterior margin of orbit. Top and posterior part of head, as well as supraorbital region, with granular scales. A short supraciliary flap present, anteriorly with five moderately enlarged, flat scales; two or three small, conical spines may be present dorsally. Pupil round. Scales on temporal region similar to those on upper part of head. Ear-opening much smaller than eye, obliquely oval to triangular, behind and at same level as commissure of mouth. Supralabials 6-7, one before last below centre of eye.

Mental large, slightly wider than long, roughly rhomboid (anteriorly convex, posteriorly borders with infralabials forming a sinuous or concave line, borders with postmentals a wide angle). Two (or three; Rodrigues, 1980) postmentals. Scales on chin juxtaposed, smooth, anteriorly larger, flat, polygonal, posteriorly distinctly smaller, roundish, convex. Infralabials 6- 7, posterior ones very small; fifth infralabial below centre of eye.

Scales on nape small, granular, becoming slightly larger on sides of neck. Scales on throat anteriorly like those on posterior part of chin, posteriorly round, flat, smooth, imbricate, with a short transitional zone between the two areas.

Dorsals granular, slightly larger on flanks than middorsally. Ventrals larger, roundish to subhexagonal, flat, smooth, imbricate, in oblique rows; 58-60 (54-60; Rodrigues, 1980) scales along the midventral line between anterior margin of forelimbs and vent; about 20-22 (18-20; Rodrigues, 1980) scales in a transverse line at midbody, with a short transitional zone between ventrals and scales on flanks. Scales around midbody 119-123 (116-126; Rodrigues, 1980). Scales on preanal plate similar to ventrals, except for border of vent, which has very small scales. Male with a relatively small escutcheon area just in front of preanal plate, and on four rows of scales on ventral surface of thighs.

Scales on tail dorsally and laterally relatively small, sub-rhomboid, flat, smooth, imbricate. On ventral surface of tail they are larger, with a midventral row of transversely enlarged scales. In MCZ 157341 ventral scales in proximal part of tail follow a pattern 1'1'2", which distally changes into 1'1'1"; in MCZ 157340 the sequence is more irregular (figs. 2, 91).

Limbs with roundish or rhomboid, flat, smooth, imbricate scales on dorsal surface of forelimbs, anterior surface of forearms, ventral surface of hindlimbs, and anterior surface of thighs, largest on hindlimbs and anterior surface of forearms; elsewhere scales smaller, convex, juxtaposed to subimbricate. Nineteen lamellae under third finger, of which the five basal ones enlarged; 20-21 (19-22; Rodrigues, 1980) under fourth finger, with six enlarged basal ones; 22 (19-22) under fourth toe, with seven basal ones which start a short distance from base of toe (which is covered by small scales). Fingers and toes with three lateral rows of scales distally. Claws exposed, non-retractile, between two basal scales.

Sexual dichromatism evident, males more colourful. Colour in life, of both males and females, described by Rodrigues (1980), who also presented a colour picture of the holotype. Male with a vivid yellow, reddish-brown, and blackish reticulation on dorsal surface and sides (where it tends to form longitudinal lines) of head, on back, on limbs, and on base of tail. Flanks blackish with irregular light blue spots, and a moderately large, conspicuous white spot, with black margins, on posthumeral region. Throat yellow with oblique, reddish-tan stripes, belly dark grey (escutcheon area lighter). Tail with same general pattern as belly, distally with two or three moderately conspicuous black and white rings.

In preservative male pattern turns into a dark/light brown reticulation. The female has a pattern similar to that in several other *Gonatodes*, with a light vertebral band bordered by pairs of dark brown spots (top of head with irregular dark and light brown spots). In both sexes there is a white, round, posthumeral spot, with dark brown margins, at each side, and oblique, alternating dark brown and tan or cream stripes from the eyes toward (but not reaching) the midventral line. Belly and ventral surface of tail predominantly brown in male, cream in female, except for the distal part of tail in female which is brown with three conspicuous white spots, of which the posterior one forms a complete ring around the tail.

Distribution (fig. 85).— Only known from type-locality.
Remarks.— Up to now the species is only known from the original description by Rodrigues (1980).

Lepidoblepharis Peracca, 1897

Diagnosis.— Sphaerodactyline geckos with claws enclosed in an ungual sheath composed of six scales, of which two large inferolaterals, two median-sized superolaterals, one smaller dorsal and one very small apical. Digits short or moderate, cylindrical, with smooth, transversely enlarged subdigital lamellae. Dorsal head scales mostly small. Dorsals granular and juxtaposed, or larger and imbricate, in some species heterogeneous in size. Ventrals flat, smooth, imbricate. Pupil round. Males with an escutcheon area on belly.
Distribution.— The genus occurs in northern South America, on both sides of the Andes, and in Central America north to Costa Rica.
Content.— A total of 15 species are known, mostly Andean or trans-Andean.

Lepidoblepharis heyerorum Vanzolini, 1978
(figs. 93-95, 269, 270)

Lepidoblepharis heyerorum Vanzolini, 1978a: 204 (holotype MZUSP 42046, type-locality: Puruzinho, Rio Madeira, Amazonas, Brasil, 3-6.xii.1975, Expedição Permanente da Amazônia); Vanzolini, 1986b: 12; Hoogmoed & Avila-Pires, 1989: 168.
Lepidoblepharis cf. *festae*; Vanzolini, 1953b: pls. 1-2; Cunha, 1961: 43.
Lepidoblepharis festae; Vanzolini, 1953b: 268, 1968: 30 (part); Crump, 1971: 19 (part?); Hoogmoed, 1979: 277 (part).
Lepidoblepharis festae festae; Peters & Donoso-Barros, 1970: 159 (part).

Material.— **Brazil.** AMAPA. Serra do Navio: 7 ♂♂, 9 ♀♀, MPEG 15040, 15051, 15061-062, 15079, 15134-136, 15146, 15178; RMNH 26465-470, 07-20.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Ponta dos Indios: 1 ♀, BM 1938.3.2.1, leg. H. Hinton.
AMAZONAS. E of Porto Urucu, Rio Urucu, near RUC-2/Petrobras: 1 ♂, MPEG 15856, 24.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila-Pires. Rio Juruá (right bank), site VQQ (3°19'S, 66°01'W): 1 ex., INPA 721, 07.v.1992, leg. C. Gascon.
PARA. Belém: 1 ♂, KU 127200, IPEAN, 30.i.1969, leg. M.L. Crump; 2 hatchlings (collected as eggs), MPEG 15565, 15627, Mocambo, 13.i.1989 & 09.iii.1989, leg. A.C.M. Lima; 1 hatchling (collected as egg), MPEG 15628, 17.v.1989, leg. A.C.M. Lima, I.F. Santos, T.C.S. Avila Pires & R. Moraes; 1 ♂, 1 ♀, 1 hatchling, MPEG 15631, 15632, RMNH 26471, Mocambo, 21.vii.1989, leg. M.S. Hoogmoed & A.C.M. Lima; 1 ♀, MNRJ 3055, 3 juv., MNRJ 3056, Paiol do Aurá. Município Acará, Ilha do Combu: 1 ♂, 3 ♀♀, MPEG 15681, 15683, 15685, 15686, 11-30.viii.1989 & 19-26.x.1989, leg. R.B. Neto. Ilha de Marajó, Município de Breves, Comunidade Tancredo Neves (c. 18 km road Breves-Anajás): 1 ♀, MPEG 12.v.1990, leg. J.S. Lima-Verde, A.C.M. Lima, R.A.T. Rocha & J.O. Dias. Chiqueirão, right margin of Rio Tocantins (area of hydroeletric dam Tucuruí reservoir): 1 ♂, 2 ♀♀, MPEG 13373-375, 30.iii.1984, leg. R.Moraes. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 1 ♂, MPEG 16615, 15.vii.1993, leg. M.S. Hoogmoed, R.J.R. Moraes & R.R. Silva. Tabuleiro Leonardo, Rio Trombetas, 1°20'S 56°45'W: 1 ♂, 1 ♀, USNM 217634- 635, 06.iii.1979, leg. M.T. Rodrigues.
French Guiana. Approuague river basin, Scientific station of Azataye, right bank of Azataye river: 1 ♂, MHNP JPG 79.132, 30.v.1979; 1 ♀, JPG 80.4, 20.iv.1980; 1 ♂, JPG 80.13, 20.xi.1980; 1 ♂, JPG 80.69, 04.i.1981; all leg. J.P. Gasc. Petit Saut, R. Sinnamary: 1 ♂, 1 ♀, RMNH 26472, MPEG 15834, 13.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

L. heyerorum? — 1 ♂, KU 127201, Brazil, Pará, Belém, IPEAN, 15.vi.1969, leg. M.L. Crump. 1 ex., MPEG 12904, Colônia Nova, BR- 316, x.1976, leg. O.R. Cunha & F.P. Nascimento.

Diagnosis.— Dorsals granular. Lamellae under fourth toe 11-13. Mental with a straight to slightly concave posterior margin, without clefts. Postmentals 2-7, larger than adjacent posterior scales. Loreal scales 5-12 (mostly 5-8). Scales around midbody 83-104 (92.7 ± 4.9), ventrals 30-40 (34.2 ± 2.2) along midventral row, 15-19 (17.3 ± 1.0) in a row at midbody. Maximum SVL 35 mm. Males dark brown with a number of yellowish markings dorsally, forming short, irregular, transverse spots on head and back, and irregular spots on the sides (especially anteriorly); a dorsolateral light stripe present at least at level of hind limbs and base of tail. Ventral surface of head in adult males with a dull orange hue.

Description.— Sphaerodactyline gecko with maximum SVL in males of 34 mm on chin mostly granular; close to posterior infralabials slightly larger and some elongate. Infralabials 3-5, decreasing in size posteriorly; 2-4 to below centre of eye. Scales on neck granular dorsally and laterally; throat with an abrupt change from an anterior region, with granular scales, to a posterior one, with scales like the ventrals.

Dorsals granular, slightly larger than scales on top of head. Scales on flanks like the dorsals, distinctly different from ventrals. Ventrals relatively large, smooth, imbricate, rhomboid to hexagonal, or some more roundish; in approximately longitudinal and oblique rows; 30-40 (34.2 ± 2.2, n= 37) along a midventral line between anterior margin of forelimbs and vent; 15-19 (17.3 ± 1.0, n= 39) in a transverse row at midbody. Scales around midbody 83-104 (92.7 ± 4.9, n= 38). Males with an escutcheon area on belly, including about 50-90 scales when fully developed. Scales on preanal plate similar to ventrals, except for those on border of vent, which are smaller.

Scales on tail similar to ventrals, but smaller; with a short transitional zone with scales on the back. Underside of tail with a midventral row of enlarged scales, usually with a repetitive sequence of one midventral scale contacting latero-distally one scale per side, followed by one slightly larger midventral, in contact with two scales per side. Ventrolateral scales increasing in size toward midventral line.

Limbs mostly with smooth, flat, imbricate scales, with round posterior margin, relatively large on thighs, smaller elsewhere; posterior surfaces with granular scales. Subdigital lamellae transversely enlarged, narrowing slightly and gradually distally; 8-10 under fourth finger, 11-13, exceptionally 14, under fourth toe. Claws enclosed in an ungual sheath composed of six scales, as typical for the genus.

Sexual dichromatism evident. Males in life dorsally predominantly dark brown (dusky-brown, 19; dark greyish-brown, 20; sepia, 219; warm sepia, 221A), either uni-

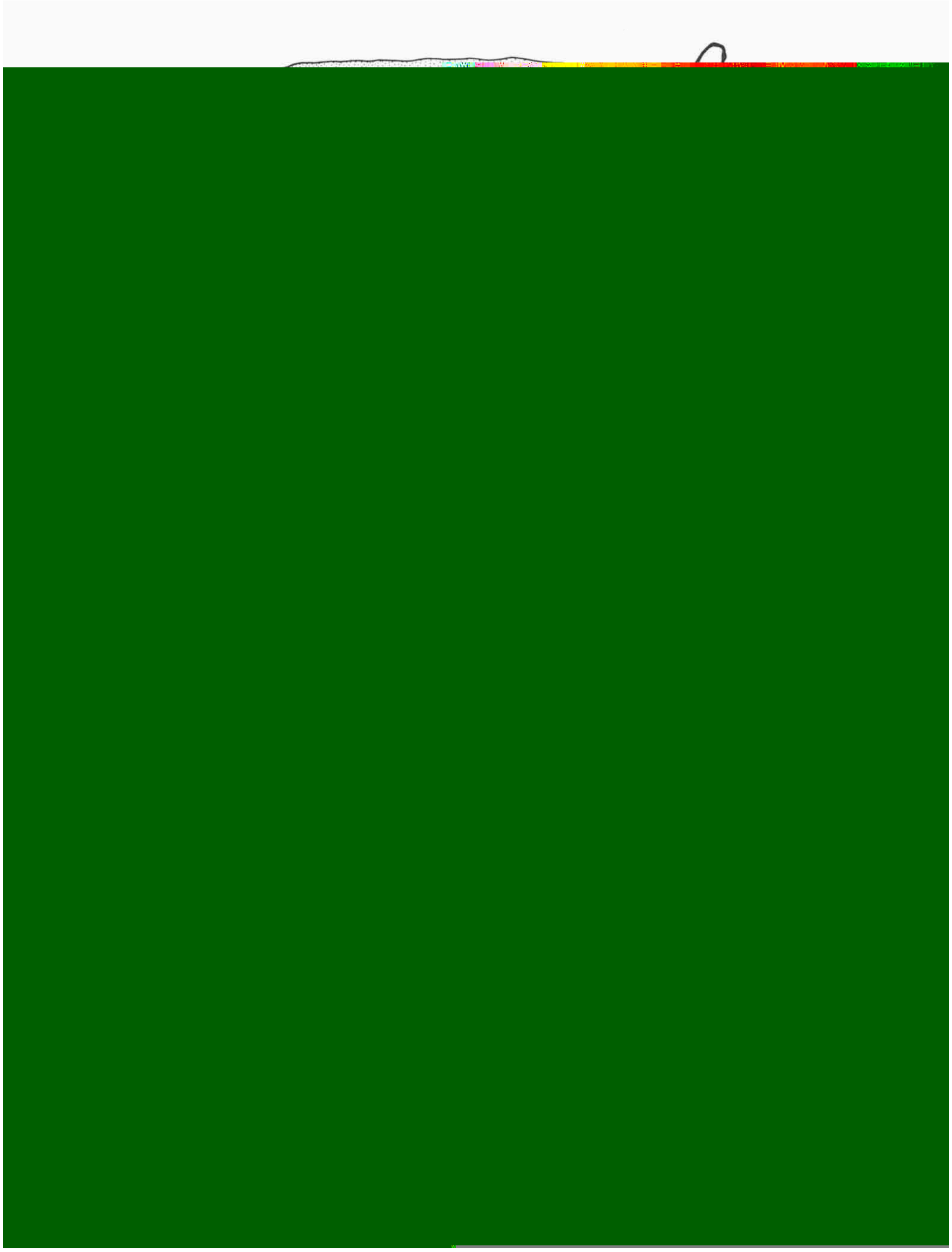


Fig. 93. *Lepidoblepharis heyerorum*, MPEG 15856; a, b, c: lateral, dorsal, and ventral views of head; d: ventral view of right hand; e: ungual sheath of third right finger in dorsal view; f: ventral view of left foot; g: ungual sheath of fourth left toe in dorsal view; h: scales on belly, showing escutcheon area; i: ventral view of tail (posterior part regenerated).

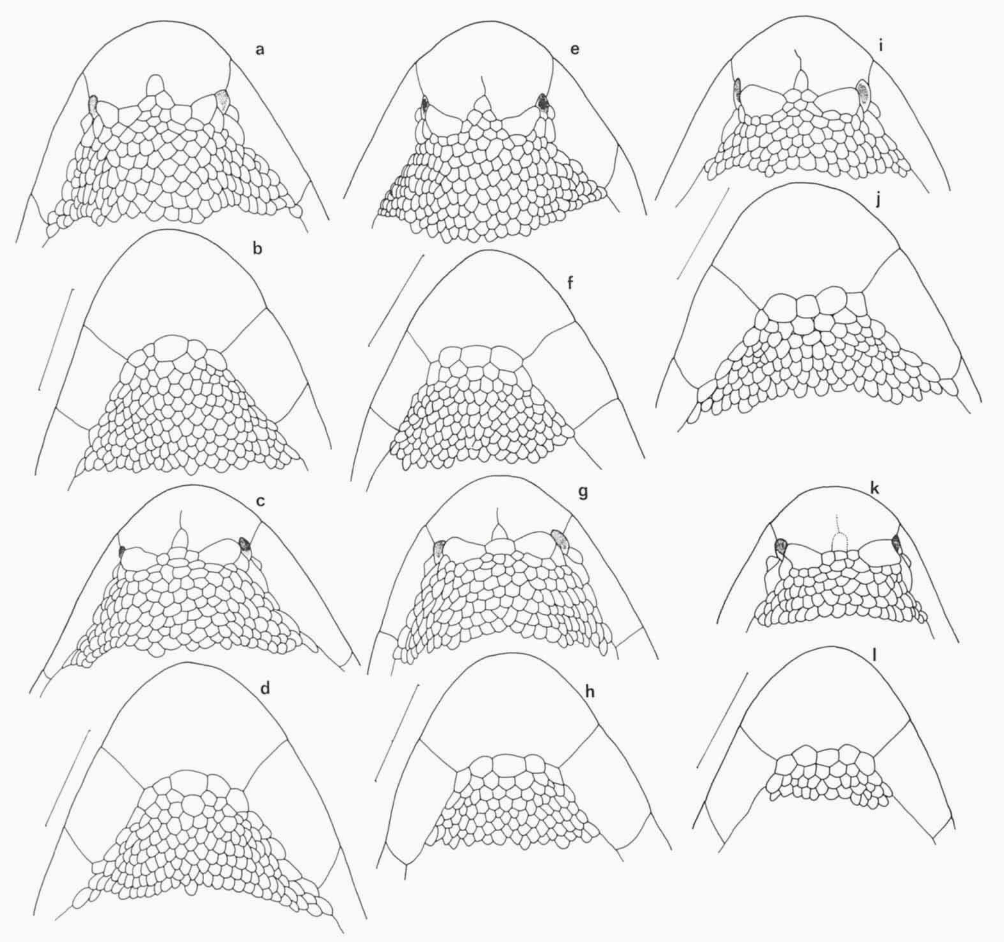


Fig. 94. *Lepidoblepharis heyerorum*, variation in scalation of snout (a, c, e, g, i, k) and chin (b, d, f, h, j, l) of: MPEG 13374 (a, b); MPEG 15683 (c, d), MPEG 15685 (e, f), MPEG 13373 (g, h); MPEG 15631 (i, j); KU 127201 (k, l).

limbs, or only apparent on neck and/or with a transverse band forming a 'H' on posterior part of body and base of tail; some spots on head and flanks may also be present; such ornamentations vary from very pale to light brown, beige, or flesh-ochre (132D). Ventral region light greyish-brown with light stripes on throat; sepia with whitish stripes on throat, sepia and white elsewhere; or under head ventrolaterally brown with whitish stripes, ventrally light grey, and belly dark brown. Iris brown, brownish-grey, or chestnut (32), with a narrow gold or orange rim around pupil.

MPEG 15656, a recently hatched specimen, had body dark fuscous (21), with light tawny (38) spots and a paired stripe on posterior part of body and base of tail; ventral region sepia (119) with oblique, whitish lines on sides of head, and small whitish spots on body; underside of tail sepia with whitish spots. Iris chestnut (32) with a narrow, clay-coloured (26), rim around pupil. The tail showed a bluish-green iridescence dorsally, its ventral surface and belly a pinkish iridescence.

Colour description of live specimens (from French Guiana) are also given by Gasc (1981, 1990) and Hoogmoed & Avila-Pires (1991).

In preservative, general colour dark greyish-brown or, in MPEG 13373-375, reddish-brown. Males with several tiny, white markings on head and body. On head, dorsally, small, irregular spots; in some specimens, a straight, thin line linking the eyes medially, a curved one posteriorly, and external to the latter, a U-shaped, in some cases partially interrupted, thin line, starting at posterior corner of eyes and reaching the posterior border of head. On nape a transverse line is present, which is followed, along body, by a series of transverse vermiculations. A dorsolateral light stripe, from eye to base of tail, with some interruptions, may be present. Laterally, head and body densely covered by roundish spots. Vermiculation and spots may become sparser posteriorly (MPEG 15685 with only a faint pattern, except for sides of head and neck). Head ventrally medially white, laterally dark greyish-brown with several white spots or up to four white stripes, the first three starting on infralabials, the fourth at level of ear. Belly greyish-brown, slightly or distinctly lighter than dorsal region, lighter on escutcheon area. Tail dark greyish-brown all around; proximal part, dorsally, with a H-shaped whitish figure, which starts on posterior part of body; irregular, whitish spots may be present ventrally.

Females homogeneously coloured, or with a simplified and less conspicuous pattern than that of male; head ventrally light greyish-brown, with same pattern of stripes as in males. Juveniles with same simplified pattern as seen in females. Hatchlings MPEG 15565,15627,15628,15632 with no vermiculation along body, but with three longitudinal series of spots on each side, of which one dorsolateral and two on flanks; on posterior part of body, the dorsolateral one becomes a continuous stripe which extends on most of tail; limbs, hands and feet also covered with light spots.

Habitat.— A forest floor dweller, found among leaflitter, under fallen tree trunks, in rotten tree trunks, or among root mass at base of trees. Gasc (1981, 1986, 1990) mentioned several specimens found at the base of the palm *Astrocaryum paramaca* Mart. The species seems to occupy always relatively humid microhabitats, frequently near creeks.

Notes on natural history.— Most specimens from which data are available were collected during the day, but MPEG 15146, 15178, and RMNH 26469 were collected between 22:00 and 23:00 h, active (see Hoogmoed & Avila-Pires, 1989). RMNH 26472 (♂) and MPEG 15834 (♀) were collected at about 100 cm from each other, both under a large dead tree trunk lying on the ground (Hoogmoed & Avila- Pires, 1991). In the area of Mocambo, Belém, during an unpublished study of A.C.M. Lima, a number of eggs of *L. heyerorum* were found repeatedly in shallow cavities in the bark of the tree *Vochysia guianensis* Aublet, at about 40 cm from the ground, most of them on the same tree, a few seen on other trees of the same species. One or two eggs were found together, sometimes with a broken, empty egg nearby, suggesting that one or several females frequently oviposit in the same spot or its immediate surroundings, one egg at a time. Eggs were found in January, March, May, and July, measuring about 6.2-6.4 mm × 5.3-5.4 mm in diameter; the longest period between the finding of an egg and its eclosion was 66 days; the hatchlings measured 13-15 mm SVL, with a tail of approximately the same size. MPEG 12904, possibly a specimen of *L. heyerorum* (see remarks), was found in the stomach of the snake *Echinantera occipitalis* (Jan).

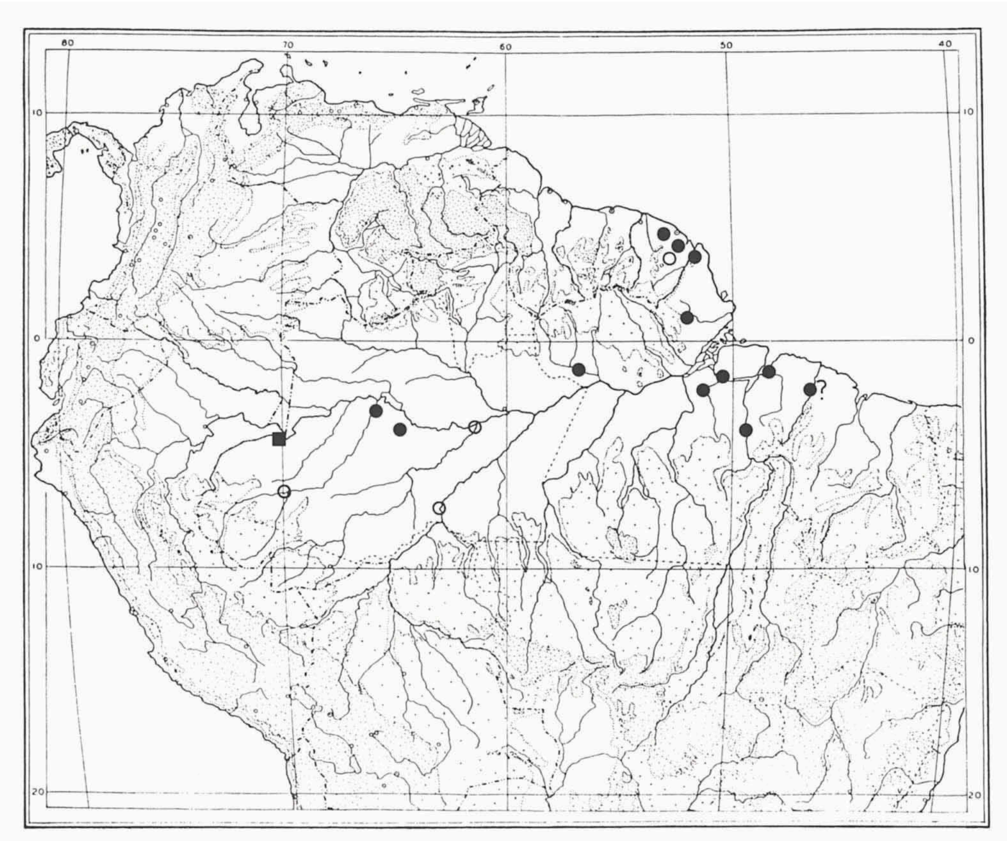


Fig. 95. Distribution of *Lepidoblepharis heyerorum* (circles) and *L. hoogmoedi* spec. nov. (square). Closed symbols = material studied; open symbols = data from literature (Vanzolini, 1978a; Hoogmoed & Avila-Pires, 1991); circle with question mark = locality of MPEG 12904 (see text).

Distribution (fig. 95).— Brazil and French Guiana. In Brazil it seems to be widespread in a large part of Amazonia, including the states of Amapá, Pará, and Amazonas. In the latter state up till now it is only known from localities south of the Amazon, where to the west it reaches at least the Rio Juruá.

Remarks.— KU 127201, from Belém, agrees in measurements and scale counts with *L. heyerorum*, but presents a different colour pattern, described by M.L. Crump (field notes) as "Dorsum dark brown. Two faint red stripes running down length of dorsum, from posterior to the eye to just posterior to the hind legs. Chin and throat rusty-orange. Venter grey-brown." (it was found on low vegetation, at night). She herself described another specimen of *Lepidoblepharis* from the same area as "Head and dorsum black with yellow speckles. Yellow stripes in form of dashes from eye to 1/3 distance between limb interval. Throat and neck rusty-orange. Belly grey with white spots.", a description agreeing with those from other specimens of *L. heyerorum*, while in no other case a red stripe was mentioned. In the preserved specimen, the dorsolateral stripe is regular and continuous (except for a short space on nape), and no other spots are present, whereas in all other *L. heyerorum* observed the dorsolateral stripe, when present, is never so regular, usually forming dashes, and there is always a number of irregular spots present, at least on the sides of the head and neck. The posterior border of the rostral, in KU 127201, is straight, with a median cleft, bordered by five postrostrals; in other specimens from Belém the rostral is indented by the postrostrals, but in the species as a whole the character is variable (fig. 94). It may be that the specimen shows a variation of pattern in *L. heyerorum*, but the possibility that it represents a different species cannot be completely discarded.

MPEG 12904 was found in the stomach of the snake *Echinantera occipitalis* Jan (MPEG 12885). It is distinctly a *Lepidoblepharis*, possibly *L. heyerorum*, but the condition of the specimen does not permit a firm identification at the species level.

Lepidoblepharis hoogmoedi spec. nov.
(figs. 95-97, 271)

Holotype.— MPEG 15984, ♂, W of Benjamin Constant, Amazonas state, Brasil, 16.xii.1989, alt. 50 m, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Paratypes.— MPEG 15968, ♀, W. of Benjamin Constant, Amazonas state, Brasil, 15.xii.1989, alt. 50 m, bought from children by M.S. Hoogmoed & T.C.S. Avila Pires; RMNH 26473, ♀, same data as the holotype.

Diagnosis.— Dorsals granular. Lamellae under fourth toe 12-14. Mental with a straight to slightly concave posterior margin, without clefts. Postmentals 3-5, larger than adjacent posterior scales. Loreal scales 9-10. Scales around midbody 92-93, ventral scales 32-34 along midventral row, 17-18 in a row at midbody. Maximum SVL 38 mm. Males brown with dark brown spots; a pearl- grey arc on posterior part of head, and at each side a pearl-grey dorsolateral stripe on neck and at level of hind limb. Ventral surface of head, in adult males, with a dull orange hue.

Description.— Sphaerodactyline gecko with SVL in only known male of 35 mm (MPEG 15984), in females of 38 mm (MPEG 15968). Head 0.21 times SVL, 1.3-1.4 times as long as wide, 1.2-1.4 times as wide as high. Snout short, round, gently sloping toward top of head. Neck slightly narrower than head and body. Body cylindrical. Limbs relatively short, forelimbs 0.26 times SVL, hind limbs 0.37-0.39 times. Tail round in cross section, tapering toward tip; complete original tail only in RMNH 26473, where it is 1.2 times SVL.

Tongue wide, narrowing anteriorly into a blunt tip; covered with imbricate, scale-like papillae; tip slightly nicked medially. Teeth minute, conical, subequal.

Rostral very large, distinctly visible from above, with approximately parallel lateral margins, and a shallow, horse-shoe shaped, posterior depression between nostrils; posterior margin roughly straight, slightly indented by postrostrals, with a long median cleft. Postrostrals 4-5 (maybe three in MPEG 15968, not very clear), of which lateral ones (supranasals) much larger than median ones; median postrostrals as large as adjacent scales on snout. Nostril bordered by rostral, first supralabial, two postnasals, and lateral postrostral; postnasal near supralabial much larger than upper one, which is slightly larger than adjacent loreal scales. Snout and loreal region covered by relatively small granules, with blunt tips mostly directed posteriorly on snout, dorsally on loreal region. Loreal scales 9-10 in a longitudinal line between postnasals and orbit. Toward posterior part of head, and on supraocular region, the granules are slightly smaller. Most of anterior and upper margin of eye forming a supraciliary flap, with two or three enlarged scales on its border, of which one is much larger than the others. Suboculars 4-5, slightly elongate. Supralabials four, decreasing in size posteriorly, first very large; suture between third and fourth below centre of eye. Ear-opening small, roundish to obliquely oval.

Mental relatively large, roughly trapezoid to semi-circular, with a straight to slightly concave posterior margin; without clefts. Postmentals 3-5, larger than adjacent scales. Scales on chin small, granular; those in contact with infralabials slightly larger and elongate. Infralabials 4-5, first much larger than others, from third on small; suture between third and fourth, or fourth infralabial, below centre of eye. Scales on neck granular dorsally and laterally. Throat with an abrupt transition between an anterior region, with granular scales, and a posterior one, with scales like the ventrals.

Dorsals granular, slightly larger than scales on top of head. Scales on flanks like dorsals, distinctly different from ventrals, which are relatively large, smooth, roundish to hexagonal, imbricate, forming approximately longitudinal and oblique rows. Scales along a midventral line 32-34 between anterior margin of forelimbs and vent; 17-18 ventrals in a transverse row at midbody. Scales around midbody 92-93. Male (MPEG 15984) with an escutcheon area on belly with 56 rhomboid to hexagonal scales. Scales on preanal plate similar to ventrals, except for those on border of vent, which are smaller.

Scales on tail smooth, flat, imbricate, mostly rhomboid; with a short transitional zone from dorsal scales. Underside of tail with a midventral row of enlarged scales; MPEG 15984 shows sequence 2"2'2"2'1" + regenerated tail, while in RMNH 26473, which has a complete original tail, the sequence is 1'2" + (1'1")n. Single midventral scale, proximally, trapezoid, wider than long. Regenerated tail with scales on dorsal surface similar to those on original tail, though slightly wider and more irregular; and with transversely elongate, short midventral scales that frequently have irregular contours.

Forelimbs with anterior and dorsal aspects of upper arms, and anterior and part of dorsal aspects of forearms with smooth, flat, imbricate scales, with round posterior margin; other surfaces covered with granules. Hind limbs with anterior and ventral aspects of thighs, and ventral aspect of lower legs with scales similar to those described for forelimbs, other surfaces covered with granules. Lamellae under fourth finger 9-12, under fourth toe 12-14. Subdigital lamellae transversely enlarged, slightly narrowing distally, mostly undivided but distal ones with a median sulcus. Claws enclosed by an ungual sheath composed of six scales, as typical for the genus.

Colour in life of male (holotype, MPEG 15984): dorsally head mars-brown (223A), body raw-umber (223) with darker spots along a paravertebral line and two lateral lines (at each side); a pearl-grey (81) arc on posterior part of head, linking the eyes, plus a dorsolateral stripe along neck and above hindlimbs, and spots along body, all of similar colour. Head and neck ventrally orange-rufous (132C), belly medium-plumbeous (87), escutcheon with white centred scales. Tail with same colour as body. Iris dark-brown with a narrow orange rim around pupil. Tongue white with dark-grey tip.

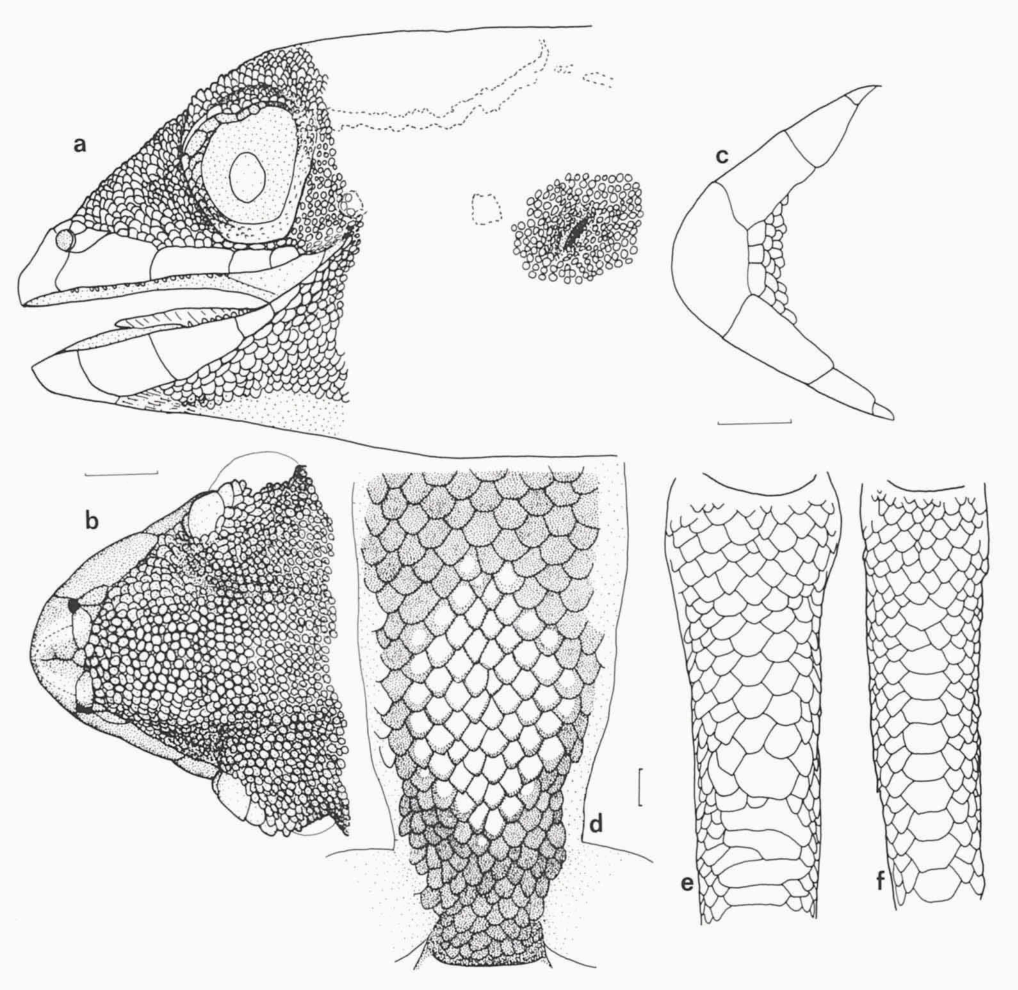


Fig. 96. *Lepidoblepharis hoogmoedi* spec. nov.; a, b: lateral and dorsal views of head; c: ventral view of head: infralabials and postmentals; d: scales on belly, showing escutcheon area; e: ventral view of tail (posterior part regenerated); all in MPEG 15984 (holotype); f: ventral view of tail in RMNH 26473.

Females less colourful than male. MPEG 15968, in life, with head dorsally raw-umber (223), back dusky-brown (19) with a faint dorsolateral light stripe; ventral region light dusky-brown (19), with lavender (77) spots and stripes under head; tail dorsally and ventrally sepia (119), velvet-like; iris dark-brown with a narrow orange rim around pupil; tongue white with dark-grey tip. RMNH 26473 dark-brown; a light arc on posterior part of head, connecting the eyes; and a faint dorsolateral light stripe, more vivid near hindlimbs and on base of tail; ventral region dark-brown mixed with some white, under head with bluish-white stripes.

In preservative, *L. hoogmoedi* presents a general brown colour, distinctly lighter in male than in females. In both sexes dorsum slightly lighter than flanks. In male, a whitish, horse-shoe shaped stripe, linking the eyes, on posterior part of head, is very

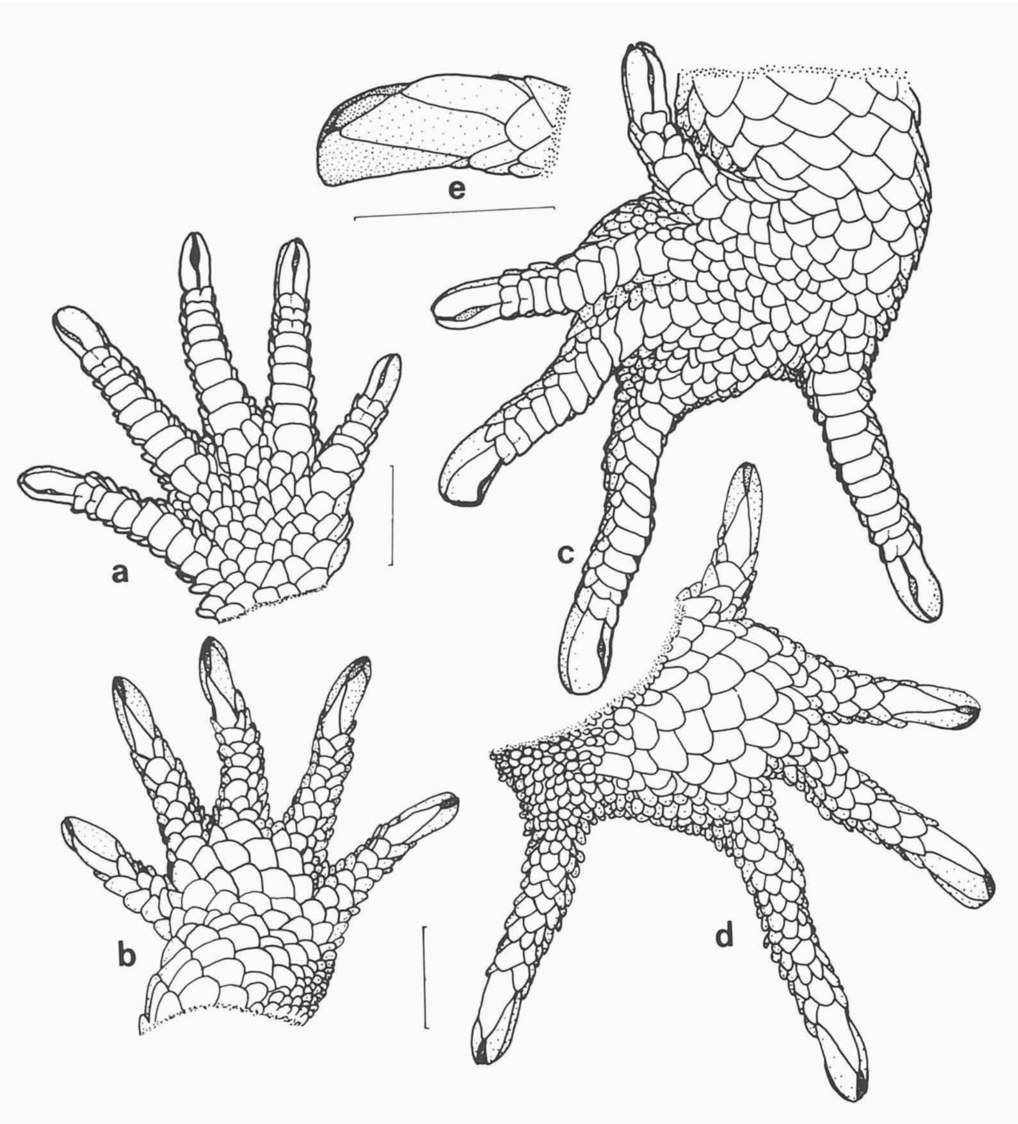


Fig. 97. *Lepidoblepharis hoogmoedi* spec. nov.; a, b: ventral and dorsal views of right hand; c, d: ventral and dorsal views of right foot; e: ungual sheath of fourth right toe.

evident; also from posterior corner of eye starts a dorsolateral light stripe, more evident on neck and above hindlimbs; moreover, some small, light spots on sides of head and neck are present. Females almost homogeneously brown, with a pale, relatively wide, "W"-shaped band on posterior part of head (more visible in RMNH 26473). Ventral region mostly light brown; under head whitish in male, with brown and white stripes in females; escutcheon area in male whitish.

Habitat.— The three specimens were collected in daytime in terra firme forest, the two females under pieces of wood, the male running among the leaflitter near a small creek. The area where the specimens were collected had had the lower vegetation mostly removed, but it was continuous with relatively undisturbed forest.

Distribution (fig. 95).— Only known from type-locality.

Remarks.— Two other species of *Lepidoblepharis* are known from the cis-Andean lowlands of northern South America: *L. festae* Peracca, from Amazonian lowlands of Colombia, Ecuador and Peru, and *L. heyerorum* Vanzolini, from Amazonian Brazil and French Guiana. All three have granular dorsals, and approximately similar numbers of lamellae under fourth toe (11-15). *L. hoogmoedi* and *L. heyerorum* are quite similar in scutellation, but they differ markedly in body proportions and colour pattern. *L. hoogmoedi* not only reaches a moderately larger size than *L. heyerorum* (respectively 38 mm and 35 mm), but it is distinctly bulkier. An indication of the difference in body mass may be obtained by comparing their weight (before fixation): 0.65-0.7 g in three specimens of *L. heyerorum* with svl 31-32 mm, 0.8 g in *L. hoogmoedi* RMNH 26473, svl 31 mm, 1.2 g in MPEG 15968, svl 38 mm. A detailed description of colour pattern in each of the species has already been given, and male patterns can also be compared in pls. 270, 271.

L. hoogmoedi was compared with holotype (♂) and cotype (♀) of *L. festae* (both under the number MZCT R-224 (ex. 2163)), and the following differences were observed: (1) snout shorter in *L. hoogmoedi*, more pointed in *L. festae*; (2) lateral postrostrals (supranasals) much larger in relation to median postrostrals in *L. hoogmoedi* than in *L. festae*; (3) the two postnasals in *L. festae* approximately of same size, in *L. hoogmoedi* lower one distinctly larger; (4) granules on dorsal surface of head generally smaller in *L. hoogmoedi*; number of loreal scales in a longitudinal line between postnasals and orbit 9-10 in *L. hoogmoedi*, 7-8 in *L. festae*; (5) mental, in *L. hoogmoedi*, with a straight to slightly concave posterior margin, bordered by 3-5 postmentals which are larger than adjacent scales on chin; "V"- shaped in *L. festae*, bordered by 8-9 postmentals about as large as adjacent scales on chin; (6) first infralabial of approximately the same length as first supralabial, not reaching anterior border of orbit, in *L. hoogmoedi*; approximately reaching middle of second supralabial and level of anterior border of orbit, in *L. festae*; (7) scales around midbody lower in *L. festae* (70-77 versus 92-93); dorsals also seem to be less numerous, but no specific counts were made; (8) ventrals, especially anteriorly (and on posterior region of throat), wider and round in *L. hoogmoedi*, narrower and more oval in *L. festae*; number of ventrals along a midventral line higher in *L. festae* (37-38 versus 32-34), though the number of ventrals in a midbody line is lower (14 in *L. festae* versus 17-18 in *L. hoogmoedi*), due to a wider belly in *L. hoogmoedi*; (9) forelimbs in *L. festae* mostly covered by granules, except for anterior aspect of forearms; in *L. hoogmoedi* a larger area (see description) is covered by smooth, flat, imbricate scales; on hindlimbs, the flat scales on ventral surface are wider and round in *L. hoogmoedi*, narrower and more oval in *L. festae*; (10) upper surface of foot in *L. hoogmoedi* with smooth, flat, round, imbricate scales, in *L. festae* covered by granules. Though comparison was based on few specimens of each species, the number of differences is large enough to warrant that they do constitute distinct species. The colour pattern of *L. hoogmoedi*, compared with that of *L. f. festae* presented by Dixon & Soini (1975, 1986), is also different.

Etymology.— The species is named after Dr. Marinus S. Hoogmoed, in recognition of his valuable contribution to the knowledge of the Amazonian herpetofauna, as much as for all the help and support he has been giving to the present study.

Pseudogonatodes Ruthven, 1915

Diagnosis.— Sphaerodactyline geckos with claws retractile into an ungual sheath composed of five scales, of which two large inferolaterals, two smaller superiors and one small, terminal. Digits short or moderate, cylindrical, with smooth, transversely enlarged subdigital lamellae. Dorsal head scales mostly small. Pupil round. Dorsals granular and juxtaposed, or larger, flat, and imbricate. Ventrals flat, smooth, imbricate. Escutcheon absent.

Distribution.— Northern South America.

Content.— Five known species, only one of which in Brazilian Amazonia.

Pseudogonatodes guianensis Parker, 1935
(figs. 98-100, 272)

Pseudogonatodes guianensis Parker, 1935: 514 (type-locality: Upper Cuyuni River, Guyana); Peters & Donoso-Barros, 1970: 243; Hoogmoed, 1973: 90, 1979: 277; Vanzolini, 1986b: 21; Hoogmoed & Avila-Pires, 1989: 168.

Pseudogonatodes amazonicus Vanzolini, 1967: 2 (holotype DZSP 13314, type-locality: Igarapé Belém, rio Solimões, Amazonas, Brasil); Vanzolini, 1968: 27; Peters & Donoso-Barros, 1970: 242.

Pseudogonatodes guianensis guianensis; Dixon & Soini, 1975: 24, 1986: 27.

Material.— **Brazil.** AMAPA. Serra do Navio: 3 ♂♂, 1 ♀, MPEG 15060, 15147, 15179, RMNH 25877, 9-20.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

AMAZONAS. Rio Uatumã, present area of hydroeletric dam Balbina reservoir: 1 ♀, MPEG 14805, 26.i.1988, leg. F.P. Nascimento & F. Braga. Reserva Florestal Ducke, km 24-26 road Manaus-Itacoatiara: 2 ♂♂, 1 ♀, MPEG 14418, 14419, 14426, 19-20.xi.1981 & 18.vii.1982, don. W.E. Magnusson. Santa Rita, Município de Maraã, margin of Lake Paricá: 1 ♂, MPEG 15213, 08.xi.1988, leg. D.C.Pimentel Neto. Rio Juruá (left bank), Condor (6°45'S, 70°51'W): 1 ex., INPA 423, 14.ix.1991, leg. C. Gascon. Rio Juruá (left bank), Lago Jainu (6°28'S, 68°46'W): 1 ex., INPA 516, 01.xi.1991, leg. C. Gascon. Igarapé Belém, Rio Solimões, ca. 70 km E Leticia: 1 ♂, MCZ 93581, paratype *P. amazonicus*, leg. B. Malkin; 2 ex., AMNH 114887-888, 18-28.v.1970, leg. B. Malkin. Tabatinga, northern bank Rio Solimões: 1 ♂, RMNH 25876, 10.xi.1985, leg. M.S. Hoogmoed. Benjamin Constant, southern bank Rio Solimões: 3 ♂♂, 3 ♀♀, 1 juv., MPEG 15910, 15926, 15952, 15989, RMNH 25879-881, 10- 18.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, MNRJ 4431.

PARA. Cruz Alta, 8 km S Rio Trombetas, Município de Oriximiná: 1 ♂, MPEG 15346, 06.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Road from Sítio Céu Estrelado and Cruz Alta, between Nhamundá and Trombetas rivers: 1 ♂, RMNH 25878, 12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.

Colombia. VAUPES. Wacará: 1 ♀, UTACV 3748, 07.vi.1973, leg. W.F. Pyburn.

Ecuador. NAPO. Tena, 1 mi. NE of, just E of Rio Masahualli: 2 ex., USNM 234574-575, 31.x-02.xi.1958, leg. J.A. Peters. Hacienda George Kiederle, 2 km W Puerto Napo: 1 ex., USNM 166138, 29.x.1958, leg. J.A. Peters. Monkey Island on Napo River: 1 ex., AMNH 124043, 25.vii.1982, leg. G.M. Tilger. PASTAZA. Montalvo: 1 ♂, RMNH 25875, 23.iv.1983, leg. M.S. Hoogmoed & A. Almendariz. MORONA-SANTIAGO. Cusuime, Rio Cusuime (60 km airline SE Macas, 2°40'S 77°42'W), 320 m: 9 ex., AMNH 113669-670, 18-23.vii.1971, leg. B. Malkin. Ashuara village on Rio Macuma, ca. 10 km above Rio Morona (ca. 83 km ESE Macas), 300 m: 14 ex., AMNH 113898-911, 5-17.vii.1971, leg. B. Malkin.

Guyana. Upper Cuyuni River: 2 ♀♀, BM 1946.8.27.8-9 (holotype and paratype), leg. G.S. Carter. Shudikar-wau: 6 ex., AMNH 61433, leg. R. Snedigar.

Peru. LORETO. Yagua Indian Village, headwaters of Rio Loretoyacu (100+ km NW Leticia): 5 ex., AMNH 114617-621, 22.iv-02.v.1970, leg. B. Malkin. Rio Ampiyacu, Estirón: 1 ex., AMNH 125130, 28.iii-09.iv.1970, leg. B. Malkin. Centro Union: 1 ex., MCZ 151764, 3-24.vi.1973, leg. P. Soini.

Suriname. SIPALIWINI. Rechter Kabaleborivier, upstream of Brokoboto cataracts, 8 km N. of K-cataracts: 1 ♂, RMNH 25873, 05.ix.1975, leg. S.B. Kroonenberg. Km 30 road to Amotopo, Kabalebo area, 60 m: 1 ♀, RMNH 25874, 11.ix.1980, leg. M.S. Hoogmoed & J.J.P. Paats. Loëkreek, Kamp Hofwijks, 120 m: 1 ♀, RMNH 25872, 01.viii.1975, leg. M.S. Hoogmoed. Dégrad Ouaremapan: 1 ♂, MHNP 1975.2419, leg. J.P. Gasc. New River, 750 ft (Kutari Head, acc. Hoogmoed, 1973: 8): 1 ♂, 1 ♀, BM 1939.1.1.67-68, leg. C.A. Hudson.

Diagnosis.— Dorsals granular. Digits short, fourth toe with five to seven (mostly six) subdigital lamellae, the third (counting from ungual sheath toward base of toe) largest; first toe with enlarged basal lamellae. Sole of foot with heterogeneous scales. Scales around midbody 86-105, 36-47 ventrals in a longitudinal row, 17-22 in a transverse row at midbody. Maximum SVL 30 mm.

Description.— Sphaerodactyline gecko with maximum SVL in males of 28 mm (Dixon & Soini, 1975), in females of 30 mm (holotype, BM 1946.8.27.8). Head 0.18-0.22 (0.20 ± 0.01, n= 53) times SVL, except for the only juvenile in sample studied, in which it is 0.24 times SVL; 1.2-1.6 (1.45 ± 0.10, n= 54) times as long as wide; 1.2-1.7 (1.39 ± 0.12, n= 54) times as wide as high. Snout short, round, gently sloping toward top of head. Neck slightly narrower than head and body. Body cylindrical. Limbs relatively short, forelimbs 0.18-0.28 (0.24 ± 0.02, n= 29) times SVL, hind limbs 0.30-0.40 (0.33 ± 0.02, n= 21) times. Tail round in cross section, tapering toward tip, 0.7-1.0 (0.87 ± 0.07, n= 14) times SVL.

Tongue relatively wide, slightly narrower anteriorly, covered with imbricate, scale-like papillae; tip round, slightly nicked medially. Teeth minute, conical, subequal.

Rostral very large, distinctly visible from above; posterior part, between level of nostrils, with a shallow depression and a short median cleft. Three or four postrostrals usually present, lateral ones (supranasals) distinctly larger than, to as large as, medial one(s); specimens from Ecuador have four or five, occasionally seven, postrostrals, usually median one distinctly indenting the rostral. Nostril bordered by rostral, first supralabial, two postnasals and lateral postrostral (supranasal). Postnasals distinctly larger than, to as large as, adjacent loreal scales. Scales on snout and on loreal region irregularly polygonal, flat, smooth anteriorly, gradually changing into granules posteriorly; all juxtaposed, decreasing in size from snout toward top of head. Loreal scales 4-8 (mostly 5-7) in a longitudinal line between postnasals and orbit. Scales of supraorbital region granular, similar to those on top of head. Most of anterior and upper margin of eye forming a supraciliary flap, with two to five (usually three or four) enlarged scales. Supralabials 4-5, decreasing in size posteriorly, 3-5 to below centre of eye. Posterior upper and lateral parts of head with small, granular scales. Ear-opening small, from vertically or obliquely oval, to round.

Mental large, with a rather straight to "V"-shaped (vertex directed anteriorly) posterior margin, medially with a short cleft. Postmentals 3-7 (mostly 3-5), irregularly polygonal to round, smooth, juxtaposed, subequal or some larger than others. Scales on chin mostly granular, decreasing in size posteriorly; latero-posteriorly, near border of mouth, elongate. Infralabials 3-7, mostly 4-5, first or second reaching anterior level of eye, posterior ones decreasing sharply in size; 3-5 to below centre of eye. Scales on neck granular dorsally and laterally; throat with an abrupt change from an anterior region with granular scales, to a posterior one with scales like the ventrals.

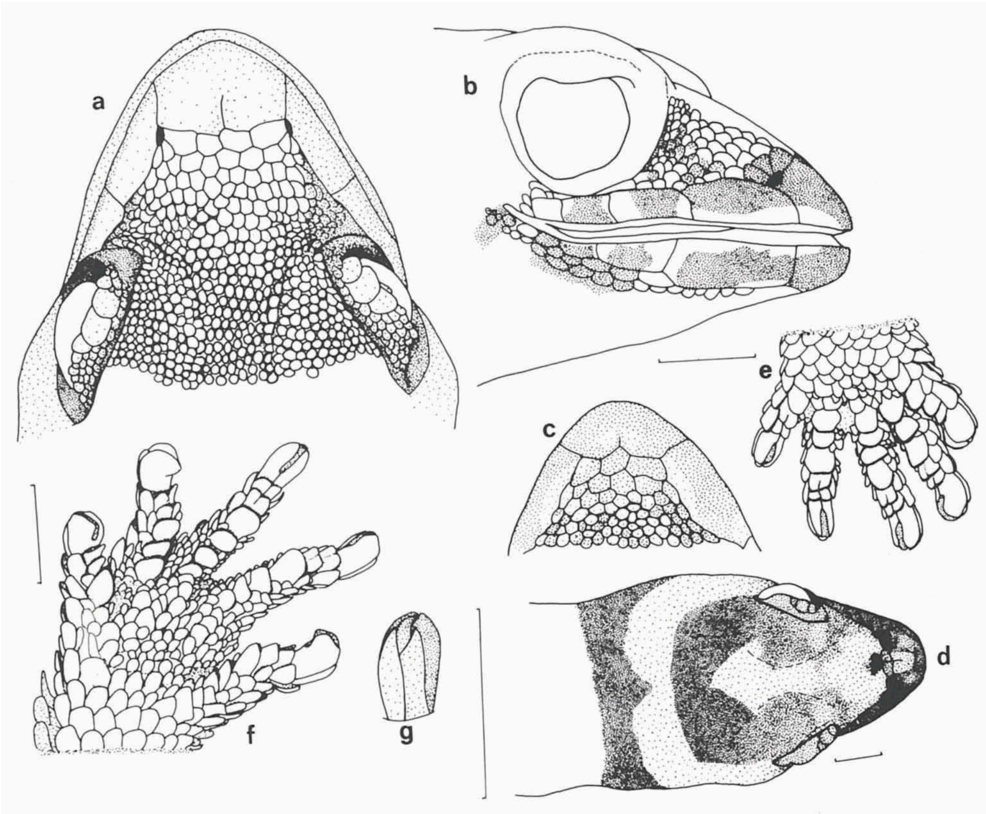


Fig. 98. *Pseudogonatodes guianensis*, BM 1946.8.27.8 (holotype); a, b, c: dorsal, lateral, and ventral views of head; d: dorsal view of head, showing colour pattern; e, f: ventral view of right hand and left foot; g: ungual sheath of third finger in dorsal view.

Dorsals granular, slightly larger than scales on top of head. Scales on flanks like the dorsals, distinctly different from ventrals, which are relatively large, flat, smooth, sub-rhomboid, imbricate; in approximately longitudinal and oblique rows. Scales along a midventral line 36-47 (41.7 ± 2.9, n= 39) between anterior margin of forelimbs and vent; 17-22 (19.5 ± 1.3, n= 48) ventrals in a transverse row at midbody. Scales around midbody 86-105 (96.9 ± 4.6, n= 46). Scales on preanal plate similar to ventrals, except for scales on border of vent, which are smaller.

Scales on tail similar to ventrals, slightly to distinctly smaller on dorsal and lateral surfaces. A midventral row may be distinct or not. There is a gradual transition between scales on the back and those on tail.

Scales on anterior and upper surfaces of upper arms, on anterior and lower surfaces of forearms and thighs, and on lower and posterior surfaces of lower legs relatively large, flat, smooth, imbricate; elsewhere on limbs scales granular. Lamellae under fourth finger 5-6, occasionally 4, of which two (rarely) to four basal ones distinctly enlarged; under fourth toe 6, rarely 5 or 7, the four (rarely three or five) basal ones, or at least the most distal one (usually the third counting from ungual sheath toward base of toe) enlarged. Basal lamellae under first toe distinctly larger than others. Claws enclosed by an ungual sheath composed of five scales, as characteristic for the genus.

Some descriptions of colour in life follow. MPEG 15060 (♂, Amapá) greyish-brown dorsally, with a middorsal dark stripe, more evident anteriorly, and a dorsolateral dark stripe at each side that continues till base of tail; a very conspicuous light (cream) arc on posterior part of head; a group of beige stripes forming an "H" at level of hind limbs. Ventral region uniformly whitish, except for throat where there was a pattern of whitish and light grey irregular stripes. Iris brownish-grey with an orange rim around pupil. RMNH 25877 (♂) and MPEG 15147 (♀), both also from Amapá, were described as "brown with a whitish "U"- shaped band on top of head, more vivid in the male" (in preservative, both specimens present same pattern of stripes as MPEG 15060, but much less conspicuous).

In RMNH 25878 (♂) from Cruz Alta, Pará, colour pattern in life similar to that of MPEG 15060. Head and body with dark greyish- brown (20) vertebral and dorsolateral bands, and fuscous (21) paravertebral and lateral bands, with whitish spots, and a whitish arc at posterior part of head; at level of hind limbs, a chrome-orange (16) dorsolateral stripe. Ventral region white under head, light greyish-brown with small white spots on belly. Iris brown with a narrow orange-brown rim around pupil. Tongue white with grey extremity.

Among specimens from Benjamin Constant, Amazonas, RMNH 25879 (♂) was dusky-brown (19) dorsally, with arc on top of head and "H"- shaped stripes at level of hind limbs hardly visible, only slightly paler than background colour; back with small groups of white scales dorsolaterally, three on one side, two on the other. Ventrally, head white with light greyish-brown markings, belly light greyish-brown, tail mainly dusky-brown. MPEG 15952 (♂) presented a similar dorsal colour, with faint "H"-shaped stripes at level of hind limbs, and arc on top of head cinnamon-drab (219C); ventrally head white, belly dirty white medially, natal- brown (219A) ventrolaterally; underside of tail sepia (219) with a beige (219D) midventral area (becoming a line distally). MPEG 15910 (♀) was raw-umber (223) dorsally, with arc on posterior part of head and "H" stripes at level of hind limbs sayal-brown (223C); ventral region brownish-white, under tail mostly brown with a greenish-blue iridescence.

RMNH 25876, from Tabatinga, Amazonas, had back dark brown, with a lighter transverse band and lighter stripes above hind limbs; on flanks a row of white spots; chin and throat white; belly grey, lateral parts with orange-brown spots; lateral surfaces of tail also with orange-brown scales; iris reddish brown (field notes M.S. Hoogmoed).

The colour in life of specimens from other localities are described by Hoogmoed (1973), Dixon & Soini (1975, 1986), Duellman (1978), and Gasc (1981).

In preservative, all specimens are predominantly brown dorsally, with a "U" or "W"-shaped light area on posterior part of head, starting on both sides at posterior border of eyes, and with a light stripe above each hind limb, completely or incompletely linked by a transverse line ("H"-shaped). Specimens from Amapá, Cruz Alta, Manaus, and Suriname, with a vertebral dark brown band (sometimes bordered on each side by thin darker brown lines), starting at posterior border of light arc of head, and usually continuing to base of tail; a dorsolateral dark brown band, on each side, from posterior border of eye to base of tail, narrower than vertebral bands; these three dark bands, but especially the vertebral band, with undulating margins. Dorsal surface of head in these specimens with irregular light brown spots. Specimens from Balbina, Maraã, Tabatinga, Benjamin Constant, Ecuador (RMNH 25875) and Colombia either uniformly brown, or with faint, light brown spots along back and flanks, sometimes also with a very pale light dorsolateral stripe which may have transverse extensions dorsally; flanks may be slightly darker than back. Dorsal surface of head more uniformly brown than in preceding group. Ventrally, head either completely white, or peppered with brown spots; ventrolaterally it is always brown, with a white oblique stripe from level of eyes posteriorly. Throat sometimes with alternating, longitudinal, brown and white (or light) stripes. Belly mostly with scales peripherally brown, medially white (or light). Underside of tail with a light median area (brown and white).

Habitat.— Forest floor among fallen leaves, at the base of trees and palms, or in rotten tree trunks, frequently near a creek, in 'terra firme' forest or in/near swampy areas. Among 14 specimens with field data available, five were in or close to swampy areas, one on the "border of water from a submersed forest", and three near a creek. The remaining five were among leaf litter in forest, with no mention of any collection of water nearby. MPEG 15060 was inside a rotten tree trunk laying on the ground, near a creek margin, where a specimen of *Lepidoblepharis heyerorum* was also collected. Hoogmoed (1973) mentioned specimens collected "among fallen leaves in the bed of dry creeks [with sandy bottom] in which a number of isolated pools were still present". Dixon & Soini (1975, 1986) reported specimens especially from beneath fallen palm leaves and bark, wood chips, and leaf litter. They also mentioned that most of the specimens were associated with areas where several small patches of sunlight could reach the forest floor, an association not mentioned by any other author, and which I myself did not notice. Gasc (1976) reported specimens in swamps with the palm *Euterpe oleracea* Mart., where fallen leaves were abundant between aerial roots and pneumatophores. Gasc (1986) considered *P. guianensis* as one of the three most abundant lizards associated with the palm *Astrocaryum paramaca* Mart. Gasc (1981, 1990) remarked that these lizards inhabit very humid places, and that they appear only briefly on the surface. Duellman (1978) mentioned them "-amidst shaded leaf litter on the forest floor by day". Among 13 specimens Duellman (1978) studied, nine were in primary forest, two in secondary forest, and two were at the edge of the forest.

Notes on natural history.— Most specimens were collected while they were active during daytime, but MPEG 15147, 14149, and RMNH 25877 were collected between 22:00-23:00 h (see Hoogmoed & Avila-Pires, 1989). MPEG 15910, collected 10.xii.1989 (Benjamin Constant), has a well developed egg in the abdomen. Females with eggs were reported by Hoogmoed (1973; referring to the holotype), Dixon & Soini (1975, 1986), and Duellman (1978). In all cases only one egg per female was present. The observations by Dixon & Soini (1975, 1986) suggested reproduction throughout the year in specimens from Iquitos region, Peru. Gasc et al. (1983) studied the stomach contents of *P. guianensis* from French Guiana, concluding that the species, though ingesting a number of different Arthropods, had a strong preference (48% of items ingested) for Collembola, especially for species of relatively large size;

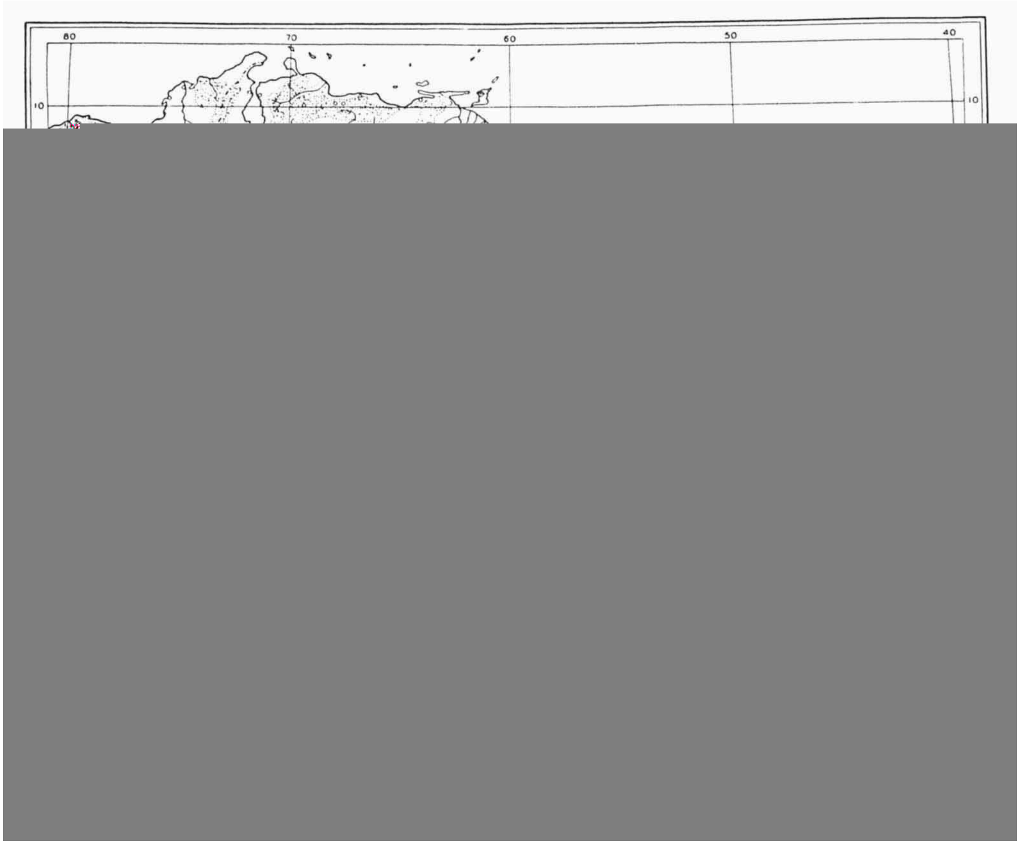


Fig. 99. Distribution of *Pseudogonatodes guianensis*. Closed circles = material studied; open circles = data from literature (Hoogmoed, 1973; Duellman, 1978, 1987; Gasc, 1986; Dixon & Soini, 1986; Henzl, 1991); dashed circles = data by Ayala (1986) for Meta and Vaupés states, Colombia.

Formicidae, though well represented in the litter, were not found. Duellman (1978) reported on the stomach contents of eleven specimens from Ecuador, which contained spiders, sow bugs, beetle larvae, termites, and small orthopterans (all together accounting for 93.3% of items and 90.9% of the volume). Gasc (1981) studied the locomotion behaviour of the species, about which some observations also were made by Hoogmoed (1973).

Distribution (fig. 99).— Widespread in a large part of Amazonia, in Brazil, French Guiana, Suriname, Guyana, Colombia, Ecuador, and Peru. In Brazil, up to now known from Amapá, Pará between the lower Trombetas and Nhamundá rivers, and Amazonas north of the Rio Amazonas/Solimoes, and at least in the extreme west (Benjamin Constant) also south of it.

Remarks.— Since the description of *P. amazonicus* Vanzolini, 1967, several authors (Huey & Dixon, 1970; Hoogmoed, 1973; Dixon & Soini, 1975, 1986; Duellman, 1978; Gasc, 1981) argued that it was possibly conspecific with *P. guianensis*, and Vanzolini (1986b) considered it as such, referring to Huey & Dixon (1970) (who only suggested this possibility, but continued to treat the two nominal taxa as species). Huey &

Dixon (1970) also included *P. lunulatus* (Roux) as a possible synonym of *P. guianensis*. Dixon & Soini (1975, 1986) compared the three nominal taxa, concluding that *P. guianensis* and *P. amazonicus* were probably conspecific, but that *P. lunulatus* was not, an idea also ventilated by Hoogmoed (1973). Hoogmoed (1973) and Gasc (1981) showed that the characters used by Vanzolini (1967) to separate *P. amazonicus* from *P. guianensis* were variable in specimens from the Guianas, a conclusion supported by Duellman (1978) on the basis of specimens from Ecuador. However, no attempt had been made so far of a broader comparison among specimens of several localities, and some of the above authors (Hoogmoed, 1973; Dixon & Soini, 1975, 1986) let open the possibility of the existence of subspecies. In the material I had the opportunity to study, the following differences among local groups were noticed:

(1) Postrostrals: three or four in specimens from Guyana, Suriname, Amapá, Cruz Alta, and Manaus, in all cases except in Manaus specimens median postrostral(s) relatively small; three, median one relatively large, in the only specimen from Balbina, four in the only one from Maraã; three, median one relatively large, in the only specimen from Tabatinga, in all specimens from Igarapé Belém, Benjamin Constant and Peru, and in the only one from Colombia; four or five, median ones frequently indenting the rostral, in specimens from Ecuador.

(2) Infralabials (character only observed in the specimens of RMNH and MPEG): in specimens from Suriname and Amapá, the posterior border of second infralabial reaches anterior border of eye; in the single specimens from Maraã, Tabatinga and Ecuador, and in those from Benjamin Constant, the first infralabial reaches anterior border of eye; specimens from Cruz Alta, Manaus, and Balbina are intermediate, or fit the second situation. The same characteristic can be seen by comparing lengths of first and second infralabials, shown in fig. 100 (the first infralabial is much larger than the second in the second situation, moderately so in the first).

(3) Lamellae under fourth finger: except for specimens from Ecuador and one from Peru, all have five (occasionally four) lamellae, of which three (rarely two) enlarged basal ones; most specimens from Ecuador, and MCZ 151764 from Peru have six lamellae, of which four enlarged basal ones; USNM 234575 and 166138, from Ecuador, have five lamellae on one side, six on the other.

(4) Scale counts: no significant differences were observed, except that specimens from Igarapé Belém and Benjamin Constant showed a slightly lower count of scales around midbody (86-97, 90.6 ± 3.7, n= 7, as compared to 92-105, 98.0 ± 3.8, n= 39, in remaining specimens). Such a difference may be due to the small sample size, and should be checked on basis of more material.

(5) Scales on ventral surface of tail (character only observed in specimens of RMNH and MPEG): in most specimens these scales are only slightly larger than those on dorsal surface, but they are moderately larger in specimens from Suriname, and distinctly larger in the only specimen from Ecuador examined for this character.

(6) Colour pattern (character only observed in specimens of RMNH and MPEG): two colour patterns were identified that seem to be geographically separated. Speci-

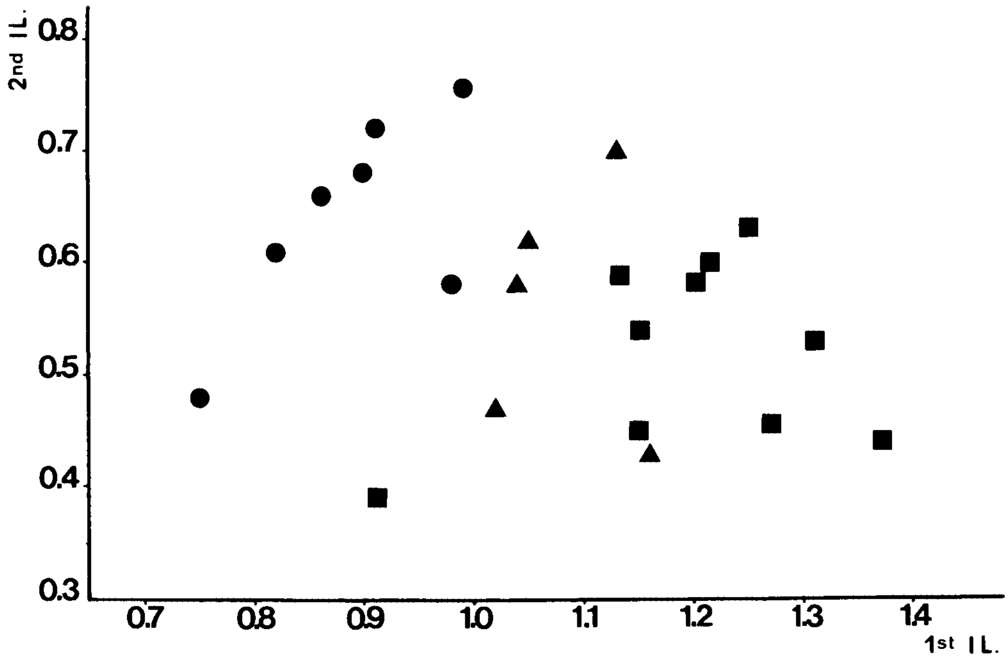


Fig. 100. *Pseudogonatodes guianensis*: comparison of length of second infralabial versus length of first infralabial in specimens from Suriname and Amapá (circles), Cruz Alta, Manaus and Balbina (triangles), and Maraã, Tabatinga, Benjamin Constant, and Ecuador (squares).

first group that I examined for this character, although in some specimens it was more conspicuous than in others, and in RMNH 25874 the bands were only visible anteriorly. However, such a pattern is not mentioned by Parker (1935), Hoogmoed (1973), or Gasc (1981, 1990), who described specimens from the Guianas. Vanzolini (1967) did mention it (emphasizing in the description the light bands, instead of the dark bands as I did) for *P. guianensis* (and *P. barbouri*). It is possible that variation in colour pattern is larger than shown in sample examined.

Summarizing, it is clear that some geographic variation exists, with specimens from Ecuador presenting the most distinct expression of characteristics (postrostrals, lamellae under the fourth finger, scales on ventral surface of tail). Several distinctions can also be noticed when specimens from Benjamin Constant (including the nearby localities Igarapé Belém and Tabatinga) and possibly also Peru, are compared with those from Guyana, Suriname and Amapá (postrostrals, first infralabial, colour pattern). The few specimens available from central Amazonia (Cruz Alta, Manaus, Balbina, Maraã), however, seem to present a mixture of the characters that distinguish these two latter groups. For a better understanding of the geographical variation, more specimens from central Amazonia should be available, as well as from localities intermediate between the material from Ecuador here studied and that from Brazil and Peru.

Family Gymnophthalmidae Merrem, 1820

Classification follows Estes et al. (1988). Presch (1980) presented a phylogenetic analysis of the family, but as pointed out by the author, his results should be considered preliminary.

Content.— About 30 genera, 15 of which present in Brazilian Amazonia.

Alopoglossus Boulenger, 1885

Diagnosis.— Gymnophthalmids with body cylindrical, tail long, round in cross section, with longitudinal ridges. Limbs well developed, pentadactyl, with all digits clawed. Nasals separated by frontonasal. Lower eyelid with semitransparent disc. Prefrontals and frontoparietals present, occipitals absent. Interparietal and parietals form a straight posterior margin. Anterior dorsal head scales smooth, posterior ones may be rugose or have lateral ridges. Dorsals keeled, in oblique rows, ventrals smooth or keeled.

Distribution.— Northern South America in French Guiana, Suriname, Guyana, Brazil, Colombia, Ecuador, and Peru.

Content.— Seven species, of which five from the eastern slopes of the Andes, two from the western slopes. Among them, *A. angulatus* and *A. atriventris* occur in Brazil, *A. buckleyi* reaches at least the Peru-Brazil border.

Alopoglossus angulatus (Linnaeus, 1758)
(figs. 101, 102, 273)

Lacerta angulata Linnaeus, 1758: 204 (neotype RMNH 15200, type-locality: 'America', restricted by Hoogmoed, 1973, by neotype selection, to Brown's Mountain, Suriname).

Leposoma carinicaudatum Cope, 1876: 160 (holotype ANSP 11371, type-locality: Valley of Rio Marañon, Peru).

Alopoglossus carinicaudatus; Boulenger, 1885b: 384; Goeldi, 1902: 537, 548; Ruibal, 1952: 508; Cunha, 1961: 123; Peters & Donoso-Barros, 1970: 15; Crump, 1971: 20; Vanzolini, 1986a: 14; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.

Alopoglossus amazonius Ruthven, 1924: 1 (holotype UMMZ 56853, type-locality: Vila Murtinho, Rondônia [formerly Mato Grosso], Brazil).

Pantodactylus amazonicus; Amaral, 1937a: 1741, 1949: 111.

Pantodactylus amazonius; Amaral, 1937b: 193.

Alopoglossus copii surinamensis Brongersma, 1946: 231 (holotype RMNH 4858, type-locality: Lucie River, Suriname).

Alopoglossus angulatus; Hoogmoed, 1973: 216, 1979: 278; Hoogmoed & Avila-Pires, 1989: 168; Gascon & Pereira, 1993: 181.

Material.— **Brazil.** ACRE. Rio Juruá, left bank, Sobral (8°22'S, 72°49'W): 1 juv., INPA 642, 1 ♂, INPA 648, 11.iii.1992; 1 ♂, INPA 660, 15.iii.1992; 1 ♂, INPA 661, 14.iii.1992; all leg. C. Gascon.
AMAPA. Serra do Navio: 1 ex., MPEG 15033, 06.xi.1988; 1 ♂, RMNH 25312, 1 ex., MPEG 15095, 11.xi.1988; 1 ♀, RMNH 25313, 12.xi.1988; 2 ♂♂, 3 ♀♀, MPEG 15150-155, 1 ♂, 2 ♀♀, RMNH 25314-316, 19.xi.1988; 2 ♂♂, 2 ♀♀, MPEG 15182-185, 1 ♂, 1 ♀, RMNH 25317-318, 20.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Bank of Rio Araguari, end of road Serra do Navio-Araguari: 1 ex., MPEG 15127, 18.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Upper Rio Maracá: 3 exs., MPEG 797-99, 1 juv., MPEG 1921, 1959, leg. M. Moreira.

AMAZONAS. Rio Uatumã, reservoir area of hydroelectric dam Balbina, igarapé Caititu: 1 ♂, 1 ♀, INPA 147, 149, 21-23.iv.1987; 1 ♀, INPA 202, 31.vii.1987; all leg. M. Martins. Reserva Florestal Ducke, 25 km N of Manaus: 1 ex., MPEG 14018, xii.1984, leg. D. Peccinini-Seale; 1 ♂, MPEG 14277, 12.ix.1985, leg. A. Lima; 1 ex., MPEG 14405, 07.xi.1985, leg. M.S. Hoogmoed & M. Hero; 1 ♂, 1 ♀, MPEG 14416-417, 20.vii.1986, leg. T.C.S. Avila Pires, A. Lima & M. Hero. Rio Negro, Arquipélago de Anavilhanas: 1 ♂, INPA 282, v.1988, leg. G. Moreira. Rio Solimões, Manacapuru: 2 ♂♂, RMNH 25307-308, 27.xi.1985, leg. M.S. Hoogmoed. Rio Urucu, E of Porto Urucu, near RUC-2/Petrobras: 1 ♀, MPEG 15861, 1 ♂, RMNH 25321, 25.xi.1989; 1 ♂, RMNH 25324, 26.xi.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Igarapé Belém, near Rio Solimões, c. 70 km E Leticia: 3 ♂♂, 2 ♀♀, AMNH 113136-140, 1970, leg. B. Malkin. Rio Solimões, Tabatinga: 1 ♂, 1 ♀, RMNH 25303-304, 12.xi.1985, leg. M.S. Hoogmoed; 1 ♀, 16003, 22.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões, Benjamin Constant: 1 ♀, MNRJ 2142; 1 ♂, MPEG 15991, W of village, 18.xii.1989, M.S. Hoogmoed & T.C.S. Avila Pires.
PARA. Capanema, Rio das Pedras (km 18 road Capanema-Bragança): 1 ♂, MPEG 14985, 03.x.1988, leg. M. Moisés da Silva. Belém: 1 ♀, USNM 158083, 16.viii.1965; 1 ♀, USNM 162209, IPEAN, APEG main reserve, 22.vii.1966; both leg. P.S. Humphrey; 1 ♂, KU 127238, IPEAN, 15.iv.1969; 1 juv., KU 127245, 08.iv.1969; both leg. M.L. Crump; 1 ♀, MPEG 233, 1958, leg. C. Egler; 1 ex., MPEG 1918, IPEAN, Utinga, 1962; 1 juv., MPEG 15626, Mocambo, 20.iv.1989, leg. A.C.M. Lima. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 1 ♂, MPEG 16478, 13.xi.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município Oriximiná, Cruz Alta, 6 km S Rio Trombetas: 1 ♂, RMNH 25319, 1 ♀, MPEG 15348, 06.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
RONDONIA. Vila Murtinho: holotype *A. amazonius*, ♀, UMMZ 56853, 06.iv.1922, leg. J.H. Williamson.
Ecuador. MORONA-SANTIAGO. Ashuara Village on Rio Macuma, 300 m, c. 10 km above Rio Morona (c. 83 km ESE Macas): 2 ♂♂, 1 ♀, AMNH 113930-932, 05-17.vii.1971, leg. B. Malkin.
French Guiana. R. Sinnamary, Petit Saut: 1 ♂, RMNH 25320, 04.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Guyana. Marudi: 1 ♀, AMNH 61381, iv.1938, leg. R. Snedigar.
Peru. LORETO. Iquitos: 1 ♂, AMNH 56277, leg. H. Bassler. Contamana region, R. Suhuaya, Rian-Rian, alt. 500 feet: 1 ♀, AMNH 56278, leg. H. Bassler. Rio Ampiyacu, Estirón: 1 ♀, AMNH 113104, 28.iii-09.kv.1970, leg. B. Malkin. Headwaters Rio Loretoyacu, Yagua Indian Village, 100+ km NW Leticia: 1 ♂, 1 ♀, AMNH 113127-128, 22.iv-02.v.1970, leg. B. Malkin. HUANUCO. Rio Llullapichis, confluence of Rio Pachitea: 1 ♀, AMNH 116338, 17.vi.1973, leg. C. Toft. Rio Llullapichis, Panguana: 1 ♀, ZFMK 41359, leg. R. Podloucky; 1 ♀, ZFMK 41840, 22-29.xii.1983, leg. M. Verhaag. MADRE DE DIOS. Puerto Maldonado, 30 km (airline) SSW of, Tambopata Reserve, Explorer's Inn, alt. 280 m (12°50'S, 69°17'W): 1 ♀, USNM 222340, 05.xi.1979, leg. R.W. McDiarmid; 1 ♂, USNM 247489, 16.ix.1984, leg. R.B. Cocroft, Tambopata Reserve Survey.
Suriname. PARANAM. Forest S of road to Hanover, N of Zanderij, alt. 10 m: 1 ♂, RMNH 26535, 05.xi.1990, leg. M.S. Hoogmoed & P.E. Ouboter. BROKOPONDO. Brownsberg National Park: Neotype, ♀, RMNH 15200, Brown's Mountain (= Brownsberg), 20.viii.1968, leg. M.S. Hoogmoed; 1 ♂, AMNH 119395.

Diagnosis.— Gulars not in two longitudinal rows. Scales on sides of neck keeled, at least posterior ones phylloid (anterior ones tuberculate or phylloid). Dorsals and scales on flanks rhomboid, strongly keeled and mucronate. Gulars smooth or keeled, posterior margin from distinctly pointed to almost rounded. Ventrals smooth or broadly keeled, posterior margin blunt or pointed.

Description.— Gymnophthalmid with maximum SVL in males of 57 mm (AMNH 113137), in females of 58 mm (MNRJ 2142). Head 0.20-0.27 (n= 65) times SVL, mostly 0.24-0.27 times in smaller specimens, 0.20-0.23 times in larger ones; 1.3-1.5 (1.44 ± 0.05, n= 65) times as long as wide; 1.1-1.5 (1.30 ± 0.08, n= 65) times as wide as high. Snout round, rising gently posteriad. Neck almost as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.24-0.32 (0.28 ± 0.02, n= 61) times SVL, hind limbs 0.36-0.50 (0.45 ± 0.03, n= 58) times. Tail round in cross section, with 12 longitudinal ridges, tapering toward tip; 1.4-1.9 (n= 31) times SVL, proportionally shorter in smallest specimens.

sides of neck distinctly smaller than dorsals, posterior ones phylloid, distinctly keeled, imbricate, anterior ones similar but shorter, or tuberculate. Dorsals and scales on flanks rhomboid, strongly keeled and mucronate, imbricate, in oblique rows; 22-30 (26.8 ± 1.7, n= 66) scales along a middorsal line from nape to base of tail. Ventrals imbricate, in 15-20 (17.0 ± 1.1, n= 66) transverse and six longitudinal rows. Scales in the four medial longitudinal rows either smooth or with each a low, broad keel, the keels forming longitudinal ridges, and with pointed or blunt posterior margin. Lateral rows keeled, mucronate, forming a transition to scales on flanks. Scales around midbody 18-23 (20.3 ± 0.9, n= 66). Preanal plate with three (exceptionally) or four smooth or broadly keeled scales, lateral ones subequal to, to distinctly smaller than, medial ones; they are preceded by two to five scales. Pores usually absent in females, exceptionally one or two small femoral pores present. In males there is a continuous series of pores on each side, the series on one side well separated from that on the other side; in each series, one pore is in preanal position. Total number of pores 16-28 (24.4 ± 2.4, n= 30). Each pore between two, occasionally three, scales.

Scales on tail variably quadrilateral, proximally wider than long in the two paravertebral rows, longer than wide in other rows; keeled, shortly mucronate, imbricate, in transverse and longitudinal rows. Keels mostly sharp, except on ventral rows where they are lower and broader; they form distinct longitudinal ridges, of which four dorsal, two lateral at each side, and four ventral.

Scales on limbs mostly rhomboid, imbricate, sharply keeled, and mucronate. Feebly keeled to smooth on ventral aspect of hind limbs, tuberculate on ventral aspect of upper arms and posterior aspect of thighs. Lamellae under fingers single, transversely enlarged, and smooth, under toes divided; 11-17 (13.8 ± 1.3, n= 124, 65 specimens) under fourth finger, 17-24 (20.1 ± 1.6, n= 117, 61 specimens) under fourth toe.

In life, males (MPEG 15150, 15152, 15991, RMNH 25312, 25314, 25321, 25324) with dorsal surface of head amber (36), Prout's brown (121A), mars-brown (223A), or warm sepia (221A). Back hair-brown (119A), Prout's brown (121A), sepia (219), natal-brown (219A), or mars-brown (223A) anteriorly to raw-umber (223) posteriorly; with blackish or sepia (119) spots. Dorsolateral stripe, from posterior corner of eye to anterior part of body, amber (36), cinnamon (39 or 123A), or army-brown (219B). Flanks black or sepia (119), with a dirty-white, light chamois (123D), or pale pinkish buff (121D) stripe; in RMNH 25312 flanks amber (36) with a buff-yellow (124) stripe bordered at both sides by series of sepia (119) spots, and with buff (124) to cream (54) spots on a ventrolateral band. On ventral surface, head pale horn colour (92), pale pinkish buff (121D), or white, usually with blackish spots on posterior chinshields and gulars; MPEG 15991 with gulars predominantly black. Belly cream, dirty-white, light chamois (123D), or pale pinkish buff (121D), immaculate or scales bordered by sepia (119) or black. Colour of tail, dorsally, similar to that of back, in some specimens with a crimson (108) hue. A series of yellow-ochre (123C) or amber (36) paired spots along tail, first pair, near base of tail, more evident and in some specimens the only one well defined. Spots of similar colour may also be present on posterior aspect of hind limbs. Underside of tail cream; sepia (119) spots may be present and become increasingly abundant posteriad. Iris brown with an orange or orange-brown rim around pupil. Tongue sepia or dark grey anteriorly, white posteriorly.

In females (MPEG 15151, 15153, 15155, 15861, 16003, RMNH 25315-316) the dor-

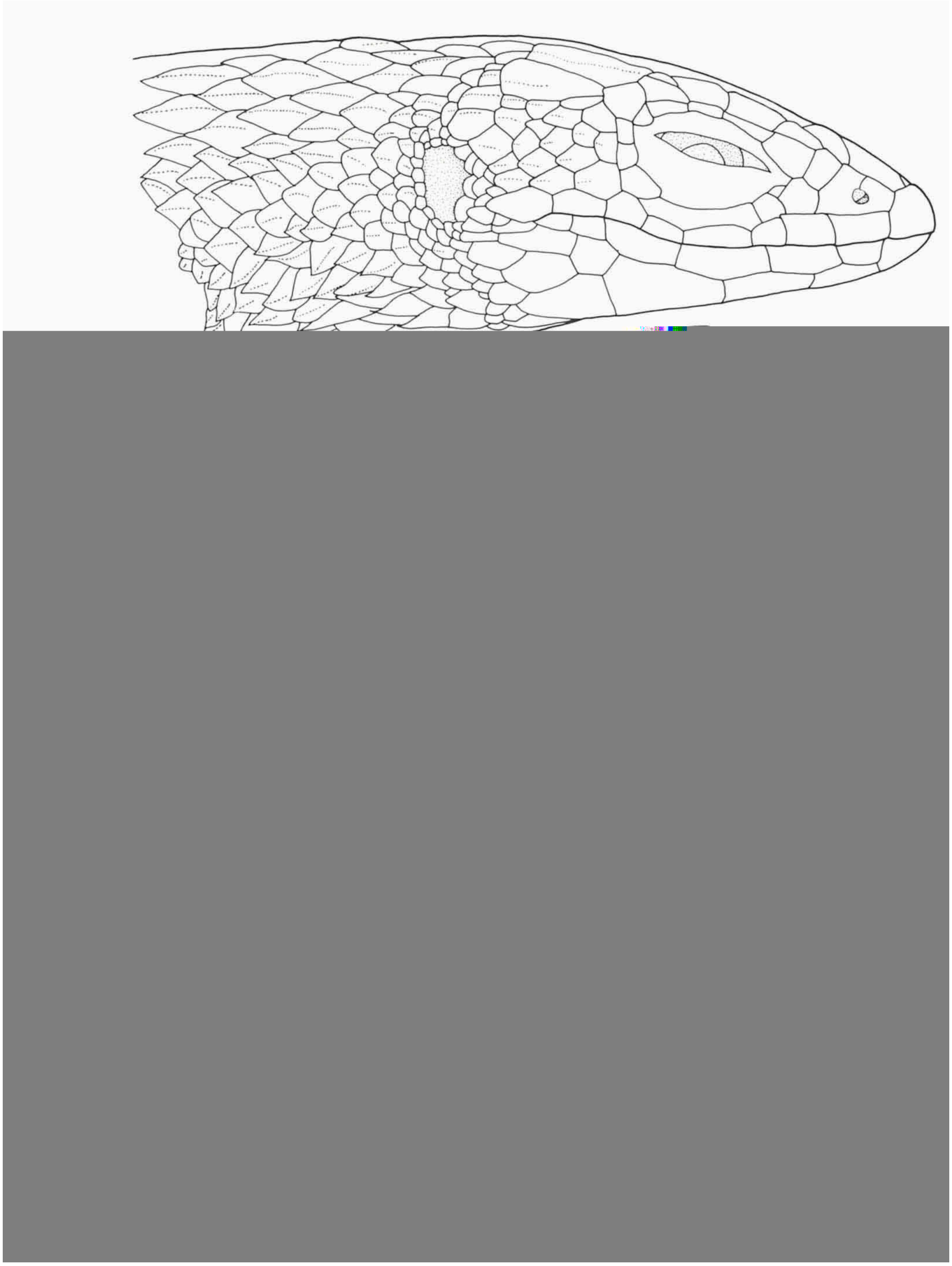


Fig. 101. *Alopoglossus angulatus*, MPEG 15150; a, b, c: lateral, dorsal, and ventral views of head; d: pre-anal plate and ventral aspect of right hind limb, showing sequence of pores.

solateral stripe is less evident, and there is no lateral stripe. Flanks may be lighter than in males. Ventral region immaculate, except for underside of tail. MPEG 15861 had dorsal surface of head and anterior part of back mars-brown (223A), posterior part of back raw umber (223) with some black scales. Dorsolateral stripe cinnamon (123A). Flanks natal-brown (219A) and sepia (119), bordered below by a pale pinkish buff (121D) band and some sepia dots. Ventral region pale pinkish buff. Juveniles resemble females.

In preservative, dorsal surface of head and back brown, either uniform or mottled dark and light brown; irregular, dark brown spots may be present along the vertebral line. A pale dorsolateral stripe from posterior corner of eye to anterior part of body (rather inconspicuous in some specimens). Posteriad this stripe either disappears completely or it continues as a series of irregular light spots. A dark brown stripe from rostral, through nostril, to eye, and from there to at least the posterior border of head. In some specimens it continues until base of tail, below the light stripe. Flanks either similar in colour to back or tending to black, usually light to dark brown in females, and with a blackish band variably developed in adult males. A lateral white or cream wide stripe is present between limbs, separated from ventral region either by a complete dark band, or by an irregular row of dark spots. Limbs dorsally uniformly, or mottled, brown. Tail idem, with a dorsolateral series of irregular light spots, more evident proximally. Ventral region in females completely white or cream, or with small, irregular dark spots. In adult males some or all ventral scales are black peripherally, so that ventral region is variably blackened. In MPEG 15991, the chin up to second pair of chinshields is predominantly white (black spots only peripherally), third pair of chinshields and gular region are predominantly black, belly predominantly white although all scales have a black border. In INPA 648 chin and gulars are predominantly black, with white spots (on gulars occupying tip of scales), belly anteriorly has about as much black as white (scales white, bordered by black), posteriorly white areas predominate. Underside of limbs predominantly light, with or without black spots. Underside of tail light with some irregular dark spots proximally, darkening posteriad.

Habitat.— An inhabitant of the forest floor, always near water: margin of creeks, swampy areas, varzea or igapó forests (pers. obs.; Crump, 1971; Meede, 1984 [as *A. copii*]; Hoogmoed & Avila-Pires, 1989; Zimmerman & Rodrigues, 1990). Most observations refer to forest. MPEG 15861, RMNH 25321, RMNH 25324 were in heavily disturbed (logged) primary forest, while MPEG 15991 was at edge of forest with freshly cleared roçado (area for plantation), near creek. Distinctly more open habitat was mentioned by Dixon & Soini (1975, 1986), who referred to "dense grassy fields associated with forest clearings and pasture situations".

Notes on natural history.— Probably a non-heliothermic lizard. Most animals about which field notes are available were collected during the day, but Hoogmoed & Avila-Pires (1989) reported individuals active at night, under full moon. On this occasion (19-20.xi.1988) males *A. angulatus* were pursuing females, which probably was a courtship behaviour.

MPEG 15095 was first seen on the base of a tree trunk, a few centimetres from the ground, near edge of creek. When pursued it fled into the water, re-emerging after a short while.

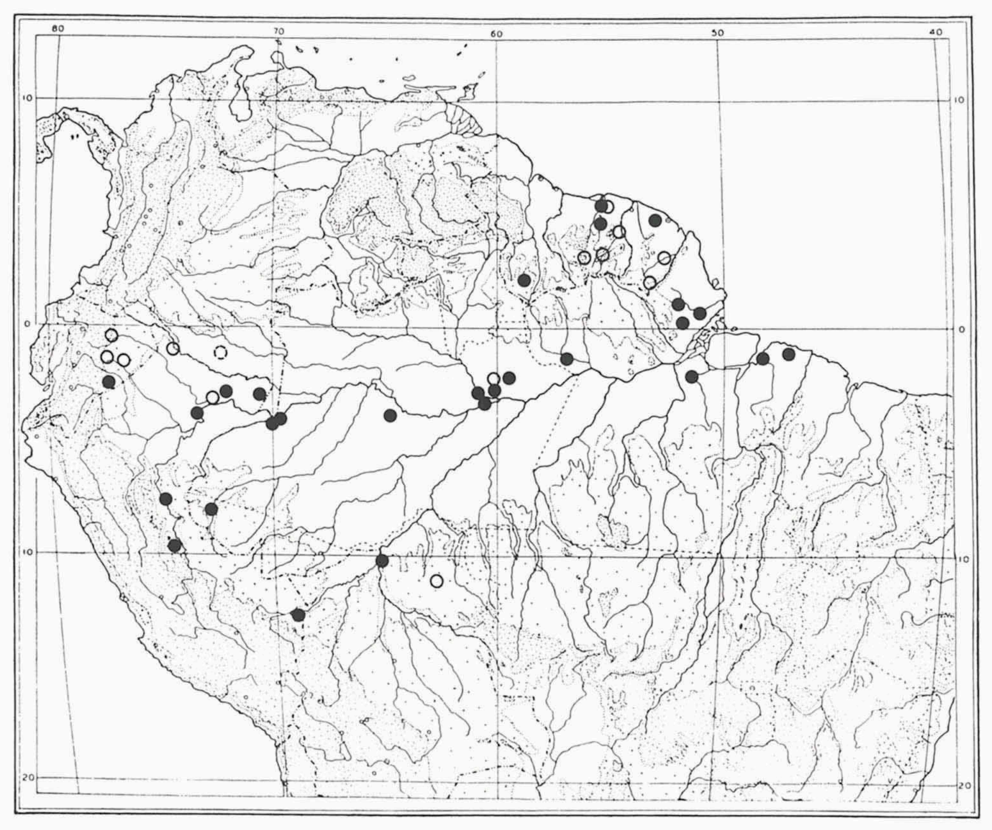


Fig. 102. Distribution of *Alopoglossus angulatus*. Closed circles = material studied. Open circles = data from literature (O'Shaughnessy, 1881; Ruibal, 1952; Hoogmoed, 1973; Lescure & Gasc, 1986; Vanzolini, 1986a; Almendáriz, 1987; Zimmerman & Rodrigues, 1990). Dashed circle = Amazonas state, Colombia (Ayala, 1986).

In the Mocambo reserve, in Belém, an egg 12.6 × 9.6 mm was found on the base of a tree trunk, in forest, on 20.iv.1989. It was taken to the laboratory where it hatched on 07.v.1989. The hatchling had 23.5 mm SVL, 32.0 mm tail length (MPEG 15656).

Martins (1991) reported one spider and one bug in the stomach of an individual.

Distribution (fig. 102).— Amazonian region in Brazil (Amapá, Pará, Amazonas, Rondônia, Acre), French Guiana, Suriname, Guyana, Colombia (Estado Amazonas), Ecuador, and Peru. Judging from present known localities, it probably occurs also in Bolivia, at least in the northern part of the country.

Remarks.— The species shows a relatively high degree of variability in gulars and ventrals, and in the scales on sides of neck. Some variation is observed within populations, but it is stronger among populations. In general, specimens from eastern Amazonia (including Guianas) have pointed and keeled gulars and ventrals, and most scales on sides of neck are phylloid and relatively large. In some western populations, gulars and ventrals are more frequently blunt or rounded, smooth or feebly keeled, and scales on sides of neck tend to be smaller, anteriorly tuberculate and only posteriorly they become phylloid. Scales on temporal region also tend to be less distinctly keeled (in some cases smooth). Where both *A. angulatus* and *A. atriventris* occur, in the states of Amazonas and Acre, Brazil, the two species can be distinguished by differences in the gulars and ventrals - wider, rounded or bluntly pointed, and smooth or almost so, in the first species; narrower, pointed and keeled in the last one. Scales on sides of neck are also distinct, but in specimens from Tabatinga and Benjamin Constant this distinction is less pronounced, the phylloid scales typical of *A. angulatus* being present only posteriorly. The two species differ, besides, in size (*A. atriventris* smaller), in the degree of blackness of venter in males (blacker in *A. atriventris*) and, in life, in colour of iris, deep orange in *A. atriventris*, paler orange in *A. angulatus*.

The type of *A. amazonius* (UMMZ 56853), from Rondônia, close to the border with Bolivia, has smooth gulars and ventrals (gulars pointed to blunt, ventrals roundish), temporals keeled, and scales on sides of neck relatively large, phylloid. Moreover, relatively large scales separate third pair of chinshields from gulars, in a similar way as specimens from Cruz Alta and Urucu. In most other specimens these scales are in direct contact, and in at least four of the six specimens studied from Belém, and one out of three from Manaus, chinshields and gulars are separated by a row of granules.

Judging from the variation observed in the degree of "blackness" in males (along flanks and on ventral region), such variation might be linked to the male reproductive cycle, and maybe it is reversible, that is the "blacker" phase would correspond to the reproductive period, while during intervals the blackness would not be so intense. A confirmation of this idea, however, demands specific, appropriate studies, which fall beyond the scope of the present paper.

Alopoglossus atriventris Duellman,1973
(figs. 103, 104, 274)

Alopoglossus atriventris Duellman, 1973: 228 (holotype KU 126783, type-locality: Lago Agrio, Provincia Napo, Ecuador); Vanzolini, 1986b: 1.

Material.— **Brazil.** ACRE. Rio Juruá, left bank, Sobral (8°22'S, 72°49'W): 1 ♀, INPA 643, 11.iii.1992, leg. C. Gascon. Rio Juruá, left bank, Porongaba (8°40'S, 72°46'W): 1 ♂, INPA 594, 23.ii.1992, leg. C. Gascon. AMAZONAS. Rio Solimões, Manacapuru: 2 ♂♂, 1 ♀, RMNH 25309-311, 27.xi.1985, leg. M.S. Hoogmoed. Rio Urucu, E of Porto Urucu, near RUC-2/Petrobras: 1 ♀, MPEG 15859, 24.xi.1989; 1 ♂, MPEG 15860, 1 ♀, RMNH 25322, 25.xi.1989; 1 ♀, MPEG 15864, 1 ♂, RMNH 25323, 26.xi.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Juruá, left bank, VV (3°17'S, 66°14'W): 1 ♀, INPA 739, 23.v.1992; 1 ♀, INPA 740, 25.v.1992; 1 ♀, INPA 745, 30.v.1992; 1 ♀, INPA 759, 02.vi.1992; 1 ♂, INPA 763, 08.vi.1992; all leg. C. Gascon. Rio Juruá, right bank, VQQ (3°19'S, 66°01'W): 1 ♀, INPA 725, 10.v.1992, leg. C. Gascon. Rio Juruá, right bank, Altamira (6°35'S, 68°54'W): 1 ♂, INPA 534, 10.xi.1991, leg. C. Gascon. Rio Juruá, right bank, Penedo (6°50'S, 70°45'W): 1 ♂, INPA 404, 24.viii.1991; 1 ♀, INPA 397, 30.viii.1991; 1 ♀, INPA 418, 05.ix.1991; all leg. C. Gascon. Rio Juruá, left bank, Condor (6°45'S, 70°51'W): 1 ♂, INPA 439, 19.ix.1991; 1 ♂, 1 ♀, INPA 450-451, 27.ix.1991; all leg. C. Gascon. Rio Solimões, Igarapé Belém, c. 70 km E Leticia: 3 ♂♂, 3 ♀♀, AMNH 113141-142, 113144-146, 113151, 18-28.v.1970, leg. B. Malkin. Rio Solimões, Tabatinga: 1 ♀, RMNH 25302, 10.xi.1985, leg. M.S. Hoogmoed. Rio Solimões, Benjamin Constant: 1 ♂, 1 juv., MNRJ 2143-44; 1 ♀, RMNH 25305, 14.xi.1985, 1 ♂, RMNH 25306, 27.xi.1985, both leg. M.S. Hoogmoed; 1 ♀, RMNH 25325, 1 juv., MPEG 15897, E of village in locality Santo Antônio, 08.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, MPEG 15928, 1 ♀, RMNH 25326, 11.xii.1989; 1 ♀, MPEG 15941, 1 ♂, RMNH 25327, 12.xii.1989; 2 juvs., MPEG 15966, RMNH 25328, 14.xii.1989; 1 ♂, 1 juv., MPEG 15971-972, 1 ♀, 1 juv., RMNH 25329-330, 15.xii.1989;

1 juv., MPEG 15978, 1 ♂, RMNH 25331, 16.xii.1989; 1 juv., RMNH 26536, 19.xii.1989; all E of village, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Ecuador. NAPO. Lago Agrio: paratype, ♂, KU 126784, 25.v.1969, leg. T.H. Fritts. Road to Loreto, km 13 (= 13 km E of road Baeza-Tena), alt. 1280 m: 1 ♂, RMNH 25332, 20.x.1987, leg. M.S. Hoogmoed, L. Coloma & F. Campos. PASTAZA. Rio Conambo, Destacamiento militar Shiona, 55 km E (83°) of Montalvo: 1 ♂, RMNH 25301, 14.viii.1983, leg. M.S. Hoogmoed & A. Almendariz.

Diagnosis.— Gulars not in two longitudinal rows. Scales on sides of neck small, tuberculate, in approximately transverse rows, and at least posterior ones keeled. Dorsals and scales on flanks rhomboid or phylloid, strongly keeled and mucronate. Gulars pointed, keeled, imbricate. Ventrals from distinctly keeled and mucronate to feebly keeled and bluntly pointed.

Description.— Gymnophthalmid with maximum SVL in males of 51 mm (Duellman, 1973), in females of 53 mm (AMNH 113145). Head 0.22-0.28 (n= 34) times SVL, around 0.27-0.28 in smaller specimens, 0.24-0.25 in larger males, 0.22-0.23 in larger females; 1.4-1.7 (1.51 ± 0.08, n= 34) times as long as wide; 1.2-1.4 (1.32 ± 0.07, n= 34) times as wide as high. Snout blunt, rising gently posteriad. Neck almost as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.25-0.36 (0.30 ± 0.02, n= 36) times SVL, hind limbs 0.43-0.50 (0.47 ± 0.02, n= 34) times. Tail round in cross section, with 12-14 longitudinal ridges, tapering toward tip, 1.3-1.9 (n= 22) times SVL, mostly around 1.4 in smaller specimens, around 1.6-1.7 in larger ones.

Tongue lanceolate, covered with oblique plicae, tip smooth, bifid. Anterior teeth conical, posterior teeth on upper jaw bicuspid and in some specimens part of them tricuspid, on lower jaw bicuspid.

Rostral hexagonal, about two and a half to three times as wide as high, visible from above, in broad contact with frontonasal. Frontonasal pentagonal, distinctly wider than long, frequently with a median suture; laterally in contact with nasal, and it may touch the loreal. Prefrontals irregularly pentagonal, wider than long, each in contact laterally with nasal (usually), loreal, and first supraocular. They form mostly a relatively short median suture, occasionally a longer suture; in two specimens prefrontals separated by frontonasal and frontal being in contact. Frontal hexagonal, distinctly wider anteriorly and longer than wide; laterally in contact with first, second, and third supraoculars. Frontoparietals irregularly pentagonal, longer than wide, with a wide median suture; laterally in contact with third and fourth supraoculars. Interparietal pentagonal, sutures with parietals approximately parallel to each other. A pair of irregularly hexagonal parietals, about as wide as, and as long as to slightly longer than, interparietal. Parietals and interparietal together form a straight (or slightly undulating) posterior head margin. Occipitals absent. Four supraoculars, first smallest. Four elongate supraciliaries, first widest. Supraocular and supraciliary series each followed by a relatively small scale, the two scales contiguous. Nasal semidivided, irregularly pentagonal, longer than wide. Nostril directed lateroposteriorly, ventral to partial suture (one specimen also presents a longitudinal suture from nostril to posterior margin of nasal). A small, rectangular loreal, and a small, irregularly pentagonal frenocular which is in contact with nasal and thus separates loreal from supralabials. Suboculars 3-4 (mostly three), of which one or two short anteriorly, one elongate medially, and one short posteriorly. Postoculars 2-3, smooth or keeled. Lower eyelid with semitransparent disc of 3-6 (mostly 4-5) palpebrals. Five supralabials, either third longest and below centre of eye, or fourth below centre of eye. Two, occasionally three, postsupralabials. Temporals irregularly polygonal, keeled, subimbricate, limited dorsally by two large, keeled supratemporal scales which border parietal. Ear-opening vertically oval, anterior margin denticulate, posterior margin smooth. Tympanum recessed into a short auditory meatus. Except for temporals, all dorsal and lateral head scales juxtaposed. Dorsal head scales anteriorly smooth, posteriorly rugose, and at least interparietal and parietals with lateral ridges, distinct even in juveniles.

Mental trapezoidal with convex anterior margin, or semicircular. An irregularly heptagonal postmental, wider than long. Three pairs of chinshields, first two in contact medially and with infralabials. Third pair separated from infralabials and medially, and followed by relatively large scales (pregulars). Four infralabials, suture between third and fourth below centre of eye. Postinfralabials 2-4, smaller than, and distinct from, infralabial series. Gulars pointed, keeled, imbricate, in 7-11 (mostly 9 or 10) transverse rows; posterior row (collar) with 8-13 scales, not differentiated from preceding rows. No gular fold.

Scales on nape similar to dorsals, except that anterior ones are smaller. Scales on sides of neck sharply distinguished from scales on nape, small, tuberculate, in approximately transverse rows, and at least posteriorly (sometimes also anteriorly) keeled. Dorsals and scales on flanks rhomboid or phylloid, strongly keeled and mucronate, imbricate, in oblique rows; 30-34 (31.4 ± 1.0, n= 34) scales along a middorsal line from nape to base of tail. Ventrals lanceolate or phylloid, from distinctly keeled and mucronate to feebly keeled and bluntly pointed, imbricate, in 17-22 (18.0 ± 1.0, n= 34) transverse and six or eight longitudinal rows; the keels form low longitudinal ridges. Dorsals and ventrals grade into each other; 23-28 (25.3 ± 1.1, n= 34) scales around midbody. Preanal plate with four smooth or broadly keeled scales, lateral ones smaller; they are preceded by two to four scales. Pores usually absent in females, exceptionally one or two small femoral pores present. In males there is a continuous series of pores on each side, the series on one side narrowly separated from that on the other side; in each series, three pores are in preanal position. Total number of pores 23-31 (27.6 ± 2.3, n= 17). Each pore usually between two, occasionally three, scales.

Scales on tail mostly obliquely rectangular, some trapezoidal, sharply keeled, mucronate, imbricate, in transverse and longitudinal rows. Keels form distinct longitudinal ridges, of which four dorsal, two or three lateral at each side, and four ventral.

Scales on limbs mostly rhomboidal, imbricate, keeled, some mucronate; flatly keeled or smooth on ventral aspect of hind limbs; smaller, tuberculate, keeled to smooth on ventral aspect of upper arms and posterior aspect of thighs. Lamellae under fingers single (occasionally some are divided), transversely enlarged, and smooth, under toes mostly divided, but some may be single; 12-18 (15.4 ± 1.4, n= 66, 33 specimens) under fourth finger, 18-23 (20.2 ± 1.3, n= 65, 33 specimens) under fourth toe.

Males in life (MPEG 15860, 15928, RMNH 25323, 25327, 25331) with dorsal surface of head mars-brown (223A) or raw-umber (223), back natal-brown (219A), or anterior-

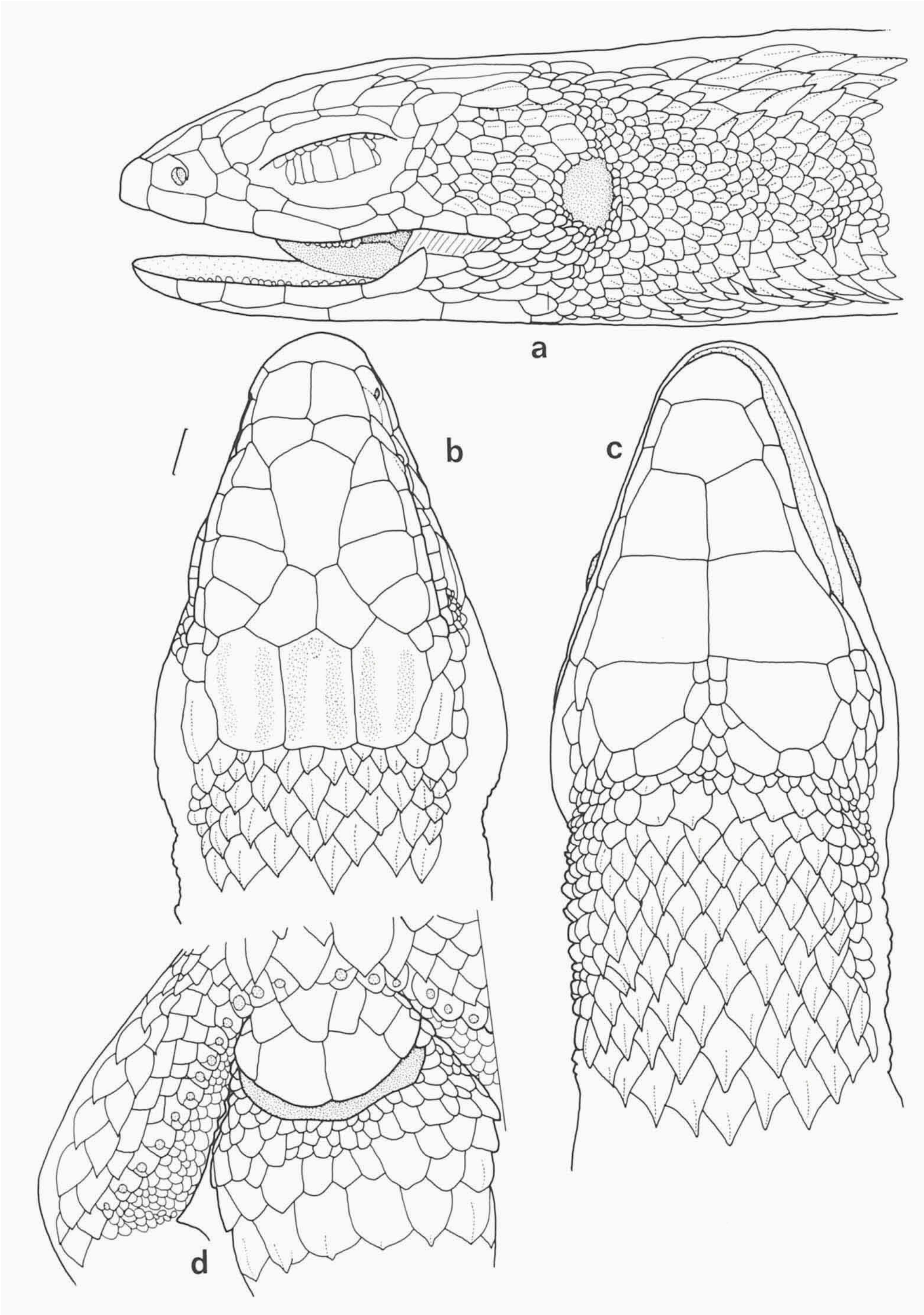


Fig. 103. *Alopoglossus atriventris*, MPEG 15860; a, b, c: lateral, dorsal, and ventral views of head; d: preanal plate and ventral aspect of right hind limb, showing sequence of pores.

ly mars-brown (223A) and posteriorly raw-umber (223), with sepia (119) spots. Dorsolateral stripe cinnamon (123A), trogon-yellow (153), or sayal-brown (223C). Flanks black or sepia (119), with a white stripe. Ventral surface black or dark drab (119C), and white. Colour of tail similar to that of body, dorsally with a pair of cream or yellow-ochre (123C) spots near base. Tongue dark grey anteriorly, white posteriorly. Iris brown with a wide, vivid orange rim around pupil, or mahogany-red (132B).

Females (MPEG 15864, 15941, RMNH 25322, 25325, 25326) with dorsal surface of head chestnut (32), amber (36), or mars-brown (223A), anterior part of back amber or mars-brown, posterior part mars-brown, raw-umber(223), hair-brown (119A) or van-dyke-brown (121). In MPEG 15864 posterior part of back and base of tail with a brick-red (132A) hue. Dorsolateral stripe vinaceous-pink (221C), chamois (123D), or amber (36). Pair of spots at base of tail cream, yellow-ochre (123C) or pale pinkish buff (121D). Flanks raw-umber (223), hair-brown (119A), or sepia (219). Ventral surface cream colour (54) or pale horn colour (92), with brown spots under tail. Iris brown with orange rim around pupil. Tongue as in males.

Colour descriptions of two juveniles were as follows. MPEG 15859 with dorsal surface of head burnt-sienna (132), anterior part of back a mixture of burnt-sienna and sepia (119), posterior part sepia. Dorsolateral row orange-rufous (132C). Chamois (123D) spots on back, and a more conspicuous pair at base of tail. Ventral region white. Tail sepia, underside white & sepia. Iris reddish-brown with orange rim around pupil. Tongue dark grey anteriorly, white posteriorly. In RMNH 26536 dorsal surface of head Brussels-brown (121B), back anteriorly walnut-brown (221B) and sepia (119), posteriorly sepia (119). Dorsolateral row walnut-brown (221B). Pair of spots at base of tail cream, not very conspicuous. Ventral region white, including underside of tail.

In preservative, dorsal surface of head and back brown, either uniform or mottled with dark and light brown. Most adult specimens with a series of irregular black spots along vertebral line, while in juveniles there are similar light spots, in some specimens with dark borders. A dorsolateral light stripe from posterior corner of eye to level of forelimbs or anterior part of body, posteriad either missing completely or it continues as a series of irregular light spots. This stripe seems to be always conspicuous in juveniles (at least anteriorly), in adults it varies from distinct to very pale. Males with sides of head and flanks black or very dark brown, with a white stripe from below eye, through corner of mouth and below ear-opening, to base of forelimb, and from there to base of hind limb. In females and juveniles, flanks dark brown, with a complete or partially missing darker stripe from rostral, through nostril, to eye, and from there to base of tail, which runs below the dorsolateral light stripe. A light stripe similar to the white lateral stripe described for males is poorly developed or absent. Limbs dorsally uniform or mottled brown. Tail idem, with or without a dorsolateral series of irregular light spots on proximal part of tail. Commonly one pair of dorsolateral light spots at base of tail is very conspicuous. Ventral region in females and juveniles completely cream, or with some small dark spots, except under tail, which is black spotted. In adult males ventral region predominantly black, with irregular white spots under head and on preanal plate, each gular and ventral scale with white tip, pore scales white, small white spots under limbs, and transversely enlarged white spots under tail. Intermediate stages, with specimens

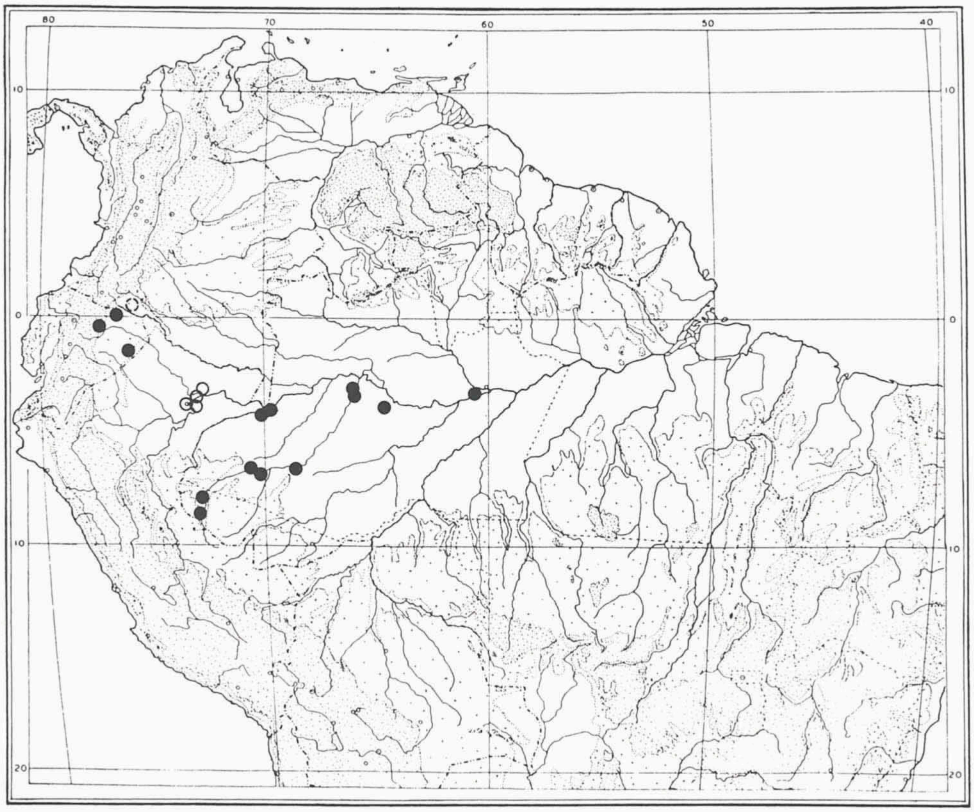


Fig. 104. Distribution of *Alopoglossus atriventris*. Closed circles = material studied. Open circles = data from literature (Dixon & Soini, 1986; Lescure & Gasc, 1986). Dashed circle = Putumayo state, Colombia (Ayala, 1986).

only partially black, are also seen.

Habitat.— Specimens from Amazonas state found in primary forest, in some cases disturbed forest due to logging, opening of trails, or removal of the undergrowth, in other cases at forest edge near plantation sites. Always amidst leaf litter, either close to water or not. RMNH 25301, from Ecuador, was among leaf litter at base of tree, in more open part of forest (M.S. Hoogmoed field notes). These data agree with those by Duellman (1973, 1978) and Dixon & Soini (1975, 1986).

Notes on natural history.— Apparently a non-heliothermic lizard, active during the day. Specimens were found between 09:00 and 17:30 h, Dixon & Soini (1975, 1986) observed them up to 18:00 h.

RMNH 25322, from Urucu, collected in November 1989, had two well developed eggs in the abdomen. For some more data on reproduction see Dixon & Soini (1975, 1986).

Dixon & Soini (1977: 79, 1986: 141) reported a specimen of *A. atriventris* in the stomach of the pitviper *Porthidium hyoprora* (Amaral).

Distribution (fig. 104).— Western Amazonia in Brazil (Acre, Amazonas), Peru (Loreto), Ecuador (Napo, Pastaza), and Colombia (Putumayo).

Remarks.— In several localities in the states of Amazonas and Acre, Brazil, *A. atriventris* occurs sympatrically with *A. angulatus*, as already noticed under the latter species. *A. atriventris* is also sympatric with *A. buckleyi* in some localities in Ecuador (Duellman, 1973). According to Duellman (1973), these two species, both of which have granular scales on sides of neck and quite similar scale counts, differ by the head scales being rugose in *A. atriventris* versus smooth in *A. buckleyi*, keeled versus smooth ventrals, and by the presence of a "weakly differentiated dorsolateral stripe" in *A. buckleyi*. Moreover, in Duellman's table 1 there is a complete separation in number of pores (in males) between the two species (*A atriventris* 27-35, mean 29.0, n= 3; *A. buckleyi* 18-25, mean 21.6, n= 5). Part of these differences are not supported by the material here studied. The holotype of *A. buckleyi* has distinctly rugose head scales; in both species a light dorsolateral stripe is present, although more evident in *A. buckleyi*; and variation in total number of pores in males, in each species, widely overlaps that in the other species (in the material here studied, respectively 23-31, mean 27.6, n= 17; 22-27, mean 24.5, n= 4), although it tends to be higher in *A. atriventris*. The difference in ventrals (keeled versus smooth) seems to be the easiest way to separate the two species; in general there is also a difference in the shape of ventrals (square to bluntly pointed in *A. buckleyi*, and phylloid, mucronate to bluntly pointed in *A. atriventris*), but in some specimens this distinction may not be very clear. Other small differences seem to exist, e.g. between temporal scales, distinctly keeled in *A. atriventris*, smooth to weakly keeled in *A. buckleyi*, and in the arrangement (and shape?) of dorsals, with oblique rows more evident than transverse rows in the former, transverse rows more evident than oblique ones in the latter; the white lateral stripe in adult males of *A. atriventris* is not present in the holotype of *A. buckleyi* (the largest and only "blackened" male of this species among the material studied).

Alopoglossus buckleyi (O'Shaughnessy, 1881)
(figs. 105-107, 275)

Leposoma buckleyi O'Shaughnessy, 1881: 233 (holotype BM 1946.8.31.66, type-locality: Canelos, Ecuador).

Alopoglossus buckleyi; Boulenger, 1885b: 385; Ruibal, 1952: 506; Cunha, 1961: 125; Peters & Donoso-Barros, 1970: 15.

Material.— **Ecuador.** NAPO. El Chaco: 1 ♂, MHNG 2240.22, ii.1984, leg. G. Onore. El Reventador: 1 ♀, MHNG 2360.53, x.1986; 1 ♂, MHNG f.n. 18968A, ii.1987; both leg. G. Onore. Southern slope Cordillera del Due above Rio Coca, alt. 1150 m: 3 ♀♀, KU 122129-130, 122133. Rio Napo, "Watershed": 1 ex., NRM WCM/1938.989.3307, 04.iv.1939 (arrival NRM), leg. W. Clarke-Mac Intyre. PASTAZA. Montalvo: 1 ♀, RMNH 25300, 23.iv.1983, leg. M.S. Hoogmoed & A. Almendariz. Canelos: holotype, ♂, BM 1946.8.31.66, leg. Buckley. Puyo: 1 ♀, MHNG 2360.52, vii.1986, leg. G. Onore. Vitagua (near Puyo): 1 ♀, NMG 3632, 08.vi.1955, leg. R. Blomberg. Mera, Rio Anzu, alt. 1400 m: 1 ♂, MHNG 2360.54, 18.vii.1985, leg. J.M. Touzet. El Oriente, near Rio Puidos outlet into Rio Pastaza: 1 ex., NRM RBB/1937.111.3507, 15.iii.1937, leg. R. Blomberg.
Peru. Peru-Brazil border, Utoquinia-Tapiche region: 1 ♀, AMNH 56279, leg. H. Bassler.

Diagnosis.— Gulars not in two longitudinal rows. Scales on sides of neck small, tuberculate, in approximately transverse rows (posteriad they may become flatter, squarish, with a short keel). Dorsals and scales on flanks sub-hexagonal or phylloid, strongly keeled and mucronate. Gulars smooth or very feebly keeled, posterior margin pointed or blunt. Ventrals from lanceolate and bluntly pointed, to squarish with rounded posterior margin; smooth, except in some specimens lateral rows.

Description.— Gymnophthalmid with maximum SVL of 50 mm (BM 1946.8.31.66, ♂; MHNG 2360.52-53, ♀♀). Head 0.21-0.27 (0.24 ± 0.01, n= 12) times SVL, 1.4-1.7 (1.52 ± 0.07, n= 12) times as long as wide, 1.2-1.5 (1.37 ± 0.08, n= 12) times as wide as high. Snout round, rising gently posteriad. Neck almost as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.28-0.32 (0.30 ± 0.01, n= 9) times SVL, hind limbs 0.41-0.50 (0.46 ± 0.03, n= 9) times. Tail round in cross section, tapering toward tip, 1.5-1.6 (n= 2) times SVL.

Tongue lanceolate, covered with oblique plicae, tip smooth, bifid. Anterior teeth conical, posterior teeth bicuspid.

Rostral hexagonal, about two and a half to three times as wide as high, visible from above, in wide contact with frontonasal. Frontonasal trapezoidal or pentagonal, distinctly wider than long, laterally in contact with nasal, in some specimens it touches loreal. Prefrontals irregularly quadrilateral or pentagonal, wider than long, with a relatively short medial suture (one prefrontal fused to frontal in MHNG f.n. 18968A; prefrontals triangular, not in contact with each other, in KU 122129 and GNM 3632). Each prefrontal in contact with nasal (usually), loreal, and first supraocular. Frontal hexagonal, distinctly wider anteriorly and longer than wide; laterally in contact with first, second and third supraoculars. Frontoparietals irregularly pentagonal, longer than wide, with a long medial suture, in contact with third and fourth supraoculars. Interparietal pentagonal, lateral sutures either straight and parallel, or curved and slightly divergent (KU 122130 with an extra, irregular, elongate scale between one frontoparietal, interparietal and one parietal). A pair of irregularly hexagonal or heptagonal parietals, as wide as to slightly narrower than, and as long as to slightly longer than interparietal. Interparietal and parietals together form a straight (slightly undulating) posterior head margin. Occipitals absent. Four supraoculars, first smallest. Four elongate supraciliaries, first widest. Supraciliaries followed by a shorter and wider scale which is usually also in contact with fourth supraocular, in some specimens separated from it by a very small scale. Nasal semidivided, irregularly quadrilateral or pentagonal, longer than wide. Nostril ventral to partial suture, directed lateroposteriorly. A small, rectangular loreal, and a small, irregularly pentagonal frenocular which is in contact with nasal and thus separates loreal from supralabials. Three suboculars, second elongate. One to three postoculars. Lower eyelid with semitransparent disc of 3-5 palpebrals. Five supralabials, third longest and reaching below centre of eye, or fourth below centre of eye. Two postsupralabials. Temporals irregularly polygonal, smooth to feebly keeled, subimbricate. Two large, smooth or feebly keeled supratemporal scales. Ear-opening vertically oval, anterior margin denticulate, posterior margin smooth; tympanum recessed into a short auditory meatus. Except for temporals, all dorsal and lateral head scales juxtaposed. Interparietal and parietals may present low lateral ridges, other scales smooth.

Mental trapezoid with convex anterior margin, or semicircular. An irregularly heptagonal postmental, wider than long. Three pairs of chinshields, first two in contact medially and with infralabials; third separated from infralabials and medially, and followed by relatively large scales (pregulars). Four infralabials, suture between

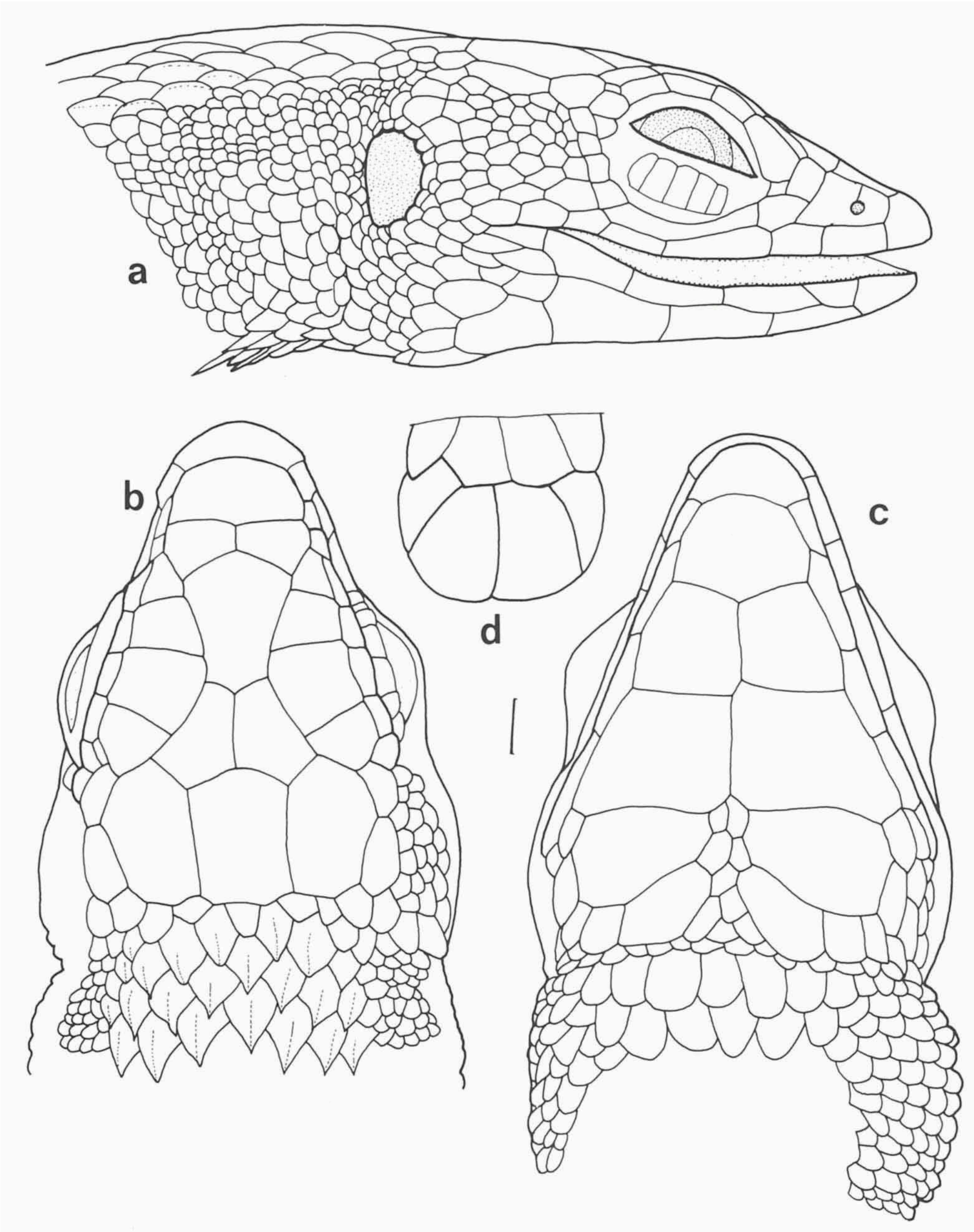


Fig. 105. *Alopoglossus buckleyi*, RMNH 25300; a: lateral view of head and scales on side of neck; b, c: dorsal and ventral view of head; d: preanal plate.

third and fourth below centre of eye. Two or three postinfralabials, smaller than and distinct from infralabial series. Gulars in 7-9 transverse rows, imbricate, smooth or very feebly keeled, posterior margin pointed or blunt; posterior rows, or only collar, may have enlarged scales. Collar with 7-10 scales. No gular fold.

Scales on nape similar to dorsals, but anterior ones shorter and sometimes less pointed. Scales on sides of neck sharply distinguished from scales on nape, small, tuberculate, in approximately transverse rows; posteriad they may become flatter, squarish, with a short keel. Dorsals and scales on flanks sub-hexagonal or phylloid, strongly keeled and mucronate, imbricate, in transverse and oblique rows; 26-32 (29.6 ± 1.7, n= 12) scales along a middorsal line from nape to base of tail. Ventrals from lanceolate and bluntly pointed, to squarish with rounded posterior margin; smooth, except sometimes lateral rows, imbricate, in 16-20 (17.3 ± 1.1, n= 12) transverse and six or eight longitudinal rows. Dorsals and ventrals grade into each other; 22-29 (25.0 ± 2.1, n= 12) scales around midbody. Preanal plate with four smooth scales, lateral ones smaller; they are preceded by two to four scales. Four out of eight females with no preanal or femoral pores; AMNH 56279 with a small femoral pore at each side, KU 122129 with a small preanal and a small femoral pore, MHNG 2360.52 with one preanal and four femoral pores, and KU 122130 with a preanal and six femoral pores. Males with a continuous series of pores on each side, the series on one side well separated from that on the other side; in each series, one to three pores are in a preanal position; total number of pores 22-27 (24.5 ± 2.4, n= 4). Each pore usually between two, occasionally three, scales.

Scales on tail rectangular, imbricate, sharply keeled and mucronate, on ventral surface smooth near base, posteriad first they become broadly, then sharply keeled; in transverse and longitudinal rows. Keels form low longitudinal ridges, of which four dorsal, two lateral at each side, and four ventral.

Scales on limbs mostly rhomboidal, imbricate, keeled, some mucronate; smooth on ventral aspect of hind limbs; smaller, some tuberculate, keeled to smooth on ventral aspect of upper arms and posterior aspect of thighs. Lamellae under fingers single (occasionally some are divided), transversely enlarged, and smooth, under toes mostly divided, some may be single; 11-16 (13.2 ± 1.3, n= 23, 12 specimens) under fourth finger, 16-22 (19.4 ± 1.8, n= 23, 12 specimens) under fourth toe.

Description of colour in life not available.

In preservative, dorsal surface of head and back brown, with some dark irregular spots (especially along vertebral line). A pale dorsolateral light stripe from posterior corner of eye to about middle of body. In females dorsolateral stripe bordered below by a blackish stripe, and sides of head, flanks and limbs slightly darker than back. In the holotype, an adult male, sides of head and flanks blackish with white flecks. Tail, at least proximally, with a continuous dorsolateral light stripe, or with a series of light spots, of which the first pair, at base of tail, more conspicuous. Ventral region in females and immature males predominantly cream. Ventrolaterally on belly, on preanal plate, and under tail there may be irregular dark spots. Holotype with chin latero-posteriorly black with white irregular stripes; gular scales white medially, black peripherally; ventrals predominantly black, with a white area posteriorly; underside of tail and limbs irregularly black and white.

Habitat.— RMNH 25300 was on forest floor among leaf litter, in wide trail

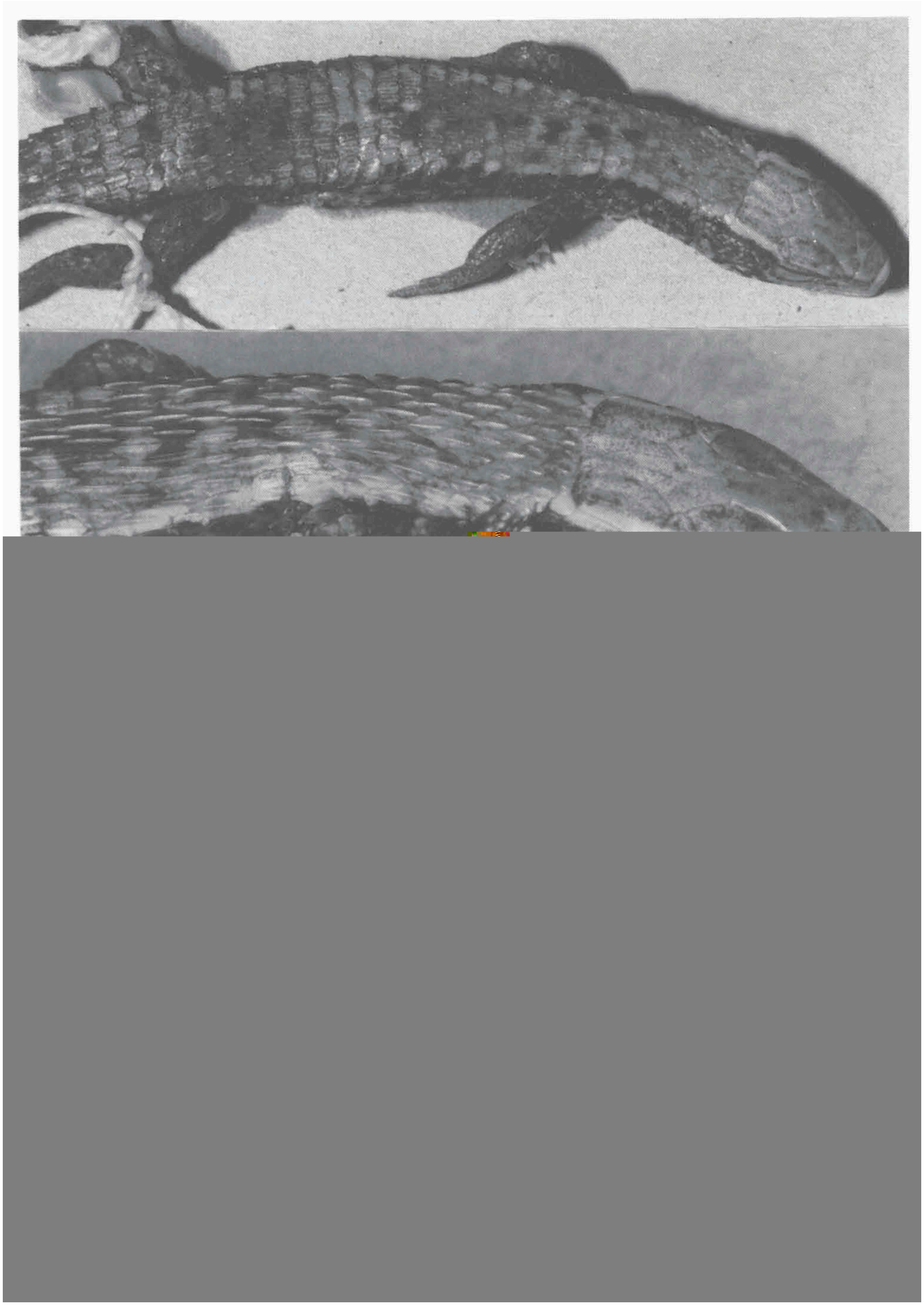


Fig. 106. *Alopoglossus buckleyi*, ♂, holotype, BM 1946.8.31.66, Canelos, Ecuador: upper figure dorsal view, middle figure dorsolateral view of head and neck, lower figure ventral view of head, throat and chest (T.C.S. Avila-Pires).

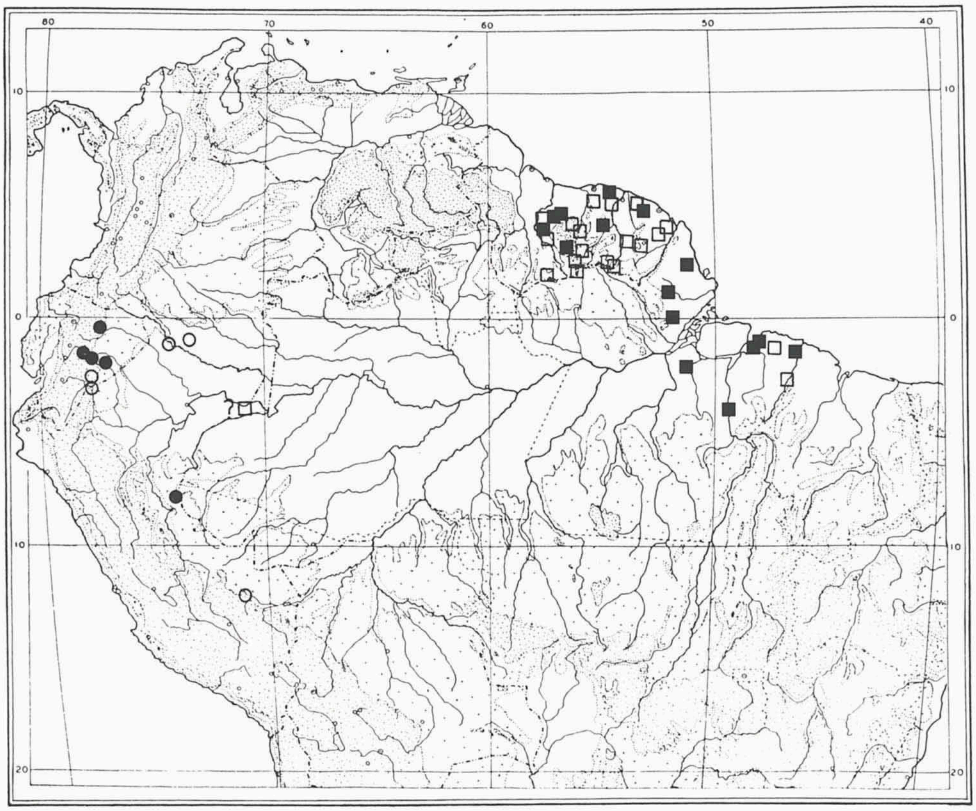


Fig. 107. Distribution of *Alopoglossus buckleyi* (circles) and *Arthrosaura kockii* (squares). Closed symbols = material studied. Open symbols = data from literature (*A. buckleyi*: Peracca, 1897; Ruibal, 1952; Lescure & Gasc, 1986; Almendáriz, 1987; Rodriguez & Cadle, 1990. *A. kockii*: Hoogmoed & Avila-Pires, 1992). Data on *A. kockii* as in Hoogmoed & Avila-Pires (1992), except for Floresta Nacional de Caxiuanã (Pará), which is a new record.

through logged forest with open areas (M.S. Hoogmoed field notes). Gasc (1977) reported the species to be relatively abundant in forest, among leaf litter (Estado Amazonas, Colombia). Almendáriz (1987) also reported two specimens from primary forest (Ecuador).

Notes on natural history.— Gasc (1977) found a specimen in the stomach of the snake *Oxybelis argenteus* (Daudin).

Distribution (fig. 107).— Eastern Ecuador, Colombia (Estado Amazonas), and Eastern Peru, at least reaching the Peru-Brazil (Acre) border. According to Duellman (1973), most specimens of *A. buckleyi* come from relatively high elevations (900-1830 m) on the Andean slopes.

Remarks.— The reference of Ruibal (1952) of a specimen (AMNH 56279) from "Peru-Brasil, Utoquinia-Tapiche" probably accounts for the inclusion, by both Cunha (1961) and Peters & Donoso-Barros (1970), of Brazil in the area of distribution of this species, although no specimen collected in the country has been mentioned so far in the literature.

See also "remarks" under *A. atriventris* about the distinction between the two species.

Amapasaurus Cunha, 1970

Diagnosis.— See diagnosis of the species.
Distribution.— Only known from upper Rio Maracá, Amapá.
Content.— Genus monotypic.

Amapasaurus tetradactylus Cunha, 1970
(figs. 108, 109)

Amapasaurus tetradactylus Cunha, 1970: 2 (holotype MPEG 2661, type-locality: Igarapé Camaipi, affluent of the upper Rio Maracá [0°N, 52°W], Amapá state [former Território Federal]).

Material.— **Brasil.** AMAPA. Igarapé Camaipi, affluent of upper Rio Maracá (0°N, 52°W): Holotype, MPEG 2661, vi.1969, leg. F.P. Nascimento. Upper Rio Maracá: Paratype, MPEG 1936, 1960, leg. M. Moreira.

Diagnosis.— Dorsal head scales anteriorly rugose, posteriorly longitudinally striated. Frontonasal divided into irregular plates. Prefrontals and frontoparietals present, occipitals absent. Lower eyelid with semitransparent disc. Interparietal and parietals form a round posterior border. Dorsals sub-hexagonal, keeled, mucronate, in transverse rows, slightly smaller on flanks. Ventrals squarish, keeled, mucronate, in transverse and eight longitudinal rows. Four fingers and five toes.

Description.— Holotype. Gymnophthalmid with SVL of 24 mm. Head 0.23 times SVL, 1.4 times as long as wide, 1.7 times as wide as high (specimen more or less dehydrated). Snout elongate, blunt. Neck slightly narrower than head and body. Body cylindrical. Tail 1.46 times SVL, round in cross section, tapering toward tip. Limbs well developed, forelimbs 0.29 times SVL, hind limbs 0.38 times. Hands tetradactyl, feet pentadactyl.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Teeth anteriorly conical, posteriorly tricuspid.

Rostral wide, visible from above, in contact with first supralabials, nasals, and three dorsal scales. In the place of the frontonasal there are five scales, of which two larger laterally and three medially (one anteriorly, two side by side posteriorly). A pair of irregularly pentagonal prefrontals, in relatively broad medial contact. Frontal hexagonal, about two and a half times as long as wide, in contact laterally with second and third supraoculars. A pair of pentagonal frontoparietals, with medial suture longer than that between prefrontals, laterally in contact with third supraoculars and parietals. Interparietal about 1.7 times as long as wide, slightly wider posteriorly, bordered at each side by a slightly smaller parietal. Interparietal and parietals with angulate anterior, and curved posterior margins, interparietal slightly posterior in position in relation to parietals. Occipital and postparietal scales rather similar to scales on nape. Four supraoculars, first smallest, third largest; on one side, a small scale in the medial corner between first and second supraoculars. Five supraciliaries on one side, six on the other, first much larger, second and respectively fifth or sixth

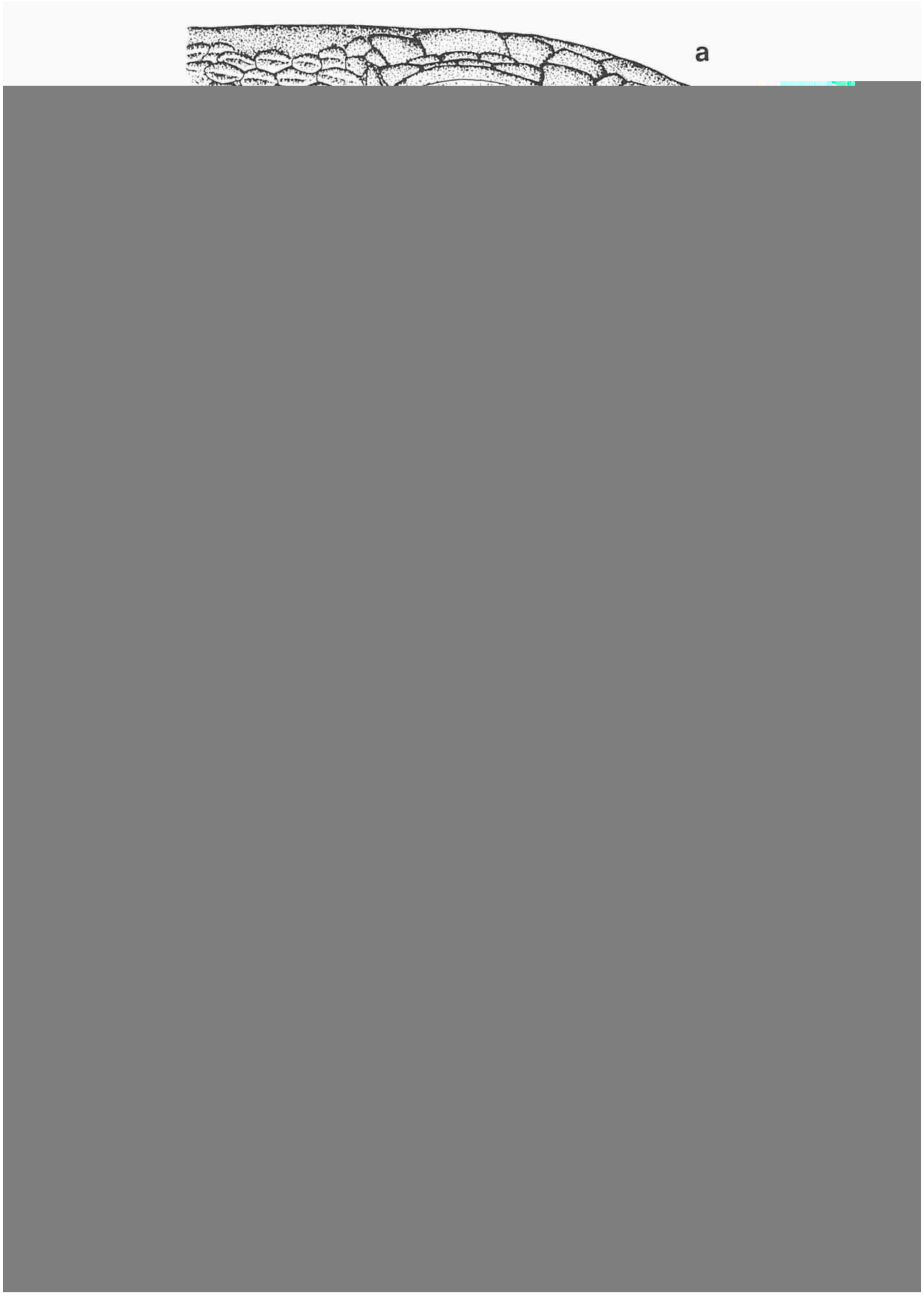


Fig. 108. *Amapasaurus tetradactylus*, MPEG 2661 (holotype); a, b, c: lateral, ventral and dorsal views of head; d, e: ventral and dorsolateral views of scales near midbody; f, g: outlines of left hand and right foot (a-e: ink drawings by A.S. Martins).

wider than median ones. They are separated (second and fourth partially, third completely) from supraoculars by three subequal, elongate scales on one side, two scales, one much longer, on the other side. Nasal large, partially divided, nostril approximately in its centre. A relatively small loreal, separated from supralabials by a larger frenocular in contact with the nasal. Lower eyelid with semitransparent disc divided into three scales. Subocular series, supra- and infralabials not distinct in the specimen at present; Cunha (1970) mentions small suboculars, six supralabials, and six infralabials. Temporals hexagonal, keeled. Ear-opening large, round, with smooth margin. Tympanum superficial.

Mental large, with lateral and posterior margins forming two obtuse angles. A large, undivided, pentagonal postmental. Three pairs of chinshields, second distinctly largest. First two pairs in medial contact and in contact with infralabials, third widely separated medially, and from infralabials by one scale. Posterior to chinshields, hexagonal, smooth to keeled scales, in approximately oblique rows, diverging from the midventral line. Chin delimited posteriorly by a transverse row of small scales. Gulars in nine approximate transverse rows (including collar), imbricate, keeled, anteriorly more rounded, in the two posterior rows more elongate and angulate. Collar with 10 scales. Gular fold distinct.

Scales on nape similar to dorsals, but slightly shorter. On sides of neck scales small, tubercular. Dorsals longer than wide, subhexagonal, keeled, mucronate, in approximately transverse rows; 35 scales along middorsal line, between interparietal and posterior margin of hind limbs. Scales on flanks similar but smaller, about three laterals corresponding to two dorsals. Ventrals of approximately similar size as dorsals, squarish, keeled, mucronate, in eight longitudinal and 24 transverse rows. Scales on preanal plate difficult to see, but apparently there are four large scales, one anterior and one posterior medially, triangular or subtriangular, plus one rhomboid scale at each side (as described by Cunha, 1970, one anterior and three posterior scales, bordered by small scales). Preanal and femoral pores absent.

Tail with hexagonal, longer than wide, keeled, mucronate scales near base. Distally scales become very narrow and sharply pointed, and form regular rings around tail (dorsal and ventral scales similar).

Forelimbs mostly with rhomboid to hexagonal, keeled scales, granular on ventral aspect of upper arms. Hind limbs with rhomboid, keeled scales on anterior and dorsal aspects, granular on posterior aspect of thighs. Elsewhere on hind limbs scales not distinct. Hands with four fingers, 1<4<2<3. Feet with five toes, 1<5<2<3<4.

Colour in life unknown. In preservative, we refer to the description by Cunha (1970): body and tail dorsally and laterally dark greyish-brown; a pale light dorsolateral band, interrupted, from temporals to base of tail; supra- and infralabials with dark greyish-brown and whitish transverse bands; ventral region yellowish, spotless.

Paratype smaller than holotype, and in bad condition of preservation, although the presence of only four fingers on each hand can be clearly observed. The following characteristics, in which it differs from the holotype, are taken from Cunha (1970). SVL 18 mm, tail length 22 mm. Frontonasal substituted by two large lateral scales and two (instead of three) medial, one behind the other. Frontal contacts shortly the first supraoculars. Preanal plate with six scales, of which five posteriorly, elongate, keeled, smaller laterally, and one mid-anteriorly, large, imbricate, bordered by small scales.

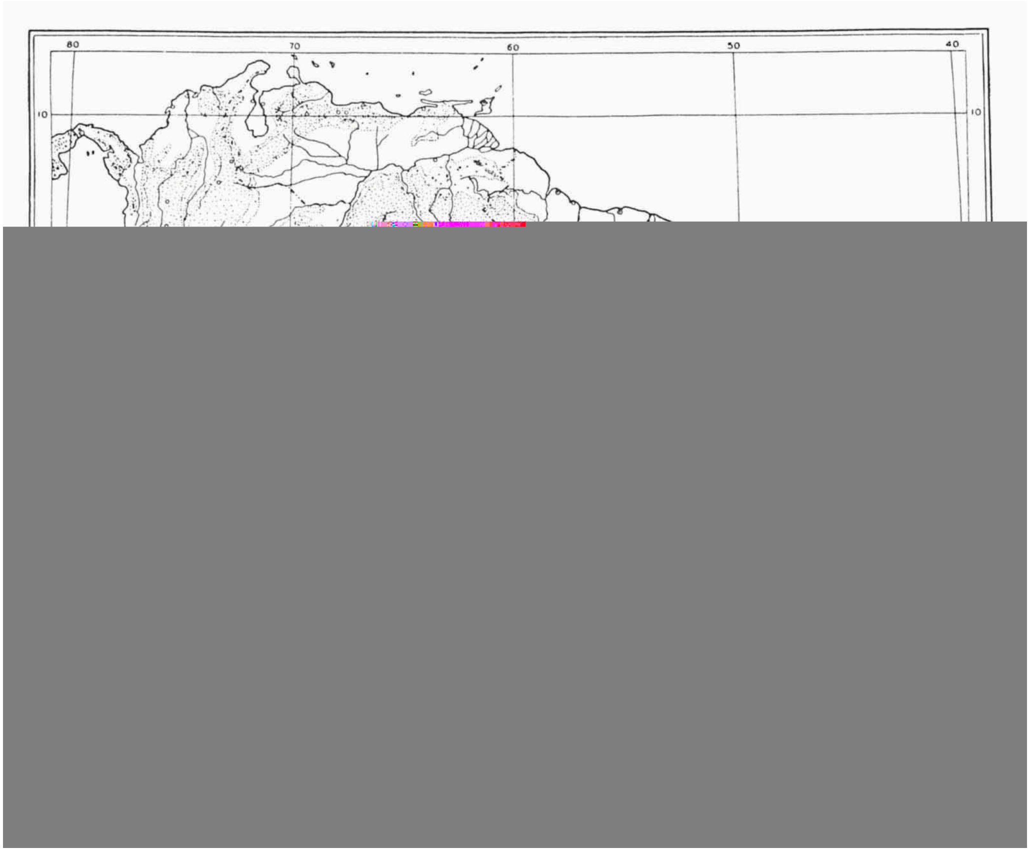


Fig. 109. Distribution of *Amapasaurus tetradactylus* (triangle), *Bachia dorbignyi* (circles), *B. panoplia* (stars), and *B. peruana* (squares). Closed symbols = material studied. Open symbols = data from literature (Dixon, 1973; Zimmerman & Rodrigues, 1990).

Habitat.— A forest dweller, living amidst the leaflitter.

Distribution (fig. 109).— Only known from the upper Maracá river, Amapá, Brazil.

Remarks.— I agree with Cunha (1970) that this species resembles most closely *Leposoma*, at the same time it presents two important differences, specifically the presence of four, instead of five, fingers, and frontonasal divided into several scales. It differs strongly from the other gymnophthalmids with reduced innermost finger.

Arthrosaura Boulenger, 1885

Diagnosis.— Gymnophthalmids with body cylindrical to slightly depressed, tail long, round in cross section. Limbs well developed, pentadactyl, with all digits clawed. Nasals separated by frontonasal. Lower eyelid with semitransparent disc. Prefrontals present or absent, frontoparietals and occipitals present. Interparietal and parietals of approximately similar length, forming a straight posterior margin. Gular region with enlarged median pairs of scales, posterior margin of scales convex. Dorsals hexagonal, elongate, keeled, in transverse rows only. Ventrals quadrangular, smooth (toward the sides narrower, and in some specimens keeled).

Distribution.— Northern South America.

Content.— Five species according to Hoogmoed & Avila-Pires (1992) and Donnelly et al. (1992), among which *A. kockii* and *A. reticulata* occur in Brazilian Amazonia.

Arthrosaura kockii (van Lidth de Jeude, 1904)
(figs. 107, 110, 277)

Prionodactylus Kockii van Lidth de Jeude, 1904: 91 (holotype RMNH 4464, type-locality: vicinity of Coppename River, Suriname, 1901, leg. Coppename Expedition).

Arthrosaura dorsistriata Müller, 1923: 147 (holotype ZSM Herpet. Nr. 138/1911, type-locality: Peixe-Boi, Pará, Brazil).

Arthrosaura kockii; Brongersma, 1932: 85; Amaral, 1937a: 1739; Cunha, 1961: 141, 1967: 155; Peters & Donoso-Barros, 1970: 75; Hoogmoed, 1973: 236; Hoogmoed & Lescure, 1975: 154; Gasc, 1981: 307; Hoogmoed & Avila-Pires, 1992: 456.

Arthrosaura kocki; Brongersma, 1928: 333; Amaral, 1937b: 20.

Arthrosaura kochi (sic!); Amaral, 1949: 111.

Arthrosaura kochii (sic!); Crump, 1971: 20.

Material.— **Brazil.** AMAPA. Tumuc Humac Mountains, upper Lunier River: 1 ♂, 1 ♀, MHNP 99-71 & 72, 1899, leg. Geay. Serra do Navio: 2 ex., MPEG 12170-171, 16.vii.1977, leg. J.L. Freire. Município de Mazagão, Rio Camaipi (affluent left bank Rio Maracá), Cachoeira Inajá: 1 ♂, 1 ♀, MPEG 2669-70, 23.vi.1969, leg. F.P. Nascimento. Rio Maracá: 1 ♂, 5 ♀♀, 9 exs., MPEG 780-90, 793-94, 1990-91, 1959, leg. M. Moreira.

PARA. Viseu, Bela Vista (74 km from Bragança, road PA-242): 1 ex., MPEG 6193, 15.iii.1973; 1 ♂, MPEG 11027, 28.ii.1976; both leg. O.R. Cunha & F.P. Nascimento. Benevides, Santa Bárbara (road to Mosqueiro): 1 ♂, MPEG 2226, 18.i.1967, leg. O.R. Cunha & F.P. Nascimento. Município de Ananindeua, mouth of Igarapé Traquateua, Matas do Sossêgo: 1 ♀, MPEG 47, 08.iii.1956, leg. C. Carvalho. Belém, IPEAN: 1 ♂, USNM 159219, 25.viii.1965, leg. P.S. Humphrey. Area of Hydroelectric dam Tucuruí: 1 ex., MPEG 13157, Rio Arapari, 500 m from Rio Tocantins (left bank), 01.iii.1984, leg. F.P. Nascimento; 1 ex., MPEG 13524, 3-5 km S of Jacundá, 16.v.1984, leg. T.C.S. Avila Pires & I.J. Lopes; 1 ♀, MPEG 13611, area of Igarapé Saúde, 01.vi.1984, leg. F.P. Nascimento, I.J. Lopes & R. Santana; 3 ex., MPEG 13629-631, 05.vi.1984, leg. F.P. Nascimento & R. Santana; 2 ♀♀, MPEG 13671-672, area of Igarapé Saúde, 17.vi.1984, leg. I.J. Lopes & R. Santana. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 1 ♂, MPEG 16414, 28.x.1992; 3 ex., MPEG 16436, RMNH 26537-538, 03.xi.1992; 3 ex., MPEG 16443-444, RMNH 26539, 04.xi.1992; 1 ex., RMNH 26540, 08.xi.1992; 1 ♂, 1 ♀, RMNH 26541, 26658, 1 ♂, 1 juv., MPEG 16462-463, 10.xi.1992; 1 ♀, MPEG 16470, 11.xi.1992; 1 ex., RMNH 26542, 12.xi.1992; 1 ex., MPEG 16482, 14.xi.1992; all leg. M.S.

RMNH 25193, 06.ii.1975, leg. M.S. Hoogmoed. Lucie River, 10-20 km N, between 2nd and 4th forest camp, alt. 200-250 m: 1 ♀, 1 juv., RMNH 25194-195, 08.ii.1975; 1 ♀, 1 ♂, RMNH 25198-199, 13.ii.1975; all leg. M.S. Hoogmoed. Mozes Creek, 3-4 km S of Reynold's (Grassalco) camp, alt. 180-300 m: 1 ♀, RMNH 25206, 21.vii.1975, leg. M.S. Hoogmoed & W.N. Polder. Paris Jacob Creek, km 251, 2nd bridge W of Nickerie River, alt. 60 m: 1 ♂, RMNH 25208, 22.vii.1975, leg. M.S. Hoogmoed & W.N. Polder. Kabalebo, road to Amotopo: 1 ♀, RMNH 25220, km 67, alt. 60 m, 19.ix.1980, leg. M.S. Hoogmoed & J.J.P. Paats; 1 ♀, RMNH 25221, km 212, alt. 120 m, 21.v.1981, leg. M.S. Hoogmoed & J. Toto.

Diagnosis.— As generic diagnosis, and in addition the following features: distance between fore- and hind limbs (measured between axil and groin) at most 1.5 times the length of a forelimb. Four supraoculars. Scales around midbody 33-41. A wide, very evident, light vertebral stripe from snout to tip of tail. Ventral surface immaculate, except for labials, sides of chinshields and gulars, which may have irregular dark spots.

Description.— Gymnophthalmid with maximum SVL in males of 54 mm, in females of 53 mm (Hoogmoed, 1973). Head 0.22-0.27 (0.24 ± 0.01, n= 34) times SVL (0.23-0.27, 0.25 ± 0.01, in 18 males; 0.22-0.25, 0.23 ± 0.01, in 22 females), 1.4-1.6 (1.45 ± 0.05, n= 42) times as long as wide, 1.2-1.6 (1.31 ± 0.08, n= 42) times as wide as high. Snout blunt, rising gently posteriad. Neck about as wide as head and anterior part of body. Body cylindrical to slightly depressed. Limbs well developed, forelimbs 0.29- [illegible]

1.8 (1.62 ± 0.15, n= 20) times SVL (1.6-1.8, 1.70 ± 0.07, in 11 males; 1.5-1.7, 1.60 ± 0.06, in seven females; 1.2-1.4 in the two smallest specimens studied), round in cross section, tapering toward tip.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid and tricuspid.

which one pre-subocular and one post-subocular (post-subocular in some specimens not in contact with supralabials, in which case it may be considered as a postocular); when five suboculars, median smallest. Postoculars 2-4, mostly three, upper scale largest. Lower eyelid with semitransparent disc of 4-7 palpebrals. Five, occasionally six, supralabials, one before last below centre of eye; followed by two or three post-supralabials (which gives a total of 7-9 scales, all named supralabials by Hoogmoed & Avila-Pires, 1992). Temporal scales variably polygonal, convex, broadly keeled, small ventro-anteriorly, distinctly increasing in size dorso-posteriorly. Ear-opening relatively large, semicircular to oval, surrounded by small scales which anteriorly form a slightly undulating, posteriorly a smooth, margin. Tympanum recessed into a short auditory meatus.

Mental trapezoidal or semicircular, followed by a large, heptagonal postmental. Four pairs of chinshields, first three in contact with infralabials, first two in contact medially. Fourth pair distinctly smaller, separated medially by a few relatively small scales, and separated from infralabials by a large and a smaller scale. In some specimens fourth pair so much reduced (or divided into more scales) that it may be considered as missing. Five infralabials, three or four to below centre of eye, followed by two or three postinfralabials. Chin delimited posteriorly by a transverse row of small scales. Gulars imbricate, smooth, larger posteriorly, in 7-9, mostly eight, transverse rows (including collar), of which 3-6 with a median pair of distinctly enlarged, trapezoid scales. Collar with 5-9 scales which form a lobed posterior margin; the scales decrease in size laterally, except for the medial one which may be narrower than the scales contiguous to it. Gular fold distinct. Most of dorsal and lateral, and part of ventral head scales with minute pits.

Scales on nape hexagonal, imbricate, in transverse rows, anteriorly slightly longer than wide and broadly keeled, posteriad grading into dorsals. Sides of neck with small, tuberculate, juxtaposed scales; a vertical row of squarish, smooth or keeled, small scales may continue from collar to above level of forelimbs. Dorsals hexagonal, elongate, pointed and sharply keeled, in 25-29 (26.7 ± 0.9, n= 42) transverse rows between interparietal and posterior level of hind limbs. On flanks scales become gradually shorter ventrad, and intermediate transverse rows of smaller scales appear, especially near limbs, but in some specimens also medially. Ventrals slightly imbricate, in 17-20 (18.2 ± 0.8, n= 42) transverse rows, and in ten, occasionally twelve, longitudinal rows, of which four medial rows of smooth, squarish scales, a contiguous row at each side of smooth, slightly longer than wide, scales, with rounded to angulate posterior margins, and two or three ventrolateral rows of hexagonal, broadly to sharply keeled scales (in the smallest specimens only the medial six rows are distinguished as ventrals). Ventrals usually sharply distinguished from scales on flanks due to the presence on flanks of intermediate smaller scales, but continuous rows may occur at midbody. Scales around midbody 33-41 (37.2 ± 1.7, n= 40). Preanal plate usually with one large, triangular, anterior scale, and five posterior ones, of which intermediate ones larger; lateral scales from relatively large to small, or completely absent. RMNH 25208 with medial-posterior scale longitudinally divided. Males with two preanal, and 7-9 femoral pores at each side (in total 18-22, 20.0 ± 1.3, n= 17); in females, one or two preanal pores per side are present, and no femoral pores. Pores between three or four scales.

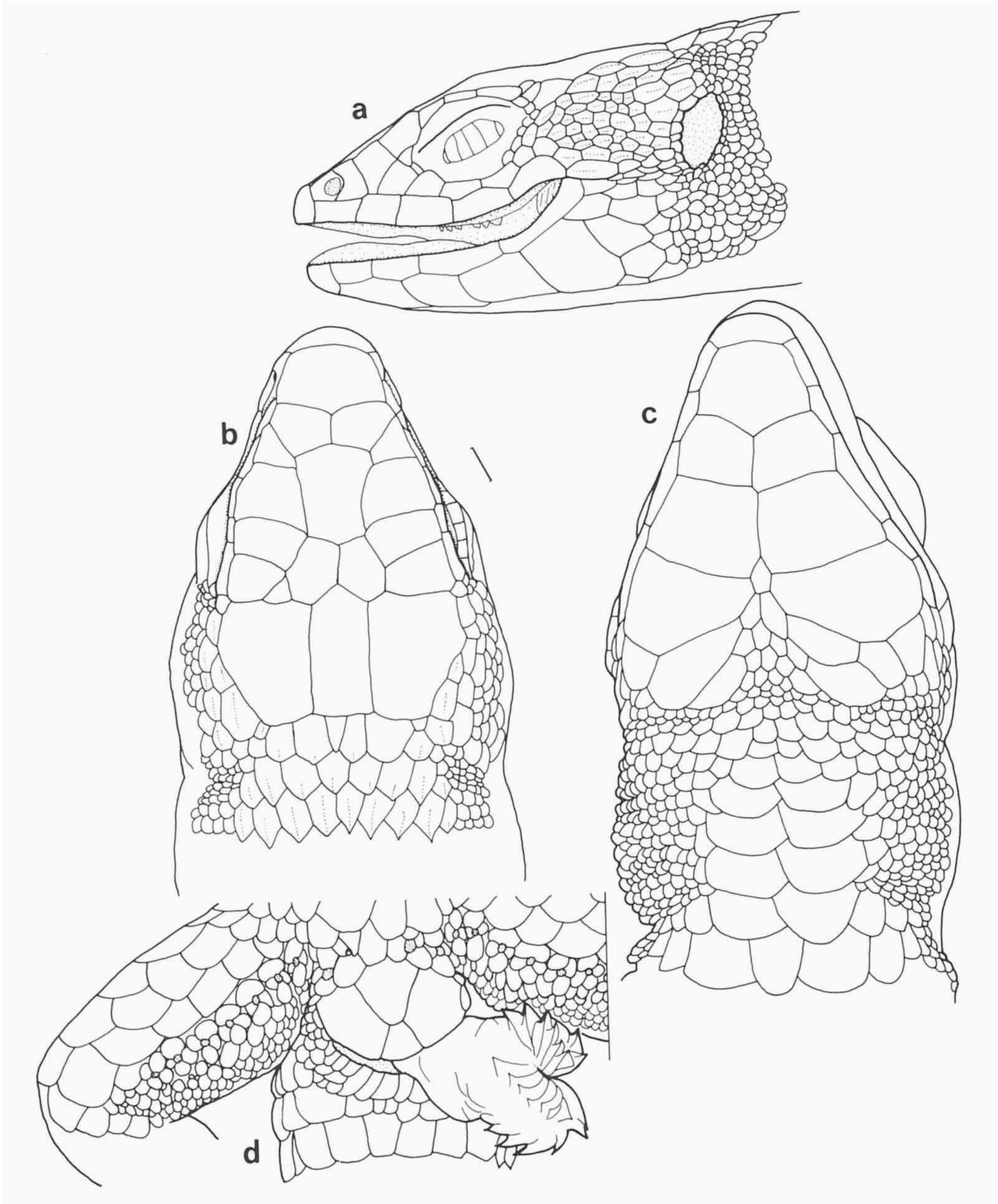


Fig. 110. *Arthrosaura kockii*, MPEG 16443; a, b, c: lateral, dorsal, and ventral views of head; d: preanal plate and ventral aspect of hind limbs, showing sequence of pores (complete series only on right hind limb) and left hemipenis.

Scales on tail dorsally and laterally hexagonal, shorter than dorsals, sharply keeled, imbricate, in transverse rows. On ventral surface scales hexagonal, smooth and wider near base, distally broadly keeled, narrow and elongate, in transverse and longitudinal rows; keels form longitudinal ridges.

Scales on upper arms relatively large, rhomboid, keeled, imbricate, except on their ventral aspect where scales are small, rounded, convex, juxtaposed. On forearms a row of large, trapezoidal, smooth, imbricate scales antero-dorsally, ventrally in contact with a narrow band of small, rounded, convex, juxtaposed scales. Otherwise scales variably polygonal, imbricate, on upper side keeled, on lower side smooth. Thighs with a row of large, trapezoidal, smooth, imbricate scales antero-ventrally, dorsally bordered by two to three rows of phylloid, keeled, imbricate scales, ventrally bordered by one to two rows of more rounded, smooth, imbricate scales; these latter scales border the pores in males, and smaller, rounded, juxtaposed, smooth scales in females. Dorso-posterior and posterior aspects of thighs covered with very small, rounded, juxtaposed scales. Lower legs with rhomboid, keeled, imbricate scales on their dorsal and posterior aspects; trapezoidal to hexagonal, smooth, imbricate scales on their anterior and ventral aspects. Subdigital lamellae medially divided, except distally; at base of toes the half lamellae toward side of first digit is slightly swollen; 12-15 (13.4 ± 0.7, n= 67, 34 specimens) lamellae under fourth finger, 18-22 (19.4 ± 1.0, n= 63, 33 specimens) under fourth toe.

In life, back burnt umber (22) or natal brown (219A), with cinnamon (39) vertebral stripe (which anteriorly, on top of head and nape, may be vandyke-brown [221]), or back sepia (219) with top of head grey changing into straw-yellow (56) on vertebral stripe along back, orange along tail. Flanks in adult males black or black and brown with cream or buff-yellow (53) spots, in females brown with a single row of cream spots. Adult males with throat (all or in part), belly, underside of tail and of legs geranium-pink (13) or scarlet (14), mental and first pair of chinshields, or most chinshields and centre of throat, white. In females only a much paler orange or salmon colour appears on belly (all or posterior part) and underside of tail, remaining areas of ventral surface white. MPEG 16588, a halfgrown, with throat and belly grey, underside of tail chrome-orange (16). Iris reddish-brown (descriptions by M.S. Hoogmoed).

In preservative, general dorsal colour dark brown with a distinct cream vertebral band, which starts at the light greyish-brown snout, continues along the body (where in some specimens it is bordered by a dark greyish-brown stripe), and widens on tail to completely cover its dorsal surface. Colour of flanks similar to that of back or darker, with an irregularly longitudinal series of small white dots surrounded by black, which may continue dorsolaterally above forelimbs up to near ear-opening, usually with smaller dots. On flanks about each vertical row of scales presents one dot, and below each of these dots there may be a vertical series of smaller white dots. On sides of neck the scales which continue from collar may form a narrow, whitish antehumeral bar. Along tail the vertebral band darkens into tan, and is usually (less so in juveniles) crossed by darker bands; it may be bordered by regularly spaced dark greyish-brown spots. Sides of tail dusted dark brown, along the ventrolateral line there may be a longitudinal series of whitish dots. Limbs dark brown, with a few whitish small dots on posterior aspect of thighs. Ventral region cream, ventrolaterally (and in some specimens all ventral surface of tail distally) peppered with dark greyish-brown.

Habitat.— An inhabitant of the forest leaf litter, occasionally climbing some centimetres (up to 30 cm, pers. obs., up to 1 m, Hoogmoed, 1973) above the ground on roots, stumps, or tree trunks. All specimens from which I have field notes were in primary, terra firme forest. Hoogmoed (1973) reported them from rather open, dry places in rainforest.

Notes on natural history.— Individuals were collected between 10:00 h and 15:00 h, and several were in sunny spots which indicates a basking behaviour (which was already observed by Hoogmoed, 1973, and Gasc, 1981, 1986). Gasc (1981) remarked that, as other heliothermic forest forms, *A. kockii* may occupy the same spots, during similar times of the day, for several consecutive weeks.

Hoogmoed (1973) presented some data on reproduction. He also examined four stomachs, which contained orthopterans, spiders, a mosquito and an earwig.

Distribution (fig. 107).— Northeastern South America, in Suriname, French Guiana, and Brazil (Amapá, eastern Pará). MZUSP 13965 is reported from Rio Ampiyacu, Peru, a locality widely separated from the core of the distribution area. Hoogmoed & Avila-Pires (1992) commented on this specimen.

Remarks.— Some geographic variation in number of scales around midbody seems to occur, especially between specimens from south and north of the Amazon. Fifteen specimens from eastern Pará presented 33-37 (35.7 ± 1.0) scales around midbody, 10 specimens from Amapá and French Guiana had 36-39 (37.6 ± 1.2) scales, and 16 specimens from Suriname 37-41 (38.4 ± 1.3) scales. Other scale counts did not show geographic variation.

Arthrosaura reticulata (O'Shaughnessy, 1881)
(figs. 111, 112, 278)

Cercosaura (Pantodactylus) reticulata O'Shaughnessy, 1881: 230, pl.22, fig.1 (holotype BM 1946.9.1.5, type-locality: Canelos, Ecuador, leg. Buckley).

Arthrosaura reticulata; Boulenger, 1885b: 389; Cunha, 1967: 153; Peters & Donoso-Barros, 1970: 75; Hoogmoed, 1979: 278 (part); Vanzolini, 1986a: 14; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Hoogmoed & Avila-Pires, 1992: 457.

Arthrosaura versteegii; Cunha, 1967: 150; Peters & Donoso-Barros, 1970: 75 (part).

Arthrosaura reticulata reticulata; Brongersma, 1935: 262; Cunha, 1961: 141.

Arthrosaura reticulata versteegii; Cunha, 1961: 143; Hoogmoed, 1973: 242 (part); Gasc, 1981: 306; Vanzolini, 1986b: 6 (part); Hoogmoed & Avila-Pires, 1989: 168.

Arthrosaura amapaense Cunha, 1967: 151 (holotype MPEG 800, type-locality: upper Rio Maracá, Estado [former Território] do Amapá, Brasil, 1959, leg. M. Moreira); Peters & Donoso-Barros, 1970: 75.

Material.— **Brazil.** AMAPA. Serra do Navio: 1 ♀, MPEG 15059, 08.xi.1988, 1 ♂, RMNH 25269, 20.xi.1988, both leg. M.S. Hoogmoed & T.C.S. Avila Pires. Upper Rio Maracá: 1 ♂ (holotype *A. amapaense*), MPEG 800, 1 ♂, 2 juvs., MPEG 802, 804, 805 (paratypes *A. amapaense*), 1 ♂, MPEG 803, all 1959, leg. M. Moreira.

AMAZONAS. Município Presidente Figueiredo, Rio Uatumã, area of hydroelectric dam Balbina: 2 ♂♂, 1 ♀, MPEG 14892-894, 06.ii.1988; 1 ♂, MPEG 14919, 22.iii.1988; all leg. rescue team; 1 ♀, MPEG 15399, 30.xii.1987, leg. R.J.R. Moraes & rescue team; 1 ♂, INPA 064, 5 km SW Rio Pitinga, near igarapé do Nazaré, 07.ix.1985, leg. J. Marinho; 1 ♀, INPA 120, 04.xii.1986; 2 ♂♂, INPA 144-45, 24.iv.1987; 1 ♂, INPA 152, 1 ♀, INPA 173, 24-30.ix.1987; 1 ♀, INPA 184, 1 ♂, INPA 190, 1 ♂, 1 ♀, INPA 200-01, 27-31.vii.1987; all igarapé Caititu, leg. M. Martins; 1 ♀, INPA 220, igarapé Caititu, 16.ix.1986, leg. A.

Queiroz; 1 ♀, INPA 259; 1 ♂, 1 ♀, MNRJ 4436-37, igarapé Caititu. Reserva Florestal Ducke, 25 km N Manaus: 1 ♂, INPA 264, iii.1988, leg. G. Moreira; 1 ♂, MPEG 14406, 08.xi.1985, leg. M.S. Hoogmoed & M. Hero; 1 ♂, MPEG 15807, 10.vii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Reserva ZF-2/INPA, 60 km N Manaus: 1 ♀, RMNH 25273, 13.vii.1989, leg. M.S. Hoogmoed. Rio Urucu, E of Porto Urucu, near Petrobras RUC-2: 1 ♂, MPEG 15868, 29.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Juruá, left bank, Nova Empresa (6°48'S, 70°44'W): 1 ♀, INPA 405, 28.viii.1991, leg. C. Gascon. Rio Solimões, W of Benjamin Constant: 2 ♂♂, RMNH 25274-275, 1 ♀, MPEG 15916, 10.xii.1989; 1 ♂, RMNH 25276, 1 ♂, 1 ♀, MPEG 15939-940, 12.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, RMNH 25277, 14.xii.1989; 1 ♀, MPEG 15969, leg. local children, through M.S. Hoogmoed & T.C.S. Avila Pires. Rio Javari, Estirão do Equador: 1 ♂, MPEG 875, 1959, 1 ♂, MPEG 909, 1961, both leg. J. Hidasi. SW: 1 ♀, MNRJ 2562.

MARANHAO. Nova Vida, 25 km from Rio Gurupi on BR-316: 1 ex., MPEG 12895, 23.ii.1976, leg. O.R. Cunha & F.P. Nascimento.

PARA. Km 74 of road BR-316 (Pará-Maranhão): 1 ♂, MPEG 5306, 12.iv.1972, leg. O.R. Cunha & F.P. Nascimento. Rio Tocantins, reservoir area of hydroelectric dam Tucuruí: 1 ♂, MPEG 13391, Chiqueirão, 07.iv.1984, leg. R.J.R. Moraes. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 1 ♀, MPEG 16367, 22.x.1992; 1 juv., RMNH 26544, 02.xi.1992; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA post (1°47'32.3"S, 51°26'01.5"W): 1 ♀, MPEG 16500, 16.xi.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Trombetas, Cachoeira Porteira: 2 ♀♀, INPA 080, 084, 67 km NNE of mouth Rio Mapuera, 07-09.viii.1985, leg. R.C. Best; 1 ♂, INPA 122, mouth of igarapé Tramalhetinho, 07.xi.1985, leg. A.L. Queiroz. Município de Oriximiná, Porto Trombetas, igarapé do Pau-Pelado: 1 ex., MPEG 14399, 21.v.1986, leg. F.P. Nascimento & J.M. Rosa. Município de Oriximiná, Cruz Alta, 6 km S Rio Trombetas: 1 ♀, RMNH 25270, 06.xii.1988, 1 ♂, MPEG 15354, 07.xii.1988, 1 ♀, MPEG 15380, 09.xii.1988, all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, road between Sítio Céu Estrelado and Cruz Alta, between Nhamundá and Trombetas rivers, near igarapé Jamari: 1 ♀, MPEG 15335, 05.xii.1988, 1 ♀, RMNH 25271, 12.xii.1988, 1 ♂, RMNH 25272, 1 ♂, 1 ♀, MPEG 15428-429, 14.xii.1988, all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.

RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ♂, 1 ♀, CEPB 0321-22, 30.xii.1988-31.i.1989, leg. N.J. Silva Jr.

Ecuador. NAPO. Santa Cecilia: 1 ♀, 1 juv., KU 109823-824, 1 ♀, KU 112198, 1 ♂, KU 122170, 1 ♂, 1 ♀, 1 juv., KU 148190-192, 1 ♀, 175338. Upper Rio Napo, Rio Misahualli: 1 ♂, USNM 196069, v.1952, leg. G. Orces-V. Loreto: 1 ♂, USNM 196071, v.1955, leg. G. Orces-V. PASTAZA. Canelos: Holotype, ♀, BM 1946.9.1.5, leg. Buckley. Montalvo: 1 ♀, USNM 196068, xii.1949, leg. G. Orces-V.

Peru. LORETO. Mishana: 2 ♂♂, TCWC 38116, 41361. Rio Aucayo, Centro Union: 1 ♀, TCWC 41884, 1 ♀, 1 juv., TCWC 42753-754. Yanamomo: 1 ♂, TCWC 40415. Moropon: 3 ♀♀, TCWC 40416, 41759, 41885.

Suriname. SIPALIWINI. Kabalebo river, Avanavero falls: 1 ♂, 1 ♀, RMNH 25266-267, 23.vii.1975, leg. M.S. Hoogmoed & W.N. Polder. Geological Survey Camp on Lucie river, 10 km NE airstrip Coeroeni: 1 ♂, RMNH 25265, 16.ii.1975, leg. M.S. Hoogmoed. Tafelberg, 3rd camp, top plateau 600 m: 1 ♀, RMNH 25268. 3-4.vii.1979, leg. M.S. Hoogmoed & W.N. Polder. CORONIE. Coronie road, km 0.8: 1 ♂, RMNH 13445, 19.xii.1948, leg. Suriname Expedition 1948-49.

Diagnosis.— As generic diagnosis, and in addition the following features: distance between fore- and hind limbs 1.5-2.5 times the length of a forelimb. Three supraoculars, posterior one followed by four or five large scales bordering the parietal laterally. Six supralabials followed by a relatively large and in some specimens a small postsupralabial. Temporals 22-48. Scales around midbody 35-52. Back either uniformly brown, brown with one vertebral, or two paravertebral dark greyish-brown bands, or brown with irregular, dark greyish-brown transverse lines. Ventral surface immaculate, except for labials, sides of chinshields and gulars, which may have irregular dark spots.

Description.— Gymnophthalmid with maximum SVL in males of 71 mm (Hoogmoed, 1973), in females of 70 mm (Duellman, 1978). Head 0.20-0.26 (0.22 ± 0.01, n= 77) times SVL (mostly around 0.24 in smallest specimens, 0.20-0.22 in largest), 1.3-1.6 (1.50 ± 0.07, n= 77) times as long as wide, 1.2-1.6 (1.34 ± 0.09, n= 76) times as wide as high. Snout blunt, rising gently posteriad. Neck about as wide as head and anterior part of body. Body cylindrical to slightly depressed, elongate. Limbs well developed, forelimbs 0.23-0.30 (0.26 ± 0.02, n= 68) times SVL, hind limbs 0.36-0.50 (0.42 ± 0.03, n= 67) times. Tail 1.4-2.1 (1.74 ± 0.14, n= 44) times SVL (commonly 1.4-1.6 in smallest specimens, 1.8-1.9 in largest); round to squarish in cross section, tapering toward tip.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid and tricuspid.

Rostral rectangular to hexagonal, two and a half to three times as wide as high, visible from above, in broad contact with frontonasal. Frontonasal single, pentagonal, laterally in contact with nasal and loreal. Prefrontals irregularly quadrilateral or pentagonal, a little wider than long or the reverse, with a short to relatively wide medial suture; laterally in contact with loreal and first supraocular, occasionally in narrow contact with second supraocular. Frontal hexagonal, one and a half to two times as long as wide, slightly wider anteriorly; laterally in broad contact with second supraoculars, and in narrow contact usually with first, occasionally with third supraoculars. Frontoparietals irregularly pentagonal, about as long as wide, medial suture from short to relatively wide; each one in contact with frontal, third (and occasionally second) supraoculars, one parietal, and interparietal. Interparietal usually slightly wider anteriorly, sometimes posteriorly; as long as, to slightly shorter, and distinctly narrower, than parietals. Interparietal and parietals form a relatively straight posterior margin, anteriorly each scale is obtusely angulate. Occipitals form a row of 4-7 roughly squarish (occasionally elongate or widened), smooth scales. Three supraoculars, first smallest, second and third subequal. Supraciliaries 4-5, rarely six, first widest; when five, usually first and fifth elongate, median ones short. Nasal undivided, nostril approximately at the centre, directed lateroposteriorly. Loreal usually approximately rectangular, in contact with nasal, second supralabial (it may touch the third supralabial), frenorbital, a small preocular, first supraciliary, first supraocular, one prefrontal, and frontonasal. In some specimens loreal quadrangular, separated from supralabials by a suture between frenorbital and nasal. Frenorbital quadrangular to trapezoidal, mostly distinctly smaller than loreal, rarely subequal. Followed by 3-6, usually 4-5, suboculars, of which one presubocular and one postsubocular. One, sometimes two rows of postoculars, with three, occasionally four, scales in a row, larger upward. Lower eyelid with a semitransparent disc of 2-4, exceptionally five, palpebrals. Six supralabials, fifth below centre of eye, followed by one or two postsupralabials (the six supralabials plus the anterior [larger] or single postsupralabial correspond to the seven supralabials reported by Hoogmoed & Avila-Pires, 1992). Temporal scales relatively numerous (22-48), variably polygonal, smooth, juxtaposed, slightly convex; toward centre they tend to hexagonal. They either increase gradually in size posteriorly, or there are one or two vertical posterior rows of larger scales. Ear-opening relatively large, semicircular to oval, surrounded by small scales which anteriorly form a slightly undulating margin, posteriorly a smooth margin. Tympanum recessed into a short auditory meatus.

Mental trapezoidal or semicircular, followed by a large, heptagonal postmental. Four pairs of chinshields, first two in contact with infralabials and medially, third in contact with infralabials and usually separated medially by one to several scales, rarely in medial contact. Fourth pair widely separated from infralabials, and medially by one to several scales. In MPEG 14893, fourth pair in oblique contact with another relatively large scale which could be considered as a fifth pair of chinshields. Five, occasionally six, infralabials, three or four to below centre of eye, followed by 1-3 postinfralabials. Scales on chin partially separated from gulars by a row of small scales. Gulars imbricate, smooth, quadrangular, with rounded posterior margin, posterior scales larger; in 7-8, occasionally 5-6, transverse rows (including collar), of which 2-4 with a medial pair of enlarged scales. Collar with 5-11 scales which form a lobed posterior margin; medial scales mostly subequal, lateral scales progressively smaller. Gular fold distinct. Most of dorsal and lateral, and part of ventral head scales with minute pits.

Scales on nape longer than wide, imbricate, in transverse rows, anterior ones smooth to broadly keeled, posterior margin rounded to bluntly pointed; posteriad they grade into dorsals. Sides of neck with distinctly smaller, squarish to suboval or round scales, juxtaposed to subimbricate. Dorsals hexagonal, elongate, distinctly keeled, in 25-31 (28.4 ± 1.3, n= 77) transverse rows (between interparietal, thus including occipitals, and posterior level of hind limbs). Flanks with scales similar to dorsals, except near ventrals, where they decrease slightly in size and become less acutely pointed; some intermediate vertical rows of smaller scales present near limb insertions. Ventrals imbricate, in 15-20 (17.3 ± 1.0, n= 77) transverse rows, and ten to fourteen longitudinal rows, of which medial rows with rectangular, smooth scales, lateral rows with distinctly narrower, bluntly pointed, smooth to broadly keeled scales; in some specimens scales of external row at each side smaller. Ventrals sharply distinguished from laterals by the presence of intermediate small scales. Scales around midbody 35-52 (42.2 ± 3.5, n= 77). Preanal plate either with one anterior and three posterior scales, laterals larger; one anterior and five posterior scales, intermediate scales larger; or three elongate scales. In USNM 196068 both anterior and medial posterior scales divided, resulting in 2+6 scales. Males mostly with two preanal pores (1-1 and 1-2 in the two males studied from Ecuador), and 4-7 femoral pores, on each side. In females none or one small preanal pore per side is present, and none or one small femoral pore, located either proximally or distally on thigh. Pores between three or four scales.

Scales on dorsal and lateral surface of tail hexagonal, keeled, imbricate, in transverse rows, smaller than dorsals. Similar, but smooth and blunt, on ventral surface.

Scales on dorsal aspect of upper arms and most of forearms variably polygonal, smooth, imbricate, larger anteriorly. On ventral aspect of upper arms and along a narrow band on inner side of forearms, scales small, roundish. Thighs with a row of large, trapezoid scales on anterior aspect, bordered at both sides by two or three rows of relatively large, polygonal scales, which ventrally are smooth, in regular rows, and reach line of pores (or equivalent area in females). Dorsally scales slightly keeled, within a short distance grading into small, granular, juxtaposed scales, which cover part of dorsal, and posterior aspect of thighs. Ventral aspect of lower legs with relatively large, rhomboid or hexagonal, smooth, imbricate scales. On dorsal aspect

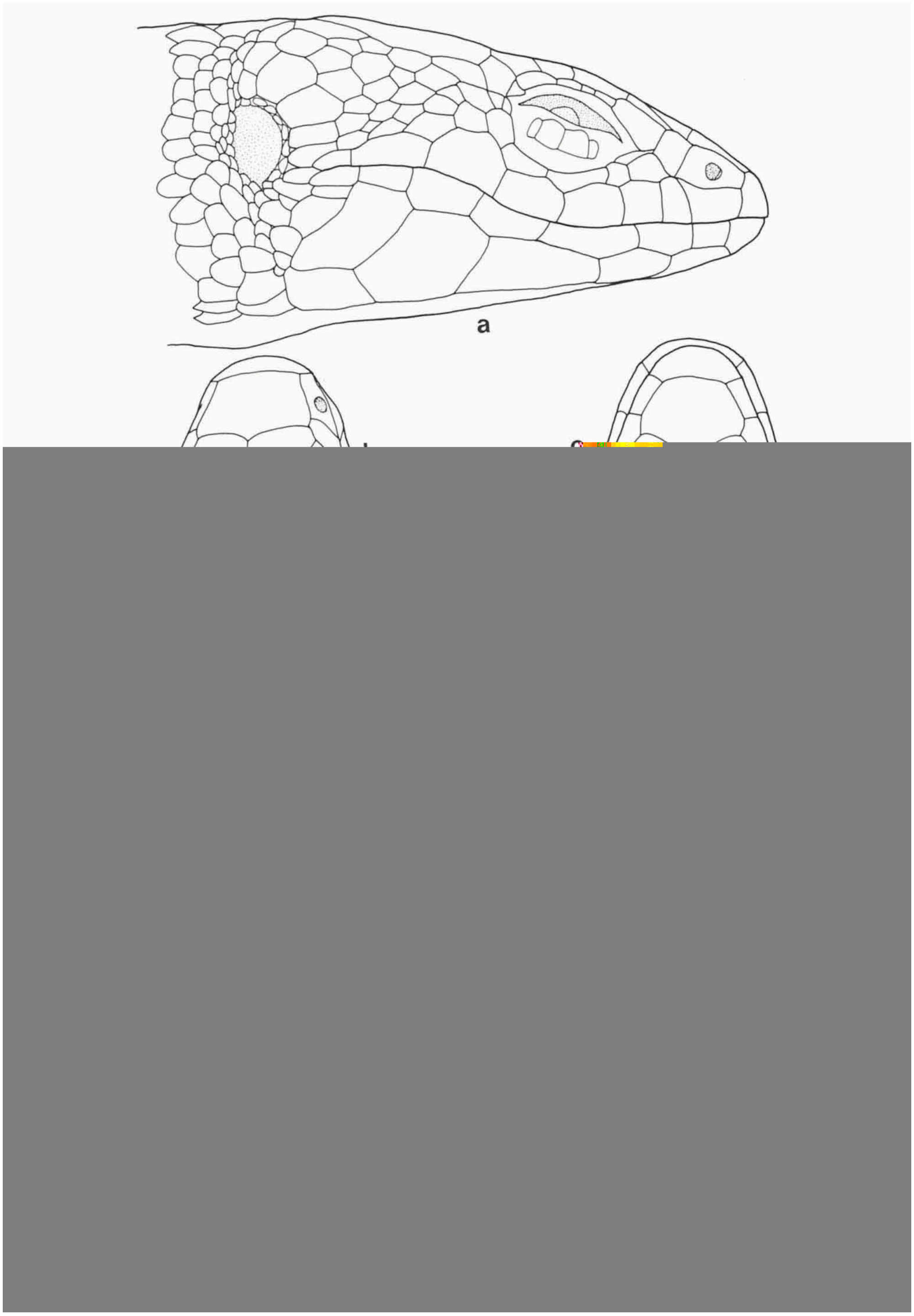


Fig. 111. *Arthrosaura reticulata*, MPEG 5306; a, b, c: lateral, dorsal, and ventral views of head; d: preanal plate and ventral aspect of right hind limb, showing sequence of pores.

of lower legs scales smaller and slightly keeled; they decrease steadily in size and become juxtaposed posteriad. Subdigital lamellae medially divided, except distally; 12-17 (14.0 ± 1.2, n= 147, 74 specimens) under fourth finger, 16-25 (20.0 ± 2.0, n= 144, 73 specimens) under fourth toe.

Some descriptions of colour in life follow. MPEG 15354, ♂, from Cruz Alta (Pará), had dorsal surface and sides of head sepia (219), labials with vertical black and cream colour (54) bands. Back cinnamon-brown (33), flanks partially cinnamon-brown, partially sepia, with buff-yellow (53) spots. Tail dorsally burnt-umber (22), on the sides with widespread sepia (219) spots, a series of tawny-olive (223D) spots dorsolaterally, and cream colour (54) spots laterally. On ventral surface, gulars mostly flesh colour (5), from posterior gulars to base of tail chrome-orange (16), tail salmon colour (106). Iris greyish-brown with an orange rim around pupil. Tongue sepia [illegible]

brown (19), back and flanks burnt-umber (22). Flanks, especially on neck, with light russet vinaceous (221D) spots. Tail dorsally dark brown with an orange tinge, light

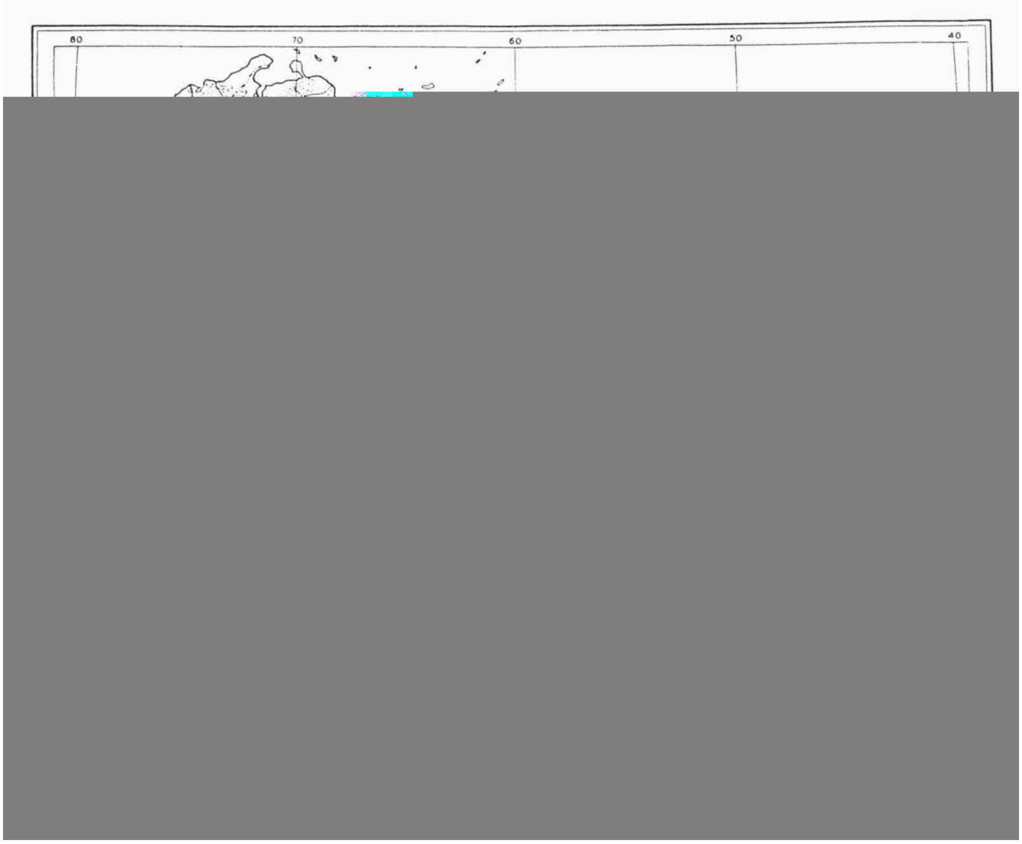


Fig. 112. Distribution of *Arthrosaura reticulata*. Closed circles = material studied. Open circles = data from literature (Gasc, 1981; Lescure & Gasc, 1986; Vanzolini, 1986a; Henzl, 1991; Hoogmoed & Avila-Pires, 1992). Data from Gasc (1981), for French Guiana, may refer either to *A. reticulata* or to *A. versteegii* Van Lidth de Jeude.

ally; an intermediate series of less bright light spots may also be present. Sides of tail usually darker than dorsal area, in some specimens of same colour. Ventral region mostly uniformly cream, except for labials, sides of chinshields, and gulars, which may have irregular, dark greyish-brown spots (variable among specimens, some with only labials spotted).

Habitat.— An inhabitant of primary or secondary forest, frequently close to water - creeks, swampy areas, border of varzea forest, small puddles in dirt roads crossing the forest. Most lizards for which field notes are available were amidst leaf litter, one was under a rotten branch on forest floor in trail, one in a rotten, fallen tree trunk, another one under large *Cecropia* leaves at border between road and dry swampy forest, and one was found in a heap of half rotten palm leaves and fruits at the base of a palm.

Notes on natural history.— Active specimens were collected between 09:00 h and 16:30 h, except RMNH 25269, collected between 22:00 h and 23:00 h (see Hoogmoed & Avila-Pires, 1989). No basking behaviour observed.

Some anecdotal data on reproduction are given by Dixon & Soini (1975, 1986) and Duellman (1978).

Duellman (1978) reported especially sow bugs and mole crickets, but also beetles and roaches from six stomachs. Martins (1991) found a majority (in percent size) of crickets, plus spiders and larvae of Lepidoptera, in five stomachs.

[illegible]

MPEG 11099. Other known predators are *Oxyrhopus formosus* (Wied), *O. melanogenys* (Tschudi), and *Bothrops atrox* (Linnaeus) (Dixon & Soini, 1975, 1986; Duellman, 1978).

Distribution (fig. 112).— Amazonian region in Brazil, French Guiana, Suriname, Guyana, southern Colombia, Ecuador, and northern Peru. In Brazil known from Amapá, Pará, Amazonas and Rondônia.

Remarks.— *Arthrosaura versteegii* Van Lidth de Jeude and *Arthrosaura tyleri* (Burt & Burt), until recently considered synonyms of *A. reticulata*, were resurrected by Hoogmoed & Avila-Pires (1992). For a complete synonymy list and a discussion on geographic variation, see this paper.

Hoogmoed & Avila-Pires (1992) mistakenly listed MPEG 12898 as *A. reticulata*, but this is indeed a specimen of *Colobosaura modesta*. Therefore, there is no record of

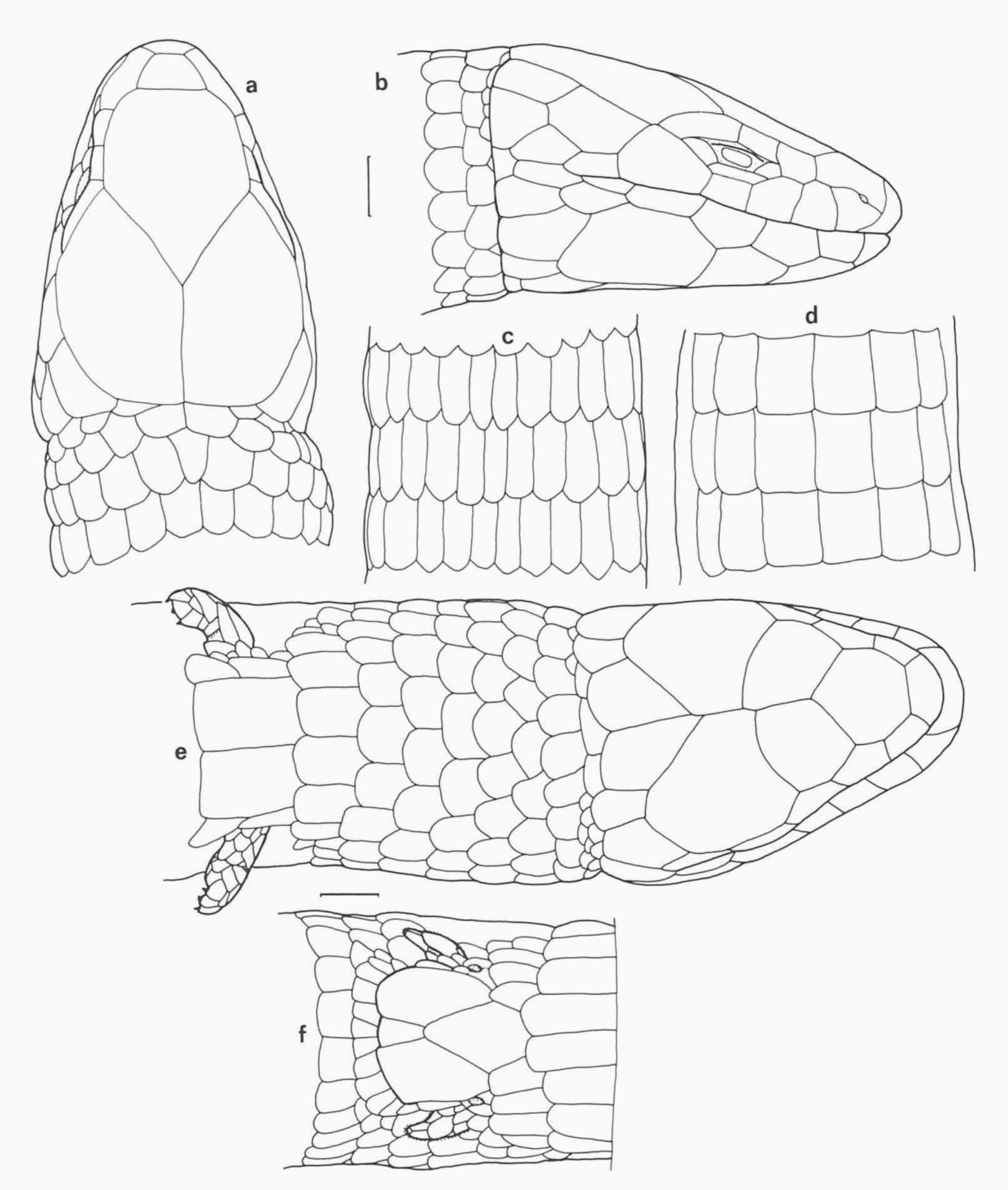


Fig. 113. *Bachia dorbignyi*, MNRJ 1729; a, b: dorsal and lateral views of head; c: dorsals near (anterior to) midbody; d: ventrals near (anterior to) midbody; e: ventral view of head, gulars, interbrachials, and forelimbs; f: preanal plate, pores and hind limbs.

Diagnosis.— As generic diagnosis, and in addition the following features: dorsals and scales on flanks hexagonal, smooth, imbricate; ventrals quadrangular, juxtaposed. Prefrontals, supraoculars, and interparietal absent. Two (mostly) or three supraciliaries. Three fingers, hind limbs styliform with one apical scale that may be divided. Fifth supralabial in contact with parietal. Preanal pores 2-2 in males, 1-1 or absent in females. Scales around midbody 23-28, dorsals 47-55, ventrals 36-43, gulars 6-7. Maximum SVL 80 mm. (Based on Dixon, 1973, numbers of dorsals and ventrals also on Vanzolini, 1961).

Description.— MNRJ 1729 is very similar to the specimens of *B. peruana* with frontonasal studied (ZUEC 436 and 438), to which description I refer, except for the following: forelimbs with three clawed digits; hind limbs slightly longer in this specimen (but also correponding in length to approximately one transverse row of dorsals), ending in two scales. Fifth supralabial in touch with parietal in one side, just not in touch on the other side, due to a short contact between second supraciliary and anterior temporal. Five infralabials, third below centre of eye. Seven transverse rows of gulars, with six scales on collar. Dorsals and scales on tail relatively wider than in the specimens of *B. peruana* (also ZUEC 435), 23 around midbody. The specimen is broken in two pieces, and apparently some segments of belly are missing, therefore counts of dorsals and ventrals are not possible; according to Vanzolini (1961: 206) there were 47 transverse rows of dorsals and 36 transverse rows of ventrals. One anterior and three posterior preanal scales, mid-posterior one distinctly smaller than the others. One femoral pore at each side. The colour pattern in the specimen is rather faint, but four longitudinal light stripes along back and tail are still visible.

Distribution (fig. 109).— Southeastern Peru, Bolivia, northern Paraguay, and Brazil, in western Rondônia (Dixon, 1973).

Remarks.— Numbers of dorsals and ventrals of MNRJ 1729, as given by Vanzolini (1961), are slightly lower than those reported for the species by Dixon (1973), but such difference may be reasonably expected within the range of variation of the species.

See also under *Bachia peruana*.

Bachia flavescens (Bonnaterre, 1789)
(figs. 114-116, 276)

'Le Chalcide' Lacépède, 1788: 443, pl. xxxii.

Chalcides flavescens Bonnaterre, 1789: 67 (holotype refers to Lacépède's 'le chalcide'; specimen originally in the MHNP, presently lost according to Brygoo, 1989a: 15; type-locality: unknown); Latreille, 1801b: 85.

Chamaesaura cophias Schneider, 1801: 209 (lectotype, according to designation by Hoogmoed, 1973: 255, Museum Lampiani specimen referred to by Schneider, also described and depicted by Gravenhorst, 1851: 306, pl.xxix; presently probably lost; type-locality: unknown). **New synonym.**

Chalcides tridactylus Daudin, 1802b: 367 (holotype refers to Lacepede's 'le chalcide', type-locality: unknown).

Chalcides monodactylus Daudin, 1802b: 370 (holotype MHNP 2839, type-locality: 'Amérique meridionale'). **New synonym.**

Chalcides Schlegeli Duméril & Bibron, 1839: 457 (holotype RMNH 3580, type-locality: 'Calcutta' (in error); redescribed by Brongersma, 1946b: 237).

Cophias tridactylus; Boulenger, 1885b: 418.
Cophias flavescens; Boulenger, 1885b: 418; Procter, 1923: 1065.
Cophias boettgeri Boulenger, 1887a: 517 (holotype SMF 39900, type-locality: 'Central America?').
Bachia parkeri Ruthven, 1925: 103 (holotype UMMZ 60813, type-locality: Chenapowu River, on the upper Potaro River, British Guiana); Peters & Donoso-Barros, 1970: 82. **New synonym.**
Bachia cophias; Cunha, 1958: 1, 1961: 150; Vanzolini, 1961a: 195; Hoogmoed, 1973: 249, 1979: 278; Hoogmoed & Lescure, 1975: 155; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Nascimento et al., 1991: 33.
Bachia flavescens; Peters & Donoso-Barros, 1970: 80; Dixon, 1973: 38.
Bachia monodactylus; Peters & Donoso-Barros, 1970: 81; Dixon, 1973: 40.
Bachia schlegeli; Peters & Donoso-Barros, 1970: 82.
Bachia f. flavescens; Dixon, 1973: 39.
Bachia flavescens schlegeli; Dixon, 1973: 39
Bachia m. monodactylus; Dixon, 1973: 40.
Bachia monodactylus parkeri; Dixon, 1973: 40.

Material.— 1 ♂, BM 1946.8.2.21. 1 ♀, RMNH 3580 (holotype *Chalcides schlegeli*). 1 ♀, MHNP 2839 (holotype *Chalcides monodactylus*).
Brazil. AMAPA. Tumuc Humac Mountains, upper Lunier River: 1 ♂, MHNP 1899.76, 1899, leg. Geay. Serra do Navio: 1 ♂, MPEG 1878, 1962, leg. J.L. Freire.
AMAZONAS. Rio Uatumã, reservoir area of hydroelectric dam Balbina, igarapé Caititu: 1 ♂, INPA 192, 30.vii.1987, leg. M. Martins. Manaus: 1 ♀, MPEG 16781, INPA, leg. W.E. Magnusson; 2 ♂♂, 1 ♀, AMNH 64869-871, INPA, 1943, leg. E.T. Gilliard; 1 ex., MNRJ 1728, "distrito de Aleixo, 12 km da capital", 10-23.vii.1941, leg. A. Parko.
PARA. Ilha de Marajó: 1 ♂, BM 1923.11.9.88, purch. W. Ehrhardt. Capitão Poço: 1 ♂, MPEG 8492, 23.x.1973, leg. O.R. Cunha. Ilha do Mosqueiro: 1 ♂, MPEG 5173, 13.x.1971, leg. O.R. Cunha & F.P. Nascimento. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 1 ♂, MPEG 16511, 15.i.1993, leg. T.C.S. Avila Pires. Rio Tapajós, village Moreira, close to Itaituba (upriver): 1 ♂, MPEG 001, v.1951, leg. O.R. Cunha. Rio Paru de Este, Tiriós: 3 ♂♂, 1 ♀, MPEG 12163-166, 1975, leg. Cap. Holanda (COMAR).
RORAIMA. Boa Vista: 1 ♀, MNRJ 4438, 26.vi.1959, leg. E.O. Koch. Rio Uraricoera, Uaicá, alt. 280 m: 1 ♀, AMNH 117778, iii.1978, leg. R.W. Dickerman.
Guyana. Soesdyke-Linden road, c. 20 km S: 1 ♀, RMNH 26545, 12.xi.1985, leg. L.G. Hoevers. Chenapowu River, upper Potaro River: 1 ♂, 2 ♀♀, 1 ex., BM 1946.8.2.42-45 (paratypes *Bachia parkeri*).

Diagnosis.— As generic diagnosis, and in addition the following features: dorsals and ventrals narrow, rectangular, smooth, slightly imbricate. Prefrontals absent. Interparietal present or absent. One or two supraoculars, two or three supraciliaries. Three fingers, one to three toes, in both cases with or without claws, or toes reduced to a small tubercle.

Description.— A worm-like gymnophthalmid, maximum SVL in males 67 mm, in females 80 mm (Hoogmoed, 1973). Head 0.10-0.15 (n= 24) times SVL, proportionally larger in juveniles than in adults; 1.4-1.8 (1.63 ± 0.11, n= 24) times as long as wide; 1.2-1.4 (1.29 ± 0.07, n= 24) times as wide as high. Neck as wide as head and body. Body cylindrical. Tail round in cross section, for the greatest part with a diameter only slightly smaller than that of body, distally tapering toward a blunt tip; about as long as SVL in juveniles, up to 1.6 times SVL in adults. Limbs very much reduced, forelimbs with three digits, with or without a claw, hind limbs ending in one to three blunt, clawless scales, or in two (or three: Dixon's, 1973 "*B. f. flavescens*") distinct, clawed digits.

Tongue lanceolate, covered with imbricate, scale-like papillae; tip bifid, smooth. Teeth conical, directed posteriorly.

Rostral trapezoid, visible from above, about twice as wide as high, in broad contact with frontonasal. Frontonasal irregularly heptagonal, laterally in contact with nasal and narrowly so with loreal. Frontal pentagonal, forming a broad, straight margin with frontonasal, and an acute angle posteriorly, where it borders the parietals and in some specimens the interparietal; laterally in contact with loreal and the two supraoculars. Interparietal mostly absent, sometimes present, narrowly rectangular to triangular, separating the parietals completely or partially. Two large parietals, anteriorly angulate, laterally and posteriorly the two together form a "U"-shaped line. Posterior to interparietal (if present) and parietals, a row of transversely elongate and very narrow scales, which can be considered as occipitals. One or two relatively small supraoculars and two or three supraciliaries. Nasal undivided, in contact with first and second supralabials. Nostril anteriorly, in the border between nasal and first supralabial, indenting the latter. A relatively large, approximately quadrangular loreal, in contact with nasal, frontonasal, frontal, first supraocular, first supraciliary, preocular, and second and third supralabials; occasionally it also touches the subocular. Subocular series formed by a short preocular, a long subocular and a short post-subocular. Lower eyelid with undivided semitransparent disc. Supralabials 5-6, when five suture between third and fourth below centre of eye, when six, fourth supralabial is under the eye. Five, occasionally six, relatively large, irregularly polygonal temporals, in two oblique rows, mostly upper row with three, lower row with two scales; holotype of *B. schlegeli* (RMNH 3580) with a third posterior, shorter scale in lower row. Ear-opening absent.

Mental relatively small, trapezoid. Postmental large, irregularly heptagonal, with the two posterior edges longest and forming an acute angle. Two large pairs of chinshields, first pair in medial contact, second pair widely separated; both in contact with infralabials. In RMNH 3580 (holotype of *B. schlegeli*) a third pair of chinshields, much smaller than the other two and widely separated medially, is present. First pair of chinshields usually followed medially by two pairs of scales, anterior pair largest; in some specimens followed by one pair only, or second pair divided into more scales. Posterior to second (or second and third) pair(s) of chinshields, a transverse row of three scales which are partially separated from gulars by very small scales. Five, rarely four, infralabials, three to below centre of eye; MPEG 16511 with three infralabials on each side, on one side first very long, on the other side second very long. Ear-opening absent. All head scales juxtaposed, smooth.

Scales on nape smooth, in transverse, slightly imbricate rows, first row with scales slightly smaller. Anterior scales quadrangular, posteriad and toward sides of neck scales narrower, rectangular. Gulars rectangular, longer than wide, smooth, increasing in size posteriad, in seven (mostly) or eight transverse, slightly imbricate rows (collar included). Most rows of gulars continuous with rows of scales on nape, but some posterior rows, especially the collar, not. Collar not pronounced, with 6-10 scales, median ones largest.

Dorsals rectangular, narrow, smooth, slightly imbricate, in 46-52 (48.8 ± 1.6, n= 24) transverse rows from nape to base of tail. Ventrals similar, but distinctly wider toward midventral line anteriorly, slightly wider posteriorly; in 33-39 (36.0 ± 1.5, n= 24) transverse rows. A lateral fold is present in anterior part of body. Dorsal and ventral transverse rows mostly continuous; 26-34 (29.0 ± 2.2, n= 23) scales around mid-

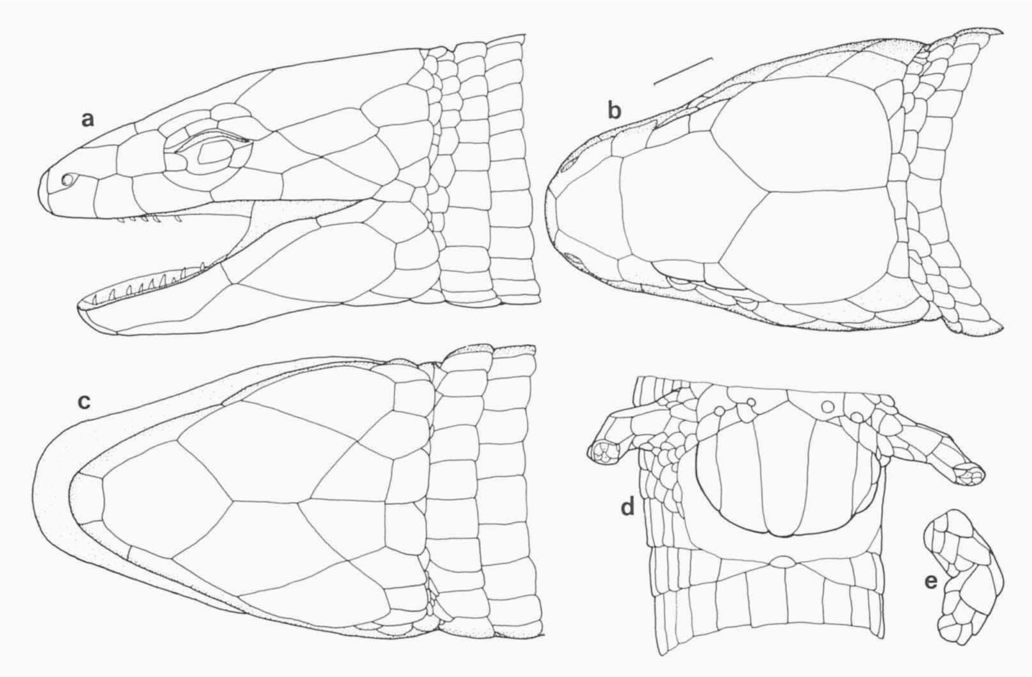


Fig. 114. *Bachia flavescens*, MPEG 16511, with characteristics predominantly of the "*cophias* type" (except for three supraciliaries on the side here represented; see text); a, b, c: lateral, dorsal and ventral views of head; d: preanal plate, preanal pores, and hind limbs; e: dorsal aspect of left forelimb. Scales on body similar to those in MNRJ 4438 (fig. 115).

body. Preanal plate either with three or five elongate scales, or medial scale transversely divided into two scales; MNRJ 4438 with four elongate scales. Two preanal pores at each side in males. Females usually without pores, but AMNH 117778 has a rather inconspicuous preanal pore on each side, and MHNP 2839 has a preanal pore on one side.

Scales on tail rectangular, longer than wide, smooth, imbricate, in transverse rows all around the tail.

Limbs compressed antero-posteriorly and very much reduced, though there is considerable variation in degree of development. Forelimbs corresponding in length to 3-6 transverse rows of dorsals, covered mostly by squarish, smooth, subimbricate scales. Anteriorly upper arms and forearms covered by three to five oblique series of scales, hands by one or two transverse rows of small scales. Three fingers, each either one scale long and clawless, or two scales long with a distinct claw. Hind limbs correspond in length to 2.5-5 transverse rows of dorsals. On anterior aspect with a transverse row of squarish scales at base of each limb, in its most reduced form followed distally by a large scale which covers most area of "thigh", one or two (side by side) scales covering "lower legs", and one to three scales on each foot, with or without a terminal tubercle, clawless. In the least reduced forms, "thigh" covered by two transverse rows of scales, "lower legs" by two or three, and each foot by one row followed by two (or three: Dixon's, 1973 "*B. f. flavescens*") two-scale-long, clawed, toes.

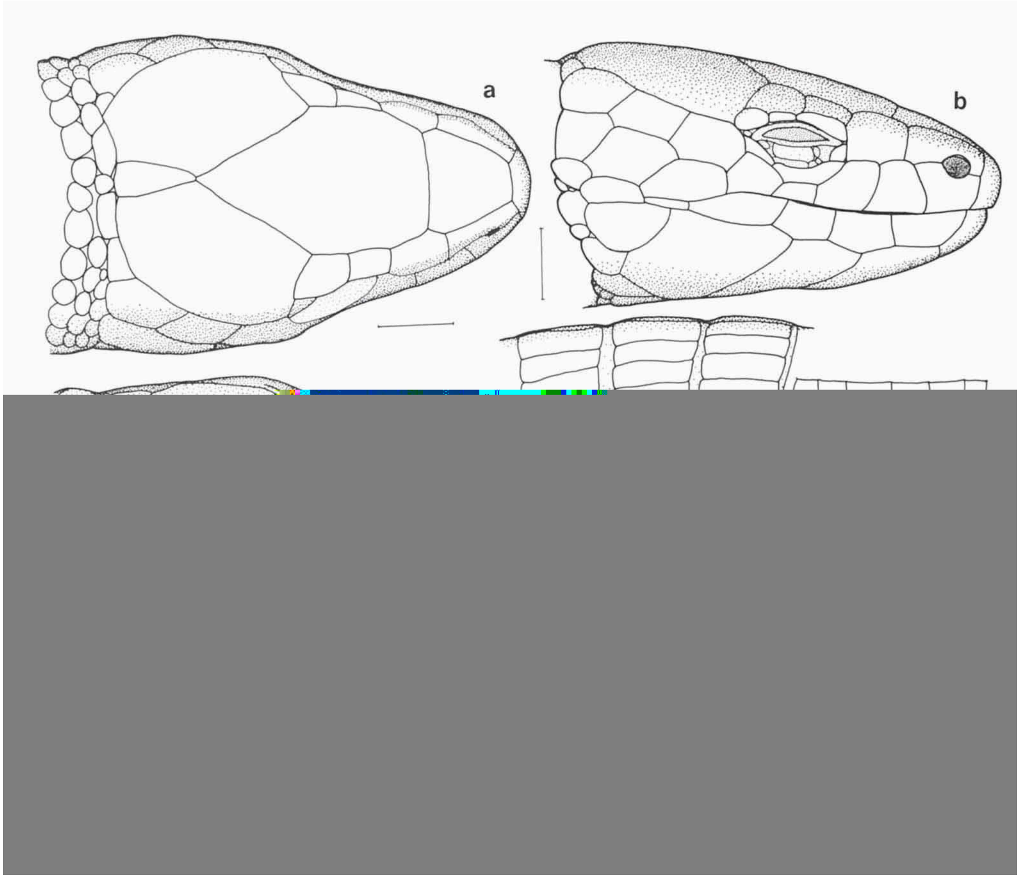


Fig. 115. *Bachia flavescens*, MNRJ 4438, with characteristics predominantly of the "*flavescens* type", except for hind limbs (see text); a, b, c: dorsal, lateral, and ventral views of head; d: scales in a lateral view of the body, near midway between fore- and hind limbs; e: preanal plate (pores absent); f: dorsal aspect of right forelimb; g: dorsal aspect of extremity of right hind limb (scale for a and b same; for c, d, and e same; and for f and g same).

MPEG 16511 in life was brown with pale lighter brown stripes. Beebe (1945) and Hoogmoed (1973) gave descriptions of colour in life.

In preservative, dorsal surface dull brown or orange-brown, with a pair of light, longitudinal, dashed, dorsolateral stripes along body and tail. Between dorsolateral stripes either a pair of similar paravertebral stripes, or a series of elongate, light spots on each transverse row of dorsals, which result in a more-or-less irregular, dark and light brown mesh, or else there is some pattern intermediate between the two above. On flanks and distally on tail the stripes may turn into an irregular vermiculation. Ventral parts tan, centre of scales faintly darker than borders.

Habitat.— Inhabits the forest floor, amidst the leaf litter, under or in decayed logs, amidst the mesh of roots and humus at base of trees and palms, in *Atta* nests, and in holes in the ground (Beebe, 1945; Cunha, 1958; Hoogmoed, 1973; Gasc, 1981, 1990; Martins, 1991). Also found in secondary vegetation (Gasc, 1981), or even in gardens within cities (Hoogmoed & Lescure, 1975). Both Beebe (1945) and Hoogmoed (1973) found individuals in pits in the forest floor. MPEG 16511 was collected in a deforested area surrounded by terra firme forest, in a man-made hole in the ground which was filled with water. RMNH 26545 was in secondary bush, under log on white sand (L.G. Hoevers's field notes).

Notes on natural history.— They are usually considered as diurnal lizards, but Hoogmoed (1973) showed evidence of nocturnal activity by these animals. Beebe (1945) described three types of locomotion in *B. flavescens* — one slower, lizard-like, using the limbs, especially the forelimbs; one faster, snake-like; and the fastest, by relatively large jumps. These agree with the field notes of MNRJ 4438, where it is stated that the animal uses its "hands", and that when pursued it may jump up to 40 cm, fast.

Beebe (1945) reported a pregnant female which later deposited its single egg beneath a leaf. The egg was oval, 4.1 by 11.5 mm.

Ants, termites, grubs, sow bugs, microlepidopteran scales and fine particles of quartz were reported from the stomach of three individuals by Beebe (1945). Martins (1991) reported five dipterous larvae in one stomach.

Beebe (1945) reported a specimen in the stomach of a coati-mundi, *Nasua nasua* (Linnaeus).

Distribution (fig. 116).— Northern South America in Brazil, French Guiana, Suriname, Guyana, and Colombia. In Brazil known from Pará on both sides of the Amazon, Amapá, Roraima, and Amazonas north of the Amazon and east of Rio Negro.

Remarks.— Dixon (1973) distinguished in the *Bachia flavescens* group two species, each with two subspecies, e.g., *B. f. flavescens*, *B. f. schlegeli*, *B. m. monodactylus*, and *B. m. parkeri*. Hoogmoed (1973) showed, contrary to what was stated by Peters & Donoso-Barros (1970) and accepted by Dixon (1973), that *Chamaesaura cophias* Schneider was not an objective synonym of *Bachia flavescens* (Bonnaterre), and that the name *cophias* remained available for the taxon these authors indicated with the name *Bachia monodactylus*. According to Dixon (1973), there were only "minor" differences among each of the two subspecies (three toes on the hind foot in *B. f. flavescens*, two in *B. f. schlegeli*, and two supraoculars in *B. c. cophias*, against one in *B. c. parkeri*), and these characters were regarded as "suspect" since they were known in both cases to be subject to variation in other species of *Bachia*. Moreover, Dixon (1973) stated that only few differences actually separated his *B. flavescens* and *B. monodactylus* (= *B. cophias*), and that "as additional material becomes available, the variation exhibited may show intermediacy between the two species and thus suggest that they are conspecific".

Among the 25 specimens studied by me, 18 agree well with the concept of *B. cophias*, presenting the following distinctive characters: interparietal absent, two supraoculars, two supraciliaries (two on one side, three on the other in MPEG 16511), mostly five (occasionally six) supralabials, fore- and hind limbs very poorly developed, clawless. Three specimens are part of the type series of *B. parkeri*, differing from *cophias* by the presence of only one, small, supraocular. Two others, the holotype of *B. schlegeli* (RMNH 3580) and BM 1946.8.2.21, fall completely under Dixon's (1973) concept of *B. flavescens*, differing from the specimens mentioned before by the presence of an interparietal, three supraciliaries, six supralabials, and fore- and hind

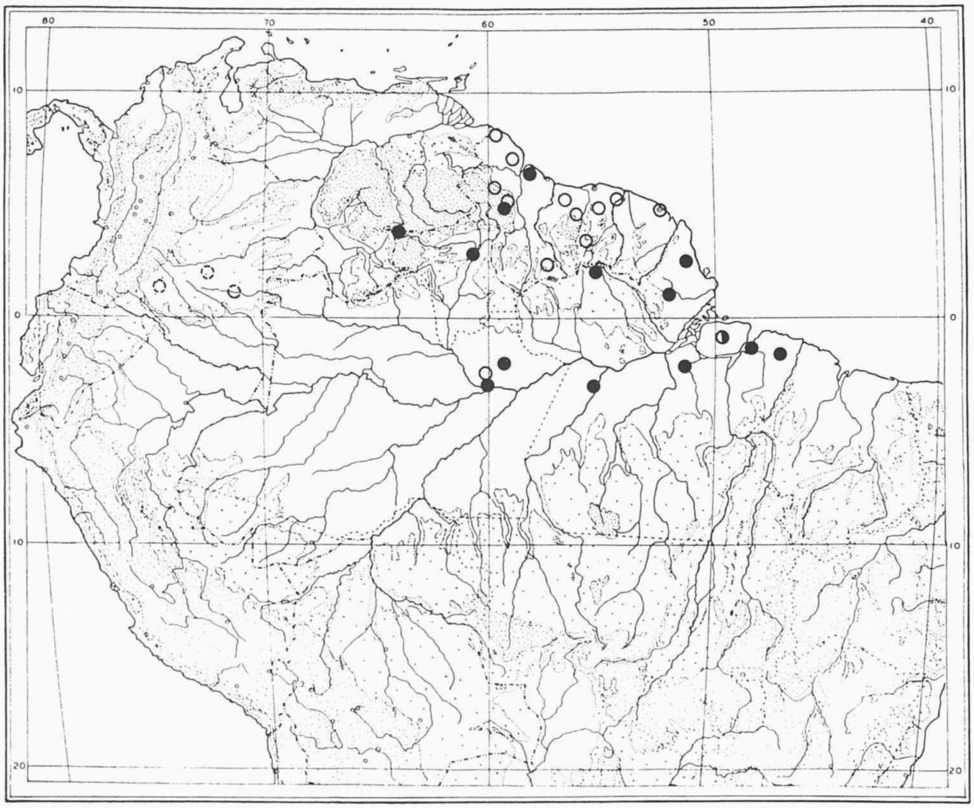


Fig. 116. Distribution of *Bachia flavescens*. Closed circles = material studied. Open circles = data from literature (Parker, 1935; Beebe, 1945; Dixon, 1973; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Zimmerman & Rodrigues, 1990). Dashed circles = data by Ayala (1986) for Colombian states.

limbs distinctly larger, with more scales, and clawed. Moreover, the holotype of *B. schlegeli* also has a third, smaller pair of chinshields and an extra temporal scale. The two remaining specimens both are from Roraima. One (AMNH 117778) has an interparietal reduced to a small triangular scale separating the posterior parts of the parietals, two supraciliaries, six supralabials; limbs with two-scale-long, clawed digits, three on forelimbs, two on hind limbs, so of the "*schlegeli* type", although limbs are smaller than in the type (RMNH 3580). The second specimen from Roraima (MNRJ 4438) has an interparietal completely separating the parietals, three supraciliaries, six supralabials, forelimbs relatively large, of the "*flavescens*/*schlegeli* type", hind limbs small, clawless, of the "*cophias* type".

Comparing the concepts of *B. flavescens* and *B. cophias*, we get the following picture. (1) One character used by several authors to distinguish them, and also in the key presented by Dixon (1973), is the presence of an interparietal in *B. flavescens*. Dixon (1973) himself observed that, among the four specimens studied by him, the interparietal varied from 100 to 60 percent of the parietal length, which suggests that loss of the scale may occur in some individuals; Hoogmoed (1973) reported a specimen from Suriname (SMNS 1084) that had a small interparietal separating the anterior part of the parietals, but further agreeing with 'normal' *B. cophias*. AMNH 117778, which agrees mostly with *B. flavescens*, has only a small, triangular interparietal posteriorly. (2) Another character which is considered to separate the two groups is the presence of three supraciliaries in *B. flavescens*, two in *B. cophias*; Dixon (1973: 40) pointed out that "the presence of three superciliaries in *B. flavescens* would be the only character separating it from *monodactylus* [= *cophias*] if some populations of *flavescens* lost the interparietal". Following this concept, AMNH 117778 would be *B. cophias*, in spite of its well developed limbs and the presence of a (small) interparietal, and MNRJ 4438 would be *B. flavescens*, in spite of its very reduced hind limbs. MPEG 16511 has two supraciliaries on one side, three on the other. (3) The limbs (and digits) are the third character which may distinguish '*flavescens*' and '*cophias*'. Comparison of RMNH 3580 (holotype of *B. schlegeli*) and a specimen of '*cophias*' with very reduced limbs shows striking differences. Nevertheless, Dixon (1973) already mentioned that the number of toes is variable in *cophias*, and may approach the condition shown by *flavescens*. Among the material here studied, all *cophias*-like specimens have reduced, clawless limbs, but with some degree of variability in the number of

Material.— **Brazil.** AMAZONAS. 1 ♂, MPEG 16779. Manaus: Holotype, ♀, AMNH 64877, 1943, leg. E.T. Gilliard; 1 ♂, AMNH 64872 (paratype), 4 ♂♂, AMNH 64878-880, 64882, all 1943, leg. E.T. Gilliard; 1 ♂, 1 ♀, INPA 059-060, campus INPA, 07.ix.1985 & 21.viii.1985, leg. J.A. Gomes; 1 ♂, INPA 241,

number), leg. local person.

Diagnosis.— As generic diagnosis, and in addition the following features: dorsals and most ventrals (except anterior ones) narrow, hexagonal-lanceolate, keeled, imbricate. Prefrontals present, in medial contact. Interparietal present. Three supraoculars, three or four supraciliaries. Four fingers and four toes, all clawed.

Description.— A worm-like gymnophtalmid, maximum SVL 82 mm (AMNH 64878, ♂; INPA 059, ♀). Head 0.11-0.17 times SVL, proportionally longer in smaller specimens; 1.4-1.8 (1.62 ± 0.14, n= 10) times as long as wide; 1.2-1.4 (1.28 ± 0.07, n= 10) times as wide as high. Neck as wide as head and body. Body cylindrical. Limbs very much reduced, both fore- and hind limbs with four clawed digits. Tail round in cross section, proximally with diameter only slightly smaller than body, distally it tapers very slowly toward tip; 1.4-2.6 times SVL, proportionally shorter in smaller specimens.

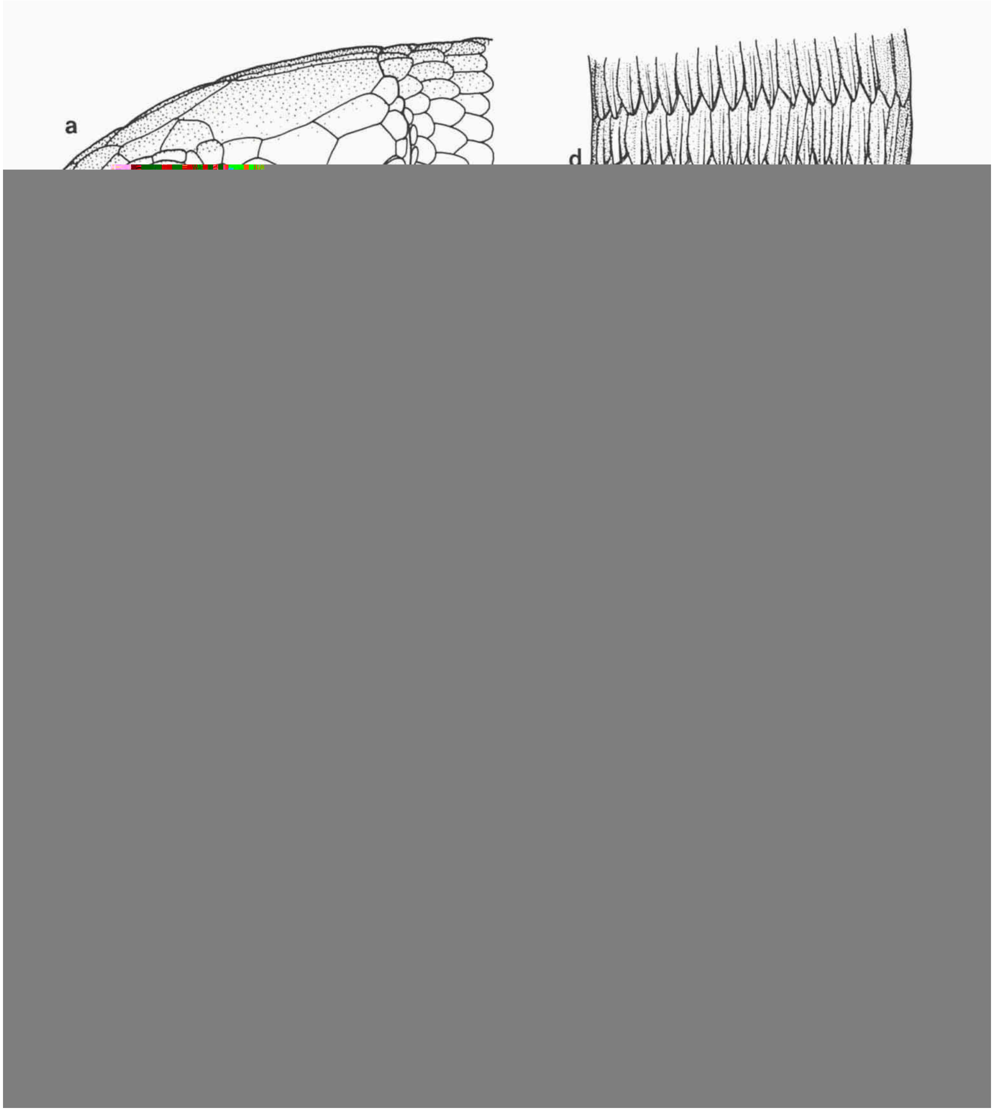


Fig. 117. *Bachia panoplia*, INPA 059; a, b, c: lateral, ventral, and dorsal views of head; d: scales on a dorsolateral view of body, near midway between fore- and hind limbs; e: posterior ventral scales and preanal plate, with right hind limb outlined; f: dorsal aspect of right forelimb; g: ventral aspect of left hand; h: dorsal aspect of left hind limb.

followed by one single scale, posterior of which there is a circular depression covered by small scales, replacing the ear opening. All head scales juxtaposed, smooth.

Scales on nape slightly imbricate, smooth, in transverse rows; anterior row with quadrangular to rectangular scales, wider than long, posteriorly they change gradusmooth, imbricate, in eight transverse rows, posterior row with seven to ten scales. Collar indistinct.

Dorsals forming transverse rows of very narrow, imbricate scales, with truncate (hidden) anterior and sharply pointed posterior margins, causing a hexagonal impression; with a wide, low keel; 48-54 (49.9 ± 1.6, n= 11) rows of scales from first row behind parietals to posterior level of hind limbs. Scales on flanks similar to dorsals. Ventrals anteriorly smooth with rounded posterior margin, posteriad they gradually become similar to dorsals; in 37-39 (37.5 ± 0.8, n= 11) transverse rows. Scales around midbody 43-48 (45.5 ± 1.7, n= 11), of which 8 and scales on flanks hexagonal, smooth, imbricate; ventrals rectangular, juxtaposed. Prefrontals, supraoculars, and interparietal absent. Two (mostly) or three supraciliaries. Three fingers, hind limbs styliform. Preanal pores 1-1 in males, one or none in

(Based on Dixon, 1973 and on specimens examined).

Description.— A worm-like gymnophthalmid, maximum SVL 107 mm (Dixon, 1973). In the three specimens studied SVL are 67 mm, 39.5 mm, and 35 mm. Head

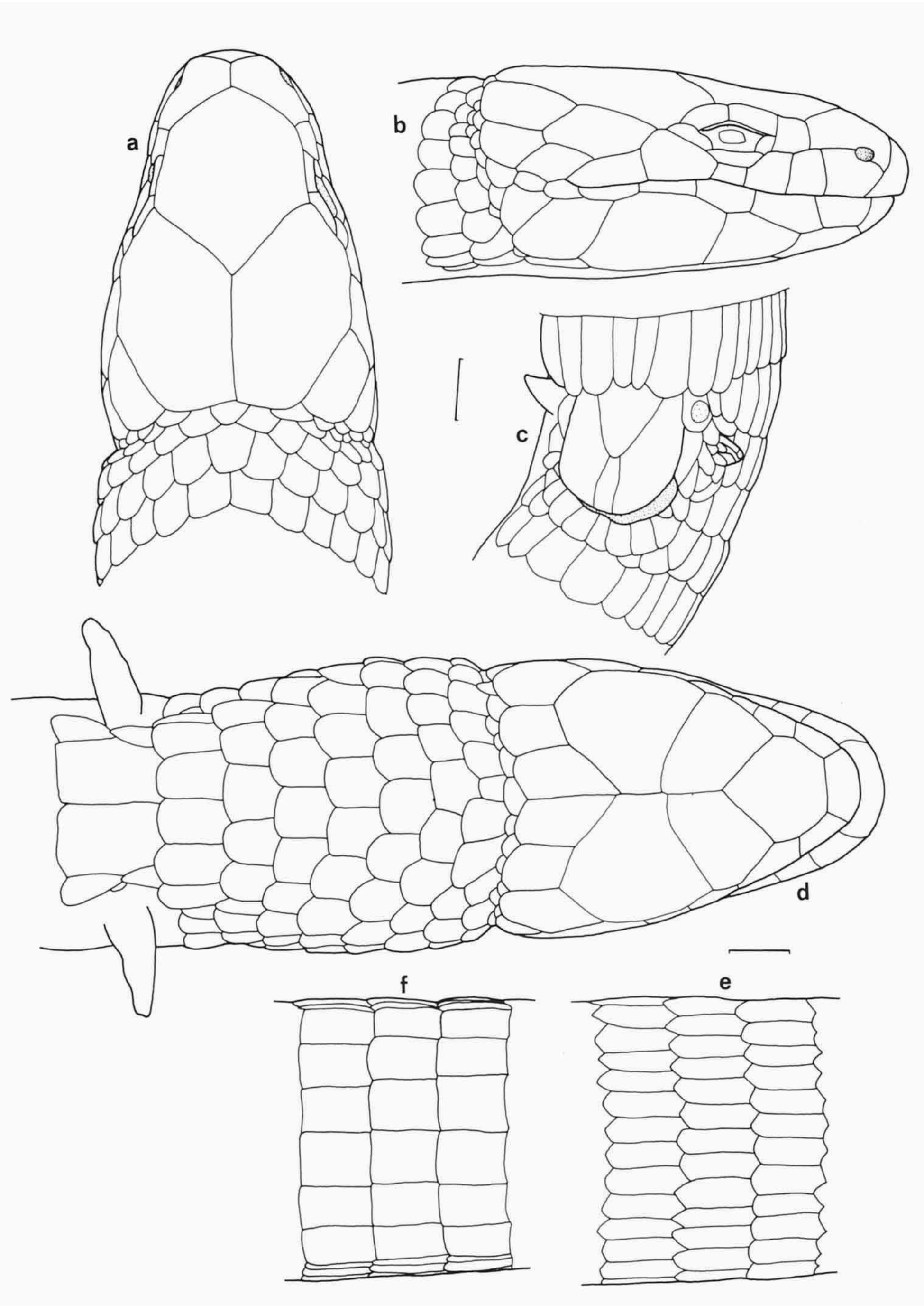


Fig. 118. *Bachia peruana*, ZUEC 435; a, b: dorsal (frontonasal absent) and lateral views of head; c: preanal plate, pore (present only on one side), and hind limbs (right one only outlined); d: ventral view of head, gulars, and interbrachials, with forelimbs outlined; e: dorsals near midbody; f: ventrals near midbody.

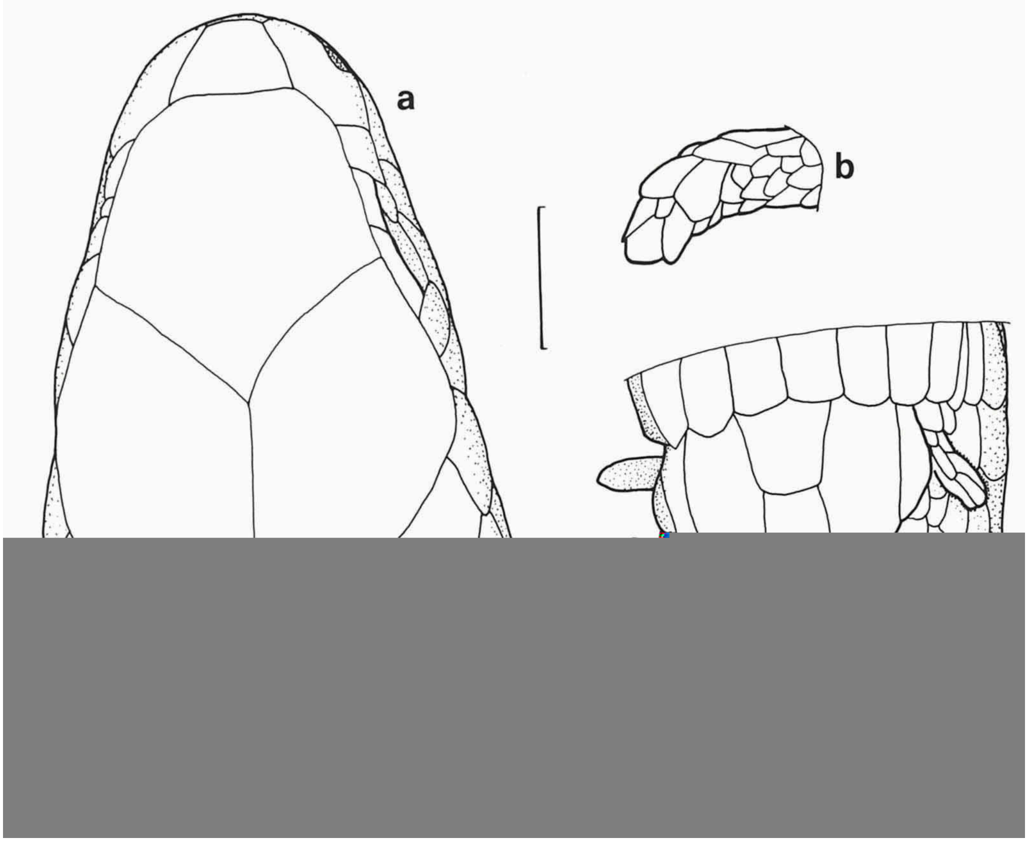


Fig. 119. *Bachia peruana*, ZUEC 436; a: dorsal view of head (frontonasal present); b: antero-dorsal aspect of right forelimb; c: preanal plate and hind limbs (right one only outlined).

Scales on tail similar to dorsals, in transverse rows all around tail.

Limbs compressed and very much reduced. Forelimbs correspond in length to three transverse rows of dorsals, hind limbs to one row. They are covered by variably polygonal, smooth scales.

Description of colour in life not available.

In preservative, head mostly brown or greyish-brown, ZUEC 435 and 436 with an irregular, elongate, white spot (or series of spots) close to lateral border of parietal. Back brown with four (paravertebral and dorsolateral) cream stripes, dorsolateral ones wider. In naked eye the stripes are straight, but under enlargement both paravertebral and dorsolateral stripes have irregular borders, and the former show brown spots. The paravertebral stripes either disappear on tail (juveniles), or become united into a series of irregular, light spots, gradually fading out distally. Ventral region uniformly tan or brown.

Habitat.— Dixon (1973) reported individuals found under rotting logs and in loose soil beneath decaying vegetation in coffee groves.

Distribution (fig. 109).— Along the median Huallaga and Ucayali rivers in Peru (Dixon, 1973); here reported for the first time from Brazil, in the state of Acre.

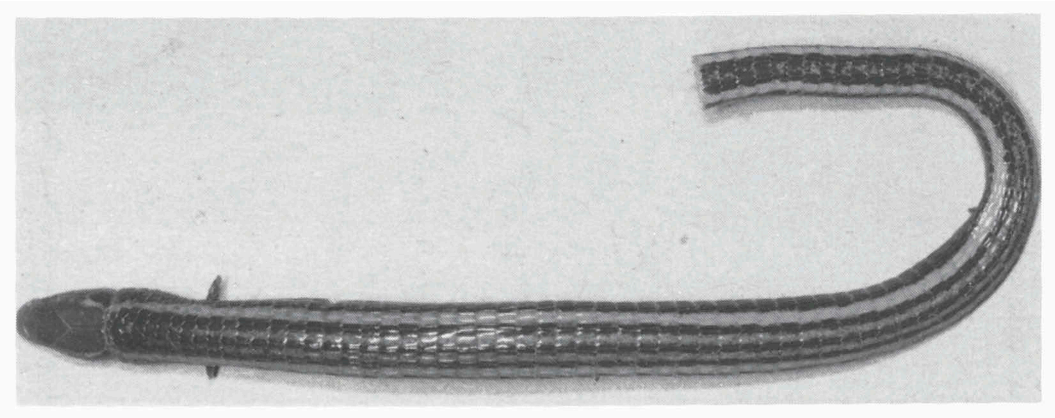


Fig. 120. *Bachia peruana*, ♀, ZUEC 435, Cruzeiro do Sul, AC, Brazil: dorsal view entire animal (T.C.S. Avila-Pires).

Remarks.— Dixon (1973) distinguished *B. dorbignyi* and *B. peruana* mainly on basis of number of dorsals (respectively 50-55 versus 53-56), ventrals (37-42 and 41-43), fifth versus fourth supralabials in contact with parietal, preanal pores 2-2 in males, 1-1 or absent in females (*B. dorbignyi*), or 1-1 in males, absent in females (*B. peruana*). Besides, frontonasal is always present in *B. dorbignyi*, present or absent in *B. peruana*. The specimens from Acre agree with *B. peruana* in the number of dorsals (54-57), ventrals (42-45), and the presence or absence of frontonasal, but agree with *B. dorbignyi* in having the fifth supralabial in contact with parietal, and in the presence of one pore (on only one side) in the only adult female studied. Previous authors

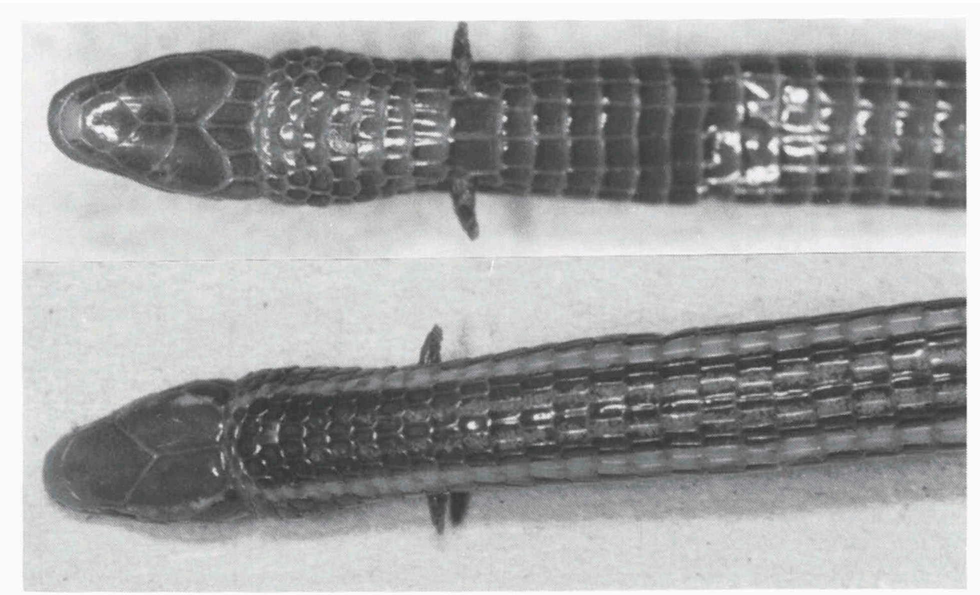


Fig. 121. *Bachia peruana*, ♀, ZUEC 435, Cruzeiro do Sul, AC, Brazil: upper figure ventral view, and lower figure dorsal view of head and anterior part of body (T.C.S. Avila-Pires).

already suggested that these two nominal taxa could be conspecific (maybe separated as subspecies; see references in Dixon, 1973). I believe more specimens from Acre could eventually throw light on this question. Moreover, Dixon (1973) already pointed out the ("superficial") similarity of *B. peruana* when it has no frontonasal, and *B. trisanale*, but he argues that there are significant (statistical) differences in numbers of dorsals and ventrals (whose ranges in *B. trisanale* are respectively 47-55 and 34-42). I have only examined the three specimens referred to here, and therefore I cannot evaluate this question, but I believe these groups deserve further studies. Even accepting that *B. trisanale* and *B. peruana* are distinct species (and considering that they are sympatric), it is important to call attention to the fact that the identification of some specimens without frontonasal and with relatively high numbers of dorsals and ventrals (in relation to *B. trisanale*) may be dubious.

Cercosaura Wagler, 1830

Diagnosis.— See diagnosis of the species.
Distribution.— In large part of South America east of the Andes.
Content.— Genus monotypic.

Cercosaura ocellata Wagler, 1830

Cercosaura ocellata Wagler, 1830: 158 (holotype ZSMH 643/0, type-locality: "Asia?", suggested by Ruibal, 1952, as northeastern South America, Suriname?); Burt & Burt, 1933: 58; Hoogmoed, 1979: 278; Vanzolini, 1986a: 14.

Diagnosis.— Body cylindrical, tail long, round in cross section. Limbs well developed, pentadactyl, all digits clawed. Nasals separated by frontonasal. Lower eyelid with semitransparent disc. Prefrontals, frontoparietals and occipitals present. Parietals shorter than interparietal. Gular region with median pairs of enlarged scales. Dorsals keeled, in longitudinal rows. Scales on flanks distinctly smaller than dorsals. Ventrals smooth.

The species comprises three subspecies, two of which (*C. o. ocellata* and *C. o. bassleri*) occur in Amazonia. A general description is presented, followed by data specific for each subspecies. Habitat, notes on natural history, and remarks refer to both subspecies.

Description.— Gymnophthalmid with maximum SVL in males of 65 mm, in females of 64 mm. Head 0.22-0.29 times SVL, relatively smaller in larger specimens; 1.5-1.8 times as long as wide; 1.1-1.4 times as wide as high. Snout blunt, rising gently posteriad. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.33-0.44 times SVL, hind limbs 0.44-0.56 times. Tail round in cross section, tapering toward tip, 1.8-3.0 times SVL, relatively longer in larger specimens.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral hexagonal, two and a half to three times as wide as high, visible from above, in broad contact with frontonasal. Frontonasal single, pentagonal, laterally in contact with nasal and loreal. A pair of quadrilateral prefrontals, slightly wider than long, in medial contact; each in contact laterally with loreal, first supraciliary, and having short suture with first supraocular. Frontal hexagonal, wider anteriorly, 1.5-1.8 times as long as its maximum width; laterally in broad contact with first supraocular, and usually a narrow contact with second supraocular. A pair of frontoparietals, each irregularly pentagonal, longer than wide, medial suture much longer than that between prefrontals; in contact laterally with second and third supraoculars (rarely separated from the latter by a suture between parietal and second supraocular), occasionally in touch with first supraocular. Interparietal with parallel or slightly posteriad divergent lateral margins, and angulate, rounded or irregular anterior and posterior margins; it may show incomplete sutures that start from posterior and/or anterior margins. A pair of irregularly pentagonal parietals, each shorter and wider than interparietal. Usually three occipitals, medial one distinctly smaller and in some specimens longitudinally or transversally split into two scales, or missing. Three supraoculars, first largest (in KU 13220 there are four supraoculars, first very small). Supraciliaries 3-5, first extends dorsally. Nasal undivided, nostril in its anterior part, directed lateroposteriorly. Loreal either single, large, usually in contact with supralabials, or divided into two scales, lower one in contact with supralabials. Frenocular either single, triangular, or divided vertically into two scales. A subocular series of 1-4 presuboculars, 3-5 suboculars s.s. (in contact with supralabials), and 2-5 postoculars (including upper scale in contact with supraoculars); usually presuboculars and anterior suboculars small, posterior suboculars and postoculars larger. Lower eyelid with a semitransparent disc of 2-3, occasionally four, palpebrals. Supralabials and postsupralabials (which form a continuous sequence) 6-9, mostly 7-8, fourth, rarely fifth, below centre of eye. Temporal scales irregularly polygonal, upper ones large, lower ones distinctly smaller. Ear-opening relatively large, oval, surrounded by small scales, anterior margin smooth or finely lobed, posterior margin smooth. Tympanum slightly recessed into a short auditory meatus. All scales smooth, juxtaposed.

Mental roughly semicircular. Postmental single, large, irregularly pentagonal or heptagonal. Four pairs of chinshields, first two in contact medially and with infralabials. Third in contact with infralabials, and usually separated medially by one or two scales, in some specimens in medial contact or separated by up to four scales. Fourth pair of chinshields separated from infralabials by one to three scales, of which one or two relatively large, separated medially by one or two rows of scales, rarely in partial contact. Chinshields either delimited posteriorly by one or two rows of smaller scales (scales of anterior row may be larger than those on posterior row), or in direct contact with gulars. Four, exceptionally five, infralabials, third longest, reaching approximately below centre of eye; followed by one to three post-infralabials, first usually largest. Gulars smooth, imbricate, in 8-11 transverse rows (including collar), of which 5-7, rarely four, with a medial enlarged pair of scales. Collar with 2-4 enlarged scales, which form a lobed posterior margin; when three or four scales, medial one(s) narrower. Gular fold rather indistinct.

Scales on nape imbricate, anterior ones smooth and slightly wider than long, posterior ones keeled, longer than wide. They form longitudinal and transverse rows, except for an anterior transverse row of slightly to distinctly larger, irregularly polygonal, smooth scales (usually four or six). Sides of neck with small, tuberculate scales.

Dorsals relatively large, rectangular to trapezoidal, longer than wide, imbricate, in eight longitudinal rows, and in 29-37 transverse rows between occipitals and posterior margin of hind limbs. Each dorsal with a low keel, the keels forming low longitudinal ridges. Scales on flanks distinctly smaller than dorsals, squarish, rhomboidal or lanceolate, imbricate, weakly keeled; in approximately transverse and oblique rows. Ventrals distinctly larger than dorsals, smooth, imbricate, either quadrangular, rectangular (slightly wider than long), or trapezoid (scales on lateral row with rounded external margins); in six longitudinal and 17-22 transverse rows. Dorsals, scales on flanks, and ventrals sharply delimited. Scales around midbody 25-36. Preanal plate with two anterior, and two or four, occasionally three, posterior scales. Preanal pores absent. Femoral pores 0-17, mostly 4-12, in total. Each pore in a much larger scale, closer to its posterior margin.

Scales on upper part and sides of tail like dorsals; on lower part like ventrals, proximally in four rows, medial pair wider, distally in two rows.

Limbs mostly with relatively large, smooth, imbricate scales. Small, granular, juxtaposed scales on lower aspect of upper arms and posterior aspect of thighs. Lamellae under fingers partially single, partially divided, under toes mostly divided, except distally; 14-18 under fourth finger, 16-24 under fourth toe.

For colour descriptions see under each subspecies.

Cercosaura ocellata ocellata Wagler, 1830
(figs. 122, 123, 281, 282)

Cercosaura ocellata; Goeldi, 1902: 537, 549.
Cercosaura olivacea; O'Shaughnessy, 1881: 228.
Cercosaura ocellata ocellata: Ruibal, 1952: 494; Cunha, 1961: 131 (part); Peters & Donoso-Barros, 1970: 91; Vanzolini, 1972: 103; Hoogmoed, 1973: 255; Cunha et al., 1985: 32; O'Shea, 1989: 68; Nascimento et al., 1991: 33.

Material.— **Brazil.** AMAPA. Município de Calçoene, road BR-156, igarapé Flaman: 1 ♂, MPEG 3530, 21.xi.1969, leg. F.P. Nascimento. Cupixi, 50 km S of Serra do Navio: 1 ♀, MPEG 15115, 15.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Município de Mazagão, Upper Rio Maracá: 1 ♂, 1 juv., MPEG 795-96, 1959, leg. M. Moreira. Município de Mazagão, Rio Camaipi (affluent Rio Maracá), Cachoeira Amapá: 1 ♀, MPEG 2650, 18.vi.1969, leg. F.P. Nascimento.
AMAZONAS. Borba: 1 ♂, 1 ♀, USNM 200685-686, 01-04.ix.1975, leg. "Expedição Permanente da Amazônia/MZUSP".
MARANHAO. Road BR-222, Gancho do Arari: 1 ♂, MPEG 12906, 14.viii.1979, leg. F.P. Nascimento & R.J.R. Moraes.
PARA. Ilha de Marajó: 1 ♂, BM 1924.2.28.12, leg. W. Ehrhardt. Rio Capim: 1 ♀, BM 49.11.8.95. Belém, Utinga: 1 ♂, MPEG 1881, 1963, leg. Fundação Rockfeller (SESP). Rio Tocantins, Mangabeira (near Baião): 1 ex., MPEG 671, 1953, leg. O.R. Cunha. Carajás, Serra Norte: 2 ♂♂, MPEG 12940, 12947, surroundings N-1, 23 & 27.v.1983, leg. F.P. Nascimento & R.J.R. Moraes; 2 ♂♂, 1 ♀, MPEG 13069, 13093-094, surroundings N-1, 13 & 16.xi.1983, leg. F.P. Nascimento, T.C.S. Avila Pires & R. Bittencourt N.; 1 ♂, MPEG 13707, Pojuca, 24.vii.1984, leg. T.C.S. Avila Pires, E. Faria & M.G.M. Nery; 1 ♀, MPEG 13768, Manganês do Azul, 06.viii.1984, leg. A. Cardoso; 1 ♀, MPEG 14391, Pojuca, 21.v.1986, leg. M. Santa Brígida & R. Souza. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA post (1°47'32.3"S, 51°26'01.5"W): 1 ex., RMNH 26560, 23.x.1992; 1 juv., RMNH 26561, 16.xi.1992; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 1 ex., MPEG 16366, 22.x.1992; 2 exs., MPEG 16423, RMNH 26546, 30.xi.1992; 1 juv., MPEG 16427, 31.x.1992; 1 ♂, RMNH 26547, 1 ♀, MPEG

16457, 08.xi.1992; 1 ♂, RMNH 26548, 10.xi.1992; 1 juv., MPEG 16483, 14.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Amazonas, Taperinha (near Santarém): 1 ex., NMW 19154:1, leg. H. Zerny. SUDAM Floral Reserve, 74 km SE Santarém: 1 ex., KU 13220, 03.vii.1970, leg. M.L. Crump.

RORAIMA. Ilha de Maracá: 1 ex., MR 134, 02.viii.1987, leg. M. O'Shea, INPA/RGS/SEMA "Projeto Maracá".

Suriname. NICKERIE. Kabalebo, road to Amotopo: 1 ♀, RMNH 25340, km 57, alt. 60 m, 03.ix.1980; 1 ♀, RMNH 25341, km 51, alt. 70 m, 08.ix.1980; 1 ♂, RMNH 25342, km 94, alt. 100 m, 23.ix.1980; all leg. M.S. Hoogmoed & J.J.P. Paats; 1 ♂, RMNH 25343, km 109, alt. 100 m, 27.ix.1980, leg. M.S. Hoogmoed; 1 ♂, RMNH 25344, km 109, alt. 100 m, 10.v.1981, leg. J. Toto; 1 ♂, RMNH 25345, km 212, alt. 120 m, 21.v.1981, leg. M.S. Hoogmoed & J. Toto.

Diagnosis.— Loreal and frenocular undivided; 1-2 presuboculars; mostly one large scale between each chinshield of fourth pair and infralabials; posterior pair of chinshields usually in contact with gulars; 24-30 (27.1 ± 1.6) scales around midbody; one transverse row of dorsals at midbody corresponds to two transverse rows of scales on flanks.

Description.— Maximum SVL in males 58 mm (MPEG 875), in females 64 mm (MPEG 15115). See table 8 for scale counts and characteristics of scutellation specific for this subspecies. Colour pattern variable, of which some examples are given below.

MPEG 15115, ♀, from Amapá, in life had dorsal surface of head raw-umber (223), sides of head drab-grey (119D); back with jet-black (89) longitudinal bands intercalating with four buff-yellow (53) longitudinal stripes; flanks mikado-brown (121C), with a faint cinnamon (39) longitudinal stripe and very small white spots; ventral surface of head and belly mother-of-pearl colour; tail with verona-brown (223B) dorsolateral bands and light-russet-vinaceous (221D) lateral bands, separated by jet-black stripes; underside of tail mother-of-pearl colour with glaucous (80) peppered spots on centre of scales; colour of limbs similar to that of tail, no spots on underside of forelimbs.

RMNH 26547-548, both males from Caxiuanã, Pará, with dorsal surface dark greyish-brown, flanks deep orange with white, black bordered ocelli; a dorsolateral and a ventrolateral stripe, anteriorly cream, posteriorly tan; on ventral surface, head and most of belly pearl-white, posterior part of belly with an orange or yellow tinge, limbs light grey or yellowish, tail vivid orange. MPEG 16457, a female from same locality, with dorsal surface of head and most of back dark greyish-brown, posterior part of back and tail orange-brown; a cream (anteriorly) to orange-brown (posteriorly) dorsolateral stripe; flanks with cream small dots with dark borders; upper part of flanks of same colour as back, lower part lighter; on ventral surface, head and belly pearl-white, limbs pale grey, tail orange on the sides, yellowish medially (regenerated part of tail grey). Juveniles with underside of tail orange.

RMNH 25342 (♂), from Suriname, with back dark brown with two dorsal light brown stripes, and two cream colour dorsolateral stripes. An orange-brown band on upper part of flanks, with a series of white, black-bordered ocelli; lower part of flanks yellow-green with a light stripe. Dorsal surface of tail brown. Chin and gulars white, belly cream colour, underside of tail near base cream colour with a lateral orange stripe, distally orange-red. Iris gold colour with a reddish-brown rim around pupil. Tongue anteriorly dark blue, near base pink (M.S. Hoogmoed field notes).

Colour in life also described by Vanzolini (1972) and Hoogmoed (1973). A colour

Table 8. Comparison between scale characteristics of *C. o. ocellata* and *C. o. bassleri*:

	C. o. ocellata	*C. o. bassleri*
loreal	undivided	divided into an upper and a lower scale*
frenocular	undivided	undivided or divided into an anterior and a posterior scale
presuboculars	1-2	1-4, mostly 3
scales between fourth pair of chinshields and infralabials	one large (one large, one small on one side of RMNH 25341)	1-4, mostly 2-3
chinshields and gulars	usually in contact, occasionally separated by a row of small scales	occasionally in contact, mostly separated by 1-2 rows of small scales
transverse rows of dorsals: t.r. of scales on flanks (near midbody)	1 : 2	mostly 1 : 3, occasionally 1 : 2 or 1 : 4
preanal plate (anterior scs/ posterior scs.)	♂♂: 2/2; ♀♀: 2/4 (mostly), 2/2 (MPEG 2650, BM 49.11.8.95)	♂♂: 2/2; ♀♀: 2/2 (all specimens from Brazil), 2/4 (two specimens from Peru)
dorsals (transverse rows)	31-37 (33.2 ± 1.5) n= 26	29-34 (32.4 ± 1.4) n= 22
ventrals (transverse rows)	18-22 (19.8 ± 0.9) n= 24	17-20 (18.6 ± 1.0) n= 23
scales around midbody	24-30 (27.1 ± 1.6) n= 23	26-36 (31.6 ± 2.6) n= 23
lamellae 4th finger	14-18 (15.4 ± 1.1) n= 39	14-18 (15.4 ± 1.0) n= 45
lamellae 4th toe	17-24 (19.8 ± 1.4) n= 43	16-21 (19.1 ± 1.3) n= 46

* MPEG 876 presents both loreals and frenoculars undivided, as in *C. o. ocellata*; ZFMK 41146 on the right side has a divided loreal and a frenocular, while on the left side what should be the lower loreal is fused with the frenocular.

picture is given by Gasc (1990).

In preservative, specimens from Suriname and Amapá with four light stripes along back, separated by black bands and bordered laterally by a black stripe; a thin light line may be present along the middle of each black band, or only in the vertebral one. In specimens from Carajás, back brown, dorsolateral light stripes with dark brown margins along all or most of body, paravertebral light stripes paler and usually thinner than dorsolateral ones. In specimens from other localities south of the Amazon, back brown, dorsolateral light stripes with dark brown margins, paravertebral light stripes absent; a vertebral dark brown band may be present. Dorsal surface of head always brown. A thin black line from rostral to anterior corner of eye, which may continue along border of eyelids. A segment of the dorsolateral light stripe, with dark borders, extends anteriad to posterior corner of eye. Flanks grey, greyish-brown, or dirty-cream. A light ventrolateral stripe from posterior corner of mouth to base of hind limbs may be present, anteriorly with undulating margins. A row of ocelli (white, black-margined spots) is usually present on upper part of flanks, well developed in adult males, small, poorly developed, or absent, in females and juveniles. Ventral surface of head and belly completely cream, or belly with an irregular, peppered, dark spot at centre of each scale, especially on lateral rows, and on preanal scales. Tail with light brown, cream or dirty-white longitudinal bands, separated by a middorsal, and at each side a lateral and a ventrolateral, dark stripe. Near its base the paravertebral stripes of back merge and disappear, while the dorsolateral stripes

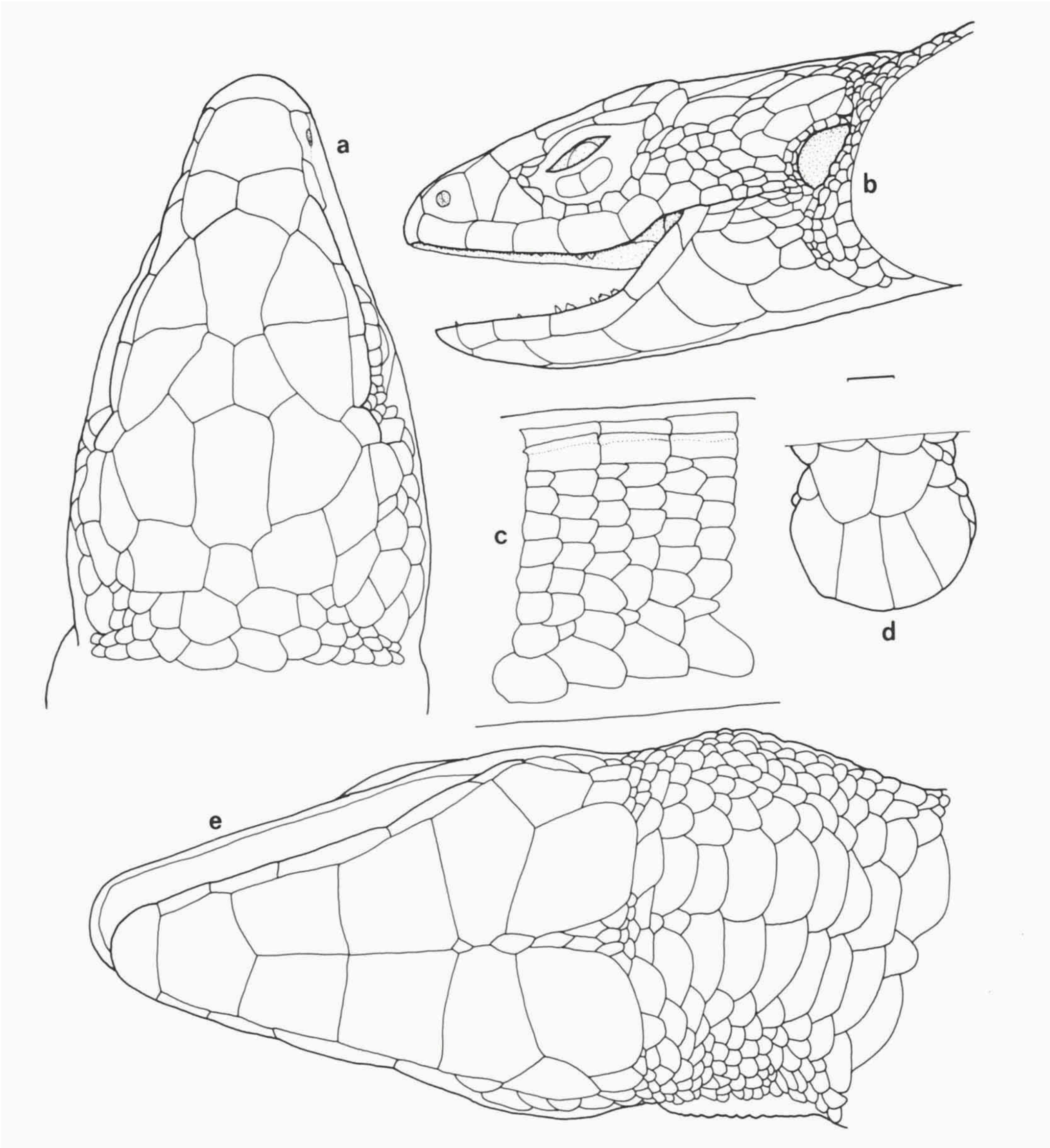


Fig. 122. *Cercosaura o. ocellata*, MPEG 14391; a, b: dorsal and lateral views of head; c: scales in a lateral view of body, near midway between fore- and hind limbs; d: preanal plate; e: ventral view of head and gulars.

converge to continue as the pair of dorsal light bands. Underside of tail cream with two longitudinal rows of dark irregular spots (a peppered dark spot at centre of each scale). Upper surface of limbs light with an irregular dark reticulation, or predominantly dark with light dots; lower surface cream, with or without dark spots.

Distribution (fig. 123).— Eastern Amazonia, in Guyana, Suriname, French Guiana, and Brazil (Amapá, western Maranhão, Pará, eastern Amazonas, Roraima). Also

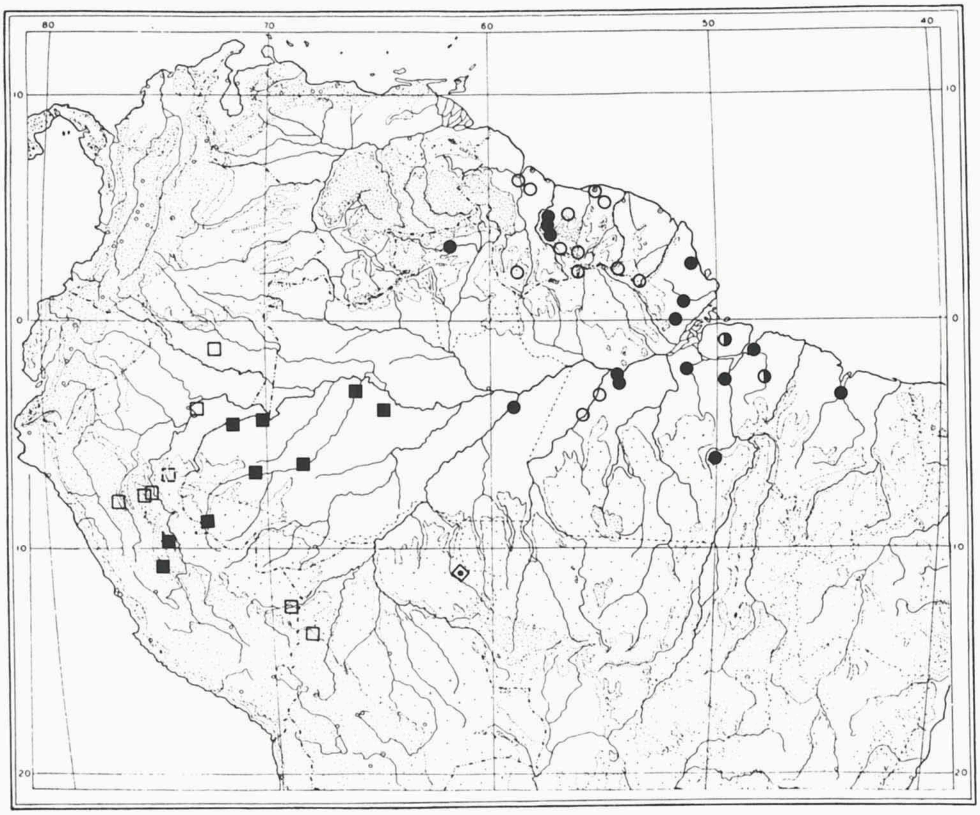


Fig. 123. Distribution of *Cercosaura ocellata* in Amazonia. Circles = *C. o. ocellata*; squares = *C. o. bassleri*; rhombus with central dot = subspecies unknown. Closed symbols = material studied. Half-open circles = material studied from Ilha de Marajó and Rio Capim, without further specification. Open symbols = data from literature (Boulenger, 1885b; Ruibal, 1952; Vanzolini, 1972, 1986a; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Dixon & Soini, 1975; Gasc, 1976; Lescure & Gasc, 1986; Duellman, 1987). Dashed square = Rio Tapiche Valley, Peru [locality Bombo, not found]).

reported from northeastern Brazil (Pernambuco and Bahia, respectively by Boulenger, 1885b, and Ruibal, 1952), most probably from the Atlantic forest.

Cercosaura ocellata bassleri Ruibal,1952
(figs. 123, 124, 279)

Cercosaura ocellata bassleri Ruibal, 1952: 499 (holotype AMNH 23191, type locality: Perené, Rio Perené, Peru); Cunha, 1961: 134; Peters & Donoso-Barros, 1970: 91.
Cercosaura ocellata ocellata; Cunha, 1961: 131 (part).

Material.— **Brazil.** ACRE. Rio Juruá (right bank), Porongaba (8°40'S, 72°47'W): 1 ex., INPA 616, 29.ii.1992, leg. C. Gascon.
AMAZONAS. Rio Urucu, E of Porto Urucu, Petrobras RUC-2: 1 ♂, MPEG 15854, 23.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Juruá (left bank), Condor (6°45'S, 70°51'W): 1 ex., INPA 429, 16.ix.1991, leg. C. Gascon. Rio Juruá (left bank), Lago Jainu (6°28'S, 68°46'W): 1 ex., INPA 475,

17.x.1991, leg. C. Gascon. Rio Juruá (left bank), site VV (3°17'S, 66°14'W): 1 ex., INPA 750, 01.vi.1992, leg. C. Gascon. Rio Solimões, Benjamin Constant: 2 ♂♂, RMNH 25346-347, 2 juv., RMNH 25348-349, 14.xi.1985, leg. M.S. Hoogmoed; 1 ♀, RMNH 25350, 1 juv., MPEG 15894, E of village (Santo Antonio), 08.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, RMNH 25351, 10.xii.1989; 2 ♂♂, MPEG 15942-943, 1 ♀, RMNH 25353, 12.xii.1989; all W of village, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 2 ♀♀, RMNH 25352, MPEG 15929, 11.xii.1989; 1 juv., RMNH 25354, 14.xii.1989; 2 ♂♂, RMNH 25355, MPEG 15970, 15-16.xii.1989; all W of village, leg. local children through M.S. Hoogmoed & T.C.S. Avila Pires; 2 ♀♀, 1 juv., MNRJ 2137-39. Rio Javari, Estirão do Equador: 1 ♀, 1 ex., MPEG 876-77, 1959, leg. J. Hidasi.
Peru. Rio Perené, Perené: holotype, ♂, AMNH 23191, leg. C. Shunke. Rio Yullapichis, Panguana: 1 ♀, ZFMK 41145, 20.iv.1980, 1 ♀, ZFMK 41146, 14.ii.1979, both leg. U. Meede.

Diagnosis.— Loreal divided into upper and lower scale; frenocular single or divided into anterior and posterior scale; 1-4, mostly 3, presuboculars; each chinshield of fourth pair separated from infralabials by 1-4, mostly 2-3, scales; posterior pair of chinshields usually separated from gulars by 1-2 rows of small scales; 26-36 (31.6 ± 2.6) scales around midbody; one transverse row of dorsals at midbody corresponds usually to three, occasionally to two or four, rows of scales on flanks.

Description.— Maximum SVL in males 65 mm, in females 63 mm (both Dixon & Soini, 1975, 1986). See table 8 for scale counts and characteristics of scutellation specific for this subspecies.

Colour in life of MPEG 15854, an adult male from Urucu, dorsally Prout's brown (121A), darker on head, with a series of black spots on back; a cream colour (54) narrow dorsolateral line, paler anteriorly, and a cream colour ventrolateral dotted line; flanks flame-scarlet (15) with white, black-margined, ocelli; on ventral surface, head and chest white (black bars crossing labials), belly white medially and flame-scarlet laterally; tail dorsally Prout's brown with black spots, laterally flame-scarlet and black, ventrally flame-scarlet; iris brown with an orange rim around pupil; tongue dark grey anteriorly, pinkish-white posteriorly. RMNH 25350, an adult female from Benjamin Constant, had dorsal surface of head and back natal-brown (219A), back with black spots and a dorsolateral series of buff-yellow (53) small spots, bordered by black; flanks and forelimbs army-brown (219B), with cinnamon-drab (219C) irregular spots, with dark borders; tail and hind limbs verona-brown (223B), with tawny-olive (223D) spots; ventrally head pearl-white, slightly yellowish on belly, underside of tail beige (219D); iris golden; tongue black anteriorly, white posteriorly. In MPEG 15894 and RMNH 25351, both juveniles from Benjamin Constant, dorsal surface of tail respectively raw-sienna (156) and orange-rufous (132C), ventral surface of tail pale spectrum-orange (17), paler near base.

Notes of colour in life also were given by Dixon & Soini (1975, 1986).

In preservative, MPEG 15854 (the only specimen from Urucu and the only adult male in the sample studied) with dorsal surface of head and back dark brown; an intermittent, irregular, dark stripe along vertebral area; a light stripe from posterior corner of eye to tail (which is broken near its base), running close to edge of brown area of back, faint on head, vivid white along most of body, faint again on posterior part of body and tail; along its dorsal side, a series of transversely elongate, black spots; flanks pale salmon, with five large ocelli on one side, six on the other, first ocellus above forelimb. MPEG 876 (Estirão do Equador, ♀) has a similar dorsal pattern, but the black spots extend closer to vertebral area, and the vertebral stripe is

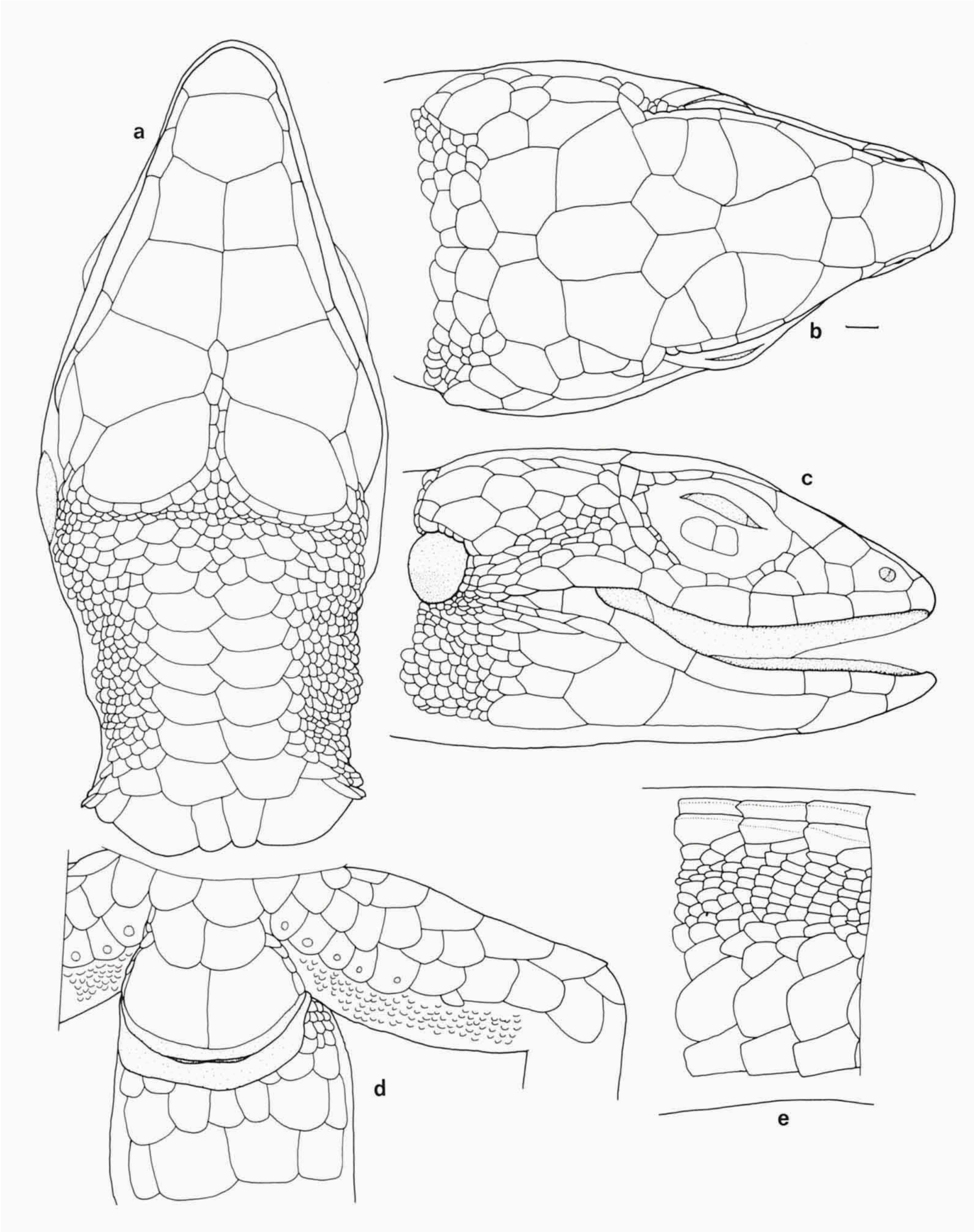


Fig. 124. *Cercosaura ocellata bassleri*, MPEG 15854; a: ventral view of head and gulars; b, c: dorsal and lateral views of head; d: preanal plate and right thigh with femoral pores; e: scales in a lateral view of body, near midway between fore- and hind limbs.

absent; flanks light brown with an irregular series of small, poorly developed ocelli. Specimens from Benjamin Constant greyish-brown, with a pair of paravertebral light stripes from nape to base of tail, and a dorsolateral row of small ocelli on each side. Between the paravertebral and dorsolateral rows, in two or three longitudinal (vertebral and dorsolateral, or only dorsolateral) rows, irregular, black spots (in larger specimens spots are more conspicuous, in juveniles stripes and ocelli are so). A ventrolateral row of larger and more irregular ocelli than those in the dorsolateral row present from posterior corner of mouth to base of hind limbs. Between these two rows, another one with smaller, paler ocelli, or just a few ill-defined ocelli not forming a row. Specimens from Peru with a very pale, dotted, paravertebral light stripe; a dorsolateral light stripe from nape to tail; and a pale ventrolateral series of small, irregular ocelli. No black spots present. All Brazilian specimens with ventral region spotless. On dorsal surface of tail the black spots of back continue for a short distance, and the dorsolateral and ventrolateral light rows continue along most of its length. Tail distally predominantly light brown with dark spots.

Distribution (fig. 123).— Western Amazonia, in Brazil (Amazonas, Acre), Colombia (Departamento Amazonas), Peru, and Bolivia.

Habitat of the species *C. ocellata*.— Found in terra firme forest, frequently close to more open, sunny places, like on border of narrow or broad trails, near river margins, fallen trees, etc. In primary or secondary forest. MPEG 15115, from Cupixi, Amapá, was in an isolated, degraded, small piece of primary forest with invading secondary elements. RMNH 26561, from Caxiuanã, Pará, was on the border of a wide trail through an open (secondary?) type of forest. M.S. Hoogmoed (field notes) reported RMNH 25340 from savanna forest on white sand. Individuals are most commonly found on the ground, MPEG 13707 was about 20 cm high on the stem of a sapling. Vanzolini (1972) reported an individual 1.5 m above ground on a tree trunk. Hoogmoed (1973) and Gasc (1976, 1990) reported the species to live near creeks.

Notes on natural history of the species *C. ocellata*.— A diurnal lizard, frequently found in sunny spots, which suggests heliothermy. Time of collecting of 18 active individuals varied between 09:30 and 14:40 h.

Dixon & Soini (1975, 1986) presented some data on reproduction.

Meede (1984) reported small arthropods as food, especially spiders and ants. Hoogmoed (1973) observed an individual that regurgitated a spider.

MPEG 12906 was found in the stomach of the colubrid snake *Liophis reginae* (Linnaeus).

Remarks.— The only character that separates the two subspecies (nearly) completely seems to be the presence of an undivided or divided loreal. However, other differences do exist, that are valid for most specimens, or in certain cases most populations (table 8).

Among scale counts (table 8), the only character that (partially) separates the two subspecies is the number of scales around midbody. In the number of transverse rows of ventrals there seems to be a tendency in *C. o. ocellata* to have one scale more, but the overlap between the two subspecies is very high. These data are in agreement with those by Hoogmoed (1973) and Dixon & Soini (1975, 1986) with reference, respectively, to *C. o. ocellata* from Suriname and Guyana, and *C. o. bassleri* from Iquitos region, Peru. Data by Ruibal (1952) for *C. o. bassleri* from several localities in Peru, all south of Iquitos, and from Bolivia, show numbers closer to those of *C. o. ocellata*.

Differences can also be observed between populations of the same subspecies. This is seen, for example, in colour pattern. Three distinct patterns of the back in *C. o. ocellata* were described above: one north of the Amazon (back black or dark brown with four light longitudinal stripes), the other two south of it (back light brown with two or four light longitudinal stripes). Ruibal (1952), Hoogmoed (1973) and Gasc (1976, 1990) reported specimens from the Guianas with a reddish-brown or light brown pattern. Whether part of this variation is individual or ontogenetic is not possible to say with the material studied, but at least part of it occurs between populations. In *C. o. bassleri*, the sample from Benjamin Constant presents some differences as compared to specimens from Urucu and Estirão do Equador, but they all have dorsal black spots, while these are absent in specimens from Peru. Geographical variation is also observed in number of pores in *C. o. ocellata*: most specimens from north of the Amazon have 8-12 pores (in total), while those in southeastern Amazonia have 4-8. USNM 200685 (♂, from Borba), however, presents 17 pores, while in USNM 200686 (♀, same locality) no pores were observed, although that could be because of its small size (30 mm SVL). No sexual dimorphism was observed in number of pores (with the exception, maybe, of the material from Borba just mentioned), and this agrees with observations of Ruibal (1952) and Hoogmoed (1973). Vanzolini (1972), however, implied sexual dimorphism in specimens he studied from Maloquinha and Monte Cristo (close to the Tapajós river), when he said that, among juveniles, "One male, 37 mm snout to vent, can be sexed by inspection of the femoral pores (...). Four specimens 33 mm and under cannot be sexed, as no pore impressions are visible". Unfortunately, he did not mention the number of pores in the adult specimens of the sample.

As to the relationship between the two subspecies, the following picture emerges: (1) *C. o. ocellata* reaches westward, south of the Amazon, at least to Borba, on the right margin of the Rio Madeira. Only two specimens were studied from this locality, which presented some differences as compared to specimens from eastern Pará and from north of the Amazon, but none of these varied in the direction of *C. o. bassleri*. (2) Among *C. o. bassleri*, Urucu is the easternmost locality. The only specimen from there, an adult male, agrees in general with specimens from Benjamin Constant, further west, except for its pattern (which at least in part is due to sexual differentiation). (3) From Benjamin Constant a relatively good sample could be studied. The sample is rather homogeneous in its characters, several of which agree with those of other populations of *C. o. bassleri*, and diverge in many aspects from *C. o. ocellata*. They all have a divided loreal and some of them also have a divided frenocular, although the scales which result from the divisions vary in shape. The colour pattern is distinctive from all other specimens observed, but closer to that of other specimens (of this subspecies) from Amazonas (Brazil) than to that of specimens from Peru. In relation to the nominal subspecies, the pattern of the specimens from Benjamin Constant is more divergent than is that of the Peruvian specimens. Some of the scale counts, as pointed out above, are more divergent from those of *C. o. ocellata* than in some Peruvian populations further southwest (according to data by Ruibal, 1952). (4) MPEG 876, from Estirão do Equador, has an undivided loreal, for which reason it was reported by Cunha (1961) as *C. o. ocellata*; it has, however, other characteristics of

C. o. bassleri, e.g. one transverse row of dorsals corresponding to three rows of scales on flanks, fourth pair of chinshields separated from infralabials by three scales, 17 transverse rows of ventrals, two posterior preanal scales (♀), and back with relatively large black spots as seen in specimens from Benjamin Constant and Urucu (MPEG 877, also from Estirão do Equador, was considered by Cunha, 1961, as *C. o. bassleri*, thus implying a divided loreal, although it is no longer possible to see this character in this specimen, due to its bad condition of preservation).

All these data are quite fragmentary, but they do suggest the existence of two groups, corresponding to the two recognised subspecies. They also indicate the existence of geographic variation within each subspecies, which means that good samples from several localities will be necessary for a better understanding of the group.

Vanzolini (1986a) reported the species from Rondônia, without specifying the subspecies. On geographical grounds, it could be of any of the two subspecies.

Colobosaura Boulenger, 1887

Diagnosis.— Gymnophthalmids with relatively short limbs and long tail. Limbs pentadactyl, first finger reduced, clawless. Nasals separated by frontonasal. Lower eyelid with semitransparent, undivided disc. Prefrontals and frontoparietals present, occipitals absent. Interparietal and parietal of approximately similar length. One to eight pairs of nuchals, separated or not by a median scale. Gular region with enlarged median pairs of scales. Dorsals elongate-hexagonal, keeled. Ventrals smooth.

Distribution.— Predominantly along the South American diagonal belt of open formations, and in southeastern Amazonia.

Content.— Two species, *C. mentalis* Amaral and *C. modesta* (Reinhardt & Lutken), of which only the latter occurs in parts of Amazonia.

Colobosaura modesta (Reinhardt & Lütken, 1862) (figs. 125-128)

Perodactylus modestus Reinhardt & Lütken, 1862: 218 (holotype ZMUC 4377, type-locality: Ponte Pari, hill of Morro da Garça, Minas Gerais, Brasil); Boulenger, 1885b: 423; Goeldi, 1902: 537, 550.

Colobosaura modesta; Boulenger, 1887a: 508; Burt & Burt, 1933: 60; Amaral, 1937a: 1739, 1937b: 22; Peters & Donoso-Barros, 1970: 99; Vanzolini & Ramos, 1977: 33; Cunha & Nascimento, 1982: 6; Nascimento et al., 1987: 44, 1988: 37.

Colobosaura landii Cunha, 1977: 3 (holotype MPEG 8513, type-locality: forest near Vila de Curupati, margins of Rio Piriá, road PA-25 (Bragança-Viseu), Pará, Brasil, at 1°26'S, 46°27'W); Vanzolini, 1986b: 8; Cunha & Nascimento, 1994: 15, 107.

Material.— **Brazil.** BAHIA. Barreiras: 2 exs., MNRJ 2571-72, 13.iii.1942, leg. Bailey & Carvalho.
GOIAS. Anápolis: 1 ♀, AMNH 62139, ii.1937, leg. R.M. Gilmore; Niquelândia: 1 ♀, CEPB 498, leg. N.J. Silva Jr.
MINAS GERAIS. Hill of Morro da Garça, Ponte Pari: holotype, ♀, ZMUC 4377, x.1855.
MARANHAO. Vila Andiroba, 18 km from São Luiz: 1 ♀, MPEG 12907, 28.vii.1980, leg. M. Gonçalves.
MATO GROSSO. Barra do Tapirapé: 2 ♂♂, AMNH 90305-306, 20.vii-15.viii.1962, leg. B. Malkin; 2 exs., MNRJ 2067-68, leg. A.L. Carvalho. Barra do Bugres, Estação Ecológica Serra das Araras: 2 juv., MPEG 14314, 14320, 22 & 27.i.1986, leg. R.J.R. Moraes.
PARA. Rio Piriá, forest near Vila de Curupati, road PA-25 (Bragança-Viseu) (1°26'S, 46°27'W): 1 ♂, MPEG 8513 (holotype *C. landii*), 1 ♂, 1 ♀, MPEG 8512, 8514 (paratypes *C. landii*), 05.x.1976, leg. O.R.

Cunha & F.P. Nascimento. Município Augusto Correa, Fazenda Cacoal (road to Arari, 27 km E of Bragança): 1 ♂, MPEG 9795, 28.ii.1976; remains of 1 or 2 specimens, MPEG 12898, 26.x.1973; both leg. O.R. Cunha & F.P. Nascimento. Município de Bragança, Parada Bom Jesus: 1 ex., MPEG 12178, 10.viii.1972, leg. O.R. Cunha & F.P. Nascimento. Capanema: 1 ♂, KU 140137. Km 23 road to Maracanã: 1 ex., MPEG 12896, 18.v.1973, leg. O.R. Cunha & F.P. Nascimento. Igarapé-Açu: 1 ♂, MPEG 5195, 19.ix.1971, leg. O.R. Cunha & F.P. Nascimento. Rio Tocantins, reservoir area of hydroelectric dam Tucuruí: 1 ♂, MPEG 13666, igarapé Saúde, 17.vi.1984, leg. I.J. Lopes & R. Santana; 1 ♂, MPEG 13810, Ilha Tocantins, 01.viii.1984, leg. R.J.R. Moraes & I.J. Lopes. Carajás, Serra Norte, N-1: 1 ♀, MPEG 13992, 17.xi.1984, leg. J.M. Santos; 1 ♂, MPEG 14205, 23.ix.1985, leg. F.P. Nascimento & M.G.M. Nery.

Diagnosis.— As generic diagnosis, and in addition the following features: three pairs of chinshields, of which anterior two very large, third pair distinctly smaller and short; 5-8 pairs of nuchals. Dorsal surface of head and back light brown, back with small, irregular, dark brown spots; flanks dark brown, well demarcated from back. No light vertebral band.

Description.— Gymnophthalmid with maximum SVL in males of 55 mm (MPEG 9795), in females of 49 mm (MPEG 13992). Head 0.17-0.24 times SVL, relatively larger in juveniles, and in adult males (0.20-0.22) in relation to adult females (0.17-0.19); 1.4-1.7 (1.54 ± 0.08, n= 19) times as long as wide, 1.2-1.6 (1.31 ± 0.10, n= 16) times as wide as high. Neck only slightly narrower than, or as wide as, head and body. Body cylindrical to slightly depressed. Limbs short, forelimbs 0.16-0.25 times SVL, relatively shorter in larger specimens, hind limbs 0.28-0.38 (0.34 ± 0.03, n= 18) times (no allometric growth observed). Tail round in cross section, tapering toward tip, 1.6 times SVL in the smallest specimen studied (SVL= 22mm), 1.8-2.4 (2.13 ± 0.23, n= 9) times SVL in the remaining ones (SVL between 27 mm and 55 mm, variation not correlated with size).

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid or tricuspid.

Rostral trapezoidal in dorsal view, about two and a half times as wide as high, in broad contact with frontonasal. Frontonasal irregularly pentagonal or heptagonal, in contact with rostral, nasals, loreals (shortly) and prefrontals. Prefrontals form a short medial border (just in touch in MPEG 8513). Each prefrontal in contact with frontonasal, loreal, first and second supraoculars, and frontal. Frontal hexagonal, slightly longer than wide, in contact with prefrontals, second supraoculars, and frontoparietals. A pair of frontoparietals which form a medial suture longer than that between prefrontals. Each one in contact also with frontal, second (in most cases) and third supraoculars, parietal, and interparietal. Interparietal more than twice as long as wide, with sides approximately parallel and posterior margin angulate, truncate or roundish. Parietals wider and slightly shorter than interparietal. Three supraoculars, first smallest, second about as large as, or slightly larger than third. Two elongate supraciliaries, followed by a short scale which in some specimens is in a supraciliary position, in other specimens in a postocular position. First supraciliary widens anteriorly but does not expand dorsally. Nasal undivided, nostril in its inferior margin, medially. One roughly rectangular loreal, in contact with nasal, frontonasal, prefrontal, first supraocular, first supraciliary, preocular, frenocular, and first and second supralabials. Frenocular mostly present, relatively small, in some specimens fused with first subocular (holotype, ZMUC 4377, with frenocular on one side divided into

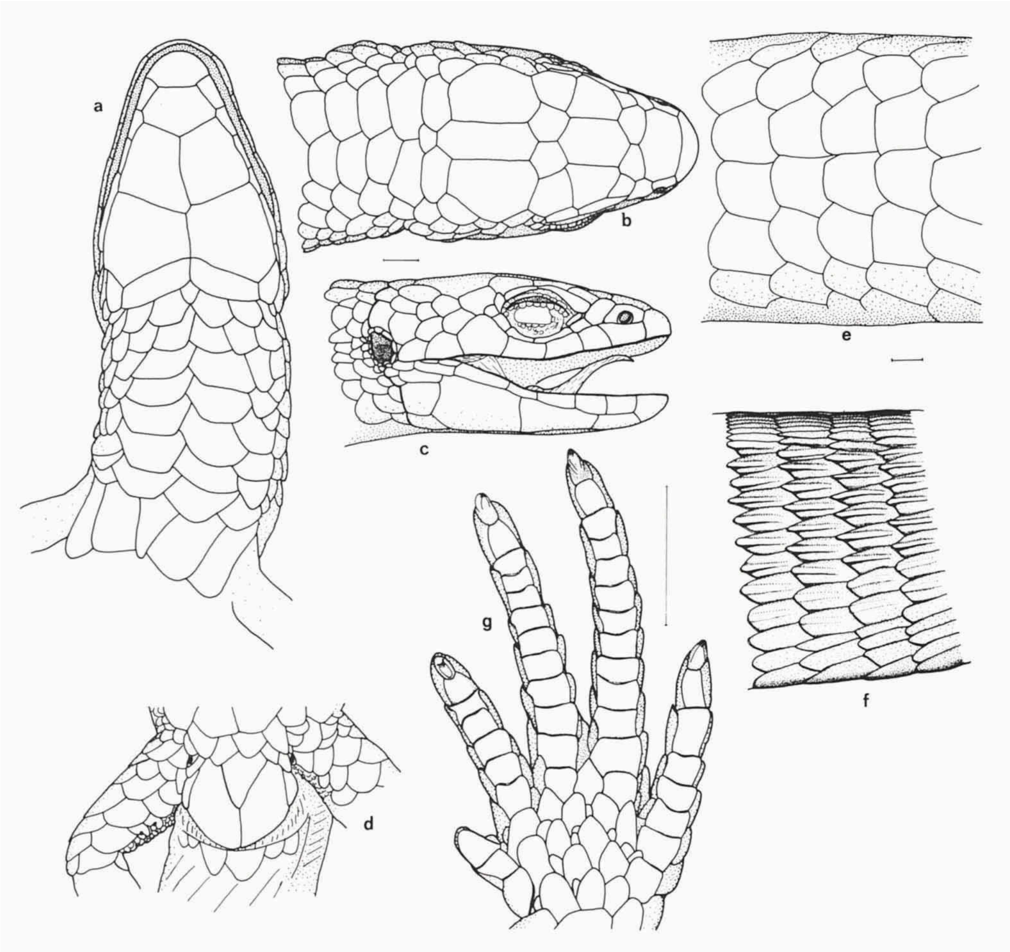


Fig. 125. *Colobosaura modesta*, MPEG 13992 (♀); a: ventral view of head, gulars, and interbrachials; b, c: dorsal and lateral views of head; d: preanal plate and right thigh, showing pores; e: ventrals near midbody; f: scales in a dorsolateral view of body, midway between fore- and hind limbs; g: ventral aspect of left hand.

one anterior and one posterior scale). One preocular, 2-4 narrow suboculars, and a wider postsubocular. One or two anterior, and one large, posterior, postoculars present. Large postocular dorsally in contact with third supraocular and parietal, ventrally either in contact with fifth supralabial, or separated from it by one of the other (smaller) postoculars. Lower eyelid with a semitransparent, undivided disc. Pupil round, lower margin may show one or a few small invaginations. Five supralabials, fifth largest, fourth below centre of eye. Supralabials followed by two postsupralabials, which decrease in size and almost reach ear-opening. Temporals 6-10, irregularly polygonal, smooth, juxtaposed, in oblique rows, slightly increasing in size posteriad. Posterior row, between parietal and ear-opening, formed by three relatively large scales. Ear-opening surrounded by small scales, with indented anterior margin. Tympanum recessed in an auditory meatus.

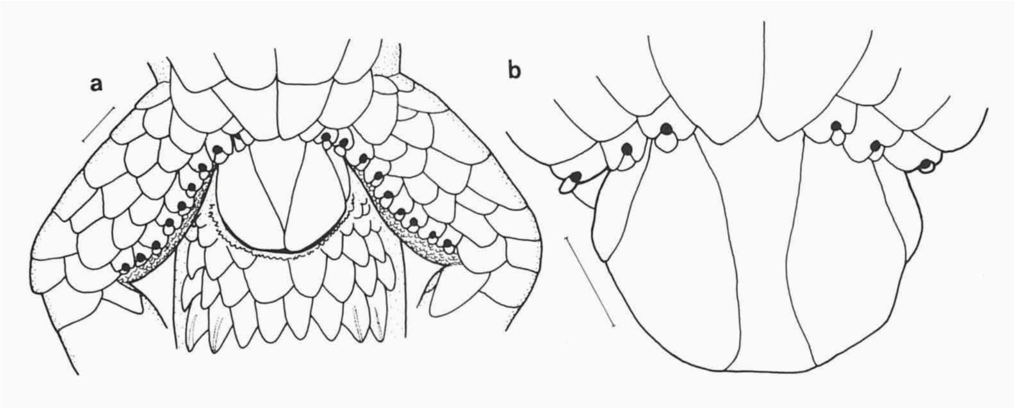


Fig. 126. *Colobosaura modesta*; a: preanal plate, thighs, and pores in MPEG 13810 (♂); b: preanal plate, preanal pores, and first femoral pore at each side in MPEG 8513 (♂, holotype of *C. landii*).

Mental wide, trapezoidal, rounded anteriorly. Postmental irregularly heptagonal, wider than long. Two large pairs of chinshields, in contact medially and with infralabials, followed by a third, much shorter, pair. Third pair usually in medial contact, and separated from infralabials by one wide and one narrow, elongate, scale. In some specimens third pair separated medially by a small scale, and so much reduced as not to be recognisable as chinshields. Five (rarely three or four) infralabials, fourth, or suture between third and fourth, below centre of eye. Infralabials followed by one or two postinfralabials, which almost reach ear-opening. All head scales juxtaposed, smooth.

Parietals followed by 5-8 pairs of trapezoidal, smooth, imbricate nuchals. Anterior pair of nuchals more than twice as wide as long, scales of posterior pair slightly longer than wide, other pairs intermediate. Between first pair of nuchals, more rarely also between second pair, may occur a medial, single scale. Scales on sides of neck flat, imbricate, smooth or multicarinate, with ellipsoid posterior margin; they increase slightly in size posteriad. Gulars with enlarged medial pair of scales (except, in some specimens, in the anterior row), slightly increasing in size posteriad, in 6-8, mostly seven, transverse rows (including collar). Collar not pronounced, formed by four scales.

Dorsals form transverse rows of narrow, imbricate scales, with truncate (hidden) anterior and sharply pointed posterior margins (causing a hexagonal impression), and with a wide, low keel; 28-32 (30.4 ± 1.2, n= 20) rows from first pair of nuchals to posterior level of hind limbs. Scales on flanks slightly wider, lanceolate; toward ventral region they gradually become smooth, and their posterior margins more rounded. Ventrals smooth, imbricate, in 18-21 (19.8 ± 1.1, n= 20) transverse rows, and in four longitudinal rows. Scales of medial pair of longitudinal rows larger, trapezoid; outer ventral scales roughly squarish, but with rounded posterior margins. Scales around midbody 26-29 (27.4 ± 1.1, n= 19). Most specimens examined with five preanal scales, of which a triangular one medially, two large paramedials that contact each other posterior to the medial triangular scale, and two small lateral ones. Paramedial scales completely separated in ZMUC 4377 (holotype), MPEG 8515, MPEG

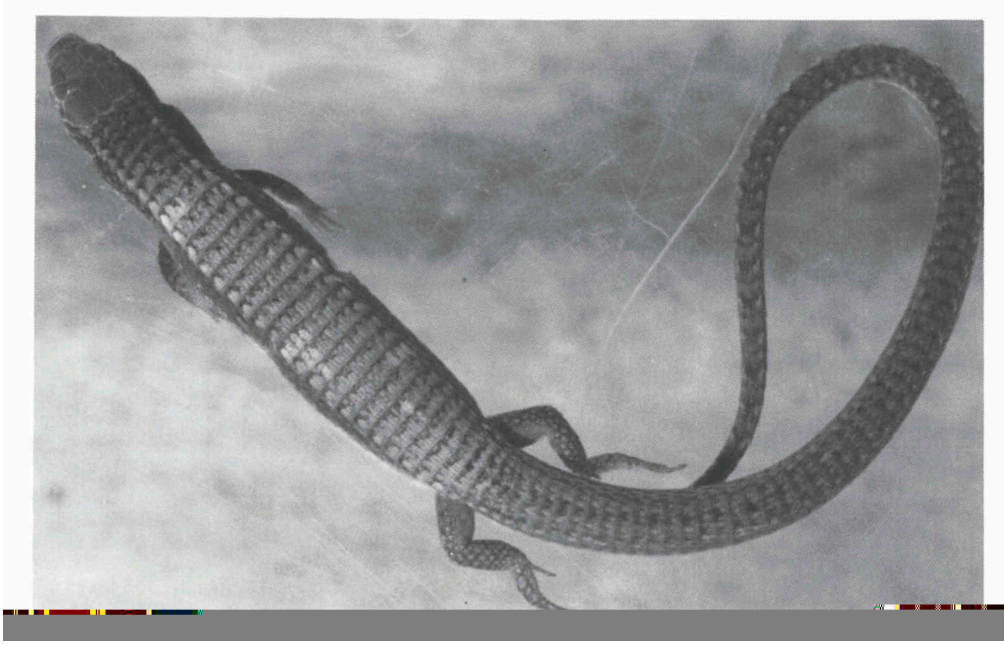


Fig. 127. *Colobosaura modesta* (Reinhardt & Lütken), ♂, MPEG 13666, Tucuruí, PA, Brazil: dorsal view (T.C.S. Avila-Pires).

14312, and MPEG 8513, in the former three specimens by an extra scale posterior to the medial one, in the latter specimen by the extension of the medial scale until the cloacal slit. In CEPB 498, MPEG 12178, and on one side of MPEG 13810 the lateral scales (which are variably developed in other specimens) completely disappear. Pores well developed in adult males, between two scales, of which one much smaller than the other; 16-21 (18.7 ± 1.3, n= 12) in total. Preanal and femoral pores form a continuous row. Females without or with poorly developed pores (MPEG 13992 with two small femoral pores and one almost inconspicuous preanal pore on each side; MPEG 12907 with six pairs of scales similar to those carrying a pore, on each thigh, in at least three of which per side a small pore can be discerned; MPEG 8512 with 6-7 pairs of scales that might carry very inconspicuous pores).

Scales on tail similar to dorsals, but smaller. They form transverse rows of similar scales all around the tail.

Scales on forelimbs large, imbricate, smooth, except on ventral aspect of upper arms, where they are much smaller. Hind limbs with very large, smooth, imbricate scales on anterior aspect of thighs; relatively large, smooth, imbricate scales on ventral aspect, bordered in males by the row of scales with pores; and granular scales on posterior and ventral aspects of thighs. Lower legs with large, smooth, imbricate scales on their ventral aspect; slightly smaller scales on anterior and posterior aspects, those on anterior aspect keeled; on dorsal aspect similar to the latter, but slightly decreasing in size. Fingers and toes well developed, with claws, except for first finger, which is reduced and clawless (according to Vanzolini & Ramos, 1977, this finger varies from tubercular, clawless, to relatively well developed). Lamellae under fingers single, not or slightly tuberculate, 9-11 (exceptionally eight or twelve)

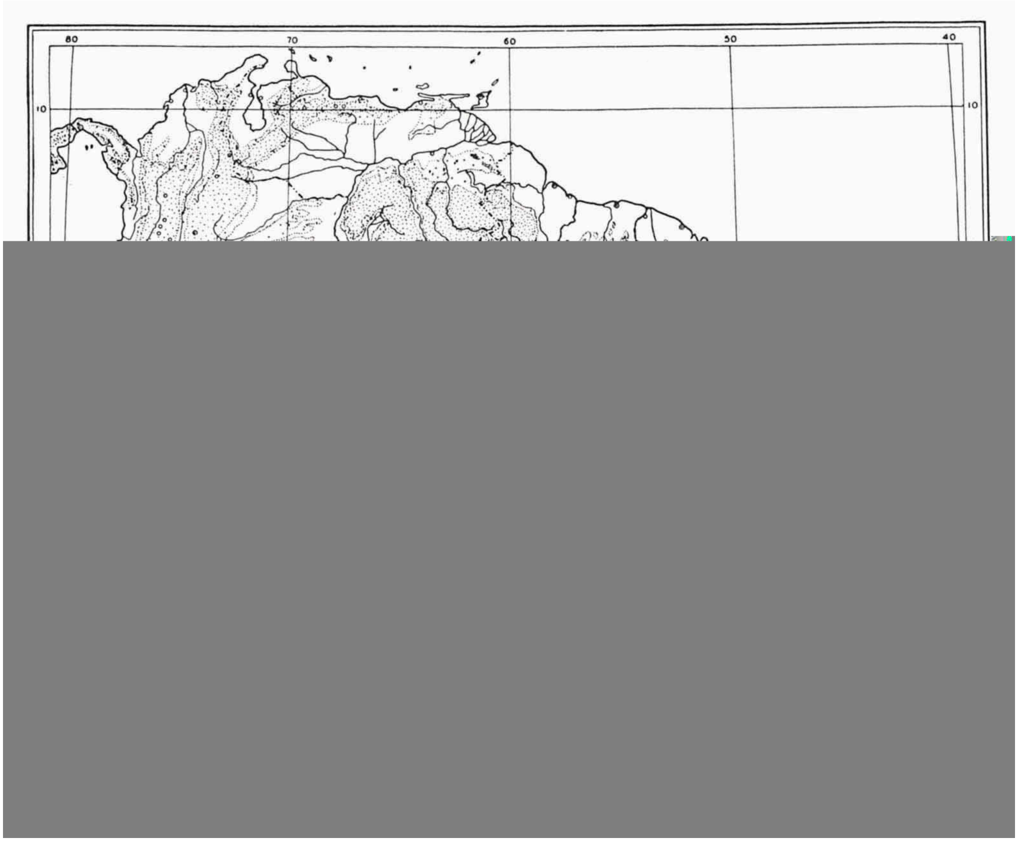


Fig. 128. Distribution of *Colobosaura modesta* (material studied). For other localities south of the area here represented (Mato Grosso do Sul and São Paulo) see Vanzolini & Ramos (1977).

under fourth finger. Lamellae under toes mostly moderately tuberculate, under first, second and fifth toes single, under third and fourth toes mostly double; 14-17 (exceptionally 13 or 18) under fourth toe (counted along inner side).

Colour in life of MPEG 13992 (♀), natal-brown (219A) on dorsal surface of head and most of back, changing on posterior part of back to chestnut (32); throughout back with small black spots. Flanks sepia (219). A narrow, dorsolateral, buff (124) stripe on anterior part of body. Ventral region cream, translucent. According to Cunha (1977), the holotype of *C. landii* (MPEG 8513), when recently captured, had belly, underside of tail and of hind limbs light red.

In preservative, dorsal region light brown, back scarcely to densely peppered with very small dark dots, and with small, irregular, dark-brown spots present in some specimens. A pale dorsolateral stripe, bordered dorsally by a dark-brown line, from nape, along body, and continuing along tail, although more conspicuous on anterior part of body. Flanks dark-brown, with one more-or-less regular longitudinal row of small light dots, or with more numerous, widespread, white dots. Labials with alternate light and dark bars. Ventral region cream. Colour of tail similar to that of body, distally the dark lateral band may disappear. A dorsolateral row of light dots continues to tip of tail. Moreover, anterior part of tail with a middorsal dark-brown stripe, variably evident in different specimens. Colour pattern similar in males and females, but colours tend to be more contrasting in males.

Habitat.— The species was originally known only from areas of cerrado (Vanzolini & Ramos, 1977). Of MNRJ 2571-72, from Bahia, one was on a trail in caatinga, the other between dry leaves on a large ant nest, in forest (from field notes). MPEG 14314 and 14320, both from Barra do Bugres, Mato Grosso, were in gallery forest in an area of cerrado, on and between stones. MPEG 12907, from near São Luiz, Maranhão, was in an open, sandy area. Cunha (1977) described *C. landii* from Amazonia on the basis of specimens found in primary forest, and later on other specimens have been collected in forested areas (eastern Pará and Tucuruí). MPEG 13810, from Tucuruí, was between dry leaves, in area of varzea forest with sandy soil. In Carajás animals were found in areas of grassy vegetation growing on predominantly rocky substrate.

Notes on natural history.— Only of few specimens the time of collecting is known: 08:00-10:30 h and 15:00-16:00 h.

MPEG 12178 was found in the stomach of *Oxybelis aeneus* (Wagler), MPEG 12896 in the stomach of *Echinantera occipitalis* Jan (MPEG 3395), MPEG 12898 in the stomach of *Oxyrhopus melanogenys orientalis* Cunha & Nascimento (MPEG 5378). In the latter two cases, besides a complete specimen there was a piece of tail of another specimen. Remains of two specimens (one complete or almost complete tail of 115 mm in length, another complete, smaller tail, and one foot) were found in the stomach of *Oxybelis aeneus*, MPEG 16573, from Carajás. Cunha & Nascimento (1978: 136) reported two more specimens of *E. occipitalis* with *C. modesta* in the stomach.

Distribution (fig. 128).— Brazil, in the area of cerrados and in southeastern Amazonia, in the states of São Paulo, Minas Gerais, Bahia, Goiás, Mato Grosso do Sul, Mato Grosso, Maranhão, and Pará. Possibly also in the chaco, in Paraguay and/or Argentina (see Vanzolini & Ramos, 1977: 38).

Remarks.— Present data seem to indicate some sexual difference in number of transverse rows of dorsals (♂♂: 28-32, 29.8 ± 1.1, n= 12; ♀♀: 30-32, 31.3 ± 0.7, n= 8) and of ventrals (♂♂: 18-20, 19.2 ± 0.8, n= 12; ♀♀: 20-21, 20.8 ± 0.5, n= 8). A larger number of specimens should be checked to evaluate whether such differences are real.

Gymnophthalmus Merrem, 1820

Diagnosis.— Gymnophthalmids with body cylindrical to slightly depressed, tail long, round in cross section. Limbs well developed, but hands tetradactyl, inner finger missing; feet pentadactyl. Nasals separated by frontonasal. Lower eyelid grown over the eye, immovable, transparent. Prefrontals present, frontoparietals absent. Dorsals and ventrals smooth, imbricate.

Distribution.— From Central America to northern Argentina, and some of the

Gymnophthalmus underwoodi species complex
(figs. 129, 130, 283, 285)

The following citations refer to animals included in this complex:

Gymnophthalmus underwoodi Grant, 1958: 228 (holotype UIMNH 42334, type-locality: Barbados, West Indies); Hoogmoed, 1973: 273; Vanzolini, 1976: 177; Cunha, 1981a: 107; Hardy et al., 1989: 215; Cole et al., 1989: 12; O'Shea, 1989: 55; Cole et al., 1990: 27; Vanzolini & Carvalho, 1991: 205.

Gymnophthalmus speciosus; Hardy et al., 1989: 215; Cole et al. 1989: 12; Cole et al., 1990: 27.

Gymnophthalmus underwoodi?; Cole et al., 1990: 28.

G[ymnophthalmus]?; Cole et al., 1990: 28.

Gymnophthalmus leucomystax Vanzolini & Carvalho, 1991: 214 (holotype MZUSP 69301, type-locality: Fazenda Salvamento, Roraima).

Gymnophthalmus cryptus Hoogmoed, Cole & Ayarzaguena, 1992: 3 (holotype RMNH 22166, type-locality: Canaripó, riverine forest 1.5 km SE of camp, 91 m elevation, Departamento Atabapo, Territorio Federal Amazonas, Venezuela).

Material.— **Brazil.** PARA. Santarém, Alter-do-Chão: 10 ♂♂, 2 ♀♀, 7 juvs., MPEG 16245-263, 02-11.ii.1982, leg. Departmento de Ecologia/INPA.
RORAIMA. Município de Boa Vista, Região do Taiano, Colônia Coronel Mota: 7 ♂♂, 6 ♀♀, MPEG 3968-70, 4009, 4033-36, 4095-99, 4108, 17-25.vi.1970, leg. F.P. Nascimento. Município de Boa Vista, Fazenda Bom Intento: 5 ♂♂, 5 ♀♀, MPEG 4147, 4172-75, 4200, 4301, 4415-17, 02-13.vii.1970, leg. F.P. Nascimento. Ilha de Maracá: 3 ♀♀, MR 375, 389, 19 & 24.x.1987, MR 607, 06.iii.1988, all leg. M. O'Shea.
Guyana. Lama Conservancy, S of Enmore Estate, 30 km S of coast, 50 km SE of Georgetown: 5 ♀♀, RMNH 25356-360, 08.vi.1986, leg. L.G. Hoevers.
Suriname. NICKERIE. Kabalebo, road to Amotopo, km 117, 4 km S of Baruba Creek: 1 ♀, RMNH 22149, 17.ix.1980, leg. M.S. Hoogmoed & J.J. Paats.

Diagnosis.— A complex of cryptic species, of which at least one (*G. underwoodi*) is parthenogenetic. In addition to the characteristics diagnostic for the genus, they are recognised by dorsals and ventrals smooth, scales around midbody 13-15, 30-36 with prefrontals, supraoculars, and interparietal, exceptionally also with frontonasal. Interparietal much larger than, and similar in shape to, frontal. A pair of irregularly pentagonal parietals, wider than long and distinctly shorter than interparietal. Three occipitals, similar to dorsals. Only one, large, supraocular. Two supraciliaries, first large, expanded dorsally, second small. Nasal undivided, about rectangular, longer than wide, nostril near its centre, directed laterally. Loreal irregularly hexagonal, about as wide as long, in contact with supralabials and followed by a smaller frenocular. A continuous series of a small preocular, two suboculars, first long and narrow, and two, rarely one, relatively small postoculars. Lower eyelid grown over the eye, immovable, transparent. Pupil round. Six, occasionally five or seven, supralabials,

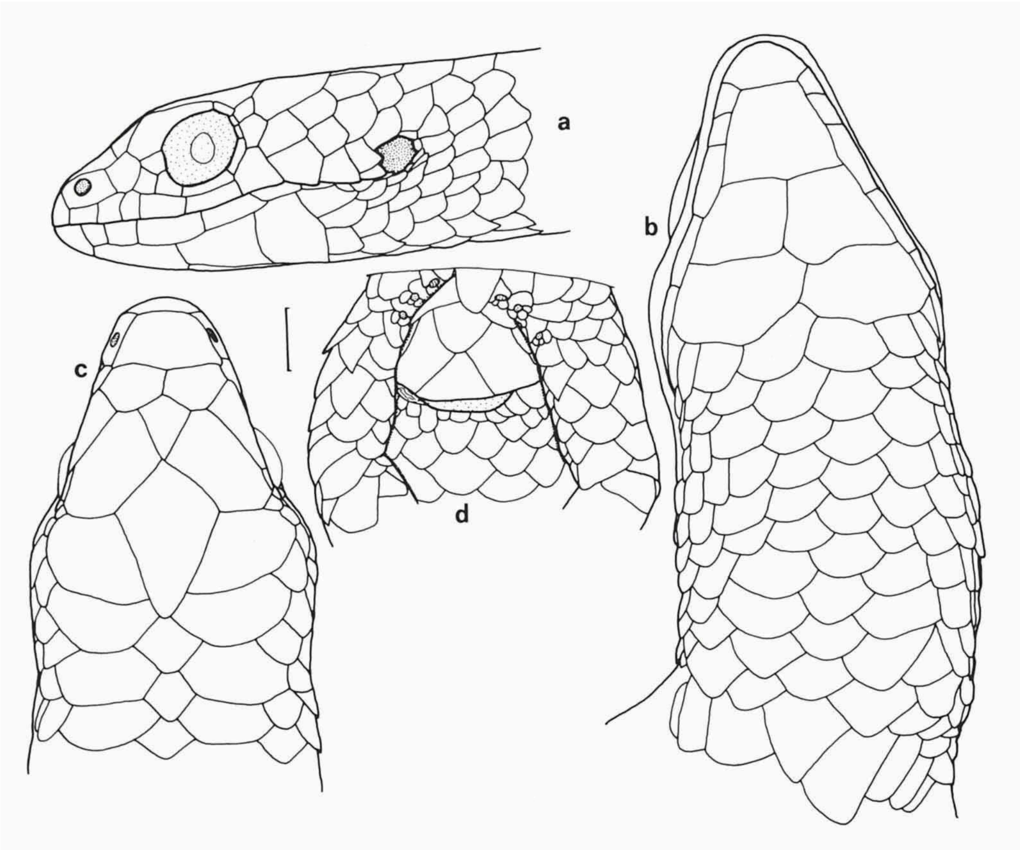


Fig. 129. *Gymnophthalmus underwoodi* species complex, MPEG 16257 (♂ from Alter-do-Chão, Pará); a: lateral view of head; b: ventral view of head, gulars, and interbrachials; c: dorsal view of head and scales on nape; d: preanal plate and thighs, showing preanal and femoral pores.

bordered by black, is commonly present. Tail may be of similar colour as body, blue, or orange to red.

In preservative, specimens from Fazenda Bom Intento and Colonia Coronel Mota (Roraima) with upper part of head and back bluish- or greenish-grey, delimited by a whitish dorsolateral stripe, especially evident on head and anterior part of body, fading posteriad. Flanks and limbs dark brown. Tail light brown, heavily to lightly peppered with dark brown, colour of back grading over a short distance into that of tail, or changing abruptly into it. Ventrally, chin with dark spots laterally, occasionally also medially. Gular region and belly with scales partially cream, partially dark or light greyish-brown. Underside of limbs and of proximal part of tail cream peppered with dark brown, usually predominantly cream, distally tail may be completely cream. In specimens from Alter-do-Chão both back and flanks are preponderantly dark brown, although in some specimens a greyish tinge appears on head and anterior part of back, or the head dorsally is distinctly greenish-grey, in contrast with the dark brown back. Dorsolateral stripe, ventral region, limbs and tail as described above.

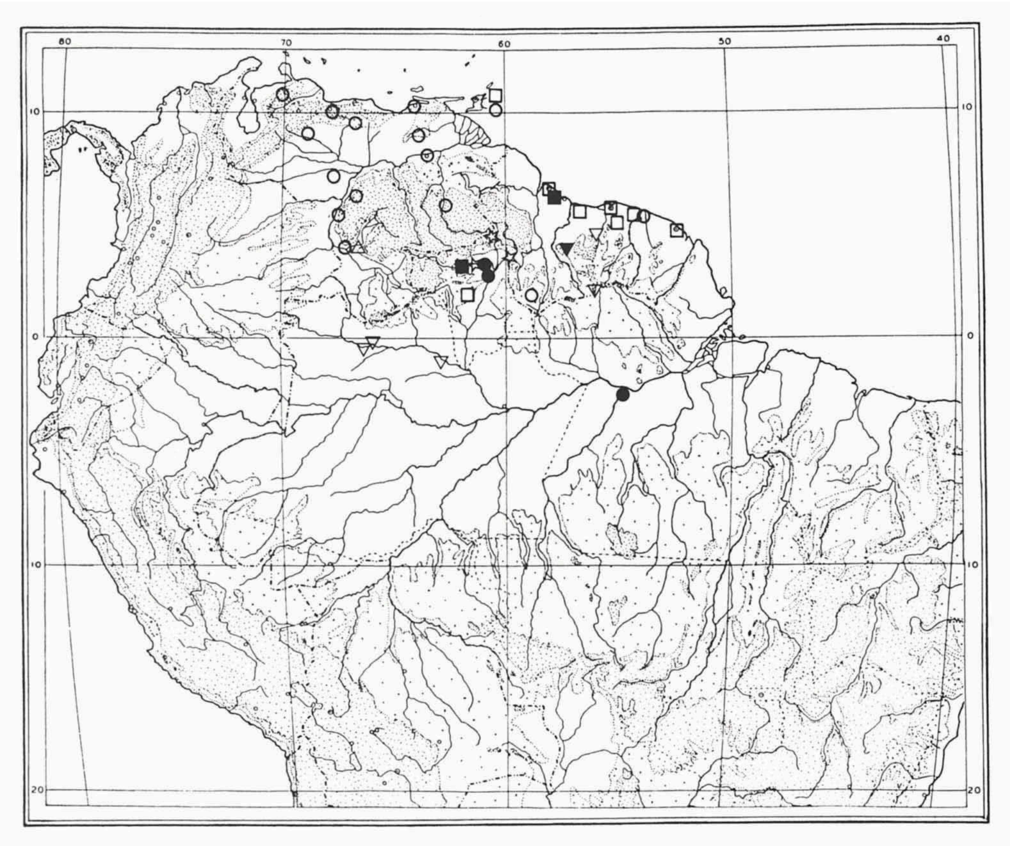


Fig. 130. Distribution of *Gymnophthalmus underwoodi* species complex. Closed symbols = material studied. Open symbols = data from literature (Hoogmoed, 1973; Cole et al., 1990; Vanzolini & Carvalho, 1991; Hoogmoed et al., 1992). Squares = *G. underwoodi* (considering as such all confirmed or supposed all-female populations). Stars = *G. leucomystax*. Triangle pointing upward = *G. cryptus*. Circles = other bisexual populations. Triangles pointing downward = condition of reproduction unknown.

Habitat.— Members of this group inhabit areas of open vegetation, or open types of forest, living among leaf-litter or grass. Hoogmoed (1973) reported *G. underwoodi* from Suriname in gardens, savanna-type forest on granite inselbergs, cocoa-groves, and among dense herbs along a river beach. RMNH 22149 was among leaf litter at base of *Furcraea foetida* Haw, on open granite slab with sparse vegetation surrounded by savanna forest (M.S. Hoogmoed, field notes). Cole et al. (1990) reported both for *G. underwoodi* and *G. speciosus* "open habitats where direct sunlight reaches the ground and temperatures are high". On Maracá Island these lizards occur in the leaf-litter of dry, sandy terra firme forest (O'Shea, 1989). Vanzolini & Carvalho (1991) reported *G. underwoodi* from sunlit spots in (usually relatively open) forest, while *G. leucomystax* occurred in open vegetation, on the ground or in cavities in termite mounds. The specimens here studied from Alter-do-Chão, Pará, were amidst the leaf litter accumulated below trees on a river beach; they also occur in the area of savanna behind the beach (W.E. Magnusson, in lit.).

Notes on natural history.— Diurnal lizards. At least one species of this complex is parthenogenetic.

Distribution (fig. 130).— *Gymnophthalmus underwoodi* species complex occurs in the Guianan region (Brazil, French Guiana, Suriname, Guyana, and Venezuela); in at least some localities south of the Amazon and Negro rivers (Taperinha and Alter-do-Chão, Pará; São João and Barcelos, Amazonas); in Trinidad and the West Indies; and possibly reaching Nicaragua (if the identification as *G. speciosus* of some of the northern South American bisexual populations is correct). In Brazil, records of bisexual populations exist for Alter-do-Chão, near Santarém, Pará (this paper) and several localities in the campos of northeastern Roraima (Vanzolini, 1976; Cunha, 1981; Vanzolini & Carvalho, 1991), where *G. leucomystax* Vanzolini & Carvalho occurs. Forested localities in Roraima seem to harbour parthenogenetic populations, identified by Vanzolini & Carvalho (1991) as *G. underwoodi*, those from Ilha de Maracá identified by Cole et al. (1990) as '*G. underwoodi*?'. Only seven specimens (all females) are known from localities on the Rio Negro, which are considered by Vanzolini & Carvalho (1991) as *G. underwoodi*, and by Cole et al. (1990) as of doubtfull identification ('*G.*?').

Remarks.— *Gymnophthalmus underwoodi* was described on the basis of 14 specimens from Barbados, all females. Thomas (1965b) and Hoogmoed (1973) studied large series of specimens from the Caribbean islands, Guyana and Suriname, finding no males, thus concluding that the species was parthenogenetic. Vanzolini (1976) reported males from three localities, one in Suriname, and two in Roraima, Brazil, suggesting that the parthenogenesis would not have had a hybrid origin, but would have originated by a spontaneous mechanism, resulting in a mosaic of unisexual and bisexual populations. Cunha (1981a) reported another bisexual population from Roraima. Hardy et al. (1989) presented good evidence for parthenogenetic reproduction in this species, and mentioned unpublished observations by Cole et al. which indicated a hybrid origin for *G. underwoodi* (also Cole et al., 1983), and at the same time suggested that the bisexual populations would represent a cryptic or sibling species, maybe one of the ancestors of *G. underwoodi*. Cole at al. (1989, 1990) identified *G. speciosus* (of northern South America) as one of the parent species of *G. underwoodi*, hypothesizing that the other parent species would be a cryptic species occurring in the Guianan region, most possibly in the savanna enclaves north of the Amazon. Cole et al. (1990) studied, among others, the specimens referred to by Vanzolini (1976) and Cunha (1981a), which included males, and those reported from Maracá island by O'Shea (1989), all females. The samples with males from Roraima, reported by Vanzolini (1976) and Cunha (1981a), were considered as *G. speciosus*, while the specimens (females) reported by Vanzolini (1976) from Pará and Amazonas were not identified to species. The Maracá sample seems to represent a parthenogenetic population, but it shows a few morphological distinctions in relation to *G. underwoodi*, so it was identified by Cole et al. (1990) as "*G. underwoodi*?". Vanzolini & Carvalho (1991) described *Gymnophthalmus leucomystax*, a bisexual species from the campos ('lavrados') of Roraima, living in relatively close proximity to parthenogenetic *G. underwoodi* which occurred in contiguous forested areas. The authors suggested the material studied by Cunha (1981a) to be *G. leucomystax*. Hoogmoed et al. (1992) described another bisexual species, *G. cryptus*, from Venezuela (T.F. Amazonas), which later was considered by Cole et al. (1993) to be the second ancestor of *G. underwoodi*.

The material studied by me included five *G. underwoodi* from Guyana and Suriname; three females ('*G. underwoodi*?') from Maracá island, Roraima; 12 males and 11 females (counts made in seven of each sex) of the material studied by Cunha (1981a), from Roraima (suggested by Vanzolini & Carvalho, 1991, to be *G. leucomystax*, and identified as '*G. speciosus*' by Cole et al., 1990); and ten males, two females and seven juveniles from Alter-do-Chão, Pará. They are mostly very similar to each other. The three females from Maracá have one infralabial less than most other specimens (two other specimens, from Alter-do-Chão, presented three infralabials on one side, four on the other). Moreover, the numbers of transverse rows of dorsals and of ventrals in all-female populations (respectively 32-34 and 23-25) are lower than those in females of bisexual populations (35-36, 25-28). These data are in agreement with those by Cole et al. (1990: 14).

Vanzolini & Carvalho (1991) referred to three differences in colour pattern which distinguished most specimens of *G. leucomystax* from *G. underwoodi* - a white upper lip (lips black or sooty), a conspicuous light dorsolateral stripe set off by dark borders (faint dorsolateral stripe), and ventral region white or yellowish (light to dark grey or dark bluish). Among the material studied from Fazenda Bom Intento and Colônia Coronel Mota (Roraima), only MPEG 3969 shows a pattern similar to that described for *G. leucomystax*. Other specimens are more similar in pattern to *G. underwoodi*, although they are bisexual. Their identification to species is, therefore, doubtful.

Vanzolini & Carvalho (1991) described colour of tail in *G. leucomystax* as similar to that of body (only getting darker distally). Cunha (1981a) described colour of tail in life in the animals he studied as pinkish-red, becoming lighter toward tip. W.E. Magnusson (in lit.) referred to an orange tail (more vivid in some individuals, less in others) in specimens from Alter-do-Chão. *G. cryptus*, from Venezuela, present a blue tail. Tail in *G. underwoodi* is bronze coloured like the body.

In conclusion, a complex of cryptic species exists in northern South America, including at least one parthenogenetic and two (probably more) bisexual species. The name *G. underwoodi* is well established for the parthenogenetic populations in the Guianas and Venezuela. The population from Maracá island, Roraima, which seems also to be parthenogenetic, possibly pertains to this same species. The name *G. speciosus* for bisexual populations in northern South America needs to be confirmed, since the type is from Nicaragua. It may be that what is being called *G. speciosus* from South America is a yet not described species. Besides, two species, *G. leucomystax* and *G. cryptus*, have been recently described. Identification of populations along the Amazon and Negro rivers still is uncertain.

Since these species are so close morphologically, other systematic approaches are essential for a better understanding of the group, besides good field data and life colour descriptions. The *G. underwoodi* species complex is being studied successfully by Cole et al., on morphological, genetical and biochemical levels. I trust their studies will eventually clarify the situation, as data from new material is gathered, and I will not pursue the matter further here.

Cunha (1961: 157) erroneously mentioned *Gymnophthalmus lineatus* from Brazil, based on the literature. Hoogmoed (1973) discussed previous citations of *Gymnoph-*

thalmus species for northern South America. Vanzolini & Carvalho (1991) presented a historical review of the literature on the genus *Gymnophthalmus*.

Cunha (1981a) reported all specimens he studied as coming from Colônia Coronel Mota, but the material indeed came from both this locality and Fazenda Bom Intento.

Iphisa Gray, 1851

Diagnosis.— See diagnosis of the species.
Distribution.— Northern South America, mainly in Amazonia.
Content.— Genus monotypic.

Iphisa elegans Gray, 1851
(figs. 131, 132, 284)

Iphisa elegans Gray, 1851: 39 (holotype BM 1946.9.1.1, type-locality: Belém, Pará); Boulenger, 1885b: 424; Goeldi, 1902: 537, 550; Burt & Burt, 1933: 66; Amaral, 1937a: 1740, 1937b: 191, 1949: 111; Cunha, 1961: 153; Vanzolini, 1972: 105, 1986a: 14; Hoogmoed, 1973: 279, 1979: 278; Dixon, 1974: 136; Hoogmoed & Lescure, 1975: 158; Hoogmoed & Avila-Pires, 1989: 168.

Material.— **Brazil.** AMAPA. Serra do Navio: 1 juv., MPEG 15081, 10.xi.1988; 1 ♂, RMNH 25364, 14.xi.1988; 1 ♀, MPEG 15188, 20.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Upper Lunier river: 1 ♀, MHNP 1899.74, leg. Geay.
AMAZONAS. Reserva Florestal Ducke, 25 km N Manaus: 1 ♂, INPA/Ecol. 27, 23.xi.1986, leg. J.M. Hero. Rio Juruá (right bank), site VQQ (3°19'S, 66°01'W): 1 ex., INPA 733, 14.v.1992, leg. C. Gascon. Igarapé Belém, near Rio Solimões, c. 70 km E Leticia: 1 ♂, AMNH 114982, 18-28.v.1970, leg. B. Malkin. Rio Solimões, Tabatinga: 1 ♂, RMNH 25363, 11.xi.1985, leg. M.S. Hoogmoed. Rio Solimões, Benjamin Constant: 2 juvs., RMNH 25361-362, 14.xi.1985, leg. M.S. Hoogmoed; 1 juv., MPEG 15896, Santo Antonio, E of city, 08.xii.1989; 2 juvs., MPEG 15918, W of city, 10.xii.1989; 1 juv., RMNH 25368, W of city, 15.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
PARA. Belém: holotype, ♂, BM 1946.9.1.1, leg. Wallace & Bates; 1 ♂, MPEG 46, Utinga, 22.xi.1956, leg. M. Moreira.
RONDONIA. Rio Guaporé, c. 8 km from the river: 1 ♂, INPA 294, 17.viii.1988, leg. A.K. Johnson. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ♂, 1 ♀, CEPB 0325-26, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.
Bolivia. Provincia Yuracares, upper R. Chapare, Puerto S. Mateo: 1 ♂, NMW 20803.
French Guiana. R. Sinnamary, Petit Saut: 2 juvs., MPEG 15827, RMNH 25365, 10.xi.1989; 1 juv., RMNH 25366, 13.xi.1989; 1 ♀, MPEG 15843, 15.xi.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Peru. LORETO. Colonia, Village Bora, right bank Rio Zumun, affluent left bank R. Yahuasyacu: 2 ♂♂, 1 juv., MHNP 1978.2191-2193, leg. M.T. Rodrigues.

Diagnosis.— Body cylindrical to slightly depressed, tail long, round in cross section. Limbs pentadactyl, but inner finger small, clawless. Nasals separated by frontonasal. Lower eyelid with undivided, semitransparent disc. Prefrontals usually present (absent in *I. e. soinii*), in medial contact or shortly separated. Frontoparietals present. A very large anterior pair of chinshields, followed by a much smaller one. Gular region with paired enlarged scales. Dorsals and ventrals in two longitudinal rows of transversely enlarged scales, smooth, imbricate. Back brown, flanks darker (greyish-brown), with a light dorsolateral stripe at least along head and anterior part of body. Venter cream.

Description.— Gymnophthalmid with maximum SVL of 62 mm (Dixon, 1974, sex unknown), in males of 59 mm (Hoogmoed, 1973), in females of 56 mm (MPEG 15188). Head 0.17-0.25 (n= 25) times SVL, relatively shorter in larger specimens; 1.3-1.6 (1.50 ± 0.08, n= 25) times as long as wide; 1.2-1.6 (1.38 ± 0.11, n= 25) times as wide as high. Snout blunt, relatively wide, rising gently posteriad. Neck only slightly narrower than head and body. Body cylindrical to slightly depressed. Limbs well developed, forelimbs 0.17-0.27 (n= 19) times SVL, hind limbs 0.30-0.44 (n= 20) times, both relatively shorter in larger specimens. Tail slightly depressed near base, round in cross section distally, tapering toward tip; 1.1-2.3 (n= 11) times SVL, relatively longer in larger specimens.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid and compressed.

Rostral hexagonal, about three times as wide as high, visible from above and in wide contact with frontonasal. Frontonasal roughly trapezoidal, distinctly wider than long, in contact with rostral, nasal, loreal (narrowly), and prefrontals, exceptionally also with frontal. Prefrontals approximately triangular (with "broken" tips), mostly in medial contact, in some specimens narrowly separated; each one in contact laterally with loreal, first and second supraoculars. Frontal hexagonal, longer than wide, sides approximately parallel to each other; laterally in contact with second supraocular. Frontoparietals irregularly pentagonal, about as long as wide, medial suture from as long as, to longer than that between prefrontals; each in contact with frontal, second (narrowly) and third supraoculars, one parietal, and interparietal. Interparietal elongate, hexagonal, in some specimens posterior sides more rounded, lateral sides either parallel, diverging anteriad, or slightly concave. Parietals as long as or slightly shorter than interparietal, and from distinctly to slightly wider. Parietals and interparietal together roughly form a wide "U". Occipitals similar to dorsals. Three supraoculars, first distinctly smaller than the others. Four, rarely three or five, supraciliaries, first widest, all but posterior one elongate. Posterior supraciliary in some specimens just in touch with third supraocular. Nasal undivided, longer than wide, nostril close to suture with first supralabial, directed laterally. Loreal irregular to roughly rectangular, obliquely elongate, in narrow contact with supralabials or separated from them by a suture between nasal and frenocular. Frenocular relatively small, irregular, quadrilateral or pentagonal. An irregular preocular, followed by a continuous series of 2-5, mostly four, suboculars. Two postoculars, upper one largest. Lower eyelid with an undivided semitransparent disc. Supralabials 4-5, one before last below centre of eye; last supralabial highest, followed by two postsupralabials, decreasing in size. Temporals irregularly polygonal, smooth, subimbricate. Ear-opening relatively small, vertically oval, bordered by small scales which form a denticulate margin. Tympanum recessed into a distinct auditory meatus. Except for temporals, all dorsal and lateral head scales juxtaposed, smooth.

Mental trapezoid, with a convex anterior margin. Postmental heptagonal, wider than long. Two pairs of chinshields, first extremely large, forming a long medial suture and in contact with infralabials; second small, in contact with infralabials and widely separated medially. Four infralabials, third below centre of eye, followed by one to three, mostly two, postinfralabials.

Scales on nape identical to dorsals. On sides of neck imbricate, smooth, with rounded posterior margin, upper scales larger. Gulars in 7-9, mostly eight, transversely elongate pairs. First pair in direct contact with first pair of chinshields, laterally in contact with second pair. Collar and gular fold indistinct.

Dorsals imbricate, smooth, in two longitudinal rows of hexagonal, transversely elongate scales; 26-33 (30.1 ± 1.6, n= 25) dorsals in a longitudinal row between parietals and posterior margin of hind limbs. Scales on flanks rhomboidal, imbricate, smooth, in oblique and in four longitudinal rows (exceptionally three or five along part of flanks). Ventrals similar to dorsals, in two longitudinal rows, 17-23 (19.5 ± 1.7, n= 24) in a longitudinal row. Scales around midbody 12, exceptionally 11 or 13. Preanal plate with five scales, the two laterals small, medial "V"-shaped and it may not reach border of plate. Males with 8-12 pores in a continuous series on each side, one or two of which can be considered preanals. Females with none, one or two preanal pores, plus three or four femoral pores per side. Each pore enclosed in a single scale (males with up to 26 pores, in total, females with from zero to 24, according to Dixon, 1974).

Scales on dorsal and lateral surfaces of tail narrow, hexagonal or lanceolate, sharply keeled, mucronate, and imbricate. On ventral surface scales similar, but smooth near base, distally successively becoming broadly, then sharply keeled. They form transverse rows all around the tail.

Limbs mostly with rhomboid to trapezoid, imbricate scales, smooth except on dorsal aspect of lower legs where they are sharply keeled. Ventroposterior aspect of upper arms and posterior aspect of thighs with roundish, juxtaposed scales, smaller on thighs. Subdigital lamellae single under fingers, partially divided under toes, frequently swollen medially toward distal margin; 9-14 (11.4 ± 1.1, n= 50, 25 specimens) under fourth finger, 14-21 (16.6 ± 1.3, n= 50, 25 specimens) under fourth toe. Inner finger reduced, clawless.

In life, MPEG 15081 with dorsal surface of head and anterior part of back (to level of forelimbs) antique-brown (37) to tawny (38). Posteriorly, back hair-brown (119A), tail sepia (119). Flanks sepia (119). Ventral region whitish. Iris black or very dark brown. In MPEG 15896 snout and dorsolateral stripe anteriorly amber (36), darkening on top of head and toward posterior part of back, which is raw-umber (223). Flanks and tail sepia (119). Ventral region white. MPEG 15918 and RMNH 25367 with rostral and dorsolateral stripes anteriorly spectrum-orange (17), top of head amber (36), back amber and raw-umber (223), darker posteriorly (including dorsolateral stripes). Flanks black. Tail sepia (119). Ventral region white, underside of tail pale grey. All descriptions above refer to juveniles. Duellman (1978) reported venter in adult males as salmon pink (grey in juveniles, creamy grey in adult females), described by Beebe (1945) as orange.

In preservative, dorsal surface of head and back light to dark brown, sides of head and flanks dark greyish-brown. Back and flanks separated by a dorsolateral light brown stripe from rostral to somewhere along first half of body, dorsally usually bordered by a dark brown line. In juveniles the dorsolateral stripe may reach the tail, although becoming narrower posteriad. Dorsals with irregular dark brown spots, variably conspicuous, on anterior part of scales. Limbs dorsally dark brown, tail in juveniles with colour pattern similar to that of body, in adults light brown heavily sprinkled with dark brown. Ventral region immaculate cream (brownish

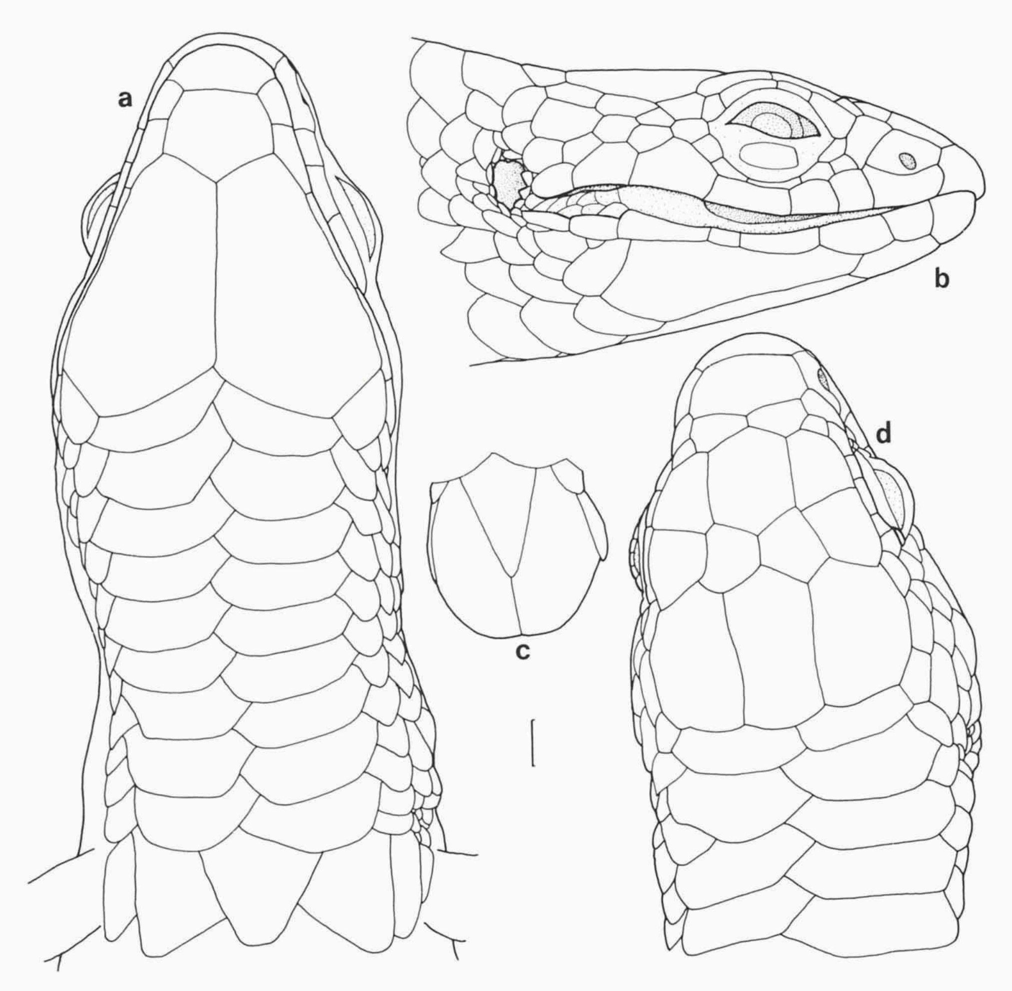


Fig. 131. *Iphisa elegans*, MPEG 15188; a: ventral view of head, gulars, and interbrachials; b: lateral view of head; c: preanal plate; d: dorsal view of head and scales on nape.

under a regenerated tail); in some specimens a band with dark brown spots may occur along the sides.

Habitat.— All individuals I observed in the field were in undisturbed or moderately disturbed terra firme forest, or at border of terra firme forest with swamp, amidst leaf litter. They were found both in wet leaf litter near a creek, as in a distinctly drier situation in an open type of forest on ridge, in agreement with observations by Dixon (1974) and Dixon & Soini (1975, 1986). Gasc (1981) found *I. elegans* amidst the litter accumulated at the base of the palm *Astrocaryum paramaca* Mart. Duellman (1978) and Gasc (1981) reported individuals in (old) secondary forest. Vanzolini (1972) reported a specimen from an old grove of cocoa and rubber trees which formed a low, closed canopy.

Notes on natural history.— Active animals were collected between 09:00 and 17:00 h, except for MPEG 15188 which was found between 22:00 and 23:00 h (see

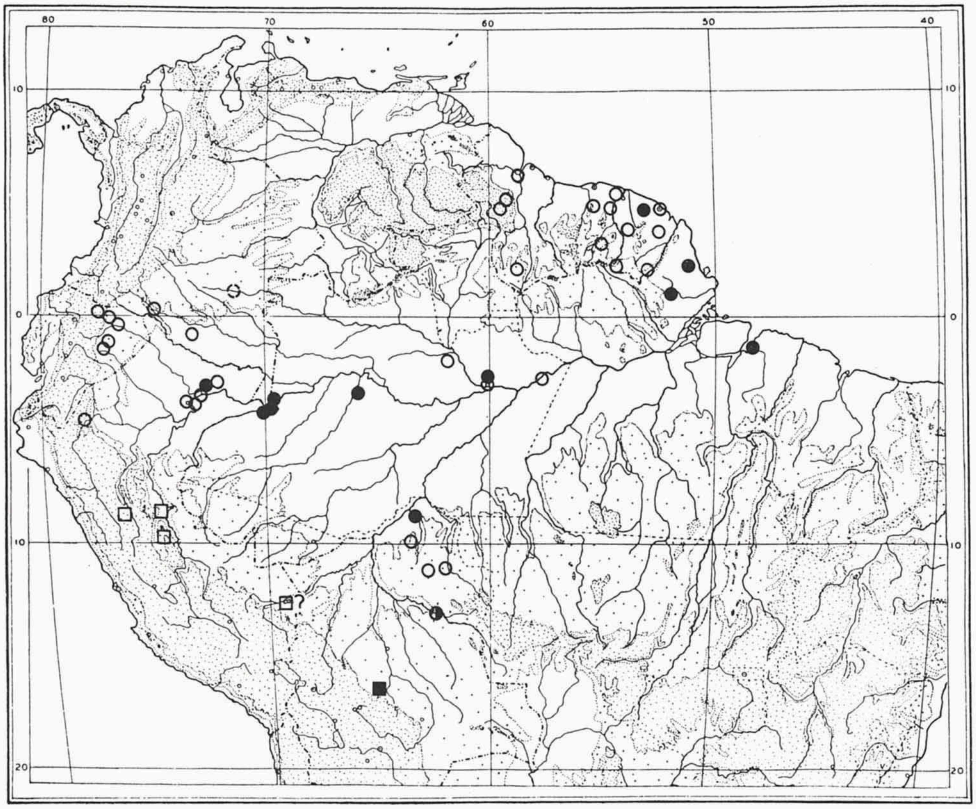


Fig. 132. Distribution of *Iphisa elegans*. Circles = *I. e. elegans*. Squares = *I. e. soinii*. Closed symbols = material studied. Open symbols = data from literature (Peters, 1959; Medem, 1968; Vanzolini, 1972, 1986a; Hoogmoed, 1973; Dixon, 1974; Gasc, 1977; Duellman, 1987; Henzl, 1991; Hoogmoed & Avila-Pires, 1991) and pers. com. M. Martins for Parque Nacional do Jaú, Amazonas state, Brazil. Half-open circle = INPA 294, from Rio Guaporé. Dashed circle = data by Ayala (1986) for Vaupés state, Colombia. Subspecies in Cuzco Amazonico, Peru (Duellman, 1978), not identified; presumed only on geographical grounds.

Hoogmoed & Avila-Pires, 1989).

According to Duellman (1978), Fitch's (1968) '*Calliscincophis* (sic!) *agilis*', for which he measured a body temperature of 28.2 °C (1.2 °C higher than air temperature), actually is *I. elegans*.

Hoogmoed & Avila-Pires (1991) reported two eggs found together in a rotten piece of wood, which hatched immediately after collecting (French Guiana, November 1989). Measurements of the eggs were 11 × 8 mm and 11 × 7 mm, of both hatchlings 27 mm SVL, tail 41 mm, weight 0.3 g. Some data on reproduction is given by Dixon (1974). Gasc (1981) reported a female with two large eggs, found in March (-French Guiana).

The only reference to food is that by Duellman (1978), who found a roach in the stomach of an individual.

MPEG 46 was found in the stomach of the hawk *Micrastur gilvicollis* (Vieillot, 1817), as reported by Cunha (1961). Other known predators are *Kentropyx calcarata* and the snake *Oxyrhopus melanogenys* (Tschudi) (respectively Hoogmoed, 1973, and Duellman, 1978).

Distribution (fig. 132).— Amazonia and some peripheral areas, in Brazil, French Guiana, Suriname, Guyana, southeastern Colombia, Ecuador, Peru, and Bolivia. In Brazil the species is known from Amapá, Pará, Amazonas, and Rondônia. Specimens from central and southern Peru and from Bolivia considered as a different subspecies, *I. e. soinii*.

Remarks.— Dixon (1974) separated the species in two subspecies, *I. e. elegans* and *I. elegans soinii*. All specimens here studied, except NMW 20803, belong to the nominal form. *I. e. soinii* occurs in central and southern Peru and in Bolivia. It is diagnosed by the absence of prefrontals and an average higher number (25.0) of femoral-preanal pores. NMW 20803, from Bolivia, agrees with *I. e. soinii* in the absence of prefrontals. It has 21 femoral pores, in total, which is close to the average number of pores in material studied of *I. e. elegans*, but it agrees with data by Dixon (1974) for a specimen from Bolivia. Judging by Dixon's (1974) and my own data, it seems to me that the number of pores varies among several populations, and the higher number of pores would be more likely a characteristic of the population from central Peru, than of the whole subspecies (at least not including *I. e. soinii* from Bolivia). These data, however, are based on relatively few specimens from most localities, and may therefore be misleading.

Leposoma Spix, 1825

Diagnosis.— Gymnophthalmids with body cylindrical, tail long, round in cross section. Limbs well developed, pentadactyl, all digits clawed. Nasals separated by frontonasal. Lower eyelid with semitransparent disc. Prefrontals and frontoparietals present, occipitals absent. Interparietal and parietals form a round posterior margin. Dorsal head scales with irregularly undulating longitudinal striations. Dorsals keeled, in oblique rows, ventrals keeled.

Distribution.— Costa Rica to Espírito Santo, in Brazil.

Content.— Eleven species, of which nine according to Peters & Donoso-Barros (1970) and Vanzolini (1986b), and two described here as new.

Remarks.— Four species of *Leposoma* have been reported from Brazilian Amazonia: *L. guianense*, *L. parietale*, *L. percarinatum*, and *L. scincoides*. The latter was described by Spix (1825), from the Amazon River. Nevertheless, up to the present no other specimen that agrees with the description of *L. scincoides* has been collected in Amazonia. Ruibal (1952), however, mentioned a specimen (MZUSP 3002) from Porto Cachoeira, state of Espirito Santo, Brazil. As some other material from Spix's collection proved to be mislabelled (Vanzolini, 1981a: xxiii), I assume that this was also the case for *L. scincoides*, and do not consider it as occurring in Amazonia.

The genus was revised by Ruibal (1952), and later Uzzell & Barry (1971) studied several of its species, including *L. guianense*, *L. parietale*, and *L. percarinatum*, modifying the key to the species given by Ruibal (1952). Hoogmoed (1973) made detailed descriptions of *L. guianense* and *L. percarinatum* from the Guiana region. In spite of all these studies, however, the identification of specimens from central Amazonia proved to be quite problematical. Many specimens could be identified either as *L.*

percarinatum or as *L. guianense*, without problem. A few specimens either showed a mixture of characteristics of *L. guianense* and *L. percarinatum*, or were mainly similar to the latter species, but were males (*L. percarinatum* is parthenogenetic) or had other distinctive characteristics. They are discussed under *L.* cf. *percarinatum*. Two other groups of specimens (one from Rondônia and Mato Grosso, the other from Urucu and Tabatinga, Amazonas state), which at first were thought to be *L. parietale*, show several characteristics of their own, differing between themselves and from *L. parietale*. They are here described as new species, respectively, *Leposoma osvaldoi* and *Leposoma snethlageae*. The occurrence of *L. parietale* in Brazil is, consequently, doubtful. Even though, its description is here included, based on material from Ecuador, Peru, and Colombia, in order to permit a better comparison with the new species.

Leposoma guianense Ruibal, 1952
(figs. 133, 134, 288)

Leposoma guianense Ruibal, 1952: 489 (holotype UMMZ 46770, type-locality: Dunoon, Demerara River, Guyana); Peters & Donoso-Barros, 1970: 165; Uzzell & Barry, 1971: 15; Hoogmoed, 1973: 316, 1979: 278; Hoogmoed & Avila-Pires, 1989: 168; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.
Leposoma percarinatum; Cunha, 1961: 137 (part)

Material.— **Brazil.** AMAPA. Upper Rio Calçoene: 1 ♀, MHNP 1898.182, leg. Geay. Rio Lunier: 2 ♂♂, 1 ♀, 1 juv., MHNP 1899.60-70, leg. Geay. Serra do Navio: 1 ♀, 2 juv., MPEG 15034-035, RMNH 25465, 06.xi.1988; 9 exs., MPEG 15042-047, RMNH 25466-468, 07.xi.1988; 7 exs., MPEG 15054-058, RMNH 25469-470, 08.xi.1988; 8 exs., MPEG 15067-071, RMNH 25471-473, 09.xi.1988; 6 exs., MPEG 15083-086, RMNH 25474-475, 10.xi.1988; 1 ♂, 2 juv., MPEG 15088-089, 15094, 1 ♂, 1 ♀, RMNH 25476-477, 11.xi.1988; 7 exs, MPEG 15103-107, RMNH 25478-479, 14.xi.1988; 3 exs., MPEG 15121-122, RMNH 26551, 17.xi.1988; 1 ♀, MPEG 15130, 18.xi.1988; 8 exs., MPEG 15139-143, RMNH 25480-482, 19.xi.1988; 16 exs., MPEG 15156-172, RMNH 25483-491, 19.xi.1988; 8 exs., MPEG 15196-198, 15201-203, RMNH 25492-493, 21.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♀, KU 97868.
AMAZONAS. Município Nhamundá, West bank Rio Nhamundá, opposite Sítio Céu Estrelado, region of Matias, 15 km N Faro: 1 ♂, RMNH 25494, 02.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Uatumã, reservoir area of hydroelectric dam Balbina, igarapé Caititu: 2 ♂♂, 1 ♀, 1 juv., INPA 150-51, 153-54, 23-25.iv.1987; 1 ♂, INPA 189, 29.vii.1987; all leg. M. Martins. Reserva INPA/ZF-2, 60 km N Manaus: 1 ♂, INPA 222, 17.viii.1987, leg. M. Martins.
PARA. Rio Tocantins (right bank), reservoir area of hydroelectric dam Tucuruí, Chiqueirão: 1 ♂, MPEG 13394, 08.iv.1984, leg. A. Bandeira. Município de Oriximiná, Porto Trombetas, road to igarapé do Pau-Pelado: 1 ♀, MPEG 14400, 21.v.1986, leg. F.P. Nascimento & J.M. Rosa. Município de Oriximiná, Cruz Alta, 6 km S Rio Trombetas: 1 ♀, MPEG 15349, 06.xii.1988; 5 ex., MPEG 15365-367, RMNH 25495-496, 08.xii.1988; 1 ♀, MPEG 15383, 1 ex., RMNH 25498, 10.xii.1988; 1 ♂, MPEG 15397, 11.xii.1988; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Surroundings of Cruz Alta, in SE direction, c. 8 km S Rio Trombetas: 1 ex., RMNH 25497, 09.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, road between Sítio Céu Estrelado and Cruz Alta, between Nhamundá and Trombeta rivers, c. 50 km N Céu Estrelado: 1 ♀, MPEG 15405, 12.xii.1988; 1 ♀, MPEG 15427, 14.xii.1988; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
French Guiana. R. Sinnamary, Petit Saut: 1 ♂, RMNH 25499, 1 ♀, MPEG 15824, 06.xi.1989; 1 ♂, RMNH 25500, 09.xi.1989; 1 ♀, MPEG 15839, 14.xi.1989; 1 ♂, RMNH 25501, 1 ♀, MPEG 15840, 15.xi.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Suriname. NICKERIE. 5 km NE of second bush camp, Linker Kabalebo River: 1 ♂, RMNH 17875, 12.iii.1976, leg. S.B. Kroonenberg.

Diagnosis.— *Leposoma* with a very large interparietal, with diverging lateral margins. Supralabials followed by a scale distinctly larger than adjacent temporals. Suture between prefrontals long, between frontoparietals shorter. Fourth pair of [illegible]

middorsally, to phylloid toward flanks; 30-35 (32.6 ± 1.2) along a middorsal row. Ventrals 19-25 (21.7 ± 1.0) along a midventral row. Scales around midbody 23-26 (23.8 ± 0.8). Flanks usually slightly darker than back, but not forming a distinct dark lateral band; an upper dark stripe may be present.

Description.— Gymnophthalmid with maximum SVL in males of 37 mm, in females of 39 mm (Hoogmoed, 1973). Head 0.20-0.25 (n= 57) times SVL, relatively larger in smaller specimens, and in adult males as compared to adult females; 1.4-1.6 (1.51 ± 0.05, n= 57) times as long as wide; 1.1-1.6 (1.34 ± 0.10, n= 57) times as wide as high. Snout short, blunt, sloping gently toward top of head. Neck slightly swollen anteriorly. Body cylindrical. Limbs well developed, forelimbs 0.26-0.33 (0.28 ± 0.01, n= 55) times SVL, hind limbs 0.36-0.48 (0.42 ± 0.02, n= 55) times. Both limbs tend to be slightly larger in smaller specimens. Tail round in cross section, tapering toward tip, 1.4-1.9 (n= 31) times SVL, relatively longer in larger specimens.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth mostly bicuspid, occasionally tricusof head with irregularly undulating longitudinal striations. On the sides, temporals and postoculars keeled, other scales smooth.

Mental approximately semicircular. Postmental pentagonal or heptagonal, single, except in MPEG 15083 in which it is longitudinally divided medially. Four pairs of chinshields, second largest, fourth distinctly smaller than the others. First and second pairs in contact medially and with infralabials, third pair separated medially by one or two small scales, and separated from infralabials by one scale. Scales of fourth pair closer to each other than to infralabials, separated from each other by two or three scales, from infralabials by three to five scales. Four, occasionally five, infralabials, suture between third and fourth below centre of eye. Infralabials followed by one to three, mostly two, narrower (except, in some specimens, the anterior one) postinfralabials. Most head scales covered with small pits, which either form a peripheral row (posterior dorsal head scales) or are scattered over the entire surface (others).

Scales on nape rhomboid, keeled, imbricate, posteriorly grading into dorsals. Scales on sides of neck conical to shortly trihedral, juxtaposed to subimbricate, in approximately vertical rows. At level of collar scales may be slightly larger, flattened, and keeled. Gulars imbricate, anteriorly squarish and weakly keeled, posteriad becoming larger, longer than wide, strongly keeled, and mucronate; in 8-11, mostly nine, transverse rows. Collar rather indistinct, with 8-11 scales. Gular fold distinct toward sides. Gulars separated from scales on chin by a row of granules.

Dorsals and scales on flanks imbricate, keeled, mucronate, in transverse and oblique rows; toward middorsal line approximately hexagonal, most scales widening posteriad, toward flanks they gradually become phylloid; 30-35 (32.6 ± 1.2, n= 53) transverse rows of dorsals between interparietal and posterior margin of hind limbs. Ventrals imbricate, in the shape of a heraldic shield, low and broadly keeled, shortly mucronate; in six or eight longitudinal, and 19-25 (21.7 ± 1.0, n= 53) transverse rows; keels longitudinally aligned. Scales around midbody 23-26 (23.8 ± 0.8, n= 53). Scales on flanks and ventrals resemble each other more the closer they are. Preanals variable, with four or five elongate scales, four elongate scales plus one small mid-posterior scale, one mid-anterior scale plus three to five (mostly five) posterior scales, or rarely three anterior and five posterior scales. Males with two preanal pores and 4-6 femoral pores at each side (femoral pores in total 9-12, 11.0 ± 1.0, n= 27). Females with none or one (most commonly) preanal pore at each side, and no femoral pores; INPA 150 with two preanal and one femoral pores at each side. Pores in centre of a swollen area formed by three or four scales, anterior one largest.

Tail with imbricate, squarish, keeled, shortly mucronate scales, in transverse and longitudinal rows, keels aligned longitudinally. On underside scales similar but narrower, roof-shaped, forming low longitudinal ridges along the tail.

Scales on limbs mostly rhomboid, keeled, imbricate. Smaller, tuberculate, subimbricate, on ventral aspect of upper arms, and most of dorsoposterior aspect of thighs, but on posterior aspect of thighs some scales are larger and flatter. Subdigital lamellae medially divided; 9-12 (10.3 ± 0.7, n= 105, 53 specimens) under fourth finger, 14-17 (15.3 ± 0.8, n= 103, 53 specimens) under fourth toe.

Colour in life of dorsal surface of head and back hair-brown (119A), sepia (219), or raw-umber (223). Dorsolateral stripe raw-umber (23) or sayal-brown (223C), bordered on both sides or only ventrally by sepia (119). Ventral region in adult males

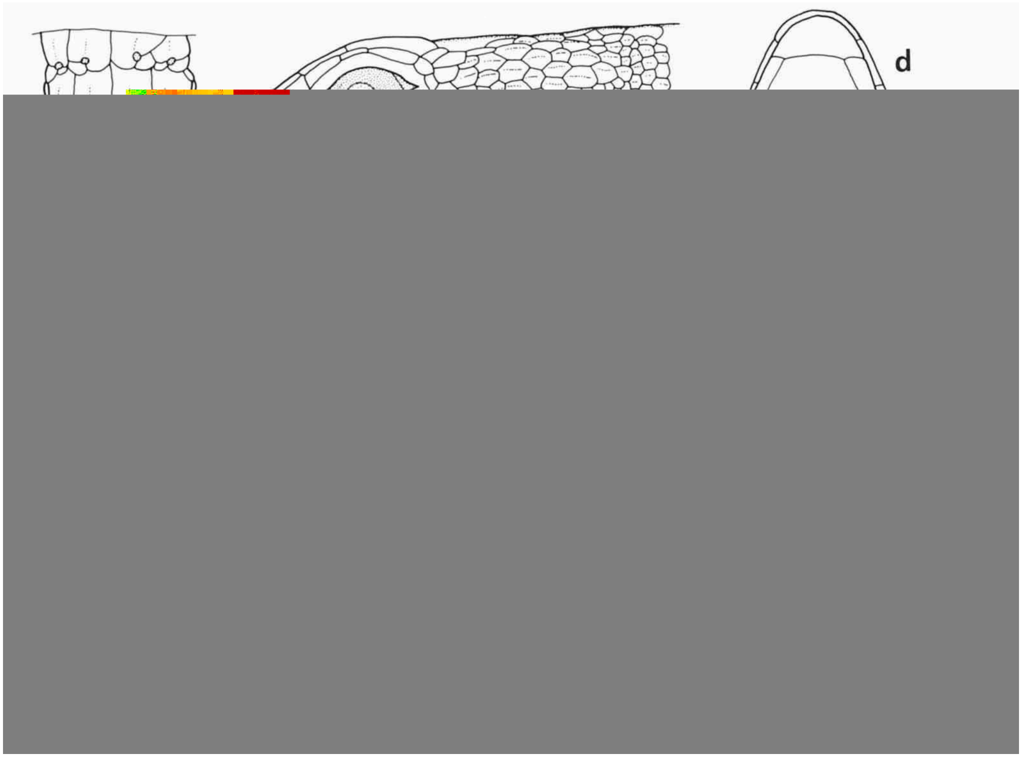


Fig. 133. *Leposoma guianense*, MPEG 15161; a: dorsal view of head; b: lateral view of head; c: preanal plate and preanal pores; d: ventral view of head, gulars, and first row of interbrachials; e: dorsals just posterior to midbody.

completely or mostly peach-red (94) or chrome-orange (16); gulars may be flesh-colour (5); centre of belly may be dirty-white or whitish with a peach-red or orange hue. In adult females and juveniles ventral region cream. Colour of tail similar to that of body. Iris reddish-brown, or greyish-brown with a wide reddish-brown rim around pupil.

In preservative, back and flanks brown. Blackish flecks may be present on back. A dorsolateral light stripe on each side from neck to base of tail, fainter near midbody. The light stripe may be bordered, on one or on both sides, by a blackish, dotted or continuous line, which laterally may form a continuous blackish stripe about as wide as the light stripe. Flanks slightly darker than back; a few roundish, light spots, with faint dark borders, may be present on sides of neck and close to forelimbs. Ventral region cream, spotless except in some specimens ventrolaterally; labials with transverse dark brown bands. Limbs brown dorsally, cream ventrally. Tail predominantly brown dorsally and laterally, with irregular blackish spots middorsally (proximally) and laterally. An ill-defined pair of dorsolateral light stripes continues from body, and some distance from base it converges and fades out. Ventrolaterally a longitudinal row of light spots at each side of tail. Ventral surface of tail predominantly cream, peppered with brown.

Habitat.— An inhabitant of the forest leaf litter, in both terra firme and varzea

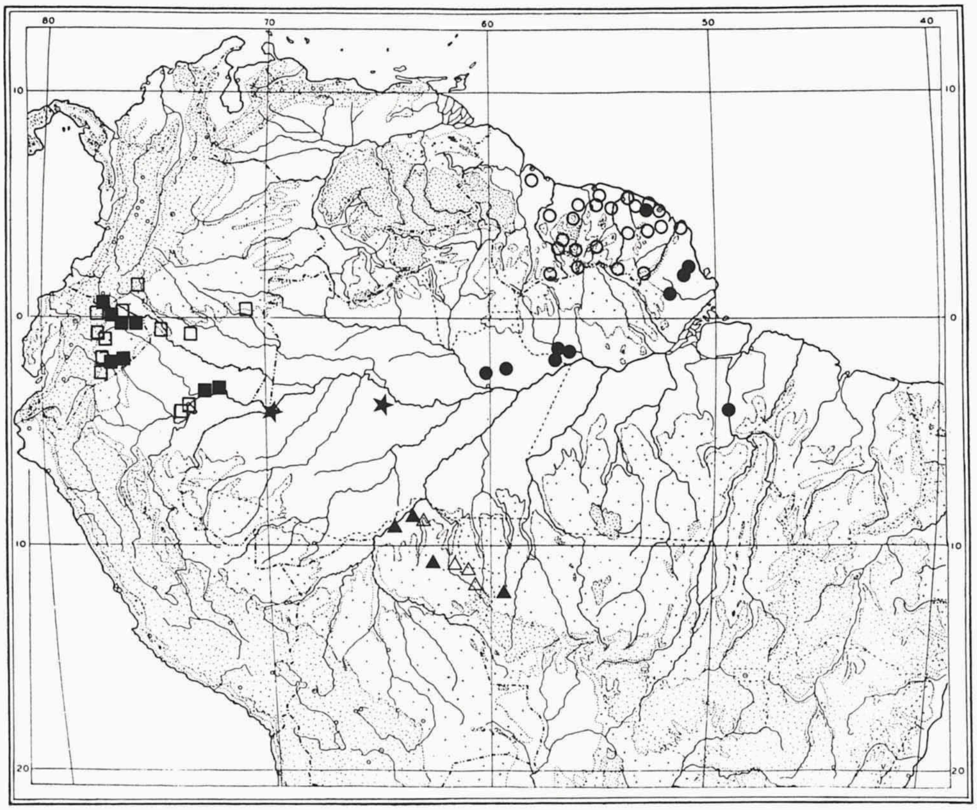


Fig. 134. Distribution of *Leposoma guianense* (circles), *L. parietale* (squares), *L. snethlageae* spec. nov. (stars), and *L. osvaldoi* spec. nov. (triangles). Closed symbols = material studied. Open symbols = data from literature (Ruibal, 1952; Medem, 1969; Uzzell & Barry, 1971; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Duellman, 1978; Gasc, 1981; Lescure & Gasc, 1986; Vanzolini, 1986a).

forests, and on border of terra firme and igapó forest or a swamp. MPEG 13394 was in a rotten tree trunk, RMNH 25497 and MPEG 15405, 15427 were on edge of road through terra firme forest, and MPEG 15839 on edge of secondary vegetation. Gasc (1986) reported individuals amidst the heap of leaves and humus at the base of the palm *Astrocaryum paramaca* Mart.

Notes on natural history.— Active lizards were collected between 09:00 and 17:15 h, except for 26 individuals captured in one full-moon night between 22:00 and 23:00 h, and 25 more observed the following night, also between 22.00 and 23.00 h (see Hoogmoed & Avila-Pires, 1989). The species can be relatively abundant in some areas. Some tentative figures on abundance are given by Gasc (1981, 1986) and Hoogmoed & Avila-Pires (1991).

L. guianense prey on several arthropods and other invertebrates of the soil, as shown by Gasc et al. (1983), who examined the stomach contents of 22 individuals; 30% of the items were Collembola, among which three genera predominated.

Three females collected in November, one from Serra do Navio, Amapá (RMNH 25469), the other two from Petit Saut, French Guiana (MPEG 15824, 15840), each had two well developed eggs in the abdomen. Hoogmoed (1973) reported pregnant females from March, and recently hatched juveniles from February, May, August and September, concluding that breeding (in Suriname) might take place throughout the year, except in the long dry season (September-December).

Castanet & Gasc (1986) concluded, after a skeletochronological analysis, that longevity in *L. guianense* does not exceed 18 to 20 months. The analysis also suggested a small decrease in growth during the dry season, which they hypothesized to be linked to a shortage in availability of food. Breeding would occur during the wet season.

Distribution (fig. 134).— Northeastern South America, in Guyana, Suriname, French Guiana and Brazil (Amapá, Pará and northeastern Amazonas).

Remarks.— The species was described by Ruibal (1952), based on two females from Guyana. Both Uzzell & Barry (1971) and Hoogmoed (1973) made subsequent detailed descriptions of it, pointing out the differences with *L. percarinatum*, a rather similar species, and at least partially sympatric. Uzzell & Barry (1971) also proposed that *L. guianense* was probably one of the parent species of *L. percarinatum* (a unisexual species).

See under '*L.* cf. *percarinatum*' for specimens with mixed characteristics of *L. guianense* and *L. percarinatum*.

Leposoma osvaldoi spec. nov.
(figs. 134-138)

Leposoma parietale; Nascimento et al., 1988: 38; Vanzolini, 1986a: 14 (probably).

Holotype.— MPEG 13920, ♂, right bank igarapé Paraíso, km 16, Line 62, Ouro Preto d'Oeste, Rondônia, Brazil, 12.xi.1984, leg. F.P. Nascimento & R. Bittencourt N.

Paratypes.— **Brazil.** MATO GROSSO. Estação Ecológica Iquê-Juruena, Rodovia Vilhena-Juína (AR-1): 1 ♀, MPEG 13863, 17.v.1984, leg. M. Zanuto.

RONDONIA. Ouro Preto d'Oeste: 1 ♀, MPEG 14057, Line 212, Gleba 21B, 16.iii.1985; 1 ♀, MPEG 14066, left bank igarapé Santa Helena, near Line 212, 20.iii.1985; both leg. T.C.S. Avila Pires & R.J.R. Moraes. Road BR-364 (Porto Velho-Cuiabá), Fazenda Rio Candeias: 1 ♂, MPEG 12927, 17.iv.1983, leg. P. Sá. Jaci-Paraná, km 85-88 road BR-364 (Porto Velho-Rio Branco): 1 ♀, MPEG 14346, 18.iii.1986, leg. R.J.R. Moraes.

Diagnosis.— *Leposoma* having a moderately large interparietal scale, with diverging lateral margins. Supralabials followed by a scale as large as, to slightly larger than adjacent temporals. Prefrontals form a short to moderately long medial suture, that between frontoparietals with approximately same length or longer. Fourth pair of chinshields reduced. Dorsals hexagonal to quadrangular (pointed posteriorly) or lanceolate; 32-34 along a longitudinal row. Ventrals 20-23. Scales around midbody 26-29. Flanks completely covered by a wide dark band.

Description.— Gymnophthalmid with SVL of 37 mm and 30 mm in the two males, 28-30 mm in the females. Head 0.20-0.21 times SVL, 1.4-1.5 times as long as wide, 1.3-1.4 times as wide as high. Snout short, blunt, sloping gently toward top of head. Neck slightly swollen anteriorly. Body cylindrical. Limbs well developed, forelimbs 0.23-0.29 times SVL, hind limbs 0.35-0.41 times. Tail round in cross section, tapering toward tip, 1.6-1.7 times SVL.

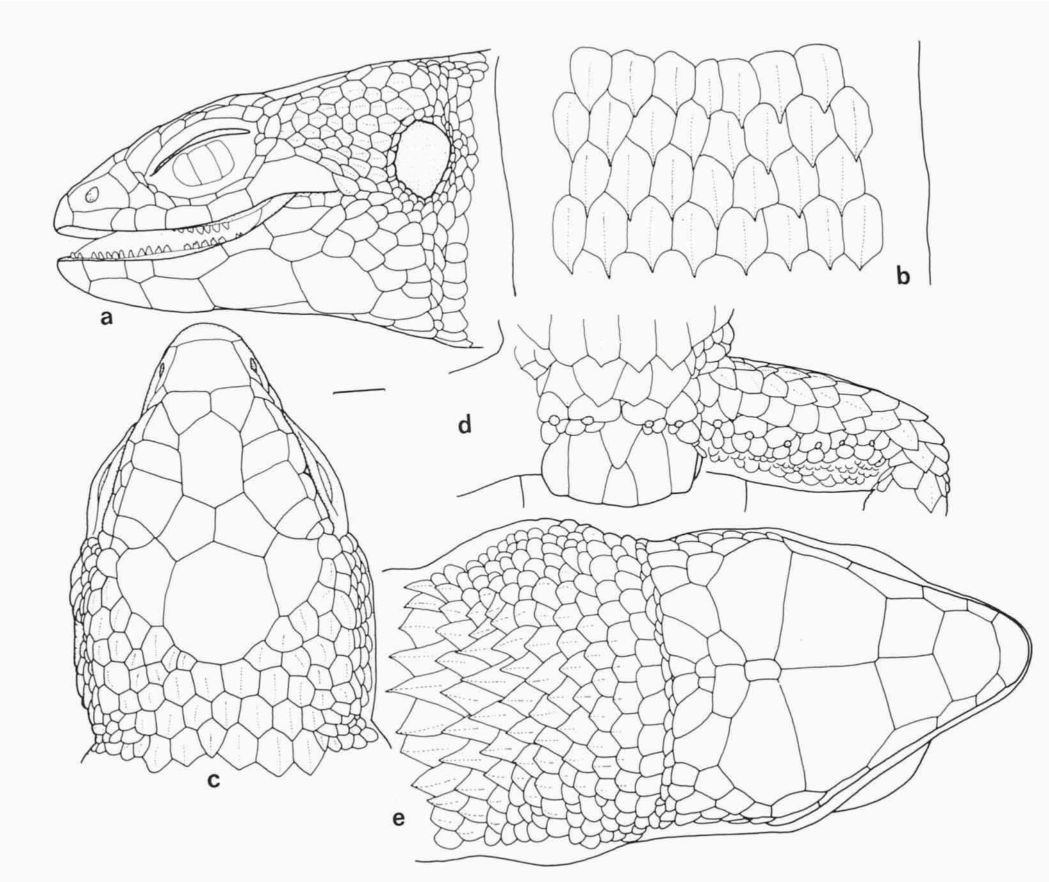


Fig. 135. *Leposoma osvaldoi* spec. nov., MPEG 13920 (holotype); a: lateral view of head; b: dorsals just posterior to midbody; c: dorsal view of head; d: preanal plate and left thigh, showing preanal and femoral pores; e: ventral view of head and gulars.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid.

Rostral approximately trapezoidal, more than twice as wide as high. Frontonasal single, irregularly pentagonal, laterally in contact with nasal and loreal. Prefrontals quadrilateral (the pair resembles a stylised butterfly, wider anteriorly), wider than long or about as wide as long, with a short to moderately long medial suture. Each prefrontal in contact at the sides with loreal and first supraocular. Frontal hexagonal, longer than wide, anteriorly as wide as, to slightly wider than posteriorly; laterally in contact with first, second and third supraoculars. Frontoparietals irregularly pentagonal, about as long as wide, medial suture as long as, to longer than that between prefrontals; laterally in contact with third supraocular, in some specimens touching fourth supraocular. A large interparietal, lateral margins divergent posteriorly. Parietals distinctly shorter and narrower than interparietals. Posterior margins of parietals and interparietal together roughly form a semicircle. Occipitals absent. Four supraoculars, third largest. Four or five supraciliaries. All specimens with one (one side

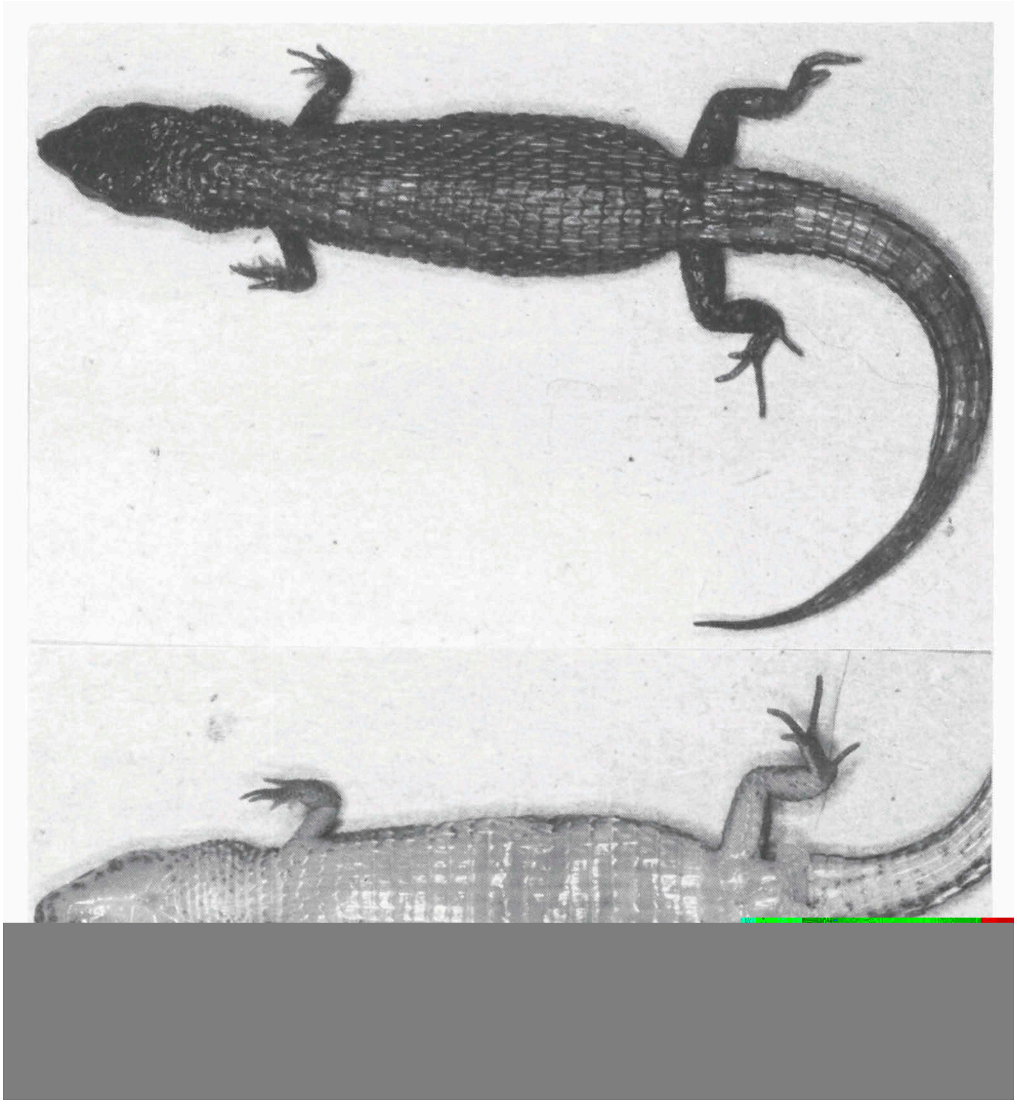


Fig. 136. *Leposoma osvaldoi* spec. nov., ♂, holotype, MPEG 13920, Ouro Preto d'Oeste, RO, Brazil: upper figure dorsal view of entire animal, lower figure ventral view (T.C.S. Avila-Pires).

only in one specimen) to three elongate scales completely separating the third, and partially the second and fourth, supraoculars from supraciliaries. Nasal undivided or semidivided, nostril in its anterior part, directed laterally. Loreal rectangular, separated from supralabials by a distinct suture between frenocular and nasal. Frenocular followed by a series of 5-7 suboculars, and 2-4 postoculars. One or two upper postoculars may be keeled; upper one in contact with parietal. Lower eyelid with semitransparent disc of three or four palpebrals. Six supralabials, posterior largest, fifth below centre of eye; they are followed by a small postsupralabial (as large as, to slightly larger than adjacent temporals). Temporal scales variably polygonal, keeled,

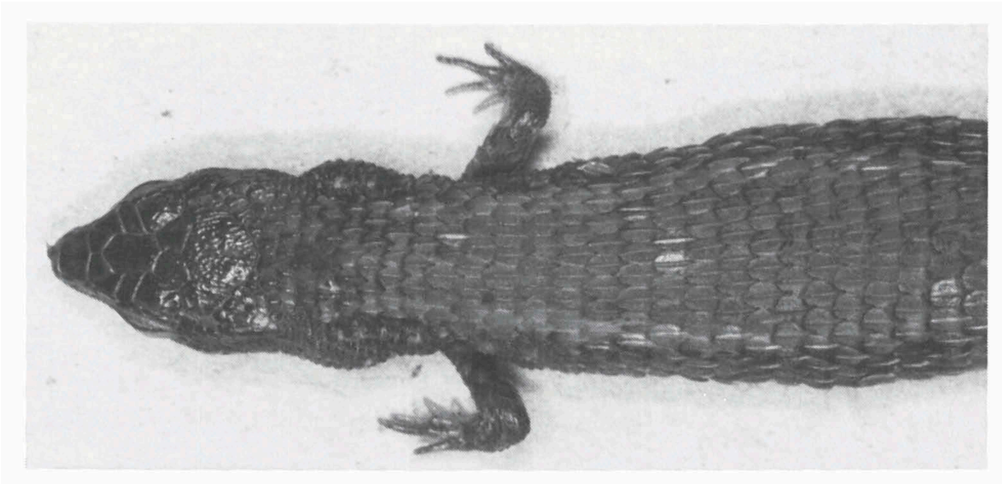


Fig. 137. *Leposoma osvaldoi* spec. nov., ♂, holotype, MPEG 13920, Ouro Preto d'Oeste, RO, Brazil: dorsal view of head and anterior part of body (T.C.S. Avila-Pires).

subimbricate, larger toward parietals. Ear-opening relatively large, vertically oval, surrounded by small scales, anteriorly forming a finely lobed margin, posteriorly smooth; tympanum almost superficial. All dorsal and lateral head scales, except temporals, juxtaposed. Scales on dorsal surface of head with irregularly undulating longitudinal striations; on sides, temporals and in some specimens part of postoculars keeled, other scales smooth.

Mental approximately semicircular. Postmental undivided, heptagonal. Three large pairs of chinshields, plus a fourth very reduced pair; second pair largest, first and second in contact medially and with infralabials; third pair usually separated medially and from infralabials by one scale (in MPEG 13920 in contact with infralabials on one side, in MPEG 12927 separated medially by three scales); fourth pair separated medially by two or three moderately enlarged scales, from infralabials by three or four such scales. Four infralabials and one postinfralabial in a continuous series, suture between third and fourth infralabials below centre of eye. Most head scales covered with small pits, either forming a peripheral row (posterior dorsal head scales) or scattered on the entire surface (others).

Gulars imbricate, anteriorly squarish, smooth or weakly keeled, posteriad becoming larger, longer than wide, hexagonal to lanceolate, strongly keeled, and mucronate; in 8-9 transverse rows. Collar rather indistinct, with 9-10 scales. Gular fold distinct toward sides. Gulars separated from scales on chin by a row of granules. Scales on nape imbricate, keeled, anteriorly variably polygonal to sub-hexagonal, posteriad grading into dorsals. Scales on sides of neck conical to roughly trihedral, juxtaposed to subimbricate, in approximately vertical rows; posteriorly they may be slightly larger.

Dorsals and laterals imbricate, keeled, mucronate, in transverse and oblique rows; dorsals hexagonal, on flanks becoming squarish, posteriorly pointed, or lanceolate; 32-34 (33.2 ± 0.8, n= 6) transverse rows of dorsals between interparietal and posterior margin of hind limbs. Ventrals imbricate, keeled, approximately rectangular, posteriorly mucronate; in the largest specimen (MPEG 13920) the median scales are almost smooth and not mucronate; in eight or ten longitudinal, and 20-23 (22.0 ± 1.3, n= 6) transverse rows; keels longitudinally aligned. Scales around midbody 26-29 (27.3 ± 1.0, n= 6), ventrals and laterals resembling each other more the closer they are. Preanal plate with one anterior and five posterior scales. Males with two preanal, and five or six femoral pores at each side. Females with two preanal and none or one femoral pores, all of them rather indistinct. Pores in the centre of a swollen area formed by three or four scales, anterior one largest.

Tail with imbricate, squarish, keeled, shortly mucronate scales, in transverse and longitudinal rows, keels aligned longitudinally. On ventral surface of tail scales are similar, except that they are narrower, roof-shaped, forming low longitudinal ridges.

Scales on limbs mostly rhomboid, keeled, imbricate; on ventral aspect of upper arms smaller, tuberculate, subimbricate; on dorsoposterior aspect of thighs roundish, juxtaposed to subimbricate, mostly small and tuberculate, with some slightly larger and flatter scales posteriorly. Subdigital lamellae medially divided; 9-11 (10.2 ± 0.8, n= 12, 6 specimens) under fourth finger, 13-15 (14.5 ± 1.2, n= 12, 6 specimens) under fourth toe.

No description of colour in life is available.

In preservative, dorsal region brown. A light dorsolateral stripe from neck to base of tail, paler near midbody. The light stripe may be bordered dorsally by a blackish line. Laterally a similar line may exist, or it borders directly on the dark brown band which covers the flanks completely. Some small light spots may be present on sides of neck and anterior part of body. Ventral region mostly cream. Labials with transverse brown bands, chin and gulars either spotless, or gulars with a few brown spots, or else both areas spotted. Limbs brown on upper side, cream on underside. Tail brown on upper side, darker brown laterally; the pair of dorsolateral stripes which continues from body fades out near base of tail or somewhere along its proximal part; a ventrolateral series of spots, or a faint light line, may be present proximally. Underside of tail cream, sparsely or densely peppered with brown.

Habitat.— All were in forest amidst the leaf litter, some in heavily disturbed forest.

Distribution (fig. 134).— Rondônia and Mato Grosso states, Brazil.

Remarks.— As *L. snethlageae* **spec. nov.**, these specimens resemble *L. parietale* more than other species. Indeed they were identified under this name by Nascimento et al. (1988). Vanzolini (1986a) also mentioned *L. parietale* from Rondônia, probably based on specimens identical with those described here. With *L. parietale* they have in common a dark lateral band, and most scale counts. Only the number of scales at midbody (26-28) shows some difference, coinciding with the upper limit of the range of variation in *L. parietale* (23-27). The number of femoral pores in males (11-12) agrees with that of specimens of *L. parietale* from Peru (10-13). As in *L. parietale*, the sixth supralabial is followed by a small postsupralabial, though it may be not larger than adjacent temporals. On the other hand, these specimens differ in the following characters from *L. parietale* (characters in parenthesis): (1) fourth pair of chinshields reduced, hardly recognizable as chinshields (relatively large); (2) prefrontals with a short to moderately long medial suture (long medial suture); (3) third supraocular larger than second (subequal or second largest); (4) dorsals hexagonal, with straight lateral margins (rhomboid, no straight lateral margins).

Plotting the data of these specimens on the graphs 'parietal length versus inter-

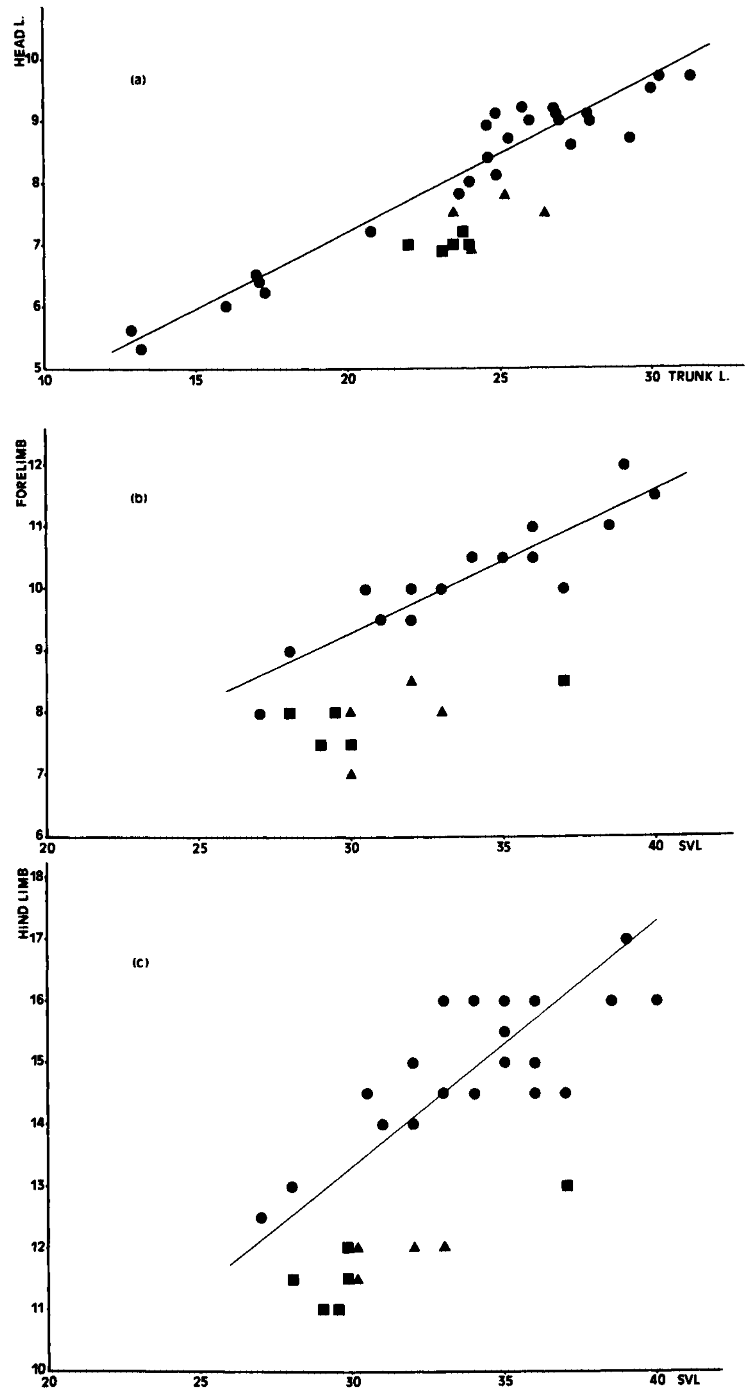


Fig. 138. Comparison of body proportions between *Leposoma parietale* (circles), *L. snethlageae* spec. nov. (triangles) and *L. osvaldoi* spec. nov. (squares): (a) head length versus trunk length; (b) forelimb versus SVL; (c) hind limb versus SVL. Regression line was calculated for *L. parietale*: in (a) y=1.28+0.25x; in (b) y=2.39+0.23x; in (c) y=1.35+0.40x.

parietal length', and 'interparietal area versus SVL', given by Uzzell & Barry (1971), the dots fall between *L. parietale* and *L. guianense*. In the first mentioned graph one dot falls in the area of *parietale*, two in that of *guianense*, and one in the area common to both. In the second graph two dots fall within *parietale*, one within *guianense*, and one in the common area.

Body proportions agree with those for *L. snethlageae*, with differences in relation to *L. parietale* (fig. 138).

From *L. guianense* these specimens differ in characters (1) and (2) above. They also differ in having a dark lateral band, and in that supralabials are followed by a relatively small scale.

From *L. snethlageae* they differ in the fourth pair of chinshields (large in *L. snethlageae*, reduced in *L. osvaldoi*); in the more symmetrical frontoparietals; in the larger frenocular; and slightly in the shape of dorsals (respectively mostly obliquely rectangular versus mostly hexagonal).

Etymology.— The species is named after Dr. Osvaldo Rodrigues da Cunha, the main person to whom the collection of herpetology of the Museu Paraense Emilio Goeldi owes its existence, and to whom I have a debt of gratitude for his help and encouragement.

Leposoma parietale (Cope, 1885)
(figs. 134, 138, 139, 291)

Mionyx parietalis Cope, 1885: 96.
Leposoma parietale; Ruibal, 1952: 492; Peters & Donoso-Barros, 1970: 165; Uzzell & Barry, 1971: 19.

Material.— **Colombia.** PUTUMAYO. Rio Rumiyacu, Santa Rosa de Sucumbio: 1 ♂, NHMG 3638, 15.i.1954, leg. R. Blomberg.

Ecuador. NAPO. Lago Agrio: 2 ♀♀, ZFMK 40666-667, leg. Patfelt. San Pablo, Rio Aguarico, reserve of indians Sequoias/Sionas: 1 ♂, 1 ♀, MHNG 2212.94, 2212.97, 1985, leg. J.M. Touzet. San Pablo Kantesiya: 1 ♂, MHNG 2260.55, 07 & 22.iii.1986, leg. J.M. Touzet. Reserva Cuyabeno: 1 ♂, MHNG 2360.74, iii.1986, leg. M. Garcia & A. Salazar. PASTAZA. Pozo Huito, 85 km E of Montalvo: 1 ♂, RMNH 25447, 22.iv.1983, leg. M.S. Hoogmoed & A. Almendariz. Rio Conambo, Destacamiento Militar Shiona, 55 km E (83°) of Montalvo: 1 ♂, 1 ♀, RMNH 25457-458, 26.iv.1983; 1 ♂, RMNH 25459, 13.viii.1983; 1 ♂, 1 ♀, RMNH 25460-461, 14.viii.1983; all leg. M.S. Hoogmoed & A. Almendariz. Montalvo: 5 ♂♂, 4 ♀♀, RMNH 25448-456, 23.iv.1983, leg. M.S. Hoogmoed & A. Almendariz.

Peru. LORETO. Rio Ampiyacu, Estirón: 2 ♂♂, MPEG 2248-49, 15-22.v.1966, leg. B. Malkin. Colonia, Village Bora, right bank Rio Zumún, affluent left bank Rio Yahuasyacu: 6 ♂♂, 4 ♀♀, MHNP 1978.2075-2077, 1978.2079-2084, 1978.2125, leg. M.T. Rodrigues.

Diagnosis.— *Leposoma* having a moderately large interparietal scale, with parallel or slightly diverging lateral margins. Supralabials followed by a scale slightly larger than adjacent temporals. Prefrontals and frontoparietals form a long medial suture (one or the other longest). Fourth pair of chinshields large. Dorsals rhomboid-phylloid, 30-38 (33.6 ± 1.8) along a longitudinal row. Ventrals 19-24 (21.9 ± 1.2). Scales around midbody 23-27 (24.6 ± 1.0). Flanks completely covered by a wide dark band.

Description.— Gymnophthalmid with maximum SVL in males 36 mm (Uzzell & Barry, 1971), in females 40 mm (MHNP 1978.2076). Head 0.21-0.26 (0.23 ± 0.01, n= 31) times SVL; 1.4-1.6 (1.48 ± 0.07, n= 31) times as long as wide; 1.2-1.6 (1.38 ± 0.08, n=

30) times as wide as high. Snout short, blunt, sloping gently toward top of head. Neck slightly swollen anteriorly. Body cylindrical. Limbs well developed, forelimbs 0.27-0.33 (0.30 ± 0.01, n= 21) times SVL, hind limbs 0.39-0.48 (0.44 ± 0.03, n= 21) times. Tail round in cross section, tapering toward tip; 1.2-1.6 (n= 11) times SVL, relatively longer in larger specimens.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, lateral teeth bicuspid.

Rostral approximately trapezoidal, more than twice as wide as high. Frontonasal single, irregularly pentagonal, laterally in contact with nasal, and generally also with loreal. Prefrontals approximately quadrilateral, or irregularly pentagonal (the pair resembles a stylised butterfly, wider anteriorly), longer than wide to about as wide as long, with a long medial suture; laterally in contact with loreal and first supraocular, occasionally touching nasal and in contact with second supraocular. Frontal hexagonal, longer than wide, slightly wider anteriorly; laterally in contact with second supraocular, frequently also (over a short distance) with first and third supraoculars. Frontoparietals irregularly pentagonal, about as long as wide, or slightly elongate in an oblique direction; medial suture relatively long, longer or shorter than suture between prefrontals; laterally they are in contact with third and fourth supraoculars, occasionally touching the second. A large interparietal, with lateral margins parallel to slightly divergent posteriorly. Parietals distinctly shorter, and slightly narrower than interparietal. Posterior margin of parietals and interparietal together roughly form a semicircle. Occipitals absent. Four supraoculars, second and third subequal, or second slightly larger; first and fourth smallest. Supraciliaries 3-6, mostly four, first widest. Nasal semidivided, nostril in its anterior part, directed laterally. Loreal rectangular, separated from supralabials by a distinct suture between frenocular and nasal. Frenocular followed by a series of 5-7 suboculars, and 3-5 postoculars. Postoculars broadly keeled, upper one bordering on parietal. Lower eyelid with semitransparent disc of three, four, or rarely, five palpebrals. Supralabials 5-7, posterior largest, one before last below centre of eye; they are followed by a moderately enlarged postsupralabial (slightly larger than adjacent temporal scales). Temporal scales irregularly polygonal, subimbricate, keeled, slightly larger toward parietals. Ear-opening rela- [illegible]

lobed margin, posteriorly smooth; tympanum almost superficial. All dorsal and lateral head scales, except temporals, juxtaposed. Scales on dorsal surface of head with irregularly undulating longitudinal striations; on the sides, temporals and postocu- [illegible]

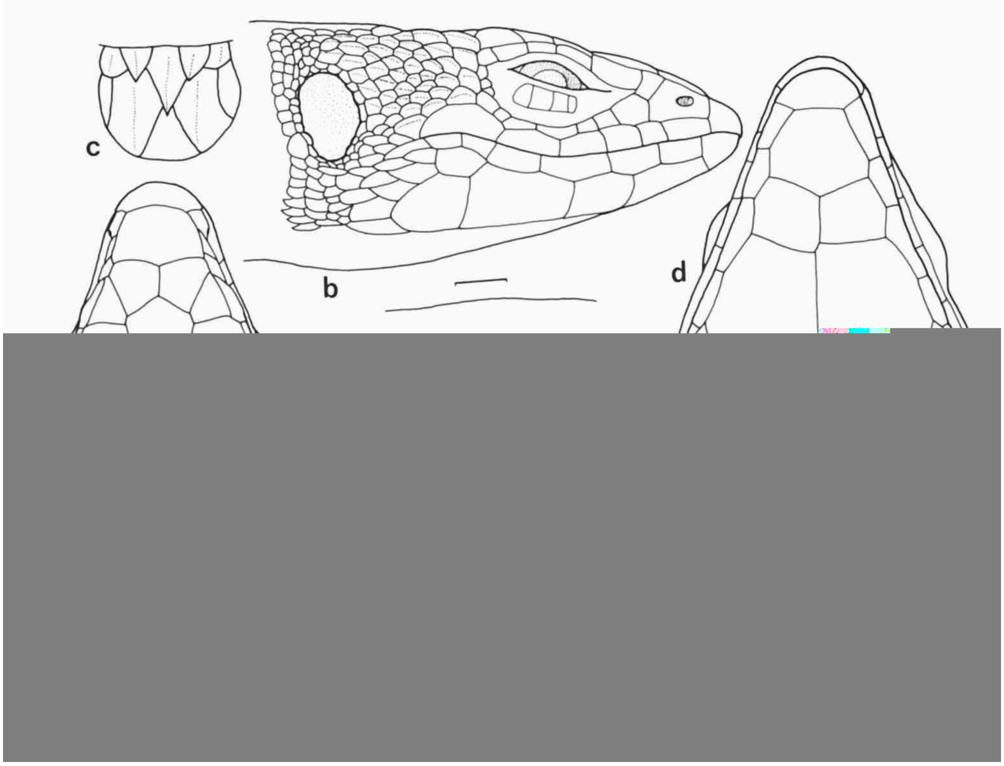
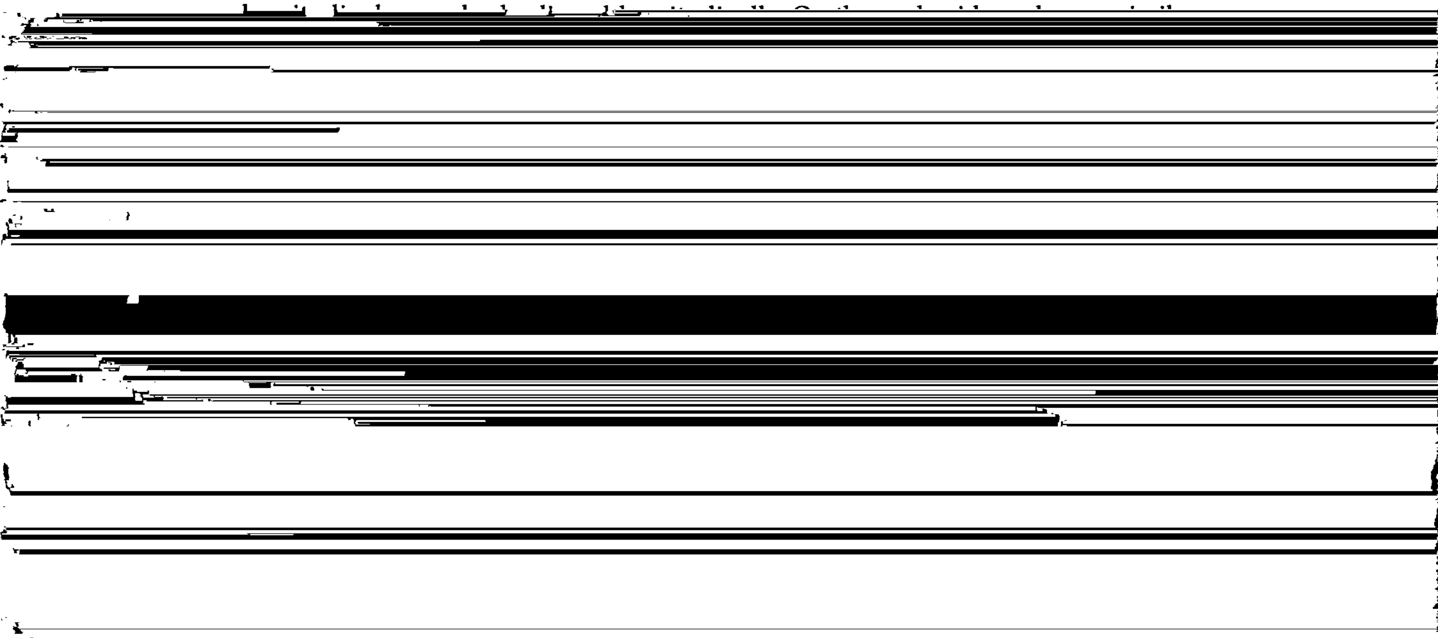


Fig. 139. *Leposoma parietale*, RMNH 25460; a, b: dorsal and lateral views of head; c: preanal plate; d: ventral view of head and gulars; e: dorsals just posterior to midbody.

ceolate; in 9-11 transverse rows. Collar rather indistinct, with 7-12 scales. Gular fold distinct toward sides. Gulars separated from scales on chin by a row of granules. Scales on nape imbricate, keeled, those adjacent to interparietal irregularly polygonal, posteriad rhomboid, grading into dorsals. Scales on sides of neck conical to shortly trihedral, juxtaposed to subimbricate, in approximately vertical rows; at level of collar the scales may be slightly larger, flatter and keeled.

Dorsals and laterals rhomboid-phylloid, imbricate, keeled, mucronate, in oblique and 30-38 (33.6 ± 1.8, n= 31) transverse rows (between interparietal and posterior margin of hind limbs). Ventrals imbricate, in the shape of a heraldic shield, sharply keeled, and shortly mucronate; in six (rarely) or eight longitudinal rows, and 19-24 (21.9 ± 1.2, n= 31) transverse rows; keels longitudinally aligned. Scales around midbody 23-27 (24.6 ± 1.0, n= 30), ventrals and laterals resembling each other more the closer they are. Preanal plate mostly with one anterior and five posterior scales; occasionally the two median ones are fused (resulting in five elongate scales), or the two lateral ones are very reduced. Males with two preanal pores and 5-9 femoral pores at each side (femoral pores in total 10-17, 13.5 ± 1.6, n= 17). Females with none or one small preanal pore, and no femoral pores. Pores in the centre of a swollen area formed by three or four scales, anterior one largest.

Tail with imbricate, squarish, keeled, shortly mucronate scales, in transverse and



except that they are narrower, roof-shaped, forming low longitudinal ridges.

Scales on limbs mostly rhomboid, keeled, imbricate, some mucronate; similar but distinctly smaller on ventral aspect of upper arms; tubercular, juxtaposed, small, on posterior aspect of thighs. Subdigital lamellae medially divided; 8-11 (9.5 ± 0.8, n= 60, 31 specimens) under fourth finger, 10-16 (13.6 ± 1.3, n= 59, 31 specimens) under fourth toe.

RMNH 25448-456, in life, with back dark brown with light brown dorsolateral stripes, flanks almost black, in adult male with a row of beige spots. Ventral surface orange in male, female with white chin, gulars and belly ochre. Iris reddish-brown (M.S. Hoogmoed field notes).

Dixon & Soini (1975, 1986) and Duellman (1978) also gave descriptions of colour in life.

In preservative, dorsal region and sides brown. Back usually with irregular, dark brown flecks. A dorsolateral light stripe, mostly formed by irregular dots, present on each side from posterior corner of eyes (in some specimens more evident from neck) to base of tail; it is partially bordered by a thin, intermittent, dark brown line. Flanks completely covered by a dark brown band. On sides of neck and anterior part of body there may be small, rounded, light spots. Ventral region cream, spotless except in some specimens ventrolaterally; labials with transverse dark brown bands. Limbs brown on upper side, cream ventrally. Tail brown dorsally and laterally, proximally with irregular dark brown flecks middorsally, limited at each side by the continuation of the dorsolateral light stripes, which distally converge and fade out; ventrolaterally with a series of light spots from base of tail to near its midlength. Ventrally tail predominantly cream near base, darkening posteriad.

Habitat.— Primary and secondary forest, forest edge, and clearings, amidst the leaf litter and on small logs (M.S. Hoogmoed, field notes; Duellman, 1978). According to Dixon & Soini (1975, 1986), they are found especially in wet situations.

Notes on natural history.— Dixon & Soini (1975, 1986) and Duellman (1978) gave data on reproduction. Duellman (1978) reported as food a variety of small insects, and in one individual he found the head of a juvenile *Leposoma*. The same author

Leposoma percarinatum (Müller, 1923)
(figs. 140, 141, 289)

Hylosaurus percarinatus Müller, 1923: 146 (holotype ZSM Herpet. Nr. 140/1911 [probably lost according to Uzzell & Barry, 1971]; type-locality: Peixe-Boi, Pará, Brazil).

Leposoma percarinatum; Burt & Burt, 1931: 349; Amaral, 1937a: 1740, 1937b: 194, 1948: 111; Ruibal, 1952: 490; Cunha, 1961: 137 (part); Peters & Donoso-Barros, 1970: 165; Crump, 1971: 20; Uzzell & Barry, 1971: 9; Vanzolini, 1972: 106; Hoogmoed, 1973: 323, 1979: 278; Vanzolini, 1986a: 14; O'Shea, 1989: 68; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Gascon & Pereira, 1993: 181.

Material.— **Brazil.** AMAPA. Alto Rio Maracá: 7 ♀♀, MPEG 841, 848, 851-854 & 16134, 1959, leg. M. Moreira.

AMAZONAS. Serra Imeri, near Salto do Huá (Brazil-Venezuela boundary): 1 ♀, USNM 83573, xi-xii.1930, leg. E.G. Hold. Rio Uatumã, reservoir area of hydroelectric dam Balbina: 2 ♀♀, MPEG 14806-807, 26.i.1988, leg. F.P. Nascimento & F. Braga; 1 ♀, INPA 024, 27.v.1985, leg. G. Ribeiro; 2 ♀♀, INPA 284-285, iv.1984, leg. Operação Muiraquitã. Reserva Florestal Ducke, 25 km N of Manaus: 1 ♀, MPEG 15797, 07.vii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Negro, Arquipélago de Anavilhanas: 1 ♀, INPA 281, v.1988, leg. G. Moreira. Manacapuru, 15 km NE of, 72 km W of Manaus: 1 ♀, RMNH 25464, 27.xi.1985, leg. M.S. Hoogmoed & M. Hero. Rio Urucu, Urucu (Base Petrobrás): 1 ♀, INPA 315, 14.v.1989, leg. C. Gascon. Rio Urucu, E of Porto Urucu, near Petrobrás RUC-2: 2 ♀♀, MPEG 15870, RMNH 25503, 29.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Juruá (left bank), Lago Jainu (6°28'S, 68°46'W): 1 ex., INPA 488, 24.x.1991, leg. C. Gascon.

MARANHAO. Nova Vida (25 km E of Rio Gurupi), road BR-316: 1 ♀, MPEG 12894, 23.ii.1976, leg. O.R. Cunha & F.P. Nascimento.

PARA. Colônia Nova (road BR-316, km 264, near Rio Gurupi): 1 ♀, MPEG 12162, 10.vii.1974, leg. O.R. Cunha & F.P. Nascimento; 1 ♀, MPEG 12897, 24.x.1973, leg. O.R. Cunha. Município de Viseu, Bela Vista: 1 ♀, MPEG 12905, 16.viii.1979, leg. F.P. Nascimento & R.J.R. Moraes. Capanema: 1 ♀, KU 140138, 25.iv.1971. Belém, IPEAN: 2 ♀♀, KU 127246-247, 17 & 30.iv.1969; 1 ♀, KU 128250, 09.iv.1970; 1 ♀, KU 130242, 08.vii.1970; all leg. M.L. Crump. Ilha de Marajó, Município de Breves, km 6 road Breves-Anajás (PA-159): 1 ♀, MPEG 14749, 01.xii.1987, leg. I.F. Santos, R.J.R. Moraes & S. Ramos. Ilha de Marajó, Município de Breves, Comunidade Tancredo Neves (c. 18 km road Breves-Anajás): 1 ♀, MPEG 15790, 20.v.1990, leg. J.S. Lima-Verde, A.C.M. Lima, R.A.R. Rocha & J.O. Dias. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 2 ♀♀, MPEG 16409, RMNH 26552, 27.x.1992; 1 ♀, MPEG 16420, 29.x.1992; 1 juv., RMNH 26553, 02.xi.1992; 1 ♀, MPEG 16477, 13.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Serra de Tumucumaque, Rio Paru de Este, Tiriós: 1 ♀, MPEG 1917, 1962, leg. E. Fittkau. Município de Oriximiná, SE of Cruz Alta, c. 8 km S of Rio Trombetas: 1 ♀, MPEG 15379, 09.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Trombetas, Hydroelectric plant Cachoeira Porteira: 1 ♀, INPA 023, rio Mapuera, 14.v.1985, leg. R.C. Best; 1 ♀, INPA 075, Cachoeira Vira-Mundo, 17.viii.1985, leg. L.M. Reis; 1 ♀, INPA 121, mouth igarapé Tramalhetinho, 27.x.1985, leg. N. Silva.

RORAIMA. Ilha de Maracá: 1 ♀, MR 129, 30.vii.1987; 1 ♀, MR 276, 22.ix.1987; 2 ♀♀, MR 323, 334, 09-10.x.1987; 1 ♀, MR 366, 16.x.1987; 1 ♀, MR 390, 24.x.1987; 1 ♀, MR 395, 27.x.1987; all leg. M. O'Shea, INPA/RGS/SEMA 'Projeto Maracá'. Rio Trairão, N of Ilha de Maracá: 2 ♀♀, MR 177, 187, 15.viii.1987, leg. M. O'Shea, INPA/RGS/SEMA 'Projeto Maracá'.

Diagnosis.— Unisexual *Leposoma* having a moderately large interparietal scale, with parallel or slightly diverging lateral margins. Supralabials followed by a scale about as large as adjacent temporals. Prefrontals form a short medial suture, that between frontoparietals longer. Fourth pair of chinshields reduced. Dorsals mostly from hexagonal (wider posteriorly) middorsally, to rectangular (in oblique position) toward flanks; 35-40 (37.6 ± 1.0) along a longitudinal row. Ventrals 22-28 (24.6 ± 1.7). Scales around midbody 24-27 (26.0 ± 0.7). Flanks with an upper dark stripe 1-3 scales wide, rest of flanks lighter.

Description.— An unisexual Gymnophthalmid, maximum SVL 37 mm (Hoogmoed, 1973). Head 0.20-0.24 (n= 30) times SVL, relatively larger in smaller specimens, around 0.20-0.22 in adults; 1.5-1.7 (1.55 ± 0.05, n= 30) times as long as wide; 1.2-1.7 (1.32 ± 0.11, n= 29) times as wide as high. Snout relatively short, blunt, sloping gently toward top of head. Neck slightly swollen anteriorly. Body cylindrical. Limbs well developed, forelimbs 0.26-0.33 (0.29 ± 0.02, n= 30) times SVL, hind limbs 0.37-0.45 (0.42 ± 0.02, n= 30) times. Tail round in cross section, tapering toward tip; 1.4-2.0 (1.71 ± 0.18, n= 13) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth mostly bicuspid, occasionally tricuspid.

Rostral approximately trapezoidal, more than twice as wide as high. Frontonasal single, irregularly pentagonal, laterally in contact with nasal and loreal. Prefrontals quadrilateral or irregularly pentagonal (the pair resembles a stylised butterfly), widest anteriorly, wider than long or about as wide as long, with a short medial suture; laterally in contact with loreal and first supraocular. Frontal hexagonal, longer than wide, widest anteriorly; the angle formed by the two anterior sides distinctly more acute than that formed by the two posterior sides; laterally in contact with first, second, and occasionally third, supraoculars. Frontoparietals irregularly pentagonal, longer than wide, medial suture longer than that between prefrontals; laterally in contact with third and fourth supraoculars, in some specimens touching second supraoculars. In MPEG 15379 there is an irregular scale between one frontoparietal and interparietal, also touching the other frontoparietal. A large interparietal, lateral margins parallel or divergent posteriorly. Parietals distinctly shorter than interparietal, and as wide as, to slightly narrower than, its anterior part. The posterior margins of parietals and interparietal together roughly form a semicircle. Occipitals absent. Four supraoculars, second and third subequal and larger than the other two. Four to six, mostly five, supraciliaries, first widest. RMNH 25503 and MR 129 on each side with two to three small scales between supraoculars and supraciliaries. Nasal semidivided; nostril in its anterior part, directed laterally. Loreal rectangular, separated from supralabials by a distinct suture between frenocular and nasal (in both MPEG 14807 and MPEG 15379 loreal and frenocular are fused on one side). Frenocular followed by a series of 5-8 suboculars, and 4-6 postoculars. Postoculars smooth or keeled, uppermost bordering on parietal. Lower eyelid with semitransparent disc of 3-5 palpebrals. Six supralabials, posterior one largest, reaching commissure of mouth; fifth below centre of eye. The scale that follows the sixth supralabial about as large as adjacent temporals. Temporal scales relatively small, roundish to irregularly polygonal, subimbricate, keeled; slightly larger in supratemporal area. Ear-opening relatively large, vertically oval, surrounded by small scales, anteriorly forming a finely lobed margin, posteriorly smooth. Tympanum almost superficial. All dorsal and lateral head scales, except for temporals, juxtaposed. Scales on dorsal surface of head with irregularly undulating longitudinal striations; on sides, temporals and in some specimens postoculars keeled, other scales smooth.

Mental approximately semicircular. Postmental undivided, pentagonal or heptagonal. Three pairs of chinshields, second largest; first and second pairs in contact medially and with infralabials, third pair separated medially by one scale, and separ-

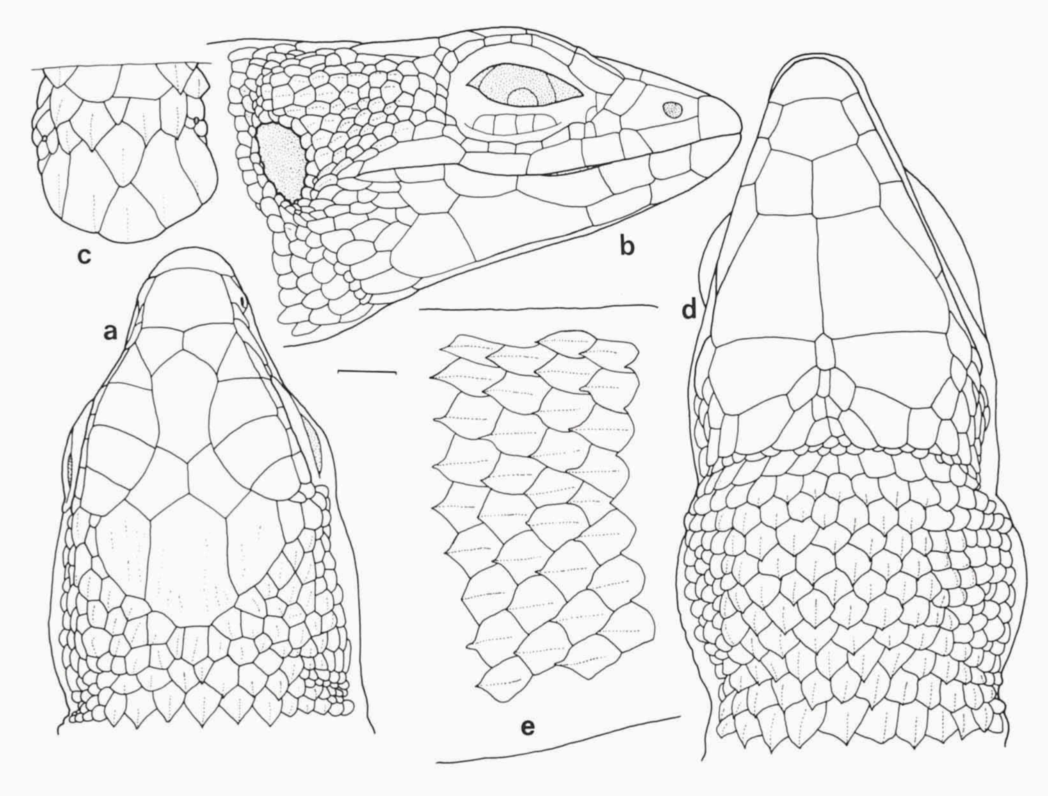


Fig. 140. *Leposoma percarinatum*, MPEG 14807; a, b: dorsal and lateral views of head; c: preanal plate, showing one preanal pore at each side; d: ventral view of head and gulars; e: dorsals just posterior to midbody.

ated from infralabials by one or two scales. They are followed posteriorly by several scales of variable size, but none large enough to be considered as a fourth pair of chinshields. Four infralabials, suture between third and fourth below centre of eye; followed by one to three postinfralabials, usually first postinfralabial as large as infralabials, posterior ones smaller. Most head scales covered with small pits, either forming a peripheral row (posterior dorsal head scales) or scattered over the whole surface (others).

Gulars imbricate, anteriorly squarish and weakly keeled, posteriad becoming larger, longer than wide, strongly keeled, and mucronate; in 9-11, mostly 10, transverse rows. Collar rather indistinct, with 9-12 scales. Gular fold distinct toward sides. Gulars separated from scales on chin by a row of granules. Scales on nape irregularly polygonal to subhexagonal, keeled, imbricate, posteriorly grading into dorsals. Scales on sides of neck conical to shortly trihedral, juxtaposed, in approximately vertical rows; at level of collar scales may be slightly larger, flatter and keeled.

Dorsals and scales on flanks imbricate, keeled, mucronate, in transverse and oblique rows; close to middorsal line approximately hexagonal, wider posteriorly, toward sides rectangular (in oblique position) with diagonal keels; 35-40 (37.6 ± 1.0, n= 29) transverse rows of dorsals between interparietal and posterior margin of hind limbs. Ventrals imbricate, in the shape of a heraldic shield, low, broadly or sharply keeled, shortly mucronate; in eight longitudinal rows, and 22-28 (24.6 ± 1.7, n= 29) transverse rows; keels longitudinally aligned. Scales around midbody 24-27 (26.0 ± 0.7, n= 29), ventrals and laterals resembling each other more the closer they are. Preanal plate mostly with one anterior and five posterior, rhomboid scales, occasionally three anterior scales, or four or five elongate scales (no anterior scale). Usually one small preanal pore is present at each side, in the centre of three scales; in some specimens it is absent (or indistinct). Femoral pores absent.

Tail with imbricate, squarish, keeled, shortly mucronate scales, in transverse and longitudinal rows, the keels aligned longitudinally. On the underside scales are similar, except that they are narrower, roof-shaped, forming low longitudinal ridges.

Scales on limbs mostly rhomboid, keeled, imbricate, some mucronate; similar but distinctly smaller on ventral aspect of upper arms; tubercular, juxtaposed, small, on posterior aspect of thighs. Subdigital lamellae medially divided; 10-13 (11.6 ± 0.9, n= 57, 29 specimens) under fourth finger, 15-20 (17.2 ± 1.1, n= 55, 29 specimens) under fourth toe.

MPEG 16420, in life, with dorsal surface of head blackish, back dark brown with a relatively inconspicuous pale brown dorsolateral stripe; flanks black; ventral surface pinkish. MPEG 16477 was dark brown with a blackish dorsolateral stripe, and a few pale spots on sides of neck; ventral surface whitish, under tail pale brown; tongue anteriorly dark brown, posteriorly white. RMNH 26553, a juvenile, was brown with an orangish dorsolateral stripe from nape to tail.

In preservative, dorsal region and sides brown. A dorsolateral light stripe on each side from neck to base of tail, fainter near midbody. Medially the light stripe is partially margined by a thin blackish line. Laterally it is bordered by a blackish stripe one to three scales wide (with some scales darker than others). Flanks slightly darker than back; some roundish light spots may be present on sides of neck and above forelimbs. Ventral region cream, spotless except ventrolaterally; labials with transverse dark brown bands. Limbs brown on upper side, cream ventrally. Tail predominantly brown dorsally and laterally; a blackish middorsal stripe is usually present at least proximally, in some specimens continuing to tip of tail as a thin line; the dorsolateral light stripes coming from the body converge and fade out proximally; at each side there is a blackish longitudinal stripe, which is bordered below by a light line. Ventrally tail predominantly cream, brown peppered.

Habitat.— An inhabitant of the forest leaflitter, frequently close to water (near creeks, in swampy area, varzea forest, or border of igapó forest), but also in terra firme forest (Beebe, 1945; Crump, 1971; Hoogmoed, 1973; O'Shea, 1989; Zimmerman & Rodrigues, 1990; Martins, 1991; pers. obs.). MPEG 16477 was found in the leaf litter while a standing piece of rotten tree trunk (in which the lizard may have been hidden) was being taken apart.

Notes on natural history.— Most individuals were captured between 10:30 and 18:00 h. KU 128250 was collected at 05:30 h, KU 130242 at night (both on ground, in swampy area, according to field notes of M.L. Crump). Beebe (1945) reported several individuals collected in pits at night.

Several insects and a spider were reported by Beebe (1945) in five stomachs. This author also observed an individual being attacked by army ants.

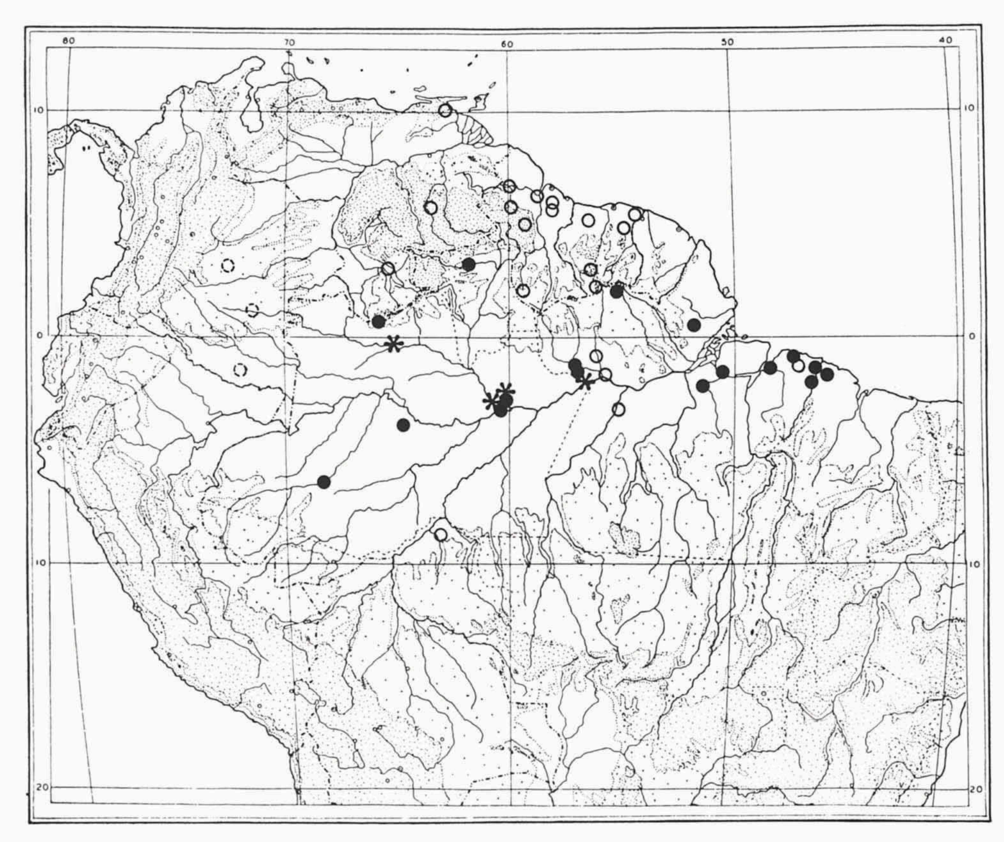


Fig. 141. Distribution of *Leposoma percarinatum* (circles) and *L.* cf. *percarinatum* (asterisks). In Anavilhanas, marked with an asterisk, *L. percarinatum* also occurs. Closed symbols = material studied. Open circles = data from literature (Parker, 1935; Beebe, 1945; Ruibal, 1952; Uzzell & Barry, 1971; Vanzolini, 1972; Hoogmoed, 1973; Mägdefrau et al., 1991). Dashed circles = data for Colombian states by Ayala (1986).

MPEG 12894 was in the stomach of the snake *Drymoluber dychrous* (Peters) (MPEG 11099), MPEG 12162 in that of *Echinantera brevirostris* (Dunn) (MPEG 5757), MPEG 12905 in that of *Echinantera occipitalis* (Jan) (MPEG 15967), and MPEG 12897 in that of *Oxybelis argenteus* (Daudin) (MPEG 5170).

No males are known in this species, which strongly suggests reproduction by parthenogenesis (see below). MPEG 15870 (Urucu, 29.ix.1989) and MPEG 16420 (Caxiuanã, 29.x.1992) each had two eggs in the abdomen. Clutches of two eggs were also observed by Beebe (1945), who gave some more data on reproduction.

Distribution (fig. 141).— Northern South America east of the Andes, in French Guiana, Suriname, Guyana, Venezuela, southeastern Colombia, and Brazil. In Brazil known from Amapá, Pará, Amazonas, Roraima and, according to Vanzolini (1986a), also from Rondônia.

Remarks.— Ruibal (1952) examined 19 specimens of this species, all females, remarking on the disproportionate sex ratio. Uzzell & Barry (1971) studied 11 additional specimens, also all females, and concluded that *L. percarinatum* was a unisexual species. They further compared it with other *Leposoma* species, showing that *L. percarinatum* was similar in several characters to, and in some aspects intermediate between, *L. guianense* and *L. parietale*, suggesting that these two species could be the parent species of *L. percarinatum*. The eight specimens Hoogmoed (1973) studied from Suriname also were only females, thus reinforcing the idea that the species was unisexual.

The material here studied also consists of females only (but see under '*L.* cf. *percarinatum*'), and considering other presently known cases among teiids of unisexual species (e.g., in *Gymnophthalmus* and *Cnemidophorus*), there is no reason to doubt that *L. percarinatum* represents another all-female species. Furthermore, in all cases where unisexual species were studied in more detail, they proved to be parthenogenetic lizards of hybrid origin, thus enabling the assumption that this can also be the case with *L. percarinatum*. The suggestion of Uzzell & Barry (1971) that *L. guianense* and *L. parietale* were the parent species would be the most probable in case only these two bisexual species occurred in Amazonia. However, in the present study two new species are described, and some specimens that could not be identified satisfactorily are commented upon under '*L.* cf. *percarinatum*'. Some of them could also be likely 'candidates' as parent species. Studies on biochemical and genetic aspects would be the most appropriate to clarify such questions.

Cunha (1961) reported a collection of *L. percarinatum* from Amapá, including several males. As suggested by both Uzzell & Barry (1971) and Hoogmoed (1973), the specimens examined by Cunha (1961) represented a mixture of *L. percarinatum* and *L. guianense*.

L. percarinatum and *L. guianense* are sympatric at least in part of their area of distribution (Uzzell & Barry, 1971; Hoogmoed, 1973; this paper). Vanzolini (1986a) mentioned both *L. percarinatum* and *L. parietale* from Rondônia; his '*L. parietale*' is probably *L. osvaldoi* **spec. nov.** INPA 281 (here identified as *L. percarinatum*), from Anavilhanas, was collected in the same general area as INPA 283 which is discussed under '*Leposoma* cf. *percarinatum*', together with other specimens with mixed characteristics.

Leposoma cf. *percarinatum*

I comment below on four specimens or groups of specimens which present some mixed characteristics.

(1) Material.— **Brazil.** PARA. Rio Nhamundá, Sítio Céu Estrelado, 15 km N of Faro: 1 ♂, MPEG 15313, 01.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.

MPEG 15313 is a male from 15 km N of Faro, Pará state, 30 mm SVL. Its scale counts are within the range of *L. percarinatum* (35 dorsals, 23 ventrals, 27 scales around midbody) but, except for scales around midbody, they also agree with those of *L. guianense*. It has 2+2 preanal and 6+7 femoral pores, all well developed. The suture between prefrontals is moderately elongate, and the interparietal relatively large, in which characters it is closer to *L. guianense*, but supralabials are followed by a scale only slightly larger than adjacent temporal scales, and fourth pair of chinshields is reduced. These two latter characteristics are closer to those of *L. percarina-*

tum, although in this species the scale posterior to supralabials is indistinguishable from adjacent temporals. Moreover, it presents some abnormal characteristics: posterior to fourth supraocular, at each side, there is a slightly enlarged scale which could be considered as a "fifth supraocular'; also an elongate scale is present separating the third supraocular from supraciliaries; third pair of chinshields with scales relatively elongate, one of them transversely divided; there are two, instead of one, anterior scales in the preanal plate (and five posterior scales). The specimen has the colour pattern (in preservative) common to both *L. percarinatum* and *L. guianense*.

(2). Material.— **Brazil.** AMAZONAS. Reserva INPA/ZF-2, 60 km N Manaus: 1 ♀, MPEG 15815, 14.vii.1989, leg. M.S. Hoogmoed.

MPEG 15815, a female with 23 mm SVL, has 34 dorsals, 22 ventrals, and 25 scales around midbody. It agrees with *L. guianense* in all characteristics, except for the scale which follows the posterior supralabial, which is as large as adjacent temporals. Besides, it has an elongate scale (at each side) which separates the third (and part of second and fourth) supraocular from the supraciliaries, and a conspicuous light dorsolateral stripe at each side up to base of tail.

(3). Material.— **Brazil.** AMAZONAS. Rio Negro, Tapurucuara: 1 ♂, 1 ♀, MPEG 1937-38, 1962, leg. F.M. Oliveira.

MPEG 1937 (♂, 32 mm SVL) and MPEG 1938 (♀, 27 mm SVL), from Tapurucuara, Amazonas state, respectively have 37-38 dorsals, 22 ventrals, and 25-26 scales around midbody. The male has 2+2 preanal and 4+5 femoral pores, the female apparently has 1+1 preanal pores (rather inconspicuous) and no femoral pores. The suture between prefrontals is short, the interparietal relatively large, the scale posterior to supralabials as large as adjacent temporal scales, and the fourth pair of chinshields is absent (in MPEG 1938 the third pair of chinshields is followed on both sides by two transverse rows of scales; MPEG 1937 shows a similar situation on one side, on the other side there is a median larger scale common to both rows). Dorsals rhomboid to hexagonal, distinctly wider posteriorly. The two specimens are completely bleached, so no colour pattern can be discerned.

Thus, except for the fact that MPEG 1937 is a male, these two specimens agree in all characteristics with *L. percarinatum*.

(4) Material.— **Brazil.** AMAZONAS. Rio Negro, Arquipélago de Anavilhanas: 1 ♀, INPA 283, v.1988, leg. G. Moreira.

INPA 283, with 34.5 mm SVL, shows the general characteristics of *L. percarinatum*, presenting, however, some significant differences: (1) 42 transverse rows of dorsals between interparietal and posterior margin of hind limbs (35-40, 37.6 ± 1.0, in *L. percarinatum*); (2) 30 scales around midbody (24-27, 26.0 ± 0.7, in *L. percarinatum*); (3) 14-15 lamellae under fourth finger, 19-20 under fourth toe (respectively 10-13. 11.6 ± 0.9, and 15-20, 17.2 ± 1.1 in *L. percarinatum*); (4) a wide dark brown band covers the flanks completely, while in *L. percarinatum* the flanks are lighter, with a dark stripe one to three scales wide in its upper part; (5) chin and gulars densely covered with brown flecks (immaculate in *L. percarinatum*). Moreover, loreal reaches supralabials, as if fused with frenocular (or part of it), which usually does not happen in *L. percarinatum*. However, in two instances in *L. percarinatum* loreal and frenocular were fused, so in INPA 283 the condition of the loreal could also be an individual variation.

Compared with the bisexual species, differences in scale counts are still larger, as they have lower numbers of dorsals and scales around midbody than *L. percarinatum* (also slightly lower numbers of subdigital lamellae). Number of ventrals (26) would also be rather high for any of these species. Moreover, the specimen resembles *L. percarinatum* (and differs from the other species except *L. osvaldoi*) in the reduced fourth pair of chinshields, and in the sixth supralabial being followed by a small scale.

Remarks.— The existence of parthenogenetic populations in lizards usually implies complex genetic interactions between species, and 'difficult' taxonomic groups with cryptic species, as is the case with the *Cnemidophorus lemniscatus* complex and the *Gymnophthalmus underwoodi* complex. This may also be the case with *Leposoma*, for which reason I preferred to highlight the differences presented by the specimens above. The variations observed could have one of three reasons: (a) the specimen is from one of the known species, although it presents some distinctive characteristics (intraspecific variability). (b) The specimen might be a hybrid between one bisexual and one parthenogenetic species. The presence of such natural hybrids has been demonstrated, for instance, by Lowe et al. (1970) for *Cnemidophorus sonorae* Lowe & Wright × *C. tigris* Baird & Girard, and suggested by Fritts (1969) for *Cnemidophorus cozumela* Gadow × *C. angusticeps* Cope, in order to explain the presence of two males similar to *C. cozumela*. Other cases in *Cnemidophorus* where the presence of males in parthenogenetic species is attributed to hybridization with a bisexual species are given by Cole (1975). (c) The specimen may represent an undescribed species. Uzzell & Barry (1971) proposed that *L. guianense* and *L. parietale* would be the parent species of *L. percarinatum*, but some characteristics in the latter are distinct from both bisexual species. One of the parent species of *L. percarinatum* might well be a cryptic, not yet described, species. I think MPEG 1937-38 would be good candidates for one such cryptic species. In the case of INPA 283, if more specimens with similar characteristics appear, I believe they should be considered as a distinct species also, but it certainly could not be called cryptic in relation to *L. percarinatum* (or any of the other known species), because of its distinct characteristics.

Leposoma snethlageae spec. nov.
(figs. 134, 138, 142, 290)

Holotype.— MPEG 15858, ♂, E of Porto Urucu, near Petrobras RUC-2, Rio Urucu, Amazonas, Brazil, 24.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Paratypes.— **Brazil.** AMAZONAS. Rio Urucu, E of Porto Urucu, near Petrobras RUC-2: 1 ♀, RMNH 25502, 27.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Urucu, Coari, Petrobras RUC-9: 1 ♂, INPA 378, 15.v.1991, leg. M. Martins & M.E. Oliveira. Rio Solimões, Tabatinga: 1 ♂, 1 ♀, RMNH 25462-463, 11.xi.1985, leg. M.S. Hoogmoed.

Diagnosis.— *Leposoma* having a moderately large interparietal scale, with parallel or slightly diverging lateral margins. Supralabials followed by a scale about as large as adjacent temporals. Prefrontals form a short to moderately long medial suture, that between frontoparietals with approximately same length or shorter. Fourth pair of chinshields large. Dorsals mostly hexagonal to rectangular (in oblique position), 31-36 along a longitudinal row. Ventrals 21-23. Scales around midbody 24-26. Flanks completely covered by a wide dark band.

Description.— Gymnophthalmid with SVL of 32 mm in the holotype, which represents the largest male, 33 mm in the largest female (RMNH 25502). Head 0.20-0.22 times SVL, 1.4-1.5 times as long as wide, 1.2-1.4 times as wide as high. Snout short, blunt, sloping gently toward top of head. Neck slightly swollen anteriorly. Body cylindrical. Limbs well developed, forelimbs 0.23-0.27 times SVL, hind limbs 0.36-0.40 times. Tail round in cross section, tapering toward tip, 1.6-1.8 times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid.

Rostral approximately trapezoidal, more than twice as wide as high. Frontonasal single, irregularly pentagonal, laterally in contact with nasal and loreal. Prefrontals quadrilateral (the pair resembles a stylised butterfly, wider anteriorly), longer than wide or about as long as wide, with a short to moderately long medial suture. Each prefrontal in contact at the sides with loreal and first supraocular. Frontal hexagonal, longer than wide, slightly wider anteriorly; laterally in contact with first, second and third supraoculars (RMNH 25463 with a medial sulcus on anterior part of frontal). Frontoparietals irregularly pentagonal, obliquely elongate, with a short medial suture (about as long as, to shorter than that between prefrontals); laterally in contact with third supraocular, and in three of the four specimens also with fourth supraocular. A large interparietal, with lateral margins parallel or slightly divergent posteriorly. Parietals distinctly shorter and narrower than interparietal. Posterior margins of parietals and interparietal together roughly form a semicircle. Occipitals absent. Four supraoculars, third largest. Four or five supraciliaries, first widest. RMNH 25462 with three, RMNH 25463 with one, small scale(s) at each side between supraoculars and supraciliaries. Nasal semidivided, nostril in its anterior part, directed laterally. Loreal rectangular, separated from supralabials by a suture between frenocular and nasal. Frenocular relatively small, followed by a series of five or six suboculars, and four postoculars. Upper postocular borders on parietal and may be keeled; other postoculars smooth. Lower eyelid with semitransparent disc of 2-5 palpebrals. Six or seven supralabials, posterior one largest, reaching commissure of mouth; fifth below centre of eye. The scale that follows the sixth supralabial about as large as adjacent temporals. Temporal scales variably polygonal, juxtaposed to subimbricate, keeled, larger toward parietals. Ear-opening relatively large, vertically oval, surrounded by small scales, anteriorly forming a finely lobed margin, posteriorly smooth; tympanum almost superficial. All dorsal and lateral head scales, except for temporals, juxtaposed. Scales on dorsal surface of head with irregularly undulating longitudinal striations; on sides, temporals keeled, other scales smooth.

Mental approximately semicircular. Postmental undivided, pentagonal or heptagonal. Four pairs of chinshields, second largest, fourth smallest. First and second pair in contact medially and with infralabials, third pair separated medially and from infralabials by one scale. Scales of fourth pair closer to each other than to infralabials, medially separated by two small scales, separated from infralabials by three or four larger scales. Four to six infralabials, suture between third and fourth, or

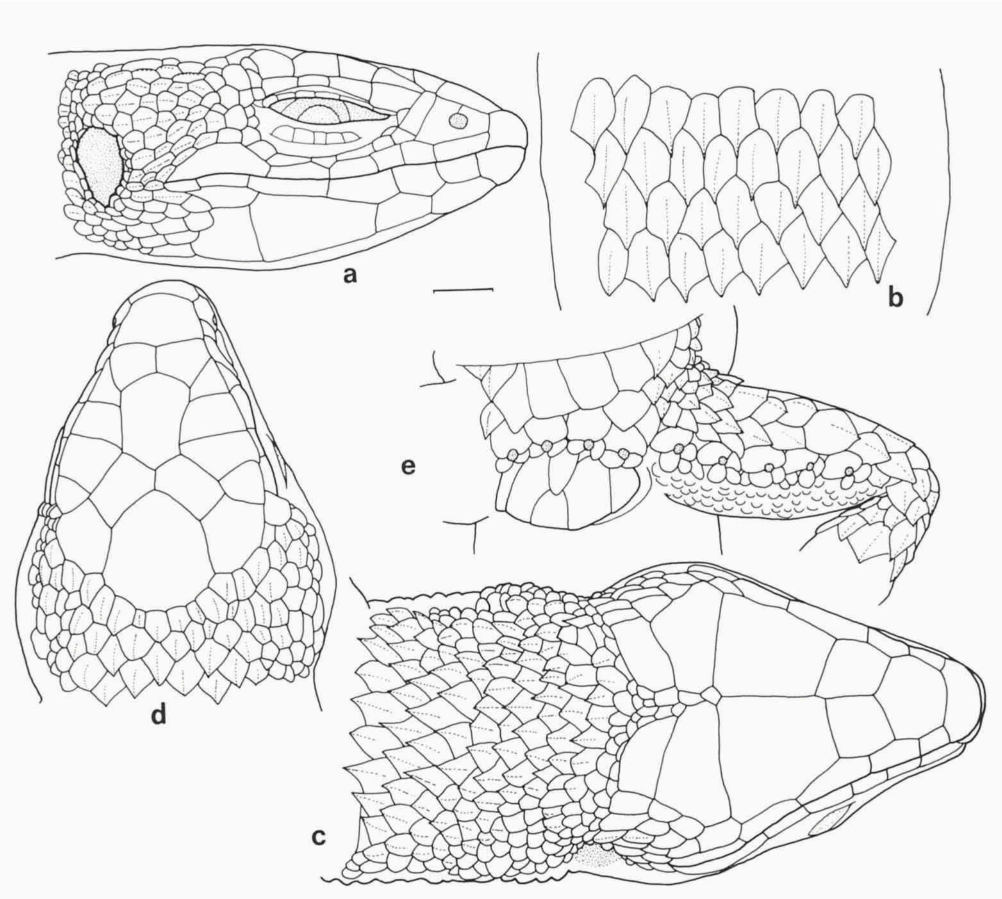


Fig. 142. *Leposoma snethlageae*, MPEG 15858 (holotype); a: lateral view of head; b: dorsals just posterior to midbody; c: ventral view of head and gulars; d: dorsal view of head; e: preanal plate and left thigh, showing preanal and femoral pores.

fourth and fifth, below centre of eye; followed by one or two postinfralabials. Most head scales covered with small pits, either forming a peripheral row (posterior dorsal head scales) or scattered on the whole surface (others).

Gulars imbricate, anteriorly squarish and weakly keeled, posteriad becoming larger, longer than wide, strongly keeled, and mucronate; in 9-11 transverse rows. Collar rather indistinct, with 8-10 scales. Gular fold distinct toward sides. Gulars separated from scales on chin by a row of granules. Scales on nape imbricate, keeled, anteriorly variably polygonal to rhomboid, posteriad grading into dorsals. Scales on sides of neck conical to roughly trihedral, juxtaposed to subimbricate, larger posteriad; in approximately vertical rows.

Dorsals and scales on flanks imbricate, keeled, mucronate, in transverse and oblique rows; anteriorly hexagonal, posteriorly hexagonal near middorsal line, changing into rectangular (oblique in position) with diagonal keels in dorsolateral area, and into phylloid on flanks; 31-36 (33.4 ± 1.8, n= 5) transverse rows of dorsals between interparietal and posterior margin of hind limbs. Ventrals imbricate, shaped like a heraldic shield, low, broadly or sharply keeled, mucronate; in eight longitudinal, and 21-23 (22.0 ± 0.7, n= 5) transverse rows; keels longitudinally aligned. Scales around midbody 24-26 (25.2 ± 0.8, n= 5), ventrals and laterals resembling each other more the closer they are. Preanal plate with one anterior and five posterior scales. Males with two preanal pores, and four to six femoral pores at each side. Females with one preanal pore and one (RMNH 25463) or none (RMNH 25502) femoral pore per side. Pores in the centre of a swollen area formed by two to four scales of which anterior one largest.

Tail with imbricate, squarish, keeled, shortly mucronate scales, in transverse and longitudinal rows, keels aligned longitudinally. On underside scales are similar, except that they are narrower, roof-shaped, forming low longitudinal ridges.

Scales on limbs mostly rhomboid, keeled, imbricate; distinctly smaller, tuberculate, juxtaposed to subimbricate on ventral aspect of upper arms, and on posterior aspect of thighs. Subdigital lamellae medially divided; 8-10 (9.1 ± 1.2, n= 10, 5 specimens) under fourth finger, 11-14 (12.1 ± 1.1, n= 9, 5 specimens) under fourth toe.

Colour in life of MPEG 15858 (♂), raw-umber (223) dorsally, with indistinct cinnamon (39) dorsolateral stripes; flanks black; ventral surface burnt-orange (116), with tail distally becoming black; iris very dark brown. According to M.S. Hoogmoed's field notes, RMNH 25462 (♂) had also a red ventral surface. RMNH 25502 (♀) with dorsal surface of head sepia (119), back and dorsal surface of tail sepia (219); dorsolateral stripe (only visible anteriorly and posteriorly) cinnamon-drab (219C); chin light ferruginous (41), gular region and belly smoke-grey (45) with some cinnamon-rufous (40) tinge posteriorly; underside of tail light cinnamon-rufous, except for distal segment which was sepia (219).

In preservative, dorsal region brown. A light dorsolateral stripe from posterior corner of eye or from neck, fading out near midbody, and re-appearing at level of hind limbs. At least anteriorly the light stripe is bordered dorsally by a blackish line. Laterally it is in direct contact with a dark brown or blackish wide band which covers flanks completely. Some small light spots may be present on sides of neck and on anterior part of body. Ventral region cream in females, with an orange hue in males (which probably will disappear eventually); spotless except for the head ventrolaterally, where labials have transverse dark bands, and some dark spots may reach other scales on sides of chin. Limbs brown on upper side, cream ventrally. Tail brown dorsally, darker brown laterally (at least proximally); the pair of dorsolateral stripes which continues from body fades out relatively close to base of tail; a light ventrolateral stripe from posterior aspect of thigh to proximal part of tail may be present, or almost completely absent and represented only by a few spots on tail. Ventrally tail predominantly cream (with an orange hue in males), brown peppered.

Habitat.— MPEG 15858 and RMNH 25502 were in heavily disturbed (logged) primary forest, the former amidst root mass, bark litter and soil at base of tree between buttresses, the latter among leaf litter in a moist spot in tractor trail. INPA 378 was captured during deforestation of an area of primary forest. RMNH 25462-463 were in large open spot (deserted camp) in primary forest, on the ground, amidst leaf litter.

Notes on natural history.— All individuals were captured in daytime. RMNH

25502 and 25463, both collected in November, had each two developed eggs in the abdomen.

Distribution (fig. 134).— Southwestern Amazonas state, Brazil, at least between Urucu and Tabatinga.

Remarks.— Using the key given by Uzzell & Barry (1971), *L. snethlageae* would key out as *L. parietale*. The two species agree in the general number of scales, in the relative size of fourth pair of chinshields, and in the presence of a dark lateral band along body. Males with lower numbers of femoral pores than *L. parietale* from Ecuador (respectively 9-11 versus 12-17), but the specimens from Peru show an intermediate number (10-13). Nevertheless, they also differ in several scale characters from *L. parietale*: (1) sixth supralabial reaches the commissure of the mouth, and it is followed by a scale not larger than adjacent temporal scales, while in *L. parietale* the sixth supralabial is followed by a postsupralabial (which reaches the commissure of the mouth), slightly larger than adjacent temporals; (2) prefrontals with a short to moderately long medial suture, while in *L. parietale* they have a long medial suture; (3) suture between frontoparietals also is distinctly shorter than in *L. parietale*; (4) frenocular small in *L. snethlageae*, relatively large in *L. parietale*; (5) dorsals hexagonal to rectangular (with straight lateral margins), in *L. parietale* rhomboid (no straight lateral margins).

Plotting the data of the specimens here studied of *L. snethlageae* on the graphs 'parietal length versus interparietal length', and 'interparietal area versus SVL', given by Uzzell & Barry (1971), the dots fall between *L. parietale* and *L. guianense* (in relation to the first mentioned graph, two dots fall within the area of *guianense*, two within the area common to both species; in the second graph one dot is in the area of *L. guianense*, one in that of *L. parietale*, and two in the area common to both). I also plotted data I took myself from some specimens of *L. guianense* and *L. parietale*, and they agree with Uzzell & Barry's (1971) data.

The species also differs from *L. parietale* in body proportions, specifically in length of head in relation to trunk length, and length of fore- and hind limbs in relation to SVL (fig. 138).

From *L. guianense*, *L. snethlageae* differs in characters (1), (2) and (4) above. The suture between frontoparietals in *L. guianense* is slightly longer than in *L. snethlageae*, but shorter than in *L. parietale*; the frontoparietals, however, differ in shape, being more asymmetrical in *L. snethlageae*. Moreover, they differ in the fourth pair of chinshields, which is larger in *L. snethlageae*, and in the presence of a dark lateral band.

For differences with *L. osvaldoi* **spec. nov.** see under this species.

Of the five specimens studied of *L. snethlageae*, two males and a female come from Urucu, two other specimens (♂ and ♀) come from Tabatinga (both localities in the state of Amazonas). They are quite similar in all characters, except that the three specimens from Urucu have four supraciliaries and three to five palpebrals, while the two from Tabatinga have five supraciliaries and two or three palpebrals. These may represent either individual variation, or small differences among populations.

Etymology.— The species is named in honour of Maria Elizabeth Emilie Snethlage (1868-1929), who dedicated many years of her life to study the Amazonian region, with emphasis on the ornithofauna, and who also gave a valuable contribution to the Museu Paraense Emilio Goeldi, where she worked between 1905 and 1922, holding the position of Director between 1917 and 1921.

Micrablepharus Boettger, 1885

Diagnosis.— Gymnophthalmids with body cylindrical, tail long, round in cross section. Limbs well developed, but inner finger either missing or reduced and clawless. Nasals separated by frontonasal. Eyelid grown over the eye, immovable, transparent. Prefrontals absent, frontoparietals present. Dorsals, scales on flanks and ventrals similar, sub-hexagonal, smooth, imbricate.

Distribution.— Brazil and Paraguay.

Content.— Two species, one of which known only from the type and with unknown distribution. The other species, *M. maximiliani*, reaches the southern and eastern limits of Amazonia.

Micrablepharus maximiliani (Reinhardt & Lütken, 1862)
(figs. 143, 144, 292)

Gymnophthalmus maximiliani Reinhardt & Lütken, 1862: 211 (2 syntypes, ZMUC-R4364 and R4365, type-locality: Maruim, Sergipe, Brasil).

Micrablepharus maximiliani; Boulenger, 1885b: 426; Goeldi, 1902: 537, 550; Cunha, 1961: 155; Peters & Donoso-Barros, 1970: 203; Vitt & Caldwell, 1993: 47.

Material.— **Brazil.** 1 juv., RMNH 25690, leg. Fiebrig.
DISTRITO FEDERAL. Brasília: 1 ♀, MPEG 12891, vi.1970; 1 juv., MPEG 4554, 1970; both leg. C. Alho.
GOIAS. Santa Rita do Araguaia: 1 ♀, MPEG 16886, 04.vi.1994, leg. M.T. Rodrigues.
MARANHAO. Município Cândido Mendes, Barão de Tromaí: 2 exs., MPEG 16757-758, 12-14.vii.1993, leg. D. Peccinini-Seale & A.C.M. Lima.
MATO GROSSO. Rio Tapirapés, Porto Velho: 1 ex., CM 65051, 11.vi.1964, leg. R.T. Lima.
SERGIPE. Maruim: syntypes, ZMUC R44364, ♂, ZMUC R4365, ♀, leg. Capt. Hygom.
PARA. Conceição do Araguaia: 1 ♀, MPEG 149, ix.1957, leg. J. Hidasi.

Diagnosis.— Follows the generic diagnosis, and differs from its congener in having the inner finger completely missing (see remarks).

Description.— Gymnophthalmid with maximum SVL, among material studied, of 39 mm in males (MPEG 16886), 40.5 mm in females (ZMUC-R4364). Head 0.18-0.23 times SVL, 1.4-1.6 times as long as wide, 1.2-1.3 times as wide as high. Snout short, wide, sloping gently posteriad. Neck about as wide as head and body. Body cylindrical. Limbs well developed, forelimbs 0.23-0.30 times SVL, hind limbs 0.36-0.43 times. Four fingers (inner one missing), five toes. Tail round in cross section, tapering toward tip, 1.6-1.7 times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Teeth small, conical.

Rostral hexagonal, more than twice as wide as high, visible from above. Frontonasal large, octagonal, in contact with rostral, nasal, loreal, first supraocular (in ZMUC-R4364 the two scales are separated on one side by an extra, small scale), and frontal; it may also touch first supraciliary. Prefrontals absent. Frontal trapezoidal, distinctly longer than wide, anterior and posterior margins slightly convex; laterally in contact with first supraocular. Frontoparietals irregularly hexagonal, wider than long, with a relatively short medial suture; laterally in contact with first and second supraoculars. Interparietal usually rhomboid, posterior borders longest and forming a blunt tip; in RMNH 25690 there is a straight, relatively wide posterior margin. One parietal at each side of interparietal, slightly shorter, and distinctly wider than interparietal; posteriorly the two scales form a transverse, slightly convex line. Two supraoculars, first largest. Two supraciliaries, first longest and widening anteriorly. Nasal semidivided, approximately rectangular; nostril at its centre, directed laterally. Loreal quadrilateral, in contact with second, and in some specimens with third, supralabial; followed by a small frenocular. Subocular series formed by a small preocular; a long subocular, which may be preceded by a short presubocular; and three postoculars, one of which may be posterior to the other two. Eyelids grown over the eye, immovable, transparent. Pupil round with a ventral and a dorsal flap projecting inwards. Seven or eight supralabials and postsupralabials; fourth or fifth supralabial longest and under the eye; the three scales that follow (one supralabial and two postsupralabials) higher and imbricate. Temporal scales smooth, imbricate, with rounded posterior margin. Ear-opening small, anterior margin broadly lobed, posterior margin finely lobed. Tympanum recessed into a short auditory meatus. Dorsal head scales smooth, most of them slightly imbricate.

Mental trapezoidal, convex anteriorly. Postmental undivided, heptagonal. Three pairs of chinshields (in RMNH 25690 one chinshield of first pair fused with postmental), all imbricate, in contact medially in a zigzag line, and in contact with infralabials. Four infralabials, fourth starting at level of centre of eye; followed by two or three postinfralabials, first almost as large as infralabials, other(s) small.

Gulars imbricate, smooth, with rounded posterior margin, in five longitudinal rows; 8-10 scales along a midventral line between chinshields and pectorals. Collar and gular fold indistinct. On nape, interparietal and parietals followed by one or two pairs of scales wider than long, first pair separated by a narrower, posteriorly rounded scale; in turn they are followed by scales in four longitudinal rows which grade into dorsals. Sides of neck with imbricate, smooth scales with rounded posterior margin, smaller than scales on nape.

Dorsals, laterals and ventrals similar, sub-hexagonal, smooth, imbricate, in 16 longitudinal rows around midbody; scales of one row in staggered position in relation to scales of adjacent rows; 31-34 scales along a middorsal line between interparietal and posterior margin of hind limbs; 21-24 along a midventral line between gulars and preanal plate. Preanal plate with one anterior and three to five posterior scales. ZMUC-R4365, a male, with five pores at each side (preanal and femoral pores indistinguishable from each other). Females either without pores (ZMUC-R3464, and probably also RMNH 25690 and MPEG 149, which are juveniles), or with up to four pores per side (MPEG 16886, with 4+4 pores, and MPEG 12891, with 3+3 pores; CM 65051, with 1+2 pores, is probably also a female, but it was not dissected for confirmation). Pores between three or four scales, of which anterior one largest and deeply indented.

Scales on proximal part of tail similar to those on body, distally keeled. On a regenerated tail scales pentagonal, narrow and elongate, keeled.

Scales on limbs mostly similar to those on body, but smaller; on dorso-posterior aspect of forearms, close to hands, some transversely elongate scales. The scales are smallest on posterior aspect of thighs. Subdigital lamellae single, medially keeled; 9-12 under longest finger (third finger, equivalent to fourth when five fingers are present), 12-16 under fourth toe.

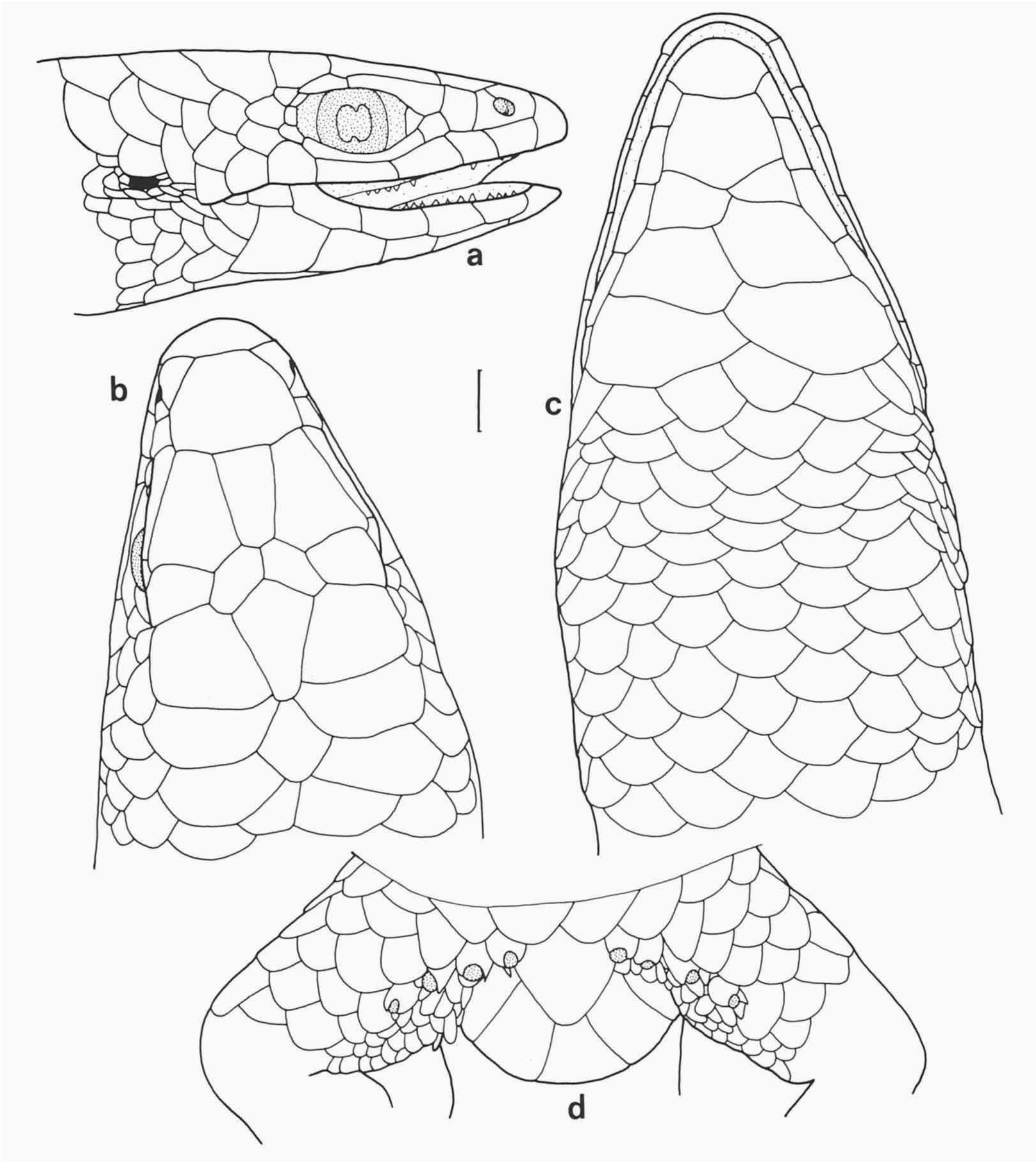


Fig. 143. *Micrablepharus maximiliani*, MPEG 16886; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: preanal plate and thighs, showing preanal and femoral pores.

In MPEG 16757-758, when alive, dorsal surface of head and back bronze, with sepia spots on posterior part of several scales. A cream dorsolateral stripe from rostral (where the two sides meet) to base of tail, bordered dorsally by a dark brown line, more distinct anteriorly. Flanks sepia. Ventral surface cream (except tail), under head with some sepia spots, and on belly, especially posteriorly, with paler, grey spots. Colour of tail near base similar to that of body, a short distance from base it becomes pastel blue. Iris black.

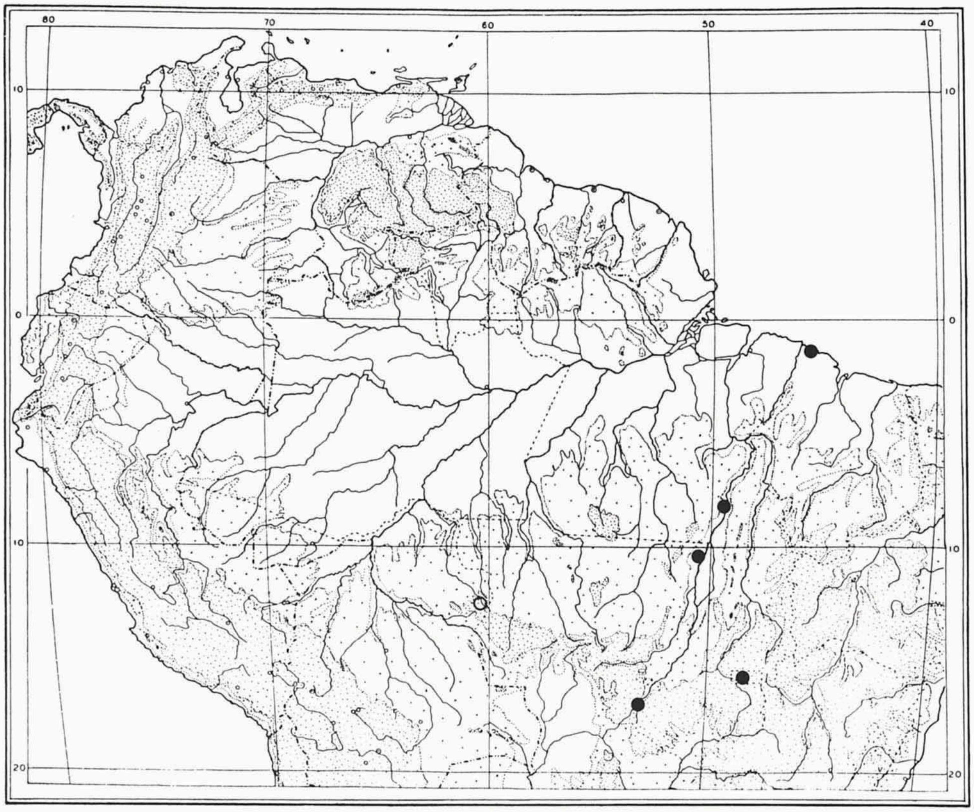


Fig. 144. Partial distribution of *Micrablepharus maximiliani*: material studied (closed circles; locality in Sergipe not shown) and locality reported by Vitt & Caldwell (1993), which represents a projection of cerrado into the forested areas of Rondônia (open circle).

In preservative, MPEG 12891 is greyish-blue dorsally, with a bluish-white dorsolateral stripe from supraciliaries to at least proximal part of tail (although becoming darker on tail), bordered at both sides, over its entire length, by black; dorsally the black margin forms a stripe about as wide as the light stripe, ventrally it forms a black band covering the flanks; moreover, there is a white stripe from labials, through lower part of ear-opening, and above forelimbs, to base of hind limbs. Ventral region white and bluish under head and on belly, brownish under tail. Limbs brown with minute whitish dots; on anterior aspect of forelimbs, a poorly developed white stripe continues from the lateral white stripe on body. Regenerated part of tail uniformly brown. RMNH 25690 has a generally more opaque, brownish appearance than MPEG 12891; the dorsolateral light stripe is bordered dorsally by a dark brown stripe, which fades out on posterior part of body; the lateral light stripe is represented only up to the forelimbs, with the ventral border less distinct; ventral region mostly cream, under tail light brown.

Habitat and notes on natural history.— A ground dweller in open vegetation. Vitt (1991b) reported the species to be associated with nests of the ant *Atta laevigata*

(Smith) in an area of cerrado in Mato Grosso. Vitt (1991b) and Vitt & Caldwell (1993) presented some ecological data on the species.

Distribution (fig. 144).— It occurs from Maranhão, in Brazil, to Paraguay (Vanzolini et al., 1980), along the diagonal belt of open formations. It reaches only some peripheral localities in Amazônia, in the states of Pará and Maranhão, and in an extension of the cerrados of central Brazil in the state of Rondônia (Vitt & Caldwell, 1993).

Remarks.— Cunha (1961) first reported this species from Amazonia, based on a specimen (MPEG 149) from Conceição do Araguaia, Pará, a locality near the southern limits of the hylaea. Recently two specimens (MPEG 16757-756) from Barão de Tromaí, Maranhão, at the eastern limits of Amazonia, were deposited in MPEG collection. In order to complement the data on the species, a few more specimens, from outside Amazonia, were studied. As they constitute a very small sample, from localities far apart, I do not present any means and standard deviations of measurements and scale counts, since they would have no real meaning.

Boulenger (1885b), in the description of the genus *Micrablepharus*, referred to "males with femoral pores", while in the description of *M. maximiliani* it is stated that there are four or five femoral pores, without specifying sex. Cunha (1961) mentioned femoral pores as present in males, absent in females, and Vanzolini et al. (1980) reported 5-6 femoral pores at each side in males. These papers therefore either imply or state clearly that females have no pores. Among the material here studied, MPEG 12891 and MPEG 16886 present respectively three and four distinct pores at each side, and in each one the opened abdomen shows an enlarged egg together with several smaller ovules, thus leaving no doubt that they are females. CM 65051 was not dissected, but since the number of pores (1+2) is lower than usual for males, it is well possible that the specimen also is a female. Among the syntypes, the male (ZMUC-R4365) has 5+5 pores, the female (ZMUC-R4364) has no pores.

M. dunni differed from *M. maximiliani*, according to Laurent (1949), in the presence of a reduced, clawless inner finger, and in the separation between the supraciliary and the frontonasal. The latter characteristic is variable in the material studied, and it cannot, therefore, be used as a specific characteristic. Laurent (1949) himself remarked that both characteristics could represent solely individual variation. Since no other specimens with the characteristics of *M. dunni* have been found up to the present, the validity of this species continues to be doubtfull.

According to M.T. Rodrigues (in lit.), MPEG 149, 4554, 12891, and 16886 (at least) are not *M. maximiliani*, but a new species which he will describe.

Neusticurus Duméril & Bibron, 1839

Diagnosis.— Gymnophthalmids with body cylindrical, tail compressed. Limbs well developed, pentadactyl, all digits clawed. Nasals separated by one or two frontonasals. Lower eyelid with semitransparent disc. Prefrontals and frontoparietals present, but they (as well as frontal) may be divided into several irregular scales. Occipitals present, frequently irregular. Interparietal longer than parietals. Often there are extra scales on head, especially an azygous scale between frontonasals and prefrontals. Dorsals usually heterogeneous in size, with large tubercles or scales interspersed between smaller scales; some species with only slightly enlarged dorsals in longitudinal rows, or all dorsals small. Tubercles either form a double crest on tail, usually well developed, in some cases obsolete, or they form transverse rows separated by smaller scales.

Distribution.— Northern South America east of the Andes, and one species in Costa Rica.

Content.— Nine species described (Peters & Donoso-Barros, 1970; Vanzolini, 1986b), among which four occur in Brazilian Amazonia. Vanzolini (1986a) reported an undescribed species from Rondônia, related to *N. ecpleopus*, and Donnelly & Myers (1991) suggested that *N. rudis* may represent more than one species.

Neusticurus bicarinatus (Linnaeus,1758)
(figs. 145, 146, 293)

Lacerta bicarinatus Linnaeus, 1758: 201 (holotype UUZM 70, type-locality: 'Indiis', restricted by Hoogmoed, 1973 to vicinity of Paramaribo, Suriname).

Neusticurus bicarinatus; Duméril & Bibron, 1839: 64; Boulenger, 1885b: 381; Goeldi, 1902: 537, 548; Müller, 1912: 14, 23; Amaral, 1937a: 1741, 1937b: 193, 1949: 111; Cunha, 1961: 118; Uzzell, 1966: 281; Hoogmoed, 1973: 330, 1979: 278; Cunha et al., 1985: 34; Vanzolini, 1986a: 14; Hoogmoed & Avila-Pires, 1989: 168; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.

Material.— **Brazil.** AMAPA. Igarapé Agua Branca, affluent left bank Rio Amapari, c. 6 km upriver from Serra do Navio: 1 ♂, KBIN 12179, 10.xii.1962, leg. S.M. Leopold III & J.P. Gosse. Serra do Navio: 1 ♀, MPEG 15031, 1 ♂, MPEG 15038, 06.xi.1988; 1 ♂, RMNH 24634, 1 juv., MPEG 15048, 07.xi.1988; 1 ♂, MPEG 15176, 19.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Rio Uatumã, hydroelectric plant Balbina: 1 ♀, INPA 043, access road, 17.iii.1986, leg. R.C. Best; 1 ♀, INPA 227, residential village, vii.1987, leg. G. Moreira & J. Rocha. Reserva Florestal Ducke, 25 km N of Manaus: 4 ♂♂, 1 ♀, KU 130243-247, 16-19.vi.1970, leg. M.L. Crump; 1 ♀, MPEG 4545, 18.vi.1970, leg. M.L. Crump; 1 ♂, MPEG 15818, 15.iv.1989, leg. T.R.J. Gasnier.
MARANHAO. Nova Vida, road BR-316, 25 km E of Rio Gurupi: 1 ♂, MPEG 8977, 23.vi.1975, leg. O.R. Cunha & R.S. Pereira; 2 ♀♀, MPEG 9065, 9082, 31.x.1975; 1 ♂, MPEG 11834, vii.1977; all leg. O.R. Cunha & F.P. Nascimento.
PARA. Viseu, Bela Vista: 1 ♂, MPEG 5323, 12.iv.1972; 2 ♂♂, MPEG 7449, 7458, 28.iii.1974; 2 ♂♂, MPEG 7873, 7886, 12.vii.1974; 1 ♂, MPEG 10387, vi.1976; all leg. O.R. Cunha & F.P. Nascimento; 5 ♀♀, MPEG 6881, 6885, 6889, 6892, 6896, 25.x.1973, leg. O.R. Cunha; 1 ♂, MPEG 8167, 07.x.1974; 5 ♀♀, MPEG 11381, 11388, 11392, 11395-396, x.1977; all leg. F.P. Nascimento; 1 ♀, MPEG 12564, 16.viii.1979, leg. F.P. Nascimento & R.J.R. Moraes. Município de Bragança, Parada Bom Jesus: 1 ♂, MPEG 5523, 24.vi.1972, leg. O.R. Cunha & F.P. Nascimento. Trombetinha (road to Salinópolis): 2 ♂♂, MPEG 7125, 16400, 16.x.1973, leg. O.R. Cunha. Capanema: 4 exs., KU 140139-142. Castanhal, Rio Apeú, Boa Vista: 1 ♀, MPEG 2146, 21.vi.1971, leg. O.R. Cunha & F.P. Nascimento. Rio Araguaia, Porto Jarbas Passarinho (road Transamazônica): 1 ♀, MPEG 10450, 24.ix.1976; 1 ♀, MPEG 10714, 07.vi.1976; both leg. O.R. Cunha & F.P. Nascimento. Carajás, Serra Norte, Pojuca: 1 ♀, MPEG 13558, 10.v.1984, leg. F. Ramos; 1 ♀, MPEG 13710, 24.vii.1984, leg. T.C.S. Avila Pires & J.C.S. Pinto; 1 ♀, MPEG 13984, 14.xi.1984, leg. T.C.S. Avila Pires, R.J.R. Moraes & J.C.S. Pinto; 1 ♀, MPEG 14009, 26.xi.1984, leg. T.C.S. Avila Pires & R.J.R. Moraes.
French Guiana. Cayenne: 1 ♂, ZFMK 39189, leg. H. Wille. Sinnamary, Petit Saut: 1 ♂, RMNH 24635, 1 ♀, MPEG 15828, 10.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. St. Laurent, 10 km NE of: 1 ♀, RMNH 24643, 26.vii.1975, leg. M.S. Hoogmoed.
Guyana. DEMERARA. Madewini creek: 1 ♀, RMNH 24633, 10.vii.1986, leg. L.G. Hoevers.
Suriname. BROKOPONDO. Tafelberg: 1 ♀, RMNH 24651, 2 km N airstrip, 15.xi.1975; 1 ♂, RMNH 24652, airstrip, 16.xi.1975; both leg. M.S. Hoogmoed. NICKERIE. Blanche Marie Falls: 1 ♂, RMNH

24650, 17.ix.1975, leg. M.S. Hoogmoed. Rechter Kabalebo River, first bush camp, 10 km S camp Keyzer: 1 ♀♀, RMNH 23639-640, 01.vi.1975, leg. M.S. Hoogmoed. Lucie River, 14 km N of: 1 ♂, RMNH 24637, 07.ii.1975, leg. M.S. Hoogmoed. Lucie River, 5 km N of: 1 ♀, RMNH 24638, 14.ii.1975, leg. M.S. Hoogmoed. Mozeskreek: 2 ♂♂, RMNH 24641-642, 19-20.vii.1975, leg. M.S. Hoogmoed. Van Amskreek: 1 ♂, 1 ♀, RMNH 24648-649, 16.ix.1975, leg. M.S. Hoogmoed.

In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Rio Maracá. MARANHAO. São Raimundo (road BR-316, 8 km NW of Santa Inês). Paruá (road BR-316). PARA. Rio Gurupi, Colonia Nova (road BR-316). Viseu, km 224 road BR-316. Viseu, Fazenda Real. Viseu, Curupati. Município Augusto Correa, Fazenda Cacoal. Capanema. Peixe-Boi. Km 23 road to Maracanã. Igarapé-Açu. Curuçá, Vila Marauá. Ourém, Puraquequara. Santa Luzia, 25 km from Capitão Poço. Rio Ubá, Povoação do Luso, km 36 road Moju-Acará. Km 16 road to Acará. Rio Inhangapi, affluent Rio Guamá. Castanhal, Rio Apeú, Macapazinho. Santa Rosa, road to Vigia. Benevides, São João da Pratinha (road to Açucareira). Ilha do Mosqueiro. Belém, road to Icoaraci. Km 72 road 332 (NE of Vila Rondon). Sítio Bela Vista, km 135 road PA-332. Km 198 road PA-332 (11 km E of Rio Tocantins).

Diagnosis.— *Neusticurus* with elongate snout, tympanum deeply recessed within an external auditory meatus, lower eyelid with semitransparent disc of 3-6 palpebrals. Back with six longitudinal rows of tubercles, 40-57 (49.1 ± 3.5) on a paravertebral row. Flanks with most scales moderately large (although heterogeneous in size) and almost flat. Ventrals in 23-28 (25.5 ± 1.1, n= 62) transverse rows. Tail distinctly compressed, with a double dorsal crest formed by two continuous rows of tubercles. Two transverse rows of scales on underside of tail corresponds to two transverse rows on the sides; no distinct verticils.

Description.— Gymnophthalmid with maximum SVL in males of 109 mm (Uzzell, 1966), in females of 96 mm (MPEG 6885). Head 0.21-0.27 (0.24 ± 0.01, n= 61) times SVL, 1.4-1.8 (1.68 ± 0.09, n= 59) times as long as wide, 1.0-1.3 (1.13 ± 0.08, n= 59) times as wide as high. Snout bluntly pointed, rising gently toward top of head; supratemporal and gular regions may become swollen in adult males. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.29-0.35 (0.32 ± 0.02, n= 57) times SVL, hind limbs 0.45-0.56 (0.50 ± 0.03, n= 56) times. Tail compressed, tapering toward tip, 1.8-2.2 (1.93 ± 0.08, n= 25) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid.

Rostral rectangular, more than twice as wide as high, just visible from above. A pair of frontonasals longer than wide (only partially divided in MPEG 24637), followed by a pair of irregular prefrontals. A rhomboid azygous scale is frequently present between frontonasals and prefrontals, in some specimens bordered at each side by another scale, the three scales separating frontonasals and prefrontals completely. More rarely two or four scales are present (asymmetrically) between frontonasals and prefrontals. Frontal longer than wide and distinctly wider anteriorly, its border with frontonasals either round or angulate; laterally in contact with first, second, and in some specimens third supraocular. Occasionally an azygous scale between frontonasals and frontal, rarely three scales separating them completely. A pair of irregularly pentagonal frontoparietals, longer than wide, with a long medial suture; laterally in contact with third and fourth supraocular, occasionally also second. MPEG 6885 with an irregular extra scale separating completely the frontal and one frontoparietal, and in contact with the other frontoparietal. An interparietal and two shorter and wider parietals. Radiating from posterior part of interparietal, five to seven occipitals. Four, occasionally five, supraoculars, first smallest (in MPEG 14009 third supraocular divided into two scales, lateral one smallest); small, extra scales frequently present peripherally. Supraciliaries 4-8, mostly 6-7. Nasal undivided or partially divided, nostril approximately in the centre. MPEG 15176 with a small, triangular scale at each side between nasal, rostral, and frontonasal. A relatively large loreal and a frenocular, each either in contact with supralabials or separated by irregular scales. Contiguous with frenocular a row of 3-6 suboculars, some of which may be broadly keeled. Two rows of postoculars, anterior row with 3-8, usually four or five, scales, posterior row with 3-6 larger, convex scales. Lower eyelid with semitransparent disc of 3-6 palpebrals. Supralabials 5-7, fifth, occasionally sixth, below centre of eye; followed by 3-5 post-supralabials, decreasing in size. Temporal scales polygonal, keeled, scales in lower part of temporal region subequal to distinctly smaller than those in upper part. Ear-opening vertically oval, with denticulate anterior and smooth posterior margins. Tympanum deeply recessed within an external auditory meatus.

Mental semicircular, followed by a pentagonal postmental. Four to six pairs of chinshields. First and in some specimens second pair in contact medially, first, second, and occasionally third pair in contact with infralabials. Fourth to sixth pair distinctly smaller than anterior ones. Posterior to chinshields scales elongately hexagonal, medially smooth and convex, smallest and/or narrowest along midventral line, laterally broadly keeled. Gulars laterally tubercular, keeled, juxtaposed, medially flatter and smooth, increasing in size toward midventral line and posteriad; in 10-16 (13.8 ± 1.4, n= 59) approximately transverse rows. Collar distinct, with 7-16 (10.4 ± 1.5, n= 59) scales.

Nape with tubercular scales, anteriorly irregularly distributed, posteriad tending to form six or more longitudinal rows; between the rows of tubercles, small, irregular, flat scales. Sides of neck with longitudinal rows of tubercles, either close together or separated by small scales. Dorsals forming six (two paravertebral and at each side two dorsolateral) longitudinal, regular or relatively irregular, rows of large, flat scales with an elevated median keel, separated by small, flat, smooth, subimbricate scales. The two paravertebral rows in contact with each other or separated by one row of small scales; 40-57 (49.1 ± 3.5, n= 57) scales in one paravertebral row from nape to base of tail. Flanks with transverse rows of smaller tubercles, intermixed with small, flat scales; most scales moderately large. Ventrals about rectangular to quadrangular with convex posterior margin, imbricate, smooth except for lateral rows; in 23-28 (25.5 ± 1.1, n= 62) transverse rows and eight or ten longitudinal rows (when ten, the most lateral at each side better developed toward midbody). Minimum number of scales around midbody 34-50 (42.6 ± 3.7, n= 60). Preanal plate with mostly five, occasionally four or seven, posterior scales, of which the paramedial are the largest, the medial the smallest; they are preceded by a large anterior medial scale, and the group is bordered anteriorly by a series of smaller scales, usually two in front of the large anterior scale, and two or three at each side; in MPEG 13710 the two medial scales (anterior and posterior) are fused. Preanal and femoral pores form a continuous row at each side, separated medially; in males total number of pores 40-56 (47.4 ± 4.8, n= 38) in females 4-15 (8.5 ± 2.4, n= 22), either only preanal pores

Scales on dorsal aspect of forelimbs rhomboid, keeled, imbricate. Similar, but distinctly smaller, on ventral aspect of upper arms, and slightly smaller and smooth to less strongly keeled on ventral aspect of forearms. Thighs with rhomboid, keeled, imbricate scales anterodorsally, becoming smooth and blunter toward ventral aspect; posteriorly with relatively small, keeled tubercles interspersed among distinctly smaller scales. Lower legs with rhomboid, keeled, imbricate scales on anterior and dorsal aspects, similar but smooth, blunter scales on ventral aspect, and slightly smaller, smooth to feebly keeled scales on posterior aspect. Subdigital lamellae under fingers single and smooth, under toes mostly divided, proximally with inner half lamellae under first to fourth toe tuberculate; 14-20 (16.1 ± 1.3, n= 120, 60 specimens) lamellae under fourth finger, 21-28 (24.1 ± 1.7, n= 118, 61 specimens) under fourth toe.

In life, dorsal surface of head hair-brown (119a) or vandyke-brown (121) to Brussels-brown (121B), with chrome-orange (16), flame-scarlet (15), or sepia (119) and spectrum-orange (17) spots around eyes. Part of loreal region and lips may also be chrome-orange, or spectrum-yellow (55) with sepia spots. Margin of eyelids may be pinkish-buff (121D) or cream. Back vandyke-brown (121) or Brussels-brown (121B) with darker spots, or cinnamon (123A) with vandyke-brown (121) spots. Flanks kingfisher-rufous (240), or with similar colour as back and partially covered with a chrome-orange (16) to brick-red (132A), or flesh colour (5) to chrome-orange (16), hue. Spots on flanks warm-buff (24), cream colour (54), pale pinkish buff (121D), or chamois (123D), at least the anterior one surrounded by vandyke-brown (121) in the form of an ocellus. Ventral surface in largest males spectrum-yellow (15) or orange-yellow (18), lighter posteriorly, in other specimens white or pearl-white; dark, hair-brown (119A) spots usually present under head, hind limbs and base of tail, or the latter two light grey. Ventral surface of tail, distally, dark greyish-brown (20), vandyke-brown (221), or kingfisher-rufous (240) and black. Iris dark grey, in MPEG 15038 with scattered darker flecks; pupil outline irregular, surrounded by an anteriorly orange-brown, posteriorly dark grey rim. Tongue anteriorly dark grey, posteriorly pinkish-white. Hemipenis mostly translucent, but dark near its base.

In preservative some specimens uniformly brown dorsally, but more commonly they are brown with blackish blurred spots on back. Spots either irregularly scattered, forming short transverse bars, or forming a reticulate pattern. MPEG 4545 presents a series of round spots along the paravertebral rows of tubercles. Flanks uniformly brown, or with irregular blackish and/or cream spots, most commonly with a blackish blurred reticulation enclosing light brown to cream spots, which may form poorly defined ocelli. One or two better defined, although still irregular, ocelli may be present on neck and/or at level of forelimbs. Limbs either uniformly brown or with irregular, light and dark brown spots. Pattern of tail at least proximally similar to that of body, distally spots become more inconspicuous. Ventral region mostly cream, under head and on gular region immaculate or with greyish-brown spots. Belly mostly immaculate, but ventrolaterally scales may have a peppered grey spot. Similar spots may be present under hind limbs and base of tail; distally underside of tail becomes completely brown or greyish-brown.

Habitat.— A forest dweller, always found in or near water, like streams or small pools along the edges; Martins (1991) reported it also from swamps. At night it

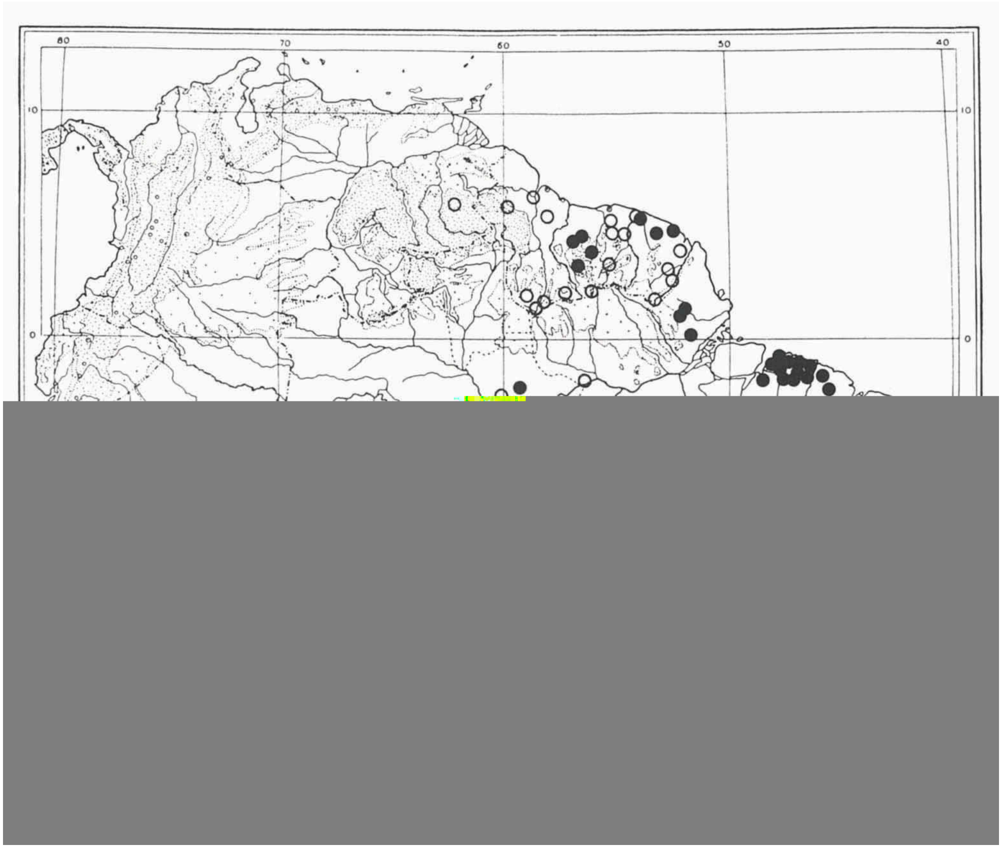


Fig. 146. Distribution of *Neusticurus bicarinatus*. Closed circles = material studied. Open circles = data from literature (Uzzell, 1966; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976; Zimmerman & Rodrigues, 1990).

sleeps on low vegetation or on rocks, above the water or near its edge. MPEG 13710, 13984 and 14009 were all in a heavily disturbed (by mining activities) segment of a stream, in forest.

Notes on natural history.— A semiaquatic, diurnal lizard. Hoogmoed (1973) reported from 17 stomachs one land snail, diplopods, several insects, spiders, and the remains of a small catfish; Martins (1991) found several flies and spiders in two stomachs. Clutch size of two eggs (Uzzell, 1966; Hoogmoed, 1973).

Distribution (fig. 146).— Northeastern South America, in eastern Venezuela, Guyana, Suriname, French Guiana, and Brazil. In Brazil known from Amapá, Maranhão, Pará, Amazonas, and Rondônia, all within the Amazonian region.

Remarks.— The species seems to be relatively uniform all over its area of occurrence. The largest degree of differentiation was observed in specimens from around Manaus, Amazonas, with 34-41 (36.2 ± 2.3, n= 9) scales around midbody, contrasting to 38-50 (43.7 ± 2.6, n= 51) in the remaining specimens studied (from Pará, Amapá, and Guianas). Moreover, temporal scales are subequal (only in two specimens this character was checked), while in all other specimens studied lower temporals are distinctly smaller than upper ones. Second pair of chinshields in medial contact in most specimens from south of the Amazon (states of Pará and Maranhão), separated in most specimens from north of the river. All specimens studied from Maranhão, Pará, Amapá, and French Guiana present one azygous scale between frontonasals and prefrontals; from Amazonas (around Manaus), six out of nine have the azygous scales, and from Suriname two out of ten (Hoogmoed, 1973 reported 18 out of 54 specimens, most from Suriname but including also a few from Guyana and French Guiana, with an azygous scale). More commonly six supralabials, but in all specimens observed from Amapá and French Guiana there were seven (usually because of a small extra scale between what would be the fifth and sixth supralabials).

An individual of *N. bicarinatus* was found close together with one *N. ecpleopus* in a heavily disturbed segment of a creek, with muddy bottom, in the area of Pojuca, Serra Norte, Carajás (Cunha et al., 1985).

The species is popularly known as 'jacarerana' or, in contrast with *Crocodilurus lacertinus* which also receives this name, 'jacarerana pequena' (= small jacarerana).

Neusticurus ecpleopus Cope, 1875
(figs. 147-149, 294)

Neusticurus ecpleopus Cope, 1876: 161 (holotype apparently lost, type-locality: middle and upper Amazon, in Brazil and Peru, proposed by Uzzell, 1966: 290 to be restricted to the drainage of Rio Huallaga, in Peru); Boulenger, 1885b: 382; Goeldi, 1902: 537, 548; Uzzell, 1966: 290; Vanzolini, 1972: 107; Cunha, et al., 1985: 35; Rocha, 1991: 40.
Neusticurus bicarinatus; Guichenot, 1855: 30.
Neusticurus ecpleopus ecpleopus; Cunha, 1961: 120.

Material.— **Brazil**. ACRE. Rio Juruá, Seringal Oriente: 1 ♂, MPEG 044, vi.1956, leg. F.C. Novaes. Upper Rio Juruá, Igarapé Caipora, Taumaturgo: 1 ex., ZUEC 836, 06-08.vi.1989, leg. A.J. Cardoso.
AMAZONAS. Rio Urucu, E of Porto Urucu, near Petrobras RUC-2: 1 ♀, MPEG 15867, 29.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Juruá, Carauari: 1 ♂, BM 1979.135, 24.viii.1978, leg. W.H. Timmis, Wallace Expedition to Amazonia. Igarapé Belém, near Rio Solimões, c.70 km E of Leticia: 2 ♂♂, 4 ♀♀, 14 exs., AMNH 114983-115002, 18-28.v.1970, leg. B. Malkin. Rio Solimões (northern bank), Tabatinga: 1 ♀, RMNH 24607, 11.xi.1985, leg. M.S. Hoogmoed; 1 ♀, RMNH 24611, 04.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões (southern bank), Benjamin Constant: 3 ♀♀, RMNH 24608-610, 14.xi.1985, leg. M.S. Hoogmoed; 3 ♀♀, MPEG 15888-889, RMNH 24612, W of city, 07.xii.1989; 1 juv., RMNH 24613, W of city, 12.xii.1989; 1 ♀, MPEG 15985, 16.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
PARA. Carajás, Serra Norte, igarapé Jacaré, near Barragem Estéril Sul: 1 ♂, MPEG 14206, 23.x.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes. Carajás, Serra Norte, surroundings N-4: 1 ♂, 1 ♀, MPEG 13287-288, 19.iii.1984, leg. T.C.S. Avila Pires, M.I.S. Assunção & J.C.S. Pinto; 1 ♀, MPEG 13735, 28.vii.1984, leg. T.C.S. Avila Pires & J.C.S. Pinto; 1 ex., MPEG 14528, 11.xi.1984, leg. T.C.S. Avila Pires, R.J.R. Moraes & J.C.S. Pinto; 1 ♂, MPEG 14163, 13.ix.1985, leg. F.P. Nascimento, M.G.M. Nery & R. Bittencourt N. Carajás, Serra Norte, igarapé Cigarra (between N-1 and N-2): 1 ♂, MPEG 14247, 07.xi.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes. Carajás, Serra Norte, Grota Bogas: 1 ♂, 2 ♀♀, 1 juv., MPEG 14250-253, 11.xi.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes. Carajás, Serra Norte, surroundings N-1: 1 ♂, MPEG 13019, 03.ix.1983, leg. T.C.S. Avila Pires & R.J.R. Moraes; 2 ♂♂, 3 ♀♀, MPEG 13030-034, 07.xi.1983; 1 ♀, MPEG 13092, 16.xi.1983; all leg. F.P. Nascimento, T.C.S. Avila Pires & R.Bittencourt N.; 3 ♂♂, 2 ♀♀, MPEG 13274-278, 18.iii.1984, leg. T.C.S. Avila Pires, J.C.S. Pinto & L.P.S. Portugal; 1 ♀, MPEG 13314, 24.iii.1984, leg. T.C.S. Avila Pires & M.I.S. Assunção; 1 ♀, MPEG 13554, 08.v.1984, 1 ♂, MPEG 13579, 14.v.1984, both leg. N.V. Borges; 1 juv., MPEG 13740, 10.vii.1984, leg. M.

Zanuto; 2 ♀♀, MPEG 13704-705, 22.vii.1984, leg. A. Cardoso. Carajás, Serra Norte, Pojuca: 1 juv., MPEG 13273, 17.iii.1984, leg. T.C.S. Avila Pires, M.I.S. Assunção & J.C.S. Pinto; 1 ♀, MPEG 13709, 24.vii.1984, leg. T.C.S. Avila Pires & J.C.S. Pinto; 1 ♀, MPEG 13737, 30.vii.1984, leg. A. Cardoso; 1 ex., MPEG 14024, 01.ii.1985, leg. R. Bittencourt N. Carajás, Serra Norte, road Pojuca-Bahia, 9.5 km from Pojuca: 1 ♂, MPEG 14214, 26.x.1985, leg. C.S. Gomes. Carajás, Serra Norte, igarapé Salobo 3-alfa: 1 ♂, 5 ♀♀, MPEG 14189-194, 21.ix.1985, leg. F.P. Nascimento, M.G.M. Nery & M. Zanuto. Carajás, Serra Norte: 1 ♂, MPEG 14023, 22.i.1985, leg. R. Bittencourt N. Sudam Floral Reserve, 74 km SE Santarém: 1 ♂, 1 ♀, KU 130248-249, 04.vii.1970, leg. M.L. Crump.

Ecuador. NAPO. Lago Agrio: 1 ♀, ZFMK 40668, leg. Patzelt. Reventador (village), km 85 from Lago Agrio, alt. 1440 m: 1 ♀, RMNH 24594, 30.ix.1987, leg. M.S. Hoogmoed, R. Nussbaum & R. Leon; 1 ♂, 1 juv., RMNH 24595-596, 01.x.1987, leg. M.S. Hoogmoed & R. Nussbaum. Santa Cecília: 2 ♀♀, ZFMK 44415-416. Rio Coca, San Rafaele Cataract: 1 ♂, ZFMK 37739, 28.vi.1982, leg. D. König. Road to Loreto, km 11 (11 km E road Baeza-Tena): 1 ♂, 3 ♀♀, RMNH 24597-600, 20.x.1987; 1 ♂, 1 ♀, RMNH 24602-603, 21.x.1987; all leg. M.S. Hoogmoed. Road to Loreto, km 13 (13 km E road Baeza-Tena): 1 ♀, RMNH 24601, 20.x.1987, leg. M.S. Hoogmoed, L. Coloma & F. Campos. PASTAZA. Fatima, 9 km N of Puyo, Centro de Experimentacion y capacitacion campesino-indígena (CECCI) "Fatima", alt. 1050 m: 1 ♂, RMNH 24604, v-ix.1987, leg. Medardo Tapia. Vitagua (near Puyo): 1 ♂, GNM 3644, 08.vi.1955, leg. R. Blomberg. Rio Copotazas, affluent Rio Pastaza, alt. 400 m: 1 ♂, GNM 3645, ix.1961, leg. R. Blomberg. TUNGURAHUA. Between Rio Negro and Puyo, 7 km E of Rio Negro, alt. 1350 m: 2 ♀♀, RMNH 24605-606, 26.x.1987, leg. M.S. Hoogmoed.

Peru. LORETO. 80 km S Yurimaguas: 1 ♂, 2 ♀♀, ZFMK 34299-301, iv.1981, leg. M. Kneller. SAN MARTIN. SW Tarapoto and Yurimaguas, 27 km: 1 ♀, ZFMK 41493, iv.1982, leg. J. Roser. UCAYALI. El Boquerón del Padre Abad: 1 ♀, ZFMK 29079, ix.1978, leg. K. Henle; 2 ♂♂, ZFMK 38879-880, iii.1983, leg. A. Ehrl & K. Henle. HUANUCO. Lower Rio Llullapichis, branch of Rio Pachitea, E of Panguana: 1 ♂, 1 ♀, RMNH 24591-592, 09.iii.1983; 1 ♂, RMNH 24593, 12.iii.1983; all leg. M.S. Hoogmoed. Rui Llullapichis, Panguana: 1 ♂, ZFMK 41357, 03.iii.1984, leg. R. Podloucky.

Diagnosis.— *Neusticurus* with short snout, tympanum superficial, lower eyelid with an undivided semitransparent disc. Back with six longitudinal rows of tubercles, 28-40 (34.1 ± 2.1) in a paravertebral row. Flanks with prominent, trihedral tubercles surrounded by distinctly smaller scales. Ventrals in 18-23 (21.3 ± 1.0) transverse rows. Tail moderately compressed, with a double dorsal crest formed by two continuous rows of tubercles. Two transverse rows of scales on underside of tail correspond to two transverse rows on the sides; no distinct verticils.

Description.— Gymnophthalmid with maximum SVL in males of 84 mm (MPEG 14206), in females of 71 mm (MPEG 13092). Head 0.21-0.28 (0.24 ± 0.02, n= 57) times SVL, 1.3-1.7 (1.52 ± 0.09, n= 57) times as long as wide, 1.0-1.4 (1.19 ± 0.07, n= 56) times as wide as high. Snout blunt, rising gently toward top of head; supratemporal and gular regions in adult males distinctly swollen. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.26-0.37 (0.32 ± 0.02, n= 47) times SVL, hind limbs 0.43-0.57 (0.50 ± 0.03, n= 45) times. Tail moderately compressed, tapering gradually toward tip, 1.4-1.8 (1.64 ± 0.11, n= 44) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical and very small, progressively enlarging posteriad and changing into bicuspid and tricuspid.

Rostral approximately rectangular, about twice as wide as high, just visible from above. Frontonasal mostly divided, but single in most specimens from Benjamin Constant (Brazil, near the border with Peru and Colombia), and in occasional specimens from other localities. In a few specimens frontonasal partially divided, while

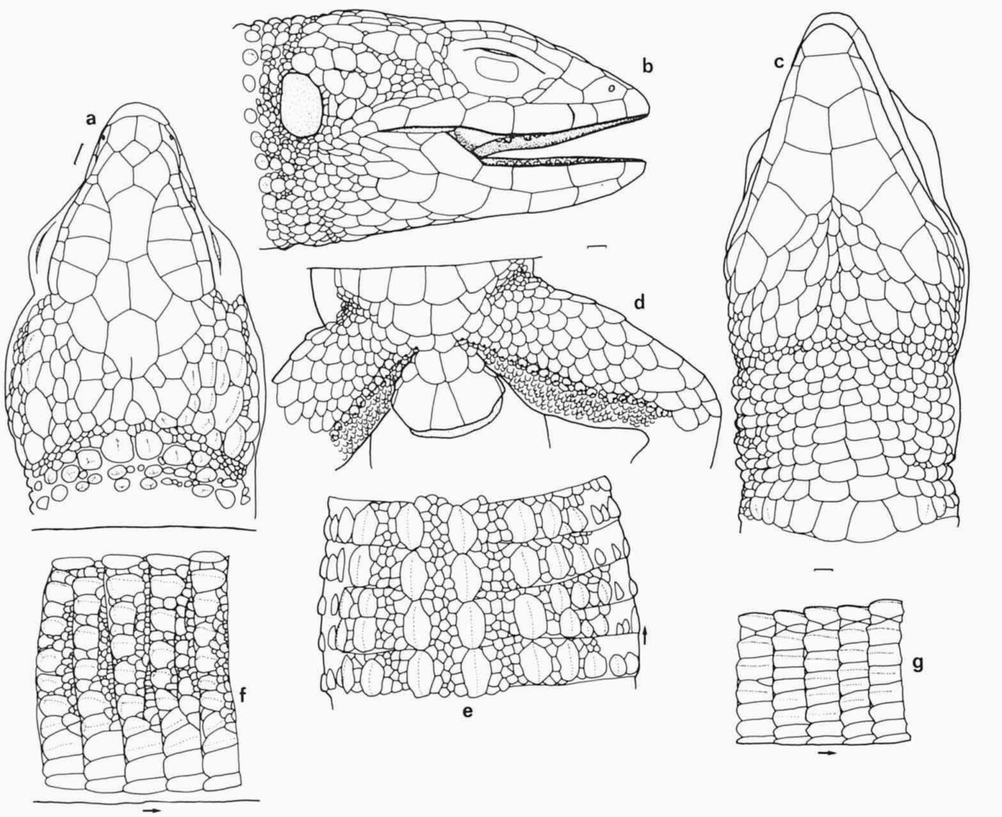


Fig. 147. *Neusticurus ecpleopus*, MPEG 13030; a, b: dorsal and lateral views of head; c: ventral view of head and gulars; d: preanal plate and left thigh, showing preanal and femoral pores; e, f: dorsals and scales on flanks near midbody; g: scales on tail, in lateral view (arrows point to direction of head).

RMNH 24599 presents a divided frontonasal with one of the parts still further (transversely) divided, resulting in three asymmetrical scales. A pair of prefrontals, irregularly pentagonal or hexagonal, slightly longer than wide. An azygous scale may occur between frontonasals and prefrontals (in MPEG 3579 and BM 1979.135 the two pairs of scales are completely separated by a large azygous scale). Frontal hexagonal, longer than wide, narrower posteriorly; laterally in contact with second, and mostly with first and third, supraoculars. A pair of irregularly pentagonal frontoparietals, longer than wide, forming a broad medial suture and laterally in contact with third and fourth supraoculars (in MPEG 13579 a small, elongate scale partially separates the two frontoparietals, and forms a short suture with interparietal). Interparietal relatively large, roughly oval to hexagonal, mostly angulate anteriorly, rounded posteriorly; bordered on each side by a subequal to smaller parietal, in a staggered position, slightly anterior to interparietal. The three scales form a round posterior margin which clearly delimits the dorsal head scales anteriorly of it from the occipital and supratemporal regions. Scales on occipital region very variable among specimens, convex, juxtaposed, heterogeneous in shape and size, mostly distinctly smaller than scales on anterior part of head, although a few enlarged scales may be present. Usually several medium-sized, elongate scales border the interparietal and are in contact with some larger, rounded to hexagonal scales; on sides of occipital region, scales form longitudinal rows, where scales within a row are subequal, but different rows have scales of different sizes; posteriorly the region is bordered by small scales. Four supraoculars, first distinctly smaller, second slightly larger than third and fourth; rarely one or a few small scales are present between two supraoculars, peripherally. Four or five, exceptionally six, supraciliaries, first longest. A few specimens show irregular grooves on some dorsal head scales, or splitting of small, extra scales, but head scutellation is mostly regular. Nasal undivided, nostril approximately in its centre or slightly anteriorly, directed lateroposteriorly. Loreal and frenocular relatively large, either loreal in contact with supralabials, thus separating nasal from frenocular, or these two latter scales in contact, separating loreal from supralabials. Continuous with frenocular there is a row of 4-7, exceptionally eight or nine, suboculars, of which median ones may be very small; in RMNH 24600 and KU 130249 the median scales completely disappear and the fourth supralabial borders on the small scales that fringe the lower eyelid. Two to four post-oculars, mostly in a regular row between posterior subocular and a slightly enlarged scale in posterior corner of supraocular area. Lower eyelid mostly with undivided semi-transparent disc; among 48 specimens, two had two palpebrals on both sides, two had one side undivided and the other side with two palpebrals, and another one had one side undivided and the other with three palpebrals. Five, exceptionally six, wide supralabials, one before last below centre of eye, followed by one or two post-supralabials. In most specimens supralabials widen slightly until fourth scale (below centre of eye), fifth supralabial and postsupralabials decrease gradually in size. Temporal scales oval, convex, all smooth or part of them broadly keeled, heterogeneous in size. Largest temporal scales either mainly in upper and posterior areas, or they form oblique rows separated by small scales. Ear-opening large, round, oval, or horseshoe-shaped, with smooth margin; tympanum superficial.

Mental distinctly curved anteriorly, with convergent, short sides, and straight posterior margin. Followed posteriorly by an undivided, pentagonal post-mental, and four pairs of chinshields. First three pairs of chinshields in contact with infralabials; first, and in most cases second pair, in contact medially (exceptions only among Ecuadorian material, where six out of fifteen specimens have second pair narrowly separated). Fourth pair in some specimens in short contact with infralabials, in other instances scales so reduced that they may no longer be recognised as chinshields. Lateral to fourth pair of chinshields some elongate, convex scales. Scales posterior to chinshields convex, oval to elongate hexagonal, juxtaposed, in divergent rows. They form a narrow mid-ventral line of small scales, followed at both sides by medium-sized scales, laterally again becoming smaller and rounded. Chin delimited posteriorly by a transverse row of small scales. Four or five, exceptionally six, wide infralabials, one before last below, or ending below, centre of eye; followed by one or two, rarely three, mostly narrow and elongate post-infralabials. Gulars in 7-11 (9.3 ± 0.9, n= 87) transverse rows, anteriorly roundish, convex, with a slightly to distinctly wider median pair of scales; posterior two or three rows (including collar) with squarish, larger scales. Some lateral gular scales may be keeled or trihedral. Gular fold distinct, collar with 6-10 (8.2 ± 1.0, n= 57) scales.

Nape with granular scales separating longitudinal rows of trihedral or sharkfin-like tubercles; frequently there is an enlarged pair of occipital scales which may form the beginning of a row of tubercles. Two or three rows of tubercles on nape converge to each paravertebral row of body tubercles, or there is a short pair of paravertebral rows on nape, the members of which converge, and the paravertebral body rows diverge anteriorly, continuing on nape as a row parallel to the paravertebral one. Two other rows on nape at each side are continuous with the dorsolateral body rows. Sides of neck similar to nape, but tubercles may become conical and in some specimens more irregularly distributed. Body with six dorsal rows of tubercles: two paravertebral rows and, on each side, two contiguous dorsolateral rows. Between the paravertebral rows, and the paravertebral and dorsolateral rows, small, flat, irregular, imbricate scales. Body tubercles larger than those on nape and mostly with an elevated median keel rising from a flat base. Twenty-eight to 40 (34.1 ± 2.1, n= 79) tubercles in a paravertebral row, from nape to base of tail. Flanks with medium-sized to small, trihedral tubercles, and small, flat, imbricate scales, forming distinct transverse bands. Ventrals mostly quadrangular, slightly imbricate, in eight longitudinal and 18-23 (21.3 ± 1.0, n= 87) transverse rows; the two medial rows at each side of midventral line with smooth scales, third row with smooth to broadly keeled scales, fourth (lateral) row with keeled and in some specimens convex scales. Minimum number of scales around midbody 33-50 (40.1 ± 3.9, n= 57). Preanal plate most commonly with two (occasionally one or four) anterior, and three (occasionally four) posterior scales (plus small lateral scales), of which either all three posterior scales reach the anterior ones, or the median posterior one is enclosed by the two lateral scales. Preanal and femoral pores present, forming a continuous row at each side; total number 16-48 in males, 4-29 in females. Pores between two or three scales, one of which usually larger than the others.

Tail dorsally with a double crest of tubercles, which are a continuation of the paravertebral rows of dorsal tubercles; anteriorly both rows are separated by small scales similar to the small dorsals, distally the two crests touch each other. Sides of tail with elongate, keeled scales, in longitudinal and transverse rows. Scales in upper row, which is a continuation of the upper dorsolateral row of tubercles on body, more sharply keeled and usually forming a lateral row of tubercles; scales in lower lateral rows less prominent. Underside of tail with two rows of smooth scales. One ventral scale corresponds to one lateral row, and one dorsal tubercle; in a few specimens one ventral corresponds, at least in part of tail, to two lateral rows, of which the anterior row is formed by small scales which are only present in part of its height.

Dorsal aspect of upper arms with rhomboid to hexagonal, imbricate, strongly keeled scales, in longitudinal rows; ventral aspect with small, trihedral to conical scales. Forearms with rhomboid to hexagonal, imbricate, strongly keeled scales on dorsal aspect, scales slightly smaller and not in longitudinal rows on posterior and ventral aspects, and anterior aspect with a row of large, trapezoidal scales, mostly separated from ventral scales by a narrow band of small scales. Thighs with an antero-ventral row of trapezoidal scales; dorsally to it two rows of rhomboid to hexagonal, keeled scales, followed on dorsal aspect of thigh by small, flat scales intermixed with prominent tubercles; these extend slightly onto posterior aspect of thigh, which toward pores is covered by granular scales. Ventral aspect of thighs with smooth scales, smaller toward pores. Lower legs with dorsal and posterior aspects covered by tubercles interspersed among small, flat scales; a row of trapezoidal scales on its anterior aspect, followed ventrally by two or three other rows of scales, first row of hexagonal, smooth scales, second and third (when present) of rhomboid scales; scales of row bordering the tuberculate area keeled. Subdigital lamellae under fingers single, smooth; under toes partially divided (proximally), the inner half lamellae under base of first to fourth toe moderately tuberculate; 11-16 (14.0 ± 1.2, n= 110, 56 specimens) lamellae under fourth finger, 20-27 (23.0 ± 1.4, n= 111, 57 specimens) under the fourth toe.

Colour in life of MPEG 14206 (♂) Prout's brown (121A) with black and lighter spots on back, spectrum yellow (55) and yellow-green (58) spots on labials and flanks; a white, black bordered ocellus at each side; belly salmon (106), darker posteriorly. In MPEG 14247 (♂), five ocelli are present on one side, six on the other, first ocelli of each side with white centre, remaining ones with greenish centres; on ventral surface, head and gular region light yellow-green (58) with grey spots, belly with the two medial rows burnt-orange (116), toward the sides becoming close to cinnamon-rufous (40). RMNH 24611 (♀) with dorsal surface of head raw-umber (223), back warm sepia (221A), flanks sepia (119) with a white, black bordered ocellus; on ventral surface, head glaucous (80) and white, gular region brown and white, belly white with an orange tinge; tail warm sepia (221A) and sepia (119), underside dark greyish-brown; iris brown. In RMNH 24613, a juvenile, head, flanks and limbs sepia (119), back and dorsal surface of tail drab (27); ventral region sepia and white under head, belly and limbs, sepia under tail.

In preservative, basic colour brown, the tonality varying among specimens, mostly mottled with dark, or dark and light, flecks (uniformly ferruginous in RMNH 24594). Head dorsally similar in colour to back, or uniformly dark. Sides of head usually with a light band from suboculars to chinshields, which in some specimens extends as an oblique line toward gulars, and other transverse light bands from supralabials to chinshields. Back and flanks with similar basic colour, or dorsal area lighter. The three smaller specimens examined (RMNH 24596, RMNH 24613, RMNH 24592) are drab dorsally and dark brown on flanks (body and tail; head completely dark brown in the former two, lighter dorsally in RMNH 24592). All other juveniles have darker dorsal regions, but still distinctly lighter than flanks, while in adults such a distinction may or may not be evident, suggesting ontogenetic variation. A white, black bordered ocellus above or slightly posterior to level of forelimbs is present in almost all specimens, although it may be less conspicuous in females; it is absent in RMNH 24594. Other ocelli may be present along flanks, one anterior to arm level, and up to six posteriorly, usually becoming less defined posteriad. Other specimens present light, dark-surrounded spots, like suffused ocelli, or else no trace of ocellus, except for the one above the arm. Ventrally, head either cream with light grey to black spots and bands, or predominantly to totally grey, bluish-grey, or (in some Ecuadorian males) blue. Belly in most specimens predominantly cream, ventrolaterally with conspicuous black, or diffused grey, irregular spots, which in some specimens occur also medially. Some specimens with predominantly black or dark brown venter; in RMNH 24594 belly is deep orange, with darker spots. Limbs dorsally uniformly or mottled brown; a pattern more or less resembling ocelli may be present, especially on hind limbs; ventral surface similar to belly. Tail pattern dorsally similar to dorsal pattern of body, ventrally usually from lightly to heavily spotted at base, darkening distally; base (ventrally) homogeneously cream in MPEG 14023; underside of tail mostly uniformly bluish-grey in RMNH 24611.

Habitat.—As its congeners, *N. ecpleopus* is a semiaquatic forest lizard. It is found in streams with sandy, rocky and muddy bottoms. Occasionally found out of water, amidst leaflitter. MPEG 13709 was at the border of water in a heavily disturbed (by mining activities) segment of a stream with muddy bottom. MPEG 15867 was in nearly dried up swampy area in disturbed primary forest, on wet ground between fallen leaves. These observations agree in general with those by Vanzolini, (1972), Dixon & Soini (1975, 1986), Duellman (1978), Meede (1984), and Rocha (1991).

Notes on natural history.— A diurnal lizard, observed between 09:00 and 16:10 h (Meede, 1984 reported them to be active approximately from 06:00 to 10:00 h), frequently partially submerged in water. MPEG 13031 was out of water when first seen, and fled into water; MPEG 14206 was close to the border of water, and fled into a hole between two rocks. Comparisons of body and air temperatures (Fitch, 1968; Rocha, 1991) indicate that *N. ecpleopus* is a non-heliotherm lizard.

MPEG 13092, collected in the month of November in Carajás, had two eggs in the abdomen. MPEG 13554, from the same locality and collected in May, expelled an egg of 5.2 × 13.8 mm through the cloaca while being preserved. According to results by Sherbrooke (1975), reproduction seems to be continuous throughout the year, but with variation in the level of reproductive activities. Two eggs seem to be the normal clutch size. Uzzell (1966) reported two nests in a rotten log close to a stream, with four and five eggs, thus possibly from more than one female.

Food consists of a variety of insects, both aquatic and terrestrial, spiders, and occasionally other lizards (Duellman, 1978; Rocha, 1991).

Dixon & Soini (1975, 1986) reported a specimen in the stomach of the snake *Helicops angulatus* (Linnaeus), Duellman (1978) another one in the stomach of *Drymoluber dichrous* (Peters).

Distribution (fig. 148).— Amazonian slopes of the Andes, from southern Colombia, through Ecuador, Peru and Brazil, to Bolivia; and southern Amazonia. In Brazil it occurs in southern Pará (actually known from Carajás and between the lower Xingu and Tapajós rivers), Amazonas (at least near its western border also north of the Rio Solimões), and Acre.

Remarks.— The first documented specimen from Brazil was reported by Cunha (1961). The species is commonly considered as occurring in northwestern cis-Andean South America, but Vanzolini (1972) reported three specimens from Monte Cristo, Tapajós river, Pará, and Cunha et al. (1985) reported a population from Serra Norte, Carajás, Pará, much further east. A few more localities in Brazil are added here, but a large gap still exists between the localities in Pará from where specimens are known, and the easternmost localities in the state of Amazonas. This is probably due to deficiency of collecting.

Geographical variation in several characters was observed, but no concordant pattern of variation was found. One of the most striking differences was the size of specimens from Serra Norte, Carajás (southern Pará, largest ♂ 84 mm SVL, largest ♀ 71 mm), as compared to remaining specimens (largest ♂ 69 mm, from Ecuador, larg-

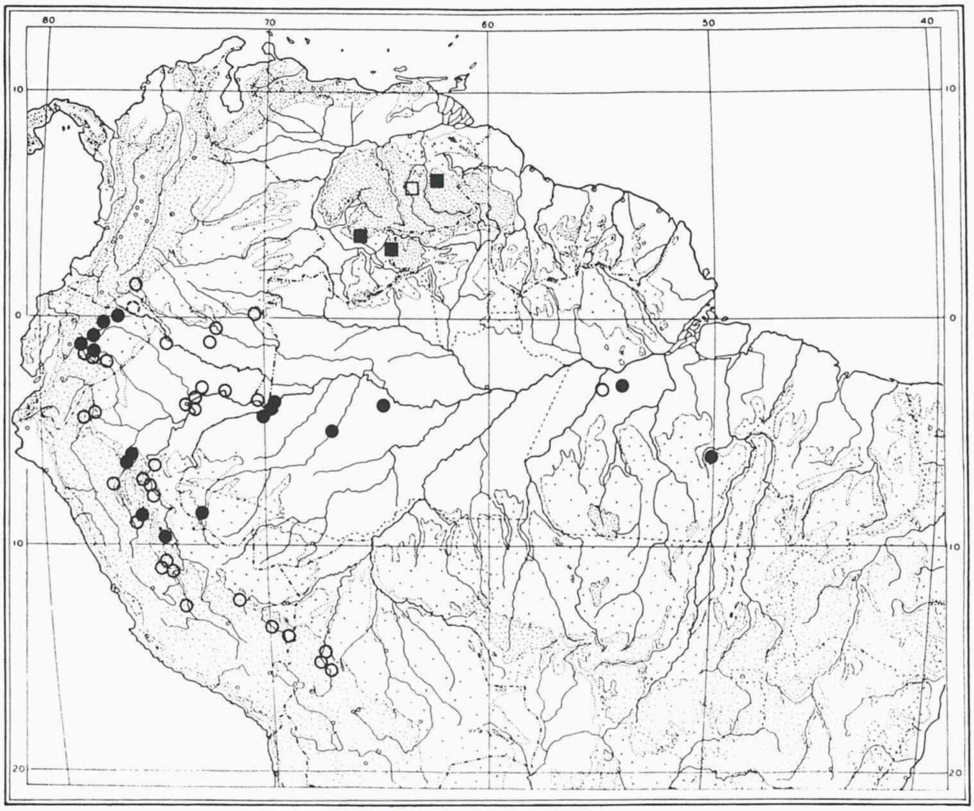


Fig. 148. Distribution of *Neusticurus ecpleopus* (circles) and *N. racenisi* (squares). Closed symbols = material studied. Open symbols = data from literature (*N. ecpleopus*: Uzzell, 1966; Vanzolini, 1972; Dixon & Soini, 1986; Lescure & Gasc, 1986; Fugler, 1989; Rodriguez & Cadle, 1990; Henle & Ehrl, 1991; *N. racenisi*: Donnely & Myers, 1991). Dashed circle = Putumayo state, in Colombia (Ayala, 1986).

est ♀ 65 mm, from western Brazil). Uzzell (1966) reported maximum SVL in specimens from several localities, and in most of them SVL was below 70 mm, only males from Bolivia reached 73 mm SVL; Sherbrooke (1975) reported largest ♂ of 71.5 mm in a population from Tingo María, Peru. Frontonasal, as mentioned before, was single in most specimens from Benjamin Constant and Tabatinga (Amazonas, Brazil), but divided in most specimens from other localities. An azygous plate between frontonasals and prefrontals is present occasionally in specimens from all localities, although more frequently among specimens from Carajás and Ecuador. A reduced fourth pair of chinshields appeared in 10 out of 17 specimens from western Brazil, in six out of 16 specimens from Ecuador, and in one each out of seven (Carajás) and ten (Peru) specimens. All non-Ecuadorian specimens had the second pair of chinshields in contact medially, but six out of 15 from Ecuador had them separated. Variation in number of pores is shown in fig. 149. In all specimens from Carajás and Ecuador the ocellus's white centre is formed by several scales, but in all specimens from Benjamin Constant and Tabatinga, the only one studied from Acre, and in some from Peru,

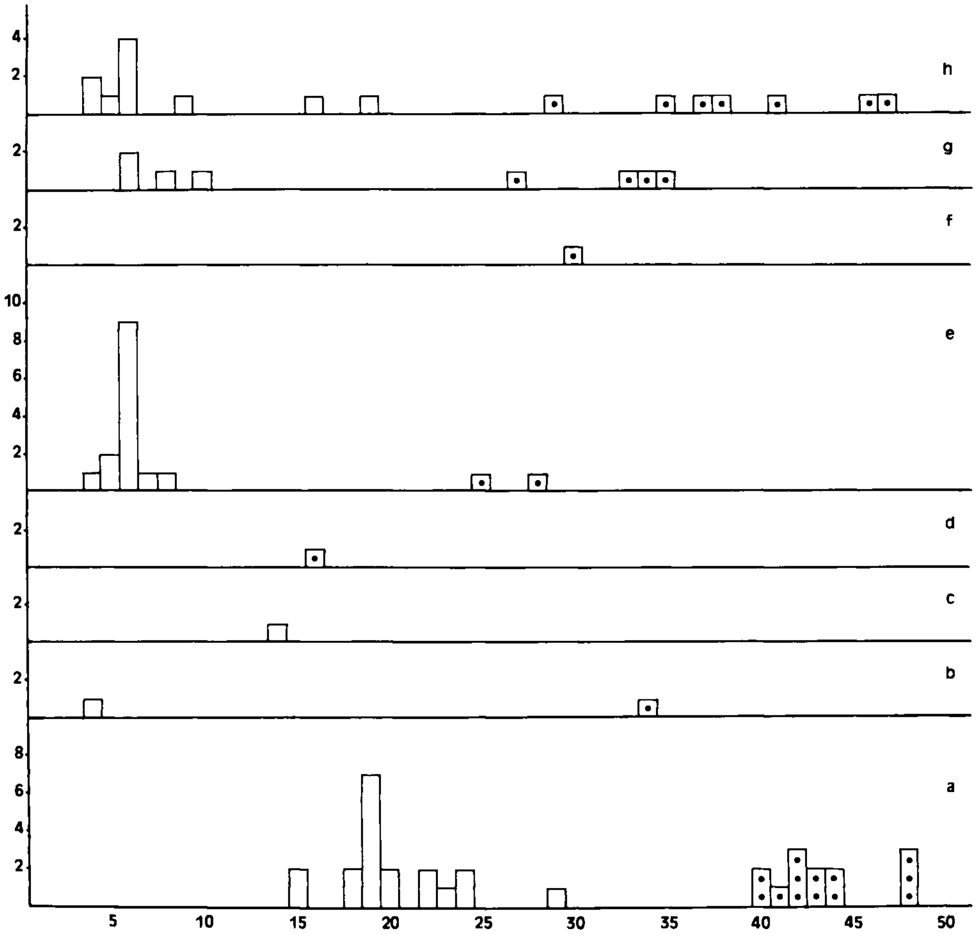


Fig. 149. Comparison of number of pores in specimens of *Neusticurus ecpleopus* from different localities: a. Carajás, Pará; b. Sudam Floral Reserve, Santarém, Pará; c. Urucu, Amazonas; d. Carauari, Amazonas; e. Igarapé Belém, Tabatinga and Benjamin Constant, Amazonas; f. Seringal Oriente, Acre; g. Peru; h. Ecuador. White bars = females; dotted bars = males.

there is only a single scale in the centre; the ocelli (especially the anterior one) in specimens from Carajás are rather large in comparison to other specimens. Significant geographical variation in scale counts was not observed.

Uzzell (1966) presented an analysis of variation in this species, including specimens from Bolivia, Peru, Ecuador and Colombia. Some of the variation reported by him, e.g. in number of supraoculars (3-5), longitudinal rows of ventrals (6-8), preanal plates (up to five posterior preanals), was not found in the material examined. Among the specimens studied by Uzzell (1966), those from Puno (Peru) and Bolivia (the most southern ones studied by him) seem to be similar in size to those from Carajás; moreover, they agree in the high number of pores and number of transverse rows of ventrals; on the other hand, they disagree in the blackening of the head (not seen in specimens from Carajás) and in the frontonasal. Specimens from western Brazil agree with those studied by Uzzell (1966) from the lowlands of Peru, Ecuador, and Colombia (the sample geographically closest) in having an undivided frontonasal, in the low number of pores in males, and in the SVL; light dorsolateral lines on head and neck in females, as reported by Uzzell (1966), were not observed. Like Uzzell (1966), I observed black-headed males among the material from the foothills of Ecuador, and a lower number of pores in males from Peru and the lowlands of Ecuador, as compared to males from higher altitudes in Ecuador, although differences were not large and, moreover, were based on relatively few specimens. Differences in number of transverse rows of ventrals were not found, except for some extreme values.

It seems that this species presents a high degree of geographical variation. In each population a special combination of character states predominates, but without a distinct geographical pattern when characters are compared with each other. A relatively "fine-grained" comparative study of populations, including both altitudinal and latitudinal transects, would be required for a thorough understanding of the situation.

N. bicarinatus and *N. ecpleopus* were found close together in the area of Pojuca, Serra Norte, Carajás.

The specimens Guichenot (1855) named as *N. bicarinatus* were later reported by O'Shaughnessy (1879) as *N. ecpleopus*. The locality of origin of the specimens was said to be "le village de Naota, rive gauche du bas Amazone, au Brésil", which probably refers to Nauta, Peru.

Vanzolini (1986a) reported an undescribed species related to *N. ecpleopus* from Rondônia.

Neusticurus racenisi Roze, 1958
(figs. 148, 150, 151)

Neusticurus racenisi Roze, 1958: 252 (holotype AMNH 61008, type-locality: Auyantepui, Estado Bolívar, Venezuela, alt. 400 m); Devender, 1969: 105; Peters & Donoso-Barros, 1970: 207; Cunha, 1971: 115.
Neusticurus tatei; Uzzell, 1966: 283 (part).

Material.— **Brazil.** RORAIMA. Serra Parima: 2 ♂♂, 1 ♀, MPEG 1927-1929, 1962, leg. José Hidasi. **Venezuela.** BOLIVAR. Auyantepui, alt. 400 m: holotype, ♂, AMNH 61008, ii.1938, leg. W.H. Phelps. AMAZONAS. Alto Cunucunuma, La Culebra: 1 ♂, MCZ 62206, 16.iv.1950, leg. J.A. Rivero. Caño de Laja, Casa de Julián: 1 juv., MCZ 62208, 26.v.1950, leg. J.A. Rivero. Caño Marahuaca, Camp Temiche, 4050 ft: 1 ♀, MCZ 66933, 11.v.1950, leg. J.A.Rivero.

Diagnosis.— *Neusticurus* with short snout, tympanum deeply recessed within an external auditory meatus, lower eyelid with low-translucent disc of 4-8 palpebrals. Prefrontals, frontal and frontoparietals divided in numerous scales which form in part a pair of supraorbital semicircles. Back without prominent tubercles, although with some longitudinal rows of slightly enlarged scales; 101-129 (114.9 ± 9.8) scales along a vertebral line. Flanks with small scales. Ventrals in 29-30 transverse rows. Tail compressed, with transverse rows of tubercles separated by 3-4 rows of smaller scales; only distally there is a low double dorsal crest. Verticils distinct on tail, with two transverse rows of ventral scales corresponding to 4-6 transverse rows of scales on the sides.

Description.— Gymnophthalmid with maximum SVL in males of 104 mm (Uzzell, 1966), in females of 94 mm (MCZ 66933). Head 0.22-0.25 (0.24 ± 0.01, n= 6) times SVL, 1.5-1-7 (1.67 ± 0.09, n= 6) times as long as wide, 1.0-1.2 (1.10 ± 0.09, n= 6) times as wide as high. Snout bluntly pointed, rising gently toward top of head; supratemporal and gular regions may become swollen in adult males. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.32-0.35 (n= 3) times SVL, hind limbs 0.47-0.52 (n= 2) times. Tail compressed, tapering toward tip, 1.8-2.2 (n= 3) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth of upper jaw bicuspid, of lower jaw tricuspid.

Rostral rectangular or hexagonal, more than twice as wide as high, visible from above. Frontonasal either single or medially divided; when single it is relatively large and squarish (although slightly wider posteriorly); in holotype an irregular scale is split off in posterior corner of frontonasal. Prefrontals, frontal and frontoparietals divided in numerous scales, variable among specimens, but in general forming a group of five to thirteen relatively small scales medially on the snout, and two series of scales resembling the supraorbital semicircles of Iguanidae, at each side with from six to ten scales, ending in the larger parietal (included in the count). Interparietal slightly to distinctly longer than, and as wide as to distinctly narrower than parietals. Between interparietal and 'supraorbital semicircles' there may be one to three (or none) small scales. Interparietal and parietals bordered posteriorly by distinctly smaller, irregular scales, one row along parietals, two or three rows of more elongate scales behind interparietal. Posteriad these scales grade into smaller, conical, juxtaposed scales which occupy most of the occipital region and merge into scales on nape. Three or four enlarged supraoculars, when three they are preceded by a group of small scales, when four first is smallest and there may be other small scales together with it; small scales are also usually present as a group posteriorly, in a row at the border with supraciliaries, and isolated on medial border of supraocular area. Supraciliaries 6-9, mostly 7-8. Nasal undivided, nostril approximately in centre, directed lateroposteriorly. Loreal large, mostly single but longitudinally divided in MCZ 66933; in contact with supralabials. Frenocular present, continuous with a row of 3-5 longitudinally convex suboculars. Two rows of relatively small postoculars, anterior row with 6-8 scales, upper one largest, posterior row with 10-12 scales which dorsally reach the parietal. Lower eyelid with low-translucent disc of 4-8, usually five or six, palpebrals. Supralabials 6-7, four or five to below centre of eye, followed by three or four tapering postsupralabials. Temporal scales small, roundish to oval, convex, juxtaposed, slightly larger peripherally. Ear-opening vertically oval, with denticulate margins, especially anteriorly; tympanum deeply recessed within an external auditory meatus.

Mental about semicircular, although borders with each infralabial and with postmental form two obtuse angles. Postmental pentagonal. Two or three pairs of chinshields, all in contact with infralabials, first in contact medially. Three or four (five on

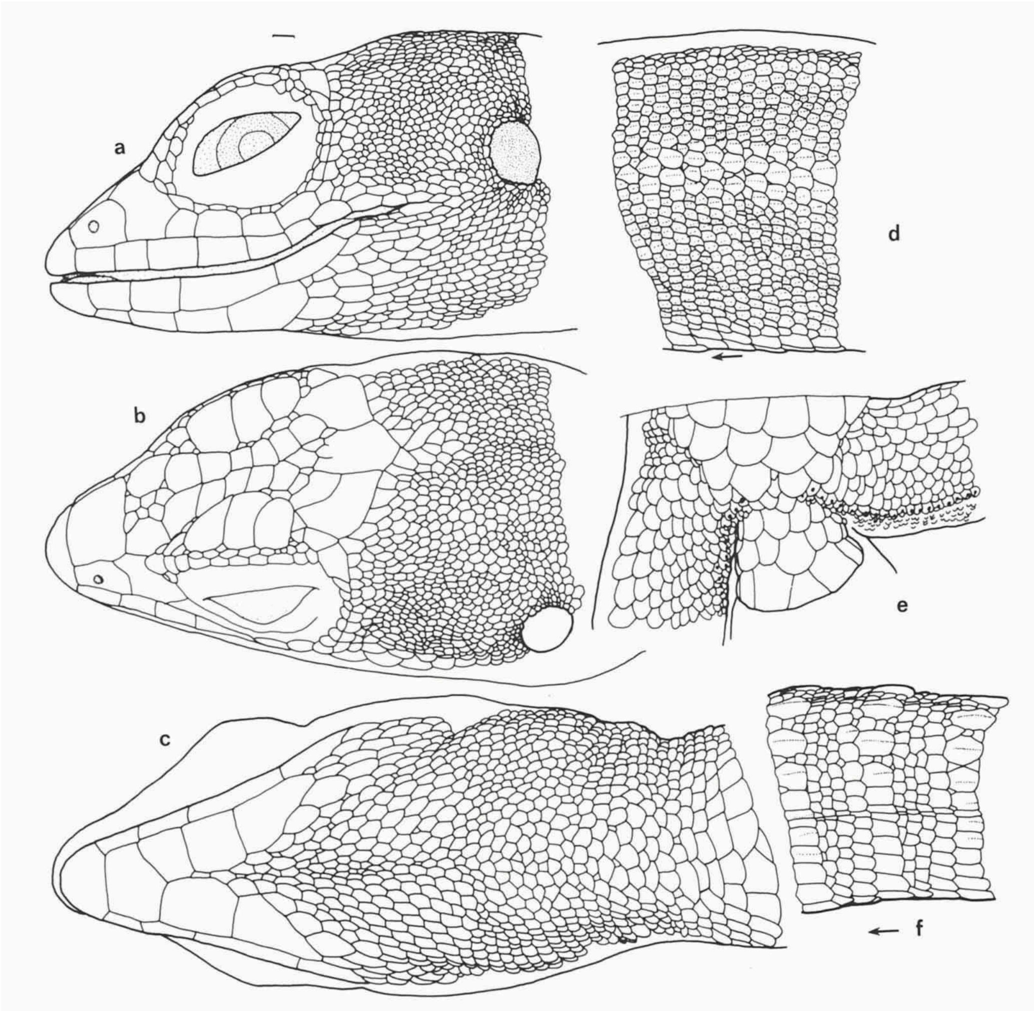


Fig. 150. *Neusticurus racenisi*, MPEG 1929; a, b: lateral and dorsolateral views of head; c: ventral view of head and gulars; d: lateral view of body near midway between fore- and hind limbs (from scales along vertebral line on top to lateral ventrals; largest scales in dorsolateral position); e: preanal plate, preanal pores, and proximal femoral pores; f: dorsolateral view of tail (arrows point to direction of head).

one side of MCZ 62208) infralabials, posterior one below, or starting below, centre of eye. Chinshields bordered posteriorly by some relatively large, although distinctly smaller, scales; medially and posteriorly, scales smaller, elongate-hexagonal, convex, juxtaposed, in medially divergent rows. Gulars anteriorly shorter than posterior scales of chin (or pregulars), imbricate, in transverse rows; posteriad (from midventral line laterally) they become flatter, from irregular to squarish, gradually increasing in size. There are about 16-21 transverse rows of gulars, of which posterior 7-10 rows with enlarged scales, although no definite borders delimit pregulars, anterior and posterior gulars, and they more-or-less merge into each other. Collar distinct, with 6-10 scales; lateral borders may not be well defined.

Scales on nape anteriorly convex, tubercular, juxtaposed, in approximately transverse rows, posteriad gradually changing into dorsals. Scales on sides of neck similar or slightly larger. Dorsals relatively small, hexagonal, keeled, imbricate. Along vertebral line it is usually possible to distinguish two more-or-less regular rows of slightly enlarged scales, from somewhere on nape until base of tail, either in contact with each other or separated by smaller scales; 101-129 (114.9 ± 9.8, n= 7) scales along one of these rows between interparietal and base of tail. One or a few rows of enlarged scales, usually larger than vertebrals, dorsolaterally, from about forelimbs to base of tail. Flanks with small, hexagonal to squarish, convex to broadly keeled scales, in approximately transverse rows. Ventrals squarish with convex posterior margin, shortly imbricate, in eight or ten longitudinal, and 29 or 30 (n= 6) transverse rows; lateral longitudinal rows with narrower scales. Scales around midbody 52-66 (61.2 ± 5.4, n= 6). Preanal plate composed of three rows of smooth, slightly imbricate scales, larger posteriad, in some specimens bordered laterally by smaller scales; first row with 4-6 scales, second and third with 5-7 each. Preanal and femoral pores form a continuous row at each side, separated medially. Males with 62-72 (67.0 ± 4.8, n= 4) pores in total, including 4-7 preanal pores at each side. In two females, one has 10 preanal pores, the other has a total of 12 pores, of which four at one side and five at the other are in preanal position. Pores between two or three scales.

Tail proximally with transverse series of enlarged scales with prominent keels, the scales in paravertebral position either as large as, to larger than the others; each transverse row separated from next one by three or four rows of distinctly smaller scales. Distally only paravertebral rows continue, forming a paired dorsal crest, each enlarged scale separated from next one by two medially enlarged scales. Each enlarged scale on dorsal crest delimits the posterior border of a verticil, which corresponds laterally to 4-6 transverse rows of relatively small, feebly to distinctly keeled scales, larger on posterior row. On underside of tail, each verticil comprises two transverse rows of relatively large, squarish, smooth scales; these scales form several longitudinal rows near base, distally two longitudinal rows.

Upper arms with rhomboid or hexagonal, keeled, imbricate scales on their anterior and dorsal aspects, and smooth, rounded, convex, and juxtaposed scales on posterior and ventral aspects, with some gradation between them. Forearms with larger, irregular, smooth, imbricate scales anterodorsally, grading dorso-posteriorly into smaller, keeled scales, which become smooth on ventral side. Scales on thighs relatively large, irregular, smooth, shortly imbricate on ventro-anterior and ventral aspects; keeled and decreasing a bit in size on dorso-anterior aspect; and small, granular, posteriorly. Lower legs with one or two rows of larger, smooth, shortly imbricate scales along their anterior aspect, distinctly smaller, keeled scales on dorsal and posterior aspects, and a transition between these two types on ventral aspect. Lamellae under fingers single, smooth, transversely enlarged, 20-25 (22.5 ± 1.7, n= 11, 6 specimens) under fourth finger; under toes partially divided, proximally internal half lamellae under third and fourth toes moderately tuberculate; 30-39 (34.5 ± 3.5, n= 7, 4 specimens) under fourth toe.

A description of colour in life is given by Donnelly & Myers (1991), who observed sexual dimorphism in colour pattern. Their description agrees with the statement by Uzzell (1966: 284) that two mature males had bluish venters. A similar

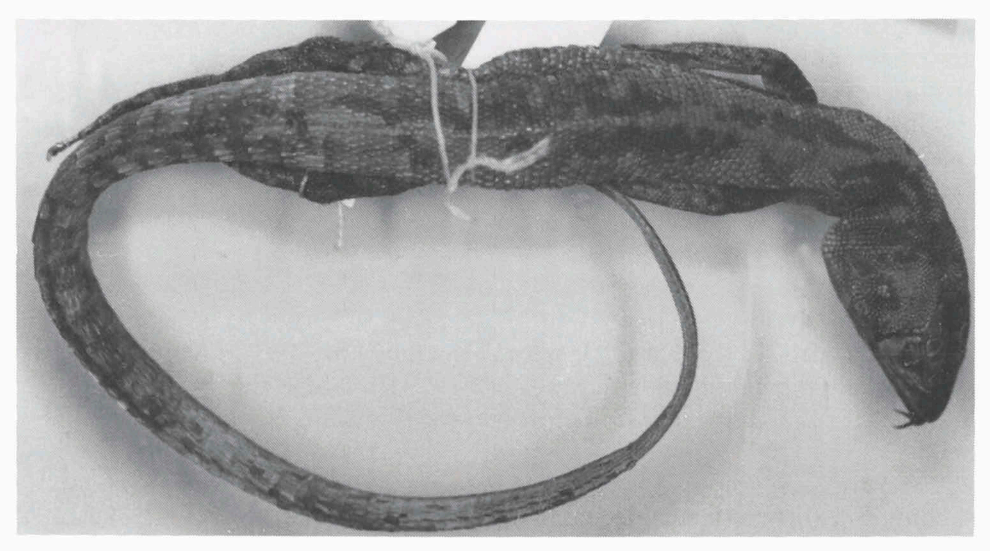


Fig. 151. *Neusticurus racenisi*, ♂, MCZ 62206, La Culebra, Upper Cunucunuma, T.F. Amazonas, Venezuela (T.C.S. Avila-Pires).

observation is seen on a label with MCZ 62208, made by its collector (J.A. Rivero).

In preservative, the three specimens from Roraima are completely bleached, so no pattern can be seen. The Venezuelan specimens are brown, uniformly or mottled with dark brown on head, with irregular dark brown spots along body and tail, and on limbs. In holotype, along flanks, there is a series of relatively large light brown round spots, with a narrow dark brown border; above this series another one with more irregular and a bit smaller, but otherwise similar, spots. Ventrally, head, most of gular region, and forelimbs mostly cream, laterally some scales may have darker spots; belly, hind limbs and tail dark grey in males, in females cream, with irregular dark spots under tail.

Habitat.— MCZ 62206 is said to have been collected in water; MCZ 66933 at night, on a branch of a tree. Donnely & Myers (1991) reported specimens found sleeping low on vegetation (about 1 m above water) along a small forest stream.

Distribution (fig. 148).— Guiana highlands of Venezuela, in Estados Bolívar and Amazonas; and in Serra Parima, Roraima, Brazil. In altitudes between 400 m and 1215 m.

Remarks.— The species was described by Roze (1958) on the basis of two specimens. Uzzell (1966), having before him nine specimens of *N. racenisi*, and the holotype of *Neusticurus tatei* (an immature male), considered the two species as synonym, under *N. tatei*, the oldest name. Devender (1969), studying three new specimens of *N. tatei*, besides the types of both species and three other specimens of *N. racenisi*, demonstrated that there were constant differences between the two groups, and resurrected *N. racenisi*. Donnely & Myers (1991) redescribed the species, comparing specimens from different localities in Venezuela. The first and only record of specimens from Brazil was made by Cunha (1971), on basis of two males and one female from Roraima, the same material here studied.

The paratype of *N. racenisi*, according to Roze (1958) a male, is considered by Devender (1969) a female, as well as MCZ 62208, a dehydrated juvenile labelled by its collector as a male, with a blue venter. This has as consequence that the number of preanal/femoral pores in females, according to his data, varies from 11-69, much higher than the variation found by us (10-12). Donnelly & Myers (1991) reported a female with a total of 15 pores.

Neusticurus rudis Boulenger, 1900
(figs. 152, 153, 295)

Neusticurus rudis Boulenger, 1900: 53 (holotype BM 1946.8.31.64, type-locality: Mount Roraima, Guyana, 3500 feet); Cunha, 1961: 119; Uzzell, 1966: 286; Peters & Donoso-Barros, 1970: 207; Hoogmoed, 1973: 337; Hoogmoed & Avila-Pires, 1989: 168.

Material.— **Brazil.** AMAPA. Serra do Navio: 3 juvs., MPEG 15032, RMNH 24630-631, 06.xi.1988; 2 exs., MPEG 15049, RMNH 24632, 07.xi.1988; 1 ♀, 1 juv., MPEG 15072, 15074, 09.xi.1988; 1 ♂, RMNH 24514, 10.xi.1988; 1 ♂, MPEG 15098, 12.xi.1988; 1 ♀, MPEG 15109, 14.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, ZFMK 45436.
PARA. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 1 juv., RMNH 24515, 06.xii.1988; 1 ♂, MPEG 15353, 07.xii.1988; 1 ♀, RMNH 24516, 11.xii.1988; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.
French Guiana. R. Sinnamary, Petit Saut: 1 ♂, RMNH 24517, 10.xi.1989; 1 ♀, MPEG 15833, 12.xi.1989; both leg. M.S. Hoogmoed & T.C.S. Avila Pires.
Guyana. Mount Roraima, 3500 feet: holotype, ♂, BM 1946.8.31.64, leg. F.V. McConnell & J.J. Quelch.
Suriname. MAROWIJNE. Lely mountains: 1 ♂, 1 juv., RMNH 24484-485, airstrip Suralco camp IV, 03.xii.1974; 1 ♀, RMNH 24488, 06.v.1975; 1 ♂, 3 juv., RMNH 24489-492, S of Suralco camp IV, 11.v.1975; all leg. M.S. Hoogmoed; 2 ♀♀, RMNH 24503-504, Suralco camp IVb, 15.viii.1975; 1 ♂, RMNH 20645, Suralco camp V, 12 km NE airstrip, 17.viii.1975; 1 ♂, RMNH 24505, Suralco camp V, 12 km NE airstrip, 16.viii.1975; 1 ♂, RMNH 24506, 2 km S of Suralco camp V, 18.viii.1975; 1 ♂, 2 ♀♀, RMNH 24507-509, 5-8 km NE airstrip, 10.viii.1975; 1 ♂, 1 ♀, RMNH 24510-511, Suralco camp IV, 20.viii.1975; all leg. M.S. Hoogmoed & W.N. Polder. Loë Creek, camp Hofwijks: 1 ♂, RMNH 24495, 02.viii.1975; 1 ♀, 1 juv., RMNH 24496-497, 03.viii.1975; 1 ♀, RMNH 24498, 04.viii.1975; 1 ♂, 2 ♀♀, RMNH 24500-502, 07.viii.1975; all leg. M.S. Hoogmoed. BROKOPONDO. Tafelberg: 1 ♀, RMNH 24512, S of airstrip Tafelberg, 14.xi.1975; 1 ♂, RMNH 24513, airstrip Tafelberg, 16.xi.1975; both leg. M.S. Hoogmoed. Brokopondo, Brown's Mountain: 1 ♀, RMNH 24518, 19.xii.1976, leg. S.B. Kroonenberg.

Diagnosis.— *Neusticurus* with moderately short snout, tympanum almost superficial or in a shallow auditory meatus, lower eyelid with semitransparent disc of 3-5 palpebrals. Back with 4-6 regular or irregular longitudinal rows of tubercles, 30-42 (35.1 ± 2.9) on a paravertebral row (45 in holotype). Flanks with prominent, trihedral tubercles surrounded by distinctly smaller scales. Ventrals in 22-26 (24.0 ± 1.0) transverse rows (18 in holotype). Tail moderately compressed, with a double dorsal crest; in each crest a large and a small tubercle alternate. Verticils distinct on tail, with two transverse rows of ventral scales corresponding to 3-5 transverse rows of scales on the sides.

Description.— Gymnophthalmid with maximum SVL in males of 94 mm (ZFMK 45436), in females of 89 mm (Uzzell, 1966). Head 0.22-0.27 (0.24 ± 0.02, n= 32) times SVL, 1.4-1.7 (1.59 ± 0.06, n= 32) times as long as wide, 1.1-1.4 (1.23 ± 0.06, n= 32) times as wide as high. Snout slightly elongate, blunt; temporal region slightly swollen. Neck almost as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.31-0.35 (0.33 ± 0.01, n= 31) times SVL, hind limbs 0.48-0.56 (0.53 ± 0.02, n= 29) times. Tail moderately compressed, tapering gradually toward tip, 1.4-1.9 (1.64 ± 0.13, n= 14) times SVL, except for holotype which has tail twice as long as SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior ones bicuspid, teeth larger posteriad.

Rostral pentagonal, visible from above, about twice as wide as high. A pair of frontonasals longer than wide (single in holotype), followed by a shorter pair of prefrontals. An azygous scale of variable size may be present in the centre of the four scales. Frontal hexagonal, longer than wide, narrower posteriorly (in holotype sutures with frontoparietals form a straight line instead of an angle); laterally in contact with second, and mostly first and third, supraoculars. A pair of irregularly pentagonal frontoparietals, in wide medial contact and laterally in contact with third, and frequently anterior part of fourth, supraoculars. A relatively large interparietal and two parietals. Parietals as long as, to shorter than interparietal, with rounded lateroposterior margin. Between frontoparietals and interparietal there may be an azygous scale of variable size (in holotype the interparietal is relatively smaller, and there are four parietals, those adjacent to interparietal distinctly smaller; no azygous scale is present). Scales on occipital region extremely variable: there may be several relatively small and irregularly arranged scales, one enlarged mid-occipital plus several relatively small scales, or three to five large occipitals. Four supraoculars, first distinctly smaller and in some specimens partially separated from the others by small scales, second supraocular slightly wider than third and fourth; a few small scales may be present peripherally. Five or six, exceptionally four, elongate, subequal supraciliaries, followed by a small, wider scale. Irregular grooves may occasionally occur on some dorsal head scales, especially posterior ones (interparietal, parietals, occipitals). Nasal undivided, nostril approximately in its centre, directed lateroposteriorly. One relatively large loreal, mostly separated from supralabials by a few to several smaller scales, occasionally divided into two scales. Frenocular present, mostly in contact with supralabials, in some specimens separated from them by small scales. A row of 3-6, mostly four, suboculars contiguous with frenocular, all of them or posterior ones broadly keeled. Lower eyelid with semitransparent disc of 3-5 palpebrals. Five or six supralabials, one before last or suture between the two posterior ones below centre of eye. The last two supralabials are narrower and followed by a distinct row of three or four, occasionally five, postsupralabials, anterior one much larger, tapering posteriad. Posterior to postsupralabials and postinfralabials another similar scale. Temporal scales polygonal to oval, convex, broadly keeled, heterogeneous in size. Enlarged temporal scales may (a) form an oblique row from upper margin of ear-opening forward, reaching first postsupralabial or not, (b) form a supratemporal row, and (c) border anterior margin of ear-opening; in some specimens, however, enlarged scales appear only sparsely, among predominantly small scales. Ear-opening large, roughly oval to horseshoe-shaped, with smooth margin and tympanum almost superficial or in a shallow auditory meatus.

Mental trapezoid or semicircular. Postmental undivided (divided in RMNH 24495), pentagonal. Three pairs of chinshields, first in contact medially and with

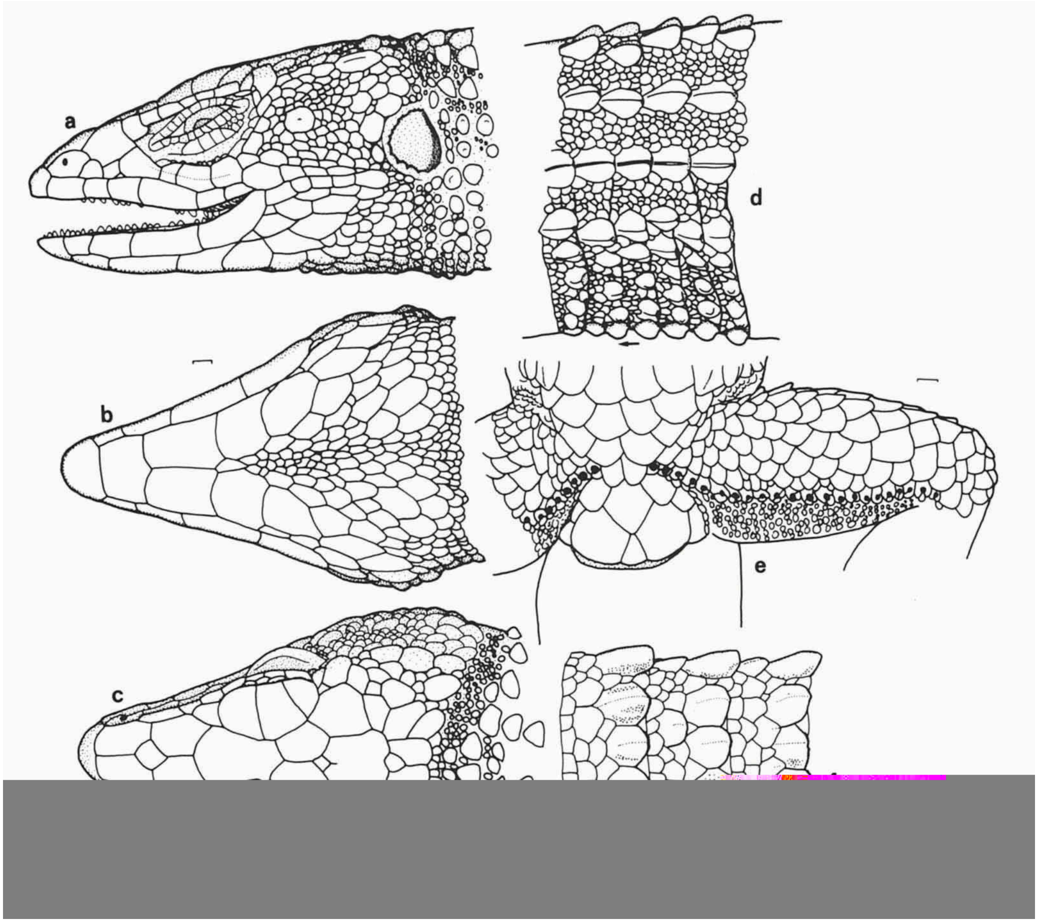


Fig. 152. *Neusticurus rudis*, MPEG 15353; a, b, c: lateral, ventral, and dorsal views of head; d: dorsals and scales on flanks near midbody; e: preanal plate and left thigh, showing preanal and femoral pores; f: scales on tail, in lateral view (arrows point to direction of head).

infralabials; second in contact or narrowly separated medially, and in contact with infralabials; third widely separated medially, and mostly in contact with, but occasionally separated from, infralabials (in three specimens one chinshield of first pair was divided into two scales, thus resulting in 3-4 chinshields; holotype with two pairs of chinshields, first in medial contact, second widely separated). Scales posterior to chinshields small, in a few longitudinal, slightly oblique rows, medially; relatively large along line following chinshields; and elongate and narrow laterally. Four infralabials, posterior one below centre of eye, followed by two to six scales, either relatively large or very small. Gulars mostly trihedral (roundish, convex, in holotype), but some of the mid-posterior scales may be flatter; juxtaposed anteriorly to imbricate posteriorly, in approximately transverse rows, gently increasing in size posteriad; 8-12 (10.6 ± 1.0, n= 31) transverse rows of gulars from posterior level of ear-opening to gular fold. Gular fold distinct, collar with 8-12 (9.5 ± 1.2, n= 32) scales. Border between chin and gular regions mostly well defined by one to three rows of small scales, but in some specimens there is a more gradual transition.

Scales on nape similar to dorsals, composed of two types: small, irregular, flat, subimbricate scales; and large, keeled, trihedral tubercles, mostly in rather regular longitudinal rows (irregular in holotype). On sides of neck and along flanks tubercles are conical, in distinct longitudinal rows on neck, and in transverse rows on flanks. At each side, dorsally, a paravertebral row of tubercles from nape to base of tail, where it continues as a serrate crest; and a double dorsolateral row which starts on nape as two separate rows, posteriad (up to base of tail) becoming mixed up, or the two rows running contiguous to each other. Paravertebral row with 30-42 (35.1 ± 2.9, n= 32) tubercles from nape to base of tail (45 in holotype). Ventrals trapezoidal to quadrangular, with slightly rounded posterior margin, shortly imbricate, in eight longitudinal and 22-26 (24.0 ± 1.0, n= 32) transverse rows (28 transverse rows in holotype). Scales in the two medial rows at each side smooth, flat, in third row smooth to broadly keeled, in fourth (lateral) row keeled and convex. Minimum number of scales around midbody 36-51 (43.9 ± 4.2, n= 29). Preanal plate mostly with one enlarged scale anteriorly and three posteriorly, plus two to four smaller scales at each side, one behind the other; median posterior scale from almost as large as, to distinctly smaller than, enlarged lateral ones; small lateral scales from very reduced to moderately large, mostly anterior one largest, the others small (resulting in formulas of 1+3, 3+3, 3+5). RMNH 24515 with five elongate posterior preanal scales, lateral ones narrower, and five hexagonal anterior scales. Holotype with five preanal scales anteriorly, four posteriorly. Preanal and femoral pores present, in a continuous row at each side; in total, 36-46 (39.8 ± 2.9, n= 14) pores in males, 6-10 (7.3 ± 1.6, n= 15) in females. Pores between two or three scales, of which one usually larger than the others.

Tail divided into distinct verticils. A double crest of tubercles dorsally where, in each crest, a larger and a smaller tubercle alternate. Crests separated middorsally by small, irregular, flat and slightly imbricate scales. A dorsolateral row of slightly smaller and lower tubercles, each tubercle separated from the next by two rows of scales. Laterally scales form transverse rows, and in some cases approximately longitudinal rows; in each verticil scales distally larger, some of which keeled and slightly convex. Scales on ventral surface of tail rectangular with convex posterior margin (nail-like), in longitudinal and transverse rows, those on pair of midventral rows wider and smooth, those on lateral rows smooth or broadly keeled. Each verticil with three or four, rarely five, transverse rows of lateral scales, and two transverse rows of ventral scales.

Forelimbs with roughly rhomboid to hexagonal, imbricate, keeled scales, in longitudinal rows, on antero-dorsal aspect of upper arms and most of forearms; smaller, trihedral to conical scales on ventro-posterior aspect of upper arms; a row of larger, trapezoidal scales on anterior aspect of forearms; and smaller scales on articulation regions and in a narrow band ventral to trapezoidal scales. On hind limbs, dorsal and posterior aspects of thighs with small, flat scales, with many interspersed tubercles which become very small close to pores. Anterior aspect of thighs with large, roughly rhomboid to hexagonal, imbricate scales, upper ones keeled, lower ones smooth and on ventral aspect becoming more rounded; scales bordering the row of pores anteriorly may be smaller. Lower legs with small, flat scales with many interspersed tubercles on anterior, dorsal, and dorso-posterior aspects; two rows of large, rhomboid to hexagonal, smooth, flat, imbricate scales on anterior aspect; and some transitional, variable scales on lower posterior aspect. Subdigital lamellae under fingers single, smooth, under toes partially divided, internal half lamellae under base of first to fourth toes tuberculate, more strongly toward fourth toe; 14-18 (15.5 ± 1.1, n= 64, 32 specimens) lamellae under fourth finger, 20-27 (23.3 ± 1.6, n= 64, 32 specimens) under fourth toe (in holotype respectively 19-20 and 29).

MPEG 15353 (♂) in life hair-brown (119A) on dorsal surface, ventral surface of head dirty-white, gulars medially, most of belly, and part of base of tail ventrally sulphur-yellow (157); toward the sides gulars, belly and lower part of flanks, base of underside of tail, as well as ventral surface of thighs, flesh-ochre (132D); iris greyish-brown with a narrow reddish-brown rim around pupil; tongue sepia. MPEG 15074 (♀) with dorsal surface of head raw umber (223), back predominantly ground cinnamon (239) with some darker scales, flanks and some dorsolateral spots salmon (106); ventral surface of head and gulars white, orange-yellow (18) and, in centre of chinshields, drab (27); belly mostly sulphur-yellow (157); posterior part of belly, ventral surface of limbs and of base of tail orange-yellow; distal part of tail, ventrally, mainly dusky brown (19); iris greyish-brown with a reddish brown rim around pupil; tongue dusky brown. In RMNH 24632 and MPEG 15049, both juveniles, dorsum vandyke brown (121) with dull orange-yellow (18) spots, also on most of rostral region; ventrally predominantly vandyke brown with whitish spots under head, fewer or absent under gular region and belly; tail pattern similar to that of body; tongue vandyke brown.

In preservative, basic colour some tone of brown, very variable among specimens. Some specimens homogeneously coloured, but most specimens mottled with dark brown, and commonly with squarish, light brown to cream-colour spots along body, which may be surrounded by a dark ring, giving the impression of suffused ocelli. Oblique, alternating light and dark bands across sides of head, especially on labials, may be present. Ventral region whitish, variably peppered under head and on gular region, peppering either widespread or forming irregular spots and, in some specimens, transverse bands across chinshields. Scales on belly with central peppered spots, from very conspicuous to very light. Tail pattern similar to that of body, except distally on underside which is predominantly dark brown with irregular whitish spots. Regenerated tail completely dark brown. Juveniles with numerous light and dark spots dorsally and laterally; alternate light and dark bands across labials and chinshields seem to be always present, and there may be longitudinal or oblique (medially convergent) longitudinal dark lines on gular region; venter usually distinctly spotted, and underside of tail predominantly dark.

Habitat.— A forest dweller, always linked to wet situations like near creeks in terra firme forest, or in swampy areas. Usually amidst leaflitter, or under rotten logs; RMNH 24516 was inside the base of an old, fallen palm leaf. RMNH 24517 was found at night among dense, low (20-30 cm high) vegetation, in higher, not inundated spot in creek valley; it was probably disturbed while sleeping. RMNH 20645 was in a hollow filled with water in a living tree, 80 cm above ground (M.S. Hoogmoed field notes).

Notes on natural history.— Among the material studied from Amapá, Pará and

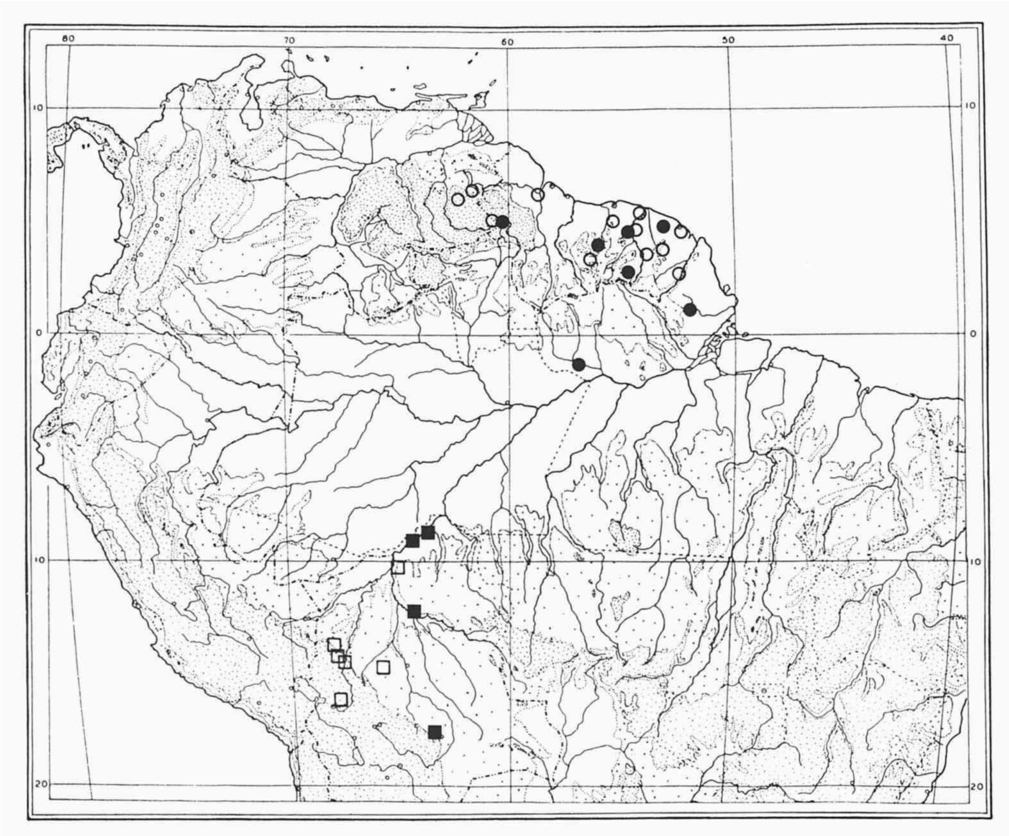


Fig. 153. Distribution of *Neusticurus rudis* (circles) and *Pantodactylus schreibersii parkeri* (squares). Closed symbols = material studied. Open symbols = data from literature (*N. rudis*: Uzzell, 1966; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976. *P. s. parkeri*: Ruibal, 1952; Fugler, 1989).

French Guiana, active individuals were collected between 10:50 and 17:00 h and, contrary to *N. bicarinatus* and *N. ecpleopus*, all animals were out of water, although usually close to it. Hoogmoed (1973) reported individuals both in or near creeks, and stated that the animals flee into the water when pursued.

Distribution (fig. 153).— Guiana region, in Venezuela (Bolívar), Guyana, Suriname, French Guiana, and Brazil. In Brazil known at present from only two localities: Serra do Navio, in Amapá, and Cruz Alta, Pará, but probably occurring in the entire area between these two points, and also in parts of Roraima.

Remarks.— The holotype, which comes from Guyana, presents several differences in relation to the material studied, which comes from Brazil, French Guiana and Suriname, and it may turn out that they represent different species. Donnelly & Myers (1991) already suggested that *N. rudis* may in fact represent more than one species. The main differences observed between the holotype and the remaining material studied are highlighted in the description, and I consider as particularly significant the differences in the frontonasal, chinshields, gular scales, dorsal tubercles forming regular rows or not, scales of the preanal plate, and in numbers of tubercles in the

Table 9. Comparison among specimens of *Neusticurus rudis* from different localities in relation to presence of an anterior azygous scale (aas) between frontonasals and prefrontals, a posterior azygous scale (pas) between frontoparietals and interparietal, and irregular grooves on dorsal head scales (ig). Localities are as follow: SN = Serra do Navio, Amapá; CA = Cruz Alta, Pará; PS = Petit Saut, French Guiana; LM = Lely Mountain, Suriname; LC = Loë Creek, Suriname; TB = Tafelberg, Suriname. For each locality the number of specimens which present the character is given, followed by the number of specimens examined.

	SN	CA	PS	LM	LC	TB
aas	1/6	3/3	1/2	10/12	4/6	0/2
pas	5/6	2/3	0/2	9/12	2/6	1/2
ig	1/6	3/3	0/2	1/12	3/6	2/2

paravertebral row, of ventrals, and of subdigital lamellae of fingers and toes (because of such differences, all calculations of mean and standard deviation have not included the holotype). Some of the scale counts also seem to present geographical variation among the remaining material. Tubercles in a paravertebral row shows values between 30-34 (32.1 ± 1.4, n= 11) in specimens from Brazil and French Guiana, 33-42 (36.6 ± 2.1, n= 21) among the Suriname specimens (45 in the holotype); lamellae under fourth finger 14-16 (14.7 ± 0.7,n= 18, 9 specimens) in the Brazilian specimens, 16/17 and 17/18 in the two specimens from French Guiana, and 14-18 (15.8 ± 1.0, n= 42, 21 specimens) in the Suriname group (holotype 20); lamellae under fourth toe respectively 20-24 (21.9 ± 1.2, n= 18, 9 specimens), 24/24 and 26/27, 21-27 (23.6 ± 1.4, n= 42, 21 specimens), and in holotype 29. These numbers could suggest a clinal variation, with the holotype representing one of the extremes (among material studied) but, on the other hand, that would not account for the several qualitative differences between the type and the remaining specimens. As the species is currently under study by Maureen A. Donnely, I will not pursue this matter further.

Individuals of *N. rudis* may present an azygous scale between frontonasals and prefrontals, and another one between frontoparietals and interparietal, also irregular grooves on dorsal head scales are frequently present. Table 9 compares the frequency of these characters between material from different localities.

Hoogmoed (1973) suggested that what Beebe (1945) called *N. rudis* was in fact *N. bicarinatus*. Judging form the colour description made by Beebe (1945) this is possible, but because of this uncertainty I did not use his data on the species. Uzzell (1966) reported both *N. bicarinatus* and *N. rudis* from Kartabo.

N. rudis is reported from the Guaiquinima Tepui by Mägdefrau et al. (1991), but Donnelly & Myers (1991) considered specimens from the same locality as *Neusticurus* sp., cf. *N. rudis*, leaving open the possibility that it is a different species. Both groups of authors gave some ecological notes about these animals.

Pantodactylus Duméril & Bibron, 1839

Diagnosis.— Gymnophthalmids with body cylindrical to slightly depressed, tail long, round in cross section. Limbs well developed, pentadactyl, all digits clawed. Nasals separated by frontonasal. Lower eyelid with semitransparent disc. Prefrontals, frontoparietals and occipitals present. Interparietal longer than parietals. Gular region with enlarged median pairs of scales. Dorsals hexagonal, elongate, keeled, in transverse rows only. Scales on flanks subequal or slightly smaller than dorsals, one merging into the other. Ventrals smooth.

Distribution.— Mainly southern South America east of the Andes, in Brazil, Bolivia, th thgl first supraocular. Frontal octagonal, with four long anterior and lateral borders (sutures with prefrontals and first supraoculars), and four short posterior borders (sutures with second supraoculars and frontoparietals). Frontoparietals pentagonal, longer than wide, with a long medial suture; laterally in contact with second and third supraoculars. Interparietal heptagonal, longer than wide, with slightly divergent sides. One parietal at each side of interparietal, irregularly polygonal, distinctly shorter and slightly wider than interparietal. Three occipitals, median one pentagonal, lateral ones irregularly hexagonal. Three supraoculars, first largest. Three or four supraciliaries, first expanded dorsally. Nasal undivided, nostril approximately in its centre, directed latero-posteriorly. Loreal and frenocular relatively large, both in contact with supralabials. One preocular (separated from supralabials by frenocular), followed by three or four suboculars, posterior one highest. Three postoculars, upper one in contact with parietal; lower subocular may be in contact with supralabials, in which situation it may be considered as a subocular. Lower eyelid with an undivided semitransparent disc. Supralabials and postsupralabials form a continuous series of 5-8, usually seven, scales, third or fourth (mostly) below centre of eye. Temporal scales irregularly polygonal, smooth, juxtaposed; relatively small in lower temporal area, much larger in upper part. Ear-opening moderately large, vertically oval, anterior margin finely lobed, posterior margin smooth. Tympanum slightly recessed within a short auditory meatus.

Mental approximately semicircular. Postmental undivided, pentagonal or heptagonal. Four pairs of chinshields, second largest; all in contact with infralabials, first and second also in contact medially. Medial area of chin with three pairs of relatively

Fig. 154. *Pantodactylus schreibersii parkeri*, MPEG 14341; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: preanal plate and thighs, showing femoral pores; e: dorsolateral view of body, midway between fore- and hind limbs, showing part of dorsals, scales on flanks, and lateral-most ventrals.

tinction between ventrals and laterals is still clear. Preanal plate with two large scales, bordered anteriorly by two much smaller scales. Preanal pores absent. Males with 3-5 femoral pores per side, females with two (or three: Ruibal, 1952) femoral pores at each side; each pore enclosed in a single scale.

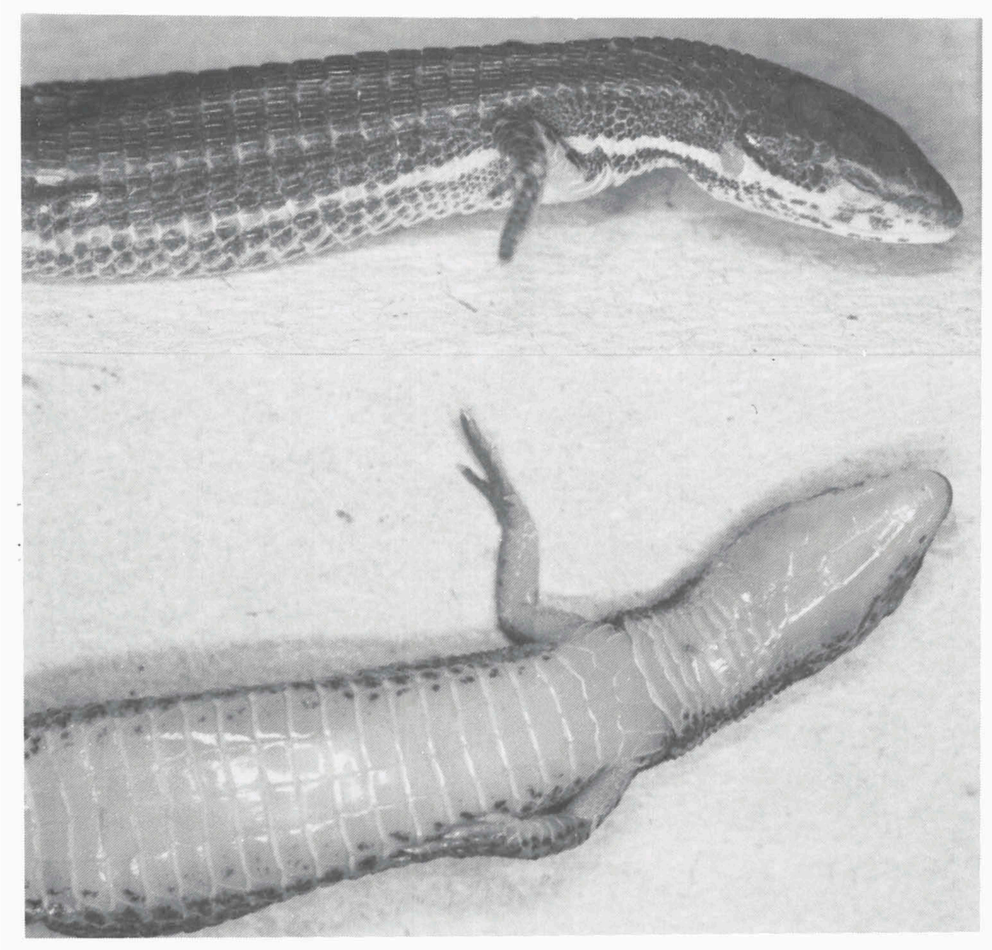


Fig. 155. *Pantodactylus schreibersii parkeri*, MPEG 14355, ♀, Porto Velho, RO, Brazil: upper figure lateral view, and lower figure ventral view of head and anterior part of body (T.C.S. Avila-Pires).

mostly medially divided, some undivided; 11-14 (12.2 ± 0.7, n= 18, 9 specimens) under fourth finger, 15-18 (16.3 ± 1.0, n= 18, 9 specimens) under fourth toe.

No description of colour in life available.

In preservative, MPEG 14341, 14355, and 14356 with dorsal surface of head and back brown, with a dark brown vertebral stripe from nape to base of tail; in MPEG 14355 this stripe is bordered on each side by a faint light brown line. A light brown dorsolateral stripe from posterior corner of eye, or nape (MPEG 14356), to tail. Flanks dark brown, with a white stripe from below eye, passing through the ear and above forelimbs, and reaching base of hind limbs. Limbs dorsally brown with small, light, round spots; the white lateral stripe on flanks continues along most of hind limbs, either as a continuous or as a dotted line. The vertebral dark stripe disappears close to base of tail; the dorsolateral light stripe continues at least proximally, or along most of tail; and the lateral white stripe continues (as a light brown stripe) to the tip. Ventral region cream, spotless except ventrolaterally along head and belly.

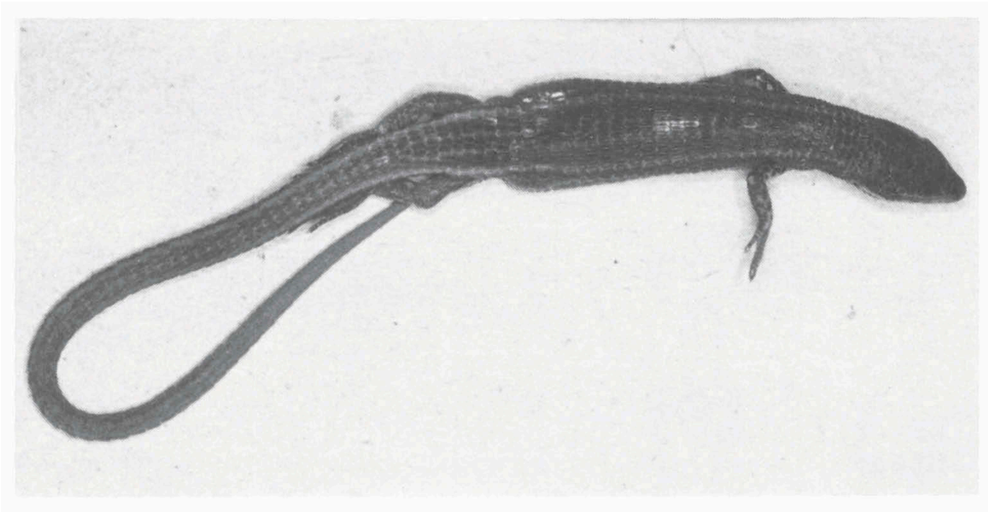


Fig. 156. *Pantodactylus schreibersii parkeri*, MPEG 14355, ♀, Porto Velho, RO, Brazil: dorsal view (T.C.S. Avila-Pires).

MPEG 1873-1876 are predominantly cream, which is certainly a result of partial bleaching. They present traces of the same pattern described above but, additionally (except in MPEG 1873), there is a series of dark brown spots on back, at each side, between the vertebral dark stripe and the dorsolateral light stripe. The spots correspond to dark brown tipped scales. In MPEG 1876, in each transverse row there are two or three adjacent dorsals, per side, with dark tips; in the other two specimens the dark-tipped scales are more scattered.

Habitat.— MPEG 14341 was in forested area, microhabitat unknown, while MPEG 14355-356 were on the periphery of the city of Porto Velho, in areas covered with grass. According to MZ/USP (1985), *P. schreibersii* is common in empty lots in the city of São Paulo. Vitt (1991b) reported *P. schreibersii* from cerrados, foraging in grass clumps and amidst leaflitter under trees and shrubs. These data, and the fact that the four localities in Rondônia from where animals are known are along the Madeira-Guaporé river system, suggest that *P. s. parkeri* occupies a natural environment either of open vegetation, or at least of open types of forests. Most probably it does not penetrate dense forest.

Notes on natural history.— Vitt (1991b) gave some data on feeding behaviour, diet and life history of *P. schreibersii* from cerrados in southeastern Mato Grosso.

Distribution (fig. 153).— The species is predominantly extra-Amazonian, occurring in central and southern parts of Brazil, and neighbouring countries (Argentina, Paraguay, Uruguay, Bolivia, and Peru). *P. s. parkeri* occurs in Bolivia, Peru (probably restricted to the southeastern lowlands, according to Ruibal, 1952), and in Brazil, in the state of Rondônia. The localities from where specimens are reported in Rondônia (Príncipe da Beira, Vila Murtinho, Jaci-Paraná, and Porto Velho) are all along the Madeira-Guaporé river system, part of which delimits the border with Bolivia.

Remarks.— Ruibal (1952) divided *P. schreibersii* into three subspecies. According to him, *P. s. parkeri* differs from *P. s. albostrigatus* (Griffin) in colour pattern (no longitudinal rows of black-tipped scales on back) and in number of pores in females (2-3 in *P. s. parkeri*, 0-1 in *P. s. albostrigatus*). He remarked that UMMZ 60598, from Buenavista, Bolivia (type-locality of *P. s. parkeri*) had the black-tipped dorsals typical of *P. s. albostrigatus*, but the number of pores (2/2) was in agreement with *parkeri*. MPEG 1872-1875, ♂♂, from Príncipe da Beira, Rondônia, also present black-tipped scales on the back. The only female available from the same locality has no black-tipped dorsals, and 2/2 femoral pores. The study by Ruibal (1952) was based on 44 specimens of *P. s. parkeri*, but only on three specimens of *P. s. albostrigatus*. Therefore, a comparison between the frequency of occurrence of black-tipped dorsals in each of the two subspecies is not possible, neither is it possible to know how this character behaves throughout the area of distribution of each subspecies. *P. schreibersii* occurs mostly outside the Amazonian region, thus the analysis of the species as a whole is out of the scope of the present study, but the data above indicate the necessity of further studies on the group.

Prionodactylus O'Shaughnessy, 1881

Diagnosis.— Gymnophthalmids with body cylindrical to slightly depressed, tail long, round in cross section. Limbs well developed, pentadactyl, all digits clawed. Nasals separated by one or two frontonasals. Lower eyelid with semitransparent disc. Prefrontals, frontoparietals and occipitals present. Interparietal longer than parietals. Gular region with two or more enlarged median pairs of scales (occasionally they are irregular). Dorsals hexagonal, elongate, keeled, in transverse rows only. Scales on flanks distincly smaller than dorsals. Ventrals smooth.

Distribution.— Panama and northern South America on both sides of the Andes.

Content.— According to Uzzell (1973) and the present paper six species, of which *P. argulus*, *P. oshaughnessyi*, and *P. eigenmanni* occur in Brazilian Amazonia. The former two species were considered by Uzzell (1970, 1973) as synonymous.

Remarks.— *Pantodactylus* and *Prionodactylus* cannot be clearly separated on the basis of external morphology, and both Ruibal (1952: 520) and Uzzell (1973: 6) suggested they may be identical. Presch (1980), however, based on osteological and myological characters, placed the two genera in different groups.

Prionodactylus argulus (Peters, 1863)
(figs. 157-163)

Cercosaura (Pantodactylus) argulus Peters, 1863: 184 (holotype ZMB 4555, type-locality: mountainous regions around Santa Fé de Bogotá, Cundinamarca, Colombia).

Prionodactylus argulus; Boulenger, 1885b: 391; Uzzell, 1970: 235 (part), 1973: 33 (part); Crump, 1971: 20; Hoogmoed, 1973: 347 (part); Nascimento et al., 1988: 40.

Prionodactylus holmgreni Andersson, 1914: 9 (holotype NRM NNN/1904.338.5226, type-locality: San Fermin, Bolivia).

Prionodactylus columbiensis Werner, 1917: 306 (holotype unknown, type-locality: Cañon de Tolima, Colombia).

Prionodactylus oshaughnessyi; Vanzolini, 1972: 107 (probably).

Material.— **Brazil.** PARA. São Miguel do Guamá: 1 ♀, MPEG 14517, 25.ii.1987, leg. W. França. Ananindeua, road BR-316, Centro Nacional de Primatas: 1 ♀, MPEG 14802, 13.xi.1987, leg. E. Martins.

Ananindeua, Maguari: 1 ♂, KU 140143, 19.ii.1971. Belém: 1 ♂, MPEG 14516, campus da UFPA, 08.iv.1986, leg. I.F.F. Santos, M.B. Souza & R.J.R. Moraes; 1 ♂, USNM 158069, 30.vi.1965, 1 ♂, USNM 159220, 13.vii.1964, both leg. P.S. Humphrey; 2 ♂♂, 2 ♀♀, KU 127248-251, IPEAN, 9-17.iv.1969 & 20.vi.1969, leg. M.L. Crump; 1 ♀, KU 128123, Utinga, 13.iii.1970, leg. E.H. Taylor; 1 ♂, KU 129867, Utinga, 08.v.1970.
RONDONIA. Ecological Reserve of Rio Jamari, former Vila Santo Antônio, c. 70 km SE of Porto Velho: 1 ♂, MPEG 14833, 10.ii.1988, leg. E. Martins. Ji-Paraná: 1 ♂, MPEG 13870, 10.viii.1984, leg. R. Bittencourt N.
Bolivia. NW Bolivia, San Fermin, 660 m: holotype *P. holmgreni*, ♂, NRM NNN/1904.338.5226, viii.1904, leg. N. Holmgren.
Colombia. Cundinamarca, mountainous regions around Santa Fé de Bogotá: holotype, ZMB 4555, leg. Lindig.
Ecuador. NAPO. Rio Araguarico, Puerto Libre, 570 m: 1 ♀, 1 juv., KU 119425, 119427. Lago Agrio, 330 m: 1 ♂, KU 126834, 1 ♂, 3 ♀♀, KU 126838-841. San Jose, Viejo de Sumaco: 1 ♂, USNM 196209 (GOV 6852), leg. J. Olalla. PASTAZA. Rio Capahuari: 1 ♂, USNM 196202, xi.1957, leg. P. Mena.
French Guiana. Village Zidock: 1 ♂, MHNP 1973.1498, i.1973, leg. J. Lescure.
Peru. AMAZONAS. Rio Caterpiza, vicinity Caterpiza: 1 ♀, USNM 334927, 07.ii.1980, leg. R.W. McDiarmid. Rio Cenepa, Rio Kayamas: 1 ♀, USNM 316891, 05.viii.1977, leg. R.W. McDiarmid. Rio Cenepa, vicinity San Antonio: 1 ♀, USNM 316893, 08.viii.1977, leg. R.W. McDiarmid. Rio Cenepa, c. 1 mi W Huampami: 1 ♀, USNM 316892, 30.viii.1977, leg. R.W. McDiarmid. Rio Yutupis, vicinity of Shiringa: 1 ♂, USNM 334928, 08.ii.1980, leg. R.W. McDiarmid. HUANUCO. Rio Pachitea: 1 ♂, ZFMK 30574, 19.iv.1980, leg. R. Schulte. MADRE DE DIOS. Cuzco Amazonico, 15 km E Puerto Maldonado: 1 ♀, KU 208348, leg. W.E. Duellman.

Diagnosis.— Frontonasal divided. Loreal in contact with supralabials. Scales around midbody 27-35. Males with 12-20, females with 2-6, pores in total, none in preanal position; the pores from two sides separated by four ventrals in a transverse row. Subdigital lamellae not or only slightly tuberculate, 16-22 under fourth toe. A sharp delimitation on sides of head, usually just above supralabials, between a brown dorsal surface and a white ventral surface; lower flanks white, continuous with white belly.

Description.— Gymnophthalmid with maximum SVL, among material studied, of 45 mm in males (KU 127248), 41 mm in females (KU 127250, USNM 334927). Head 0.22-0.27 (0.25 ± 0.01, n= 33) times SVL, 1.5-2.0 (1.75 ± 0.10, n= 33) times as long as wide, 1.2-1.5 (1.32 ± 0.07, n= 33) times as wide as high. Snout pointed, widening gradually posteriorly. Neck slightly narrower than head and body. Body cylindrical to slightly depressed. Limbs well developed, forelimb 0.25-0.33 (0.29 ± 0.02, n= 29) times SVL, hind limb 0.33-0.49 (0.41 ± 0.04, n= 28) times. Tail round in cross section, 2.2-2.6 (2.43 ± 0.10, n= 13) times SVL in all but one specimen with SVL 31 mm (SVL in remaining specimens ± 31 mm); tail in this specimen 2.1 times SVL.

Tongue lanceolate, covered with small, imbricate, scale-like papillae, except for the bifid tip which is smooth. Anterior teeth conical, posterior teeth mostly tricuspid, occasionally bicuspid.

Rostral crescent-shaped in dorsal view, more than twice as wide as deep. A pair of rectangular frontonasals (much longer than wide), followed by a pair of shorter, irregularly pentagonal prefrontals. Frontal hexagonal, longer than wide, widest anteriorly. A pair of irregularly pentagonal frontoparietals, with a long medial suture. Interparietal heptagonal, longer than wide, lateral borders approximately parallel. One parietal at each side, shorter and wider than interparietal. One median and two

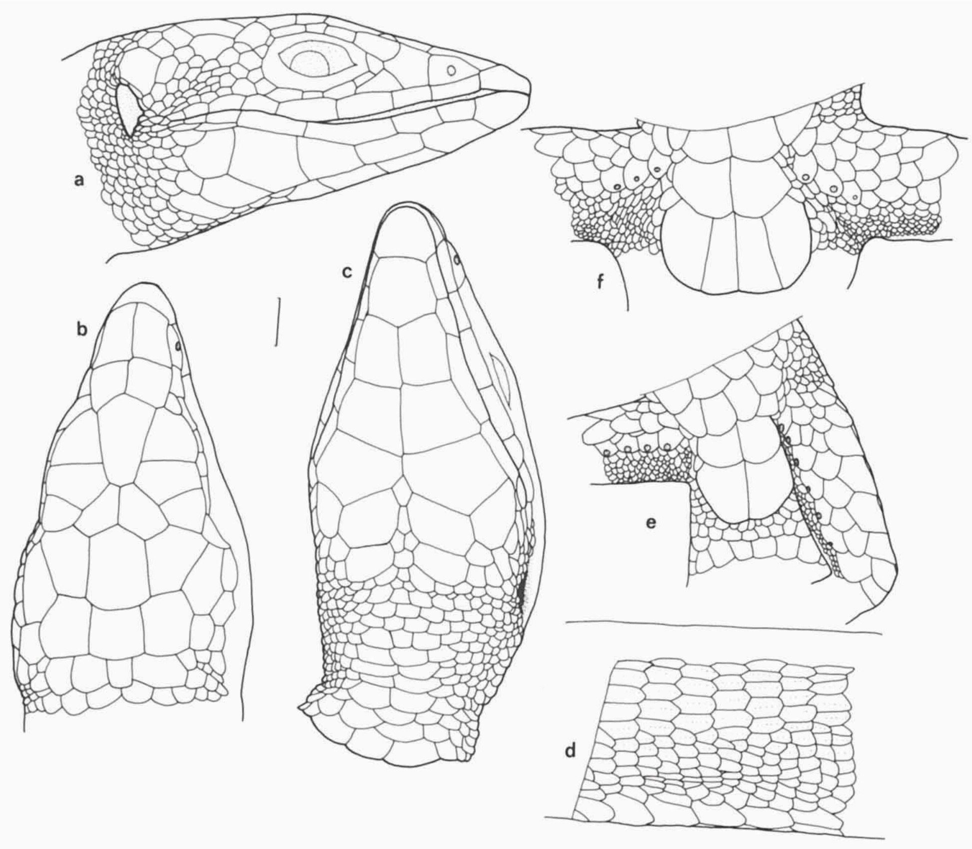


Fig. 157. *Prionodactylus argulus*; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: dorsolateral view of body halfway between fore- and hind limbs, showing part of dorsals, scales on flanks, and lateralmost ventrals; e: preanal plate and thighs, with femoral pores (only left thigh complete); all in MPEG 13870 (♂); f: preanal plate and proximal part of thighs, with femoral pores, in MPEG 14802 (♀).

larger paramedian occipitals. Three supraoculars, first largest. Four, occasionally three or five, supraciliaries, first expanded dorsally. Nostril in an undivided nasal. One large loreal, irregularly pentagonal, in contact with supralabials, followed by a triangular or trapezoidal frenocular. Subocular series formed by a small preocular, 3-5 suboculars, posterior one usually largest, and 3-4 postoculars, uppermost largest. Lower eyelid with semitransparent disc of 1-4, mostly two, palpebrals. Seven or eight, occasionally nine, supralabials and postsupralabials in total, fourth supralabial below centre of eye. Lower part of temporal region with relatively small scales, upper part with large scales. Ear-opening oval to roughly triangular, surrounded by small scales which form a smooth margin. Tympanum recessed, leaving a short external auditory meatus.

Mental relatively long. Postmental large, pentagonal or heptagonal. Four pairs of chinshields, first two pairs in medial contact, third pair with a short medial suture or completely separated medially by one or two longitudinal series of small scales; all three pairs in contact with infralabials. Fourth pair longitudinally divided at each side, the inner pair rather than the outer pair in line with anterior chinshields; outer pair in contact with infralabials or not, inner pair mostly separated medially but occasionally partially in contact. Posteriorly of the inner fourth pair a relatively large scale at each side (in some specimens transversely divided), which can be considered as a fifth pair of chinshields. Four or five infralabials, followed by 1-3 narrower post-infralabials; when four infralabials, third and fourth long and suture between the two below centre of eye; when five infralabials, fourth shorter than third and fifth below centre of eye. Scales on chin either in direct contact with gulars, or separated from them by a row of small scales. All scales on head juxtaposed, smooth.

Nape with an anterior pair of enlarged scales (or four scales moderately enlarged), followed by subimbricate to imbricate transverse series of quadrangular or slightly wider than long, smooth or slightly keeled scales. Posteriad scales grade into dorsals. Scales on sides of neck small, rounded, juxtaposed to subimbricate, in transverse rows. Gulars in 8-11 transverse rows of imbricate or subimbricate, smooth scales, of which two to six rows with a pair of enlarged median scales (occasionally all gulars irregular, not forming pairs). Collar with two or three enlarged median scales, followed toward the sides by gradually smaller scales.

Dorsals imbricate, keeled, elongate-hexagonal, in 38-45 (41.4 ± 1.9, n= 25) transverse rows (from first row posterior to occipitals to posterior margin of hind limbs) in most specimens except those from Colombia (see remarks); 12-15 (13.5 ± 0.8, n= 32) scales in a transverse row at midbody. Scales on flanks smaller than, but with some gradation toward, dorsals and ventrals, with rounded posterior margin and mostly keeled. Ventrals imbricate, smooth, in 19-23 (20.7 ± 1.3, n= 30) transverse, and six longitudinal rows. Scales in the four median rows quadrangular, with rounded posterior margin, in outermost row at each side narrower and with rounded lateral and posterior margins. Scales around midbody 27-35 (32.0 ± 1.9, n= 25). Preanal plate with two anterior and two posterior scales in males, two anterior and two or four (occasionally three) posterior scales in females. Pores enclosed in a single scale, 12-20 (n= 19) in total in males, 2-6 (n= 13) in females, none in preanal position. The two rows of pores at each side are separated by four ventrals in a transverse row.

Scales on dorsal surface of tail similar to dorsals, distally smooth. On underside of tail scales similar to ventrals, but becoming gradually narrower.

Scales on dorsal and posterior aspects of upper arms, on most of forearms, on anterior and ventral aspects of thighs, and on ventral and part of anterior and posterior aspects of lower legs large, smooth, imbricate. On remaining areas of limbs scales small, smooth and subimbricate. Subdigital lamellae not or only slightly tuberculate, in a double row except for a few distal lamellae which are single; 13-17 (15.6 ± 1.0, n= 60, 31 specimens) under fourth finger, 16-22 (19.3 ± 1.3, n= 56, 29 specimens) under fourth toe.

Colour in life of MPEG 14516, sepia (119) on dorsal surface of head and back, flanks gem ruby (110) with black dots, on neck bordered ventrally by a black stripe; both back and flanks lighter posteriorly. Five ocelli on one side, six on the other, white in centre, bordered by black; first largest, above forelimb insertion. A ventrolateral sulphur-yellow (57) band, bordered dorsally by a lighter band. Ventral surface white. Tail dorsally salmon (6), darker along a middorsal band and on the sides; ventral surface light salmon. KU 127248 was described as "Dorsum and head brown.

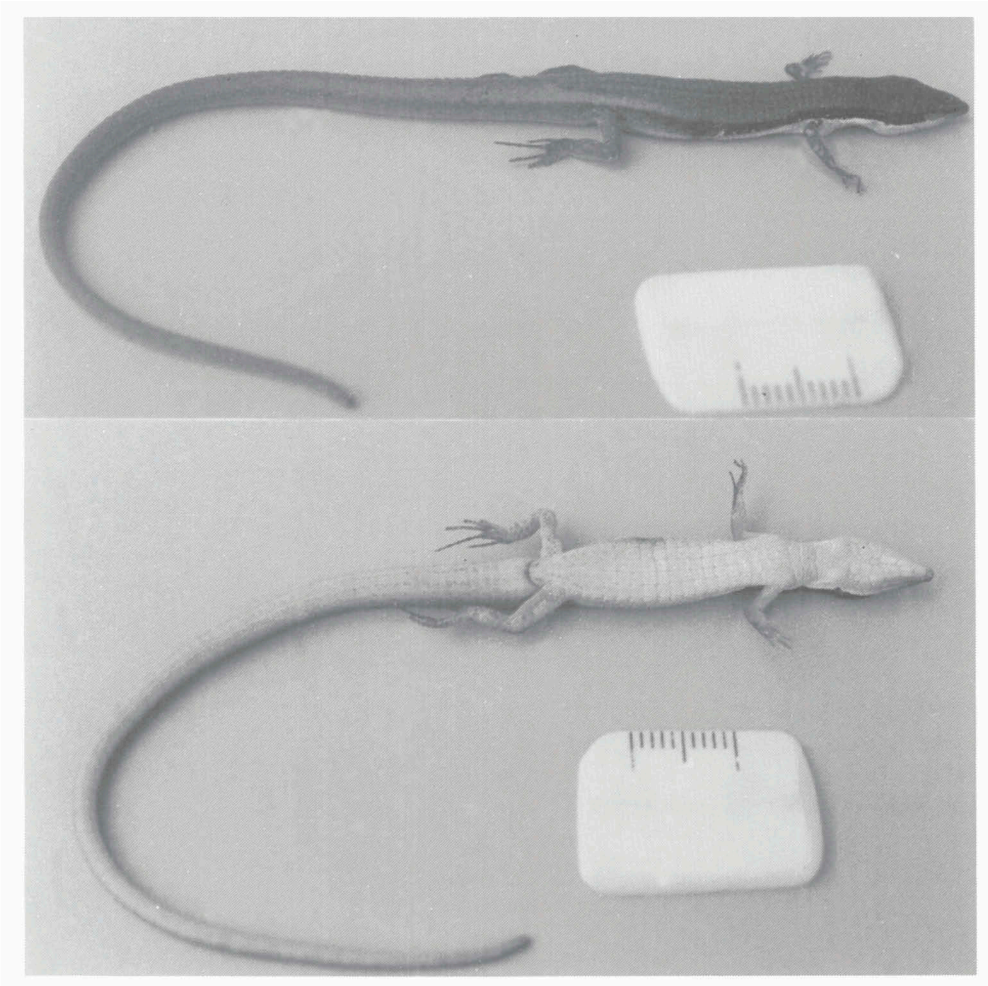


Fig. 158. *Prionodactylus argulus*, ♂, MPEG 14516, Belém, PA, Brazil: upper figure dorsal view, lower figure ventral view (T.C.S. Avila-Pires).

Reddish and brown stripe running along side of body. Venter cream; tail bright red", and KU 128123 as "Head and dorsum brown; venter cream. Dark brown stripes along sides. Tail orange" (M.L. Crump field notes).

In preservative head and nape greyish-brown, back progressively becoming lighter brown. Some rather inconspicuous light and dark longitudinal stripes may be present on back. Flanks distinctly or slightly darker than back, especially anteriorly, delimited ventrally by a dark stripe, which makes a sharp contrast with the light (cream or white) ventral surface. In most specimens this dark stripe runs just above the supralabials on temporal area, in a few cases on the middle or upper level of first row of scales above supralabials. A series of small ocelli (white centre usually one scale wide), less conspicuous in females than in males, borders the dark lateral stripe dorsally, on flanks. Ventral surface of head immaculate cream or white, or with few, irregularly spaced spots consisting of small dark dots. Gulars, ventrals, preanals and

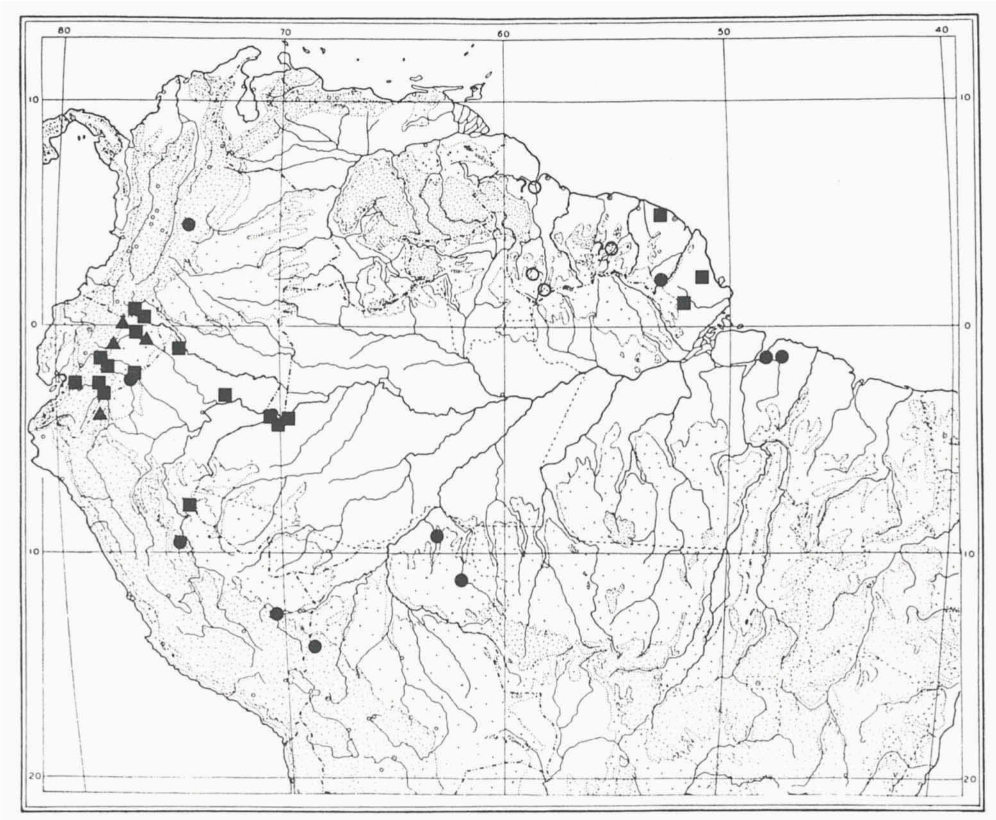


Fig. 159. Distribution of *Prionodactylus argulus* (circles) and *P. oshaughnessyi* (squares). Triangles = localities where both species occur. Square with question mark: Pallatanga, one of the type-localities (together with Canelos) of *P. oshaughnessyi*, probably in error. Closed symbols = material studied. Open circles = Hoogmoed (1973) (circles with question marks refer to localities from where only a male is known; see text). Other literature records not considered.

subcaudals each with a central clutch of small dark dots.

Habitat.— An inhabitant of both varzea and terra firme forest, on the ground among leaflitter, or on low substrate. MPEG 14516 was in an isolated patch of varzea forest, MPEG 14833 on a road crossing terra firme forest. M.L. Crump's field notes on KU 127248-151 report two individuals on forest floor, one on log 3 ft. above ground, and one 2 in. above ground on tree trunk.

Distribution (fig. 159).— At least in French Guiana, Colombia, Ecuador, Peru, Bolivia, and Brazil (eastern Pará and Rondônia), probably also in Suriname and Guyana. The species is relatively uncommon, and it may eventually prove to be more widespread than shown here.

Remarks.— Contrary to Uzzell (1973), *P. oshaughnessyi* is here considered a valid species, distinct from *P. argulus*. Table 10 lists the main general differences between the two species. Differences become more evident when geographical variation is analysed. Figs. 160-162 show variation in number of scales around midbody, number of ventrals, and of pores (♂♂ and ♀♀) in both species. Geographical variation is also

Table 10. Comparison between *P. argulus* and *P. oshaughnessyi*.

	P. argulus	*P. oshaughnessyi*
scales on flanks	moderately smaller than dorsals	distinctly smaller than dorsals
scales around midbody	27-35	31-45
pores in ♂♂	12-20	17-28
pores in ♀♀	2-6	8-15 or 0
preanal pore	absent	present
ventrals in a row between pores	4	2
tail/SVL for SVL > 32 mm	2.2-2.6	2.0-2.3

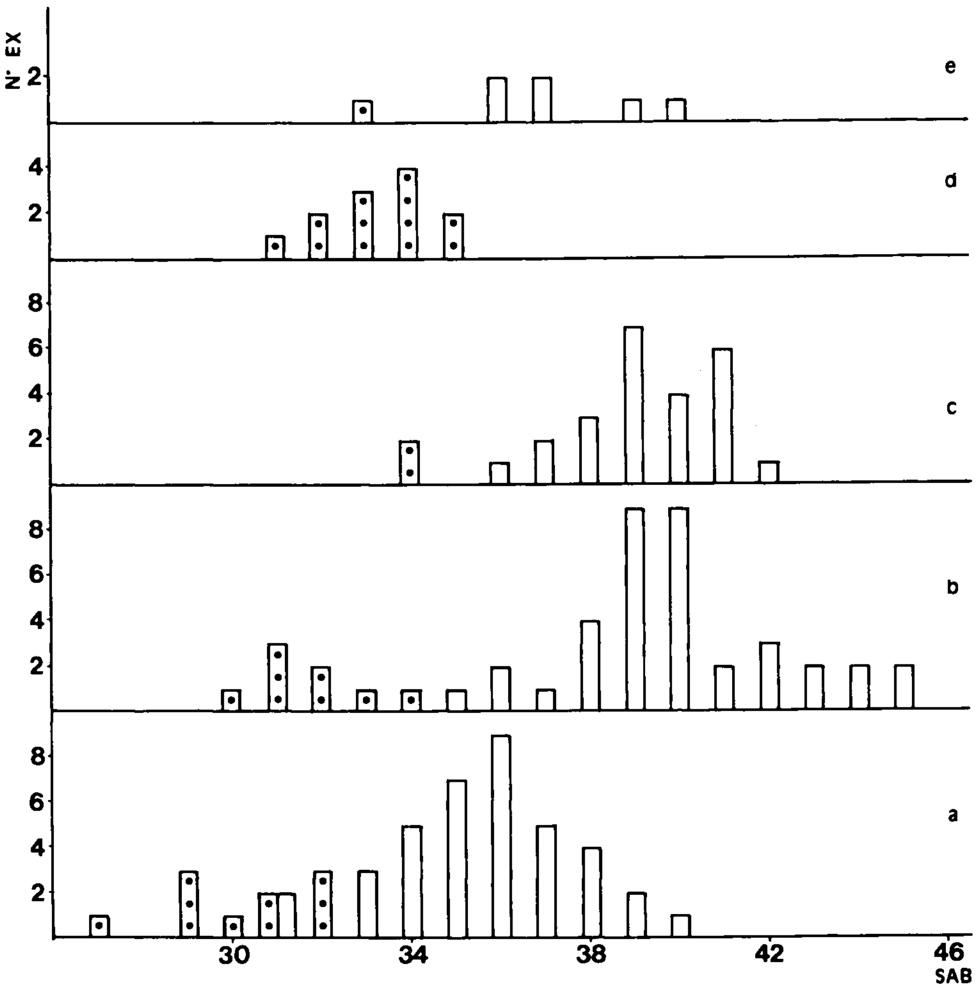


Fig. 160. Comparison of number of scales around midbody (SAB) in *Prionodactylus argulus* (dotted bars) and *P. oshaughnessyi* (white bars) in different regions: a=Ecuador+Colombia; b=Peru+Bolivia; c=Amazonas+Rondônia (Brazil); d=Pará (Brazil); e=Amapá (Brazil)+ French Guiana.

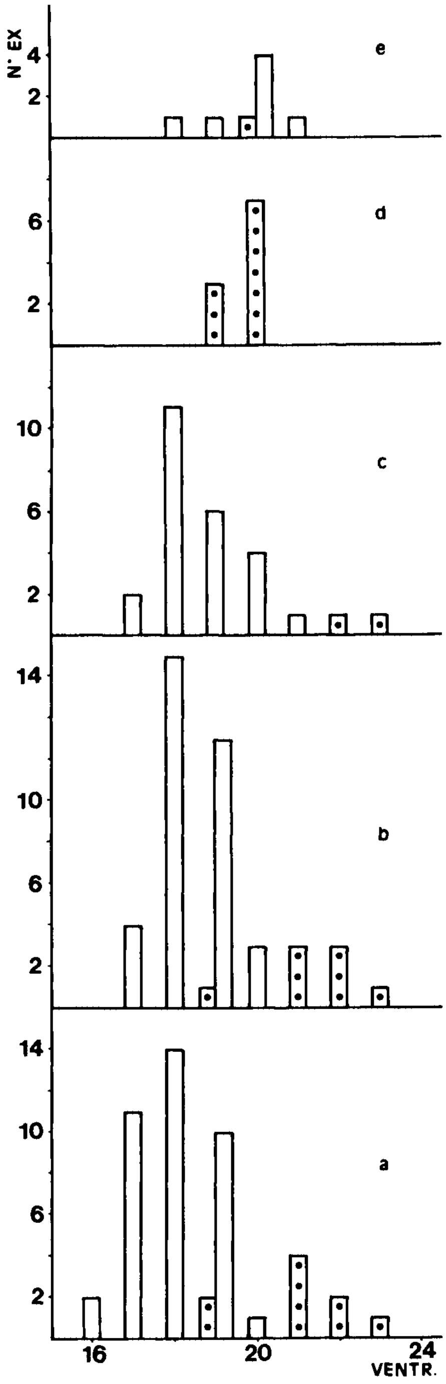


Fig. 161. Comparison of number of ventrals (VENTR.) in *Prionodactylus argulus* and *P. oshaughnessyi* in different regions (for explanations see fig. 160).

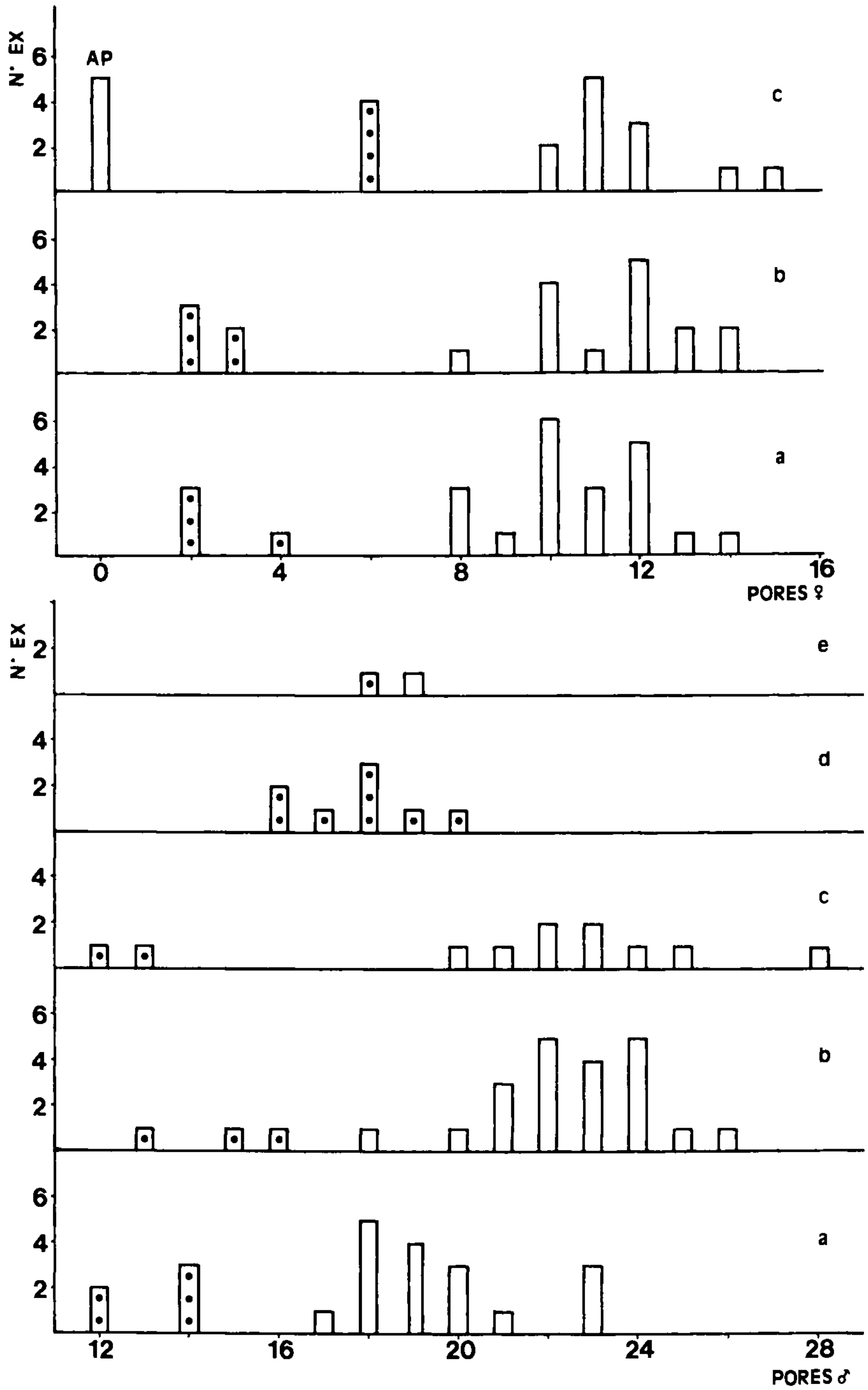


Fig. 162. Comparison of total number of pores in *Prionodactylus argulus* and *P. oshaughnessyi* from different regions, in females (upper graph) and males (lower graph). For explanation of symbols, and of letters of lower graph see fig. 160. Upper graph: a=Ecuador+Colombia; b=Peru; c=Amazonas+Pará +Amapá (AP).

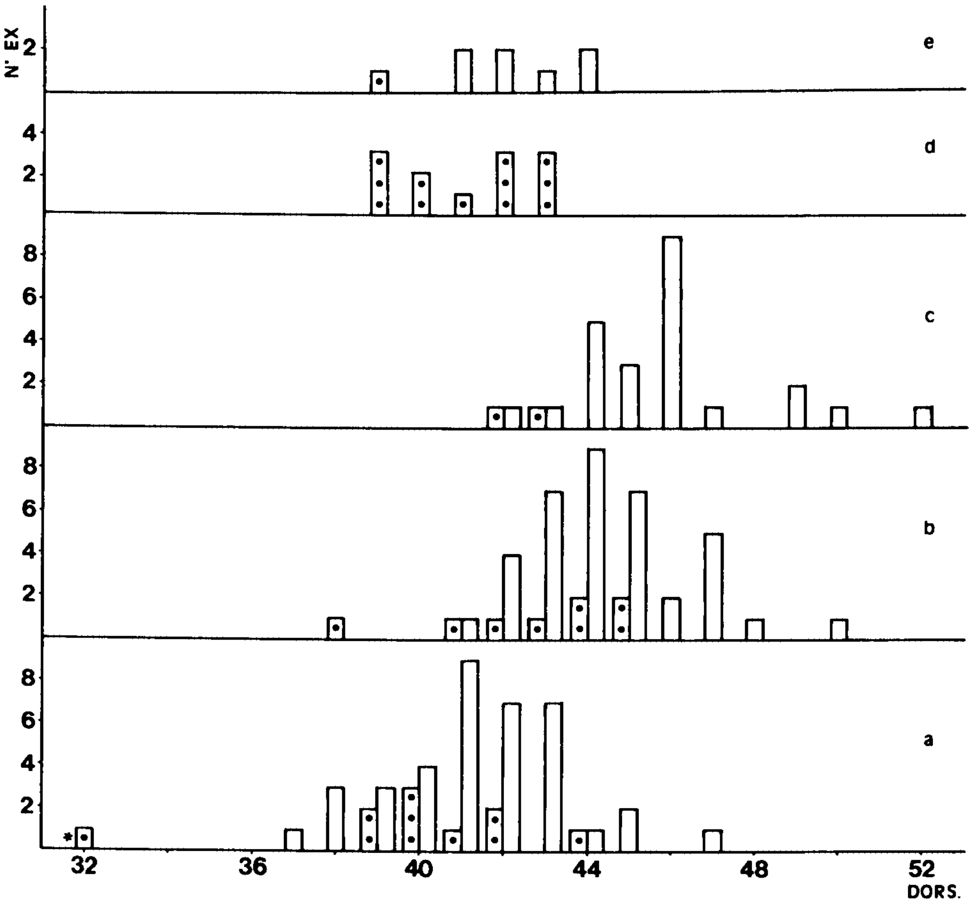


Fig. 163. Comparison of number of dorsals (DORS.) in *Prionodactylus argulus* and *P. oshaughnessyi* in different regions (for explanations see fig. 159); specimen from Colombia marked with an asterisk.

observed in number of dorsals (fig. 163). Specimens from Ecuador tend to have lower numbers of dorsals than those from Peru (and probably Rondônia), and the only specimen studied from Colombia (the holotype, ZMB 4555) shows even lower counts. If data by Uzzell (1973) are compared, it is possible to see that all material he studied from Colombia has such low numbers of dorsals (31-36), thus distinctly lower than in specimens of *P. argulus* from other regions (38-45). Material from Ecuador also tends to have lower numbers of scales around midbody and lower number of pores in males, in both species. From Amapá only *P. oshaughnessyi* is known. They form a distinct population, especially characterised by the absence of pores in females, while in other areas females of *P. oshaughnessyi* present 8-15 pores.

P. argulus and *P. oshaughnessyi* are sympatric in at least parts of Peru and Ecuador. Judging from my own experience in the field and from collections, *P. argulus* is relatively rare, while collections seem to indicate that *P. oshaughnessyi* may be more abundant in some areas.

Despite extensive efforts by Dr. Z. Rocek, from Charles University, Prague, and Ing.Dr. Z. Kux, from Moravské Museum, Brno, both Czech Republic, the type of *Prionodactylus columbiensis* Werner, 1916 could not be located. Considering the low number of scale counts reported in the original description (25 scales around midbody, 32 transverse rows of dorsals, 18 transverse rows of ventrals), I regard *P. columbiensis* as a synonym of *P. argulus*, even though the number of scales around midbody is too low for this species.

Hoogmoed (1973) included in the material of '*P. argulus*' he studied the syntypes of *P. oshaughnessyi*, from Ecuador, and a specimen, MHNP 1899.73 (which he referred to as being from French Guiana, but which indeed came from Amapá, Brazil), that I also examined and which is *P. oshaughnessyi*. Among the material reported from Suriname and Guyana, considering the data in his table 27, I believe they are all *P. argulus*, but this identification is firmer for females than males, because of the distinctiveness of the number of pores in females.

A more detailed, comparative study of these two species is still necessary, as well as a better geographical definition of the distribution of each species. All material from Brazil available in the collections I had access to was studied, but not all material from outside Brazil. Such a study goes beyond the scope of the present paper, and I do not pursue the matter further here.

Prionodactylus eigenmanni Griffin, 1917
(figs. 164, 165, 296)

Prionodactylus eigenmanni Griffin, 1917a: 316 (holotype CM 981, type-locality: Provincia de Sara, Beni, Bolivia, alt. 400 m); Griffin, 1917b: 428; Peters & Donoso-Barros, 1970: 235; Uzzell, 1973: 32; Vanzolini, 1986a: 14; Nascimento et al., 1988: 40.

Material.— **Brazil.** RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 1 ♂, CEPB 0327, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr. Ecological reserve of Rio Jamari, former Vila Santo Antônio, c. 70 km SE of Porto Velho: 3 ♂♂, 5 ♀♀, MPEG 14832, 14834, 14836-838, 14841-842, 14848, 10-13.ii.1988, leg. E. Martins. Road BR-364, km 120 (between Porto Velho and Ariquemes), Mineração Santa Bárbara, 10 km W of main office (09°10'S 63°07'W): 1 ♀, 1 ♂, MPEG 12969-970, 29.v.1982, leg. L.O.A. Teixeira & J.L. Santos. Ouro Preto d'Oeste, km 16, line 62, right bank of igarapé Paraíso: 2 ♀♀, MPEG 13918-919, 12.xi.1984, leg. F.P. Nascimento & R. Bittencourt N.; 1 ♂, MPEG 14058, 17.iii.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes. Ouro Preto d'Oeste, line 212, left bank igarapé Santa Helena: 1 ♀, MPEG 14064, 19.iii.1985; 2 ♂♂, MPEG 14068-069, 20.iii.1985; 2 ♀♀, MPEG 14074-075, 21.iii.1985; all leg. T.C.S. Avila Pires & R.J.R. Moraes; 1 ♂, MPEG 14079, 21.iii.1985, leg. R. Bittencourt N. Ouro Preto d'Oeste, INPA Ecological Reserve: 1 ♀, MPEG 14501, 22.viii.1986; 1 ♀, MPEG 14503, 23.viii.1986; 1 ♀, MPEG 14509, 27.viii.1986; all leg. T.C.S. Avila Pires & R.J.R. Moraes. Ji-Paraná: 1 ♂, MPEG 13872, 12.viii.1984, leg. R. Bittencourt N.
Bolivia. SANTA CRUZ. Buenavista: 1 ♂, BM 1927.8.1.152, purch. J. Steinbach. Prov. Ñuflo de Chávez, Perseverancia, Rio Negro, alt. 257 m (14°18'S 63°10'W): 1 ♀, RMNH 25691, 07-18.ix.1990, leg. M.S. Hoogmoed.

Diagnosis.— Frontonasal single. Loreal in contact with supralabials. Scales around midbody 26-32, transverse rows of dorsals 31-36. Males with 6-7 femoral pores, absent in females. Subdigital lamellae with single and double tubercles, 12-15 under fourth toe. Sides of head brown, with white vertical bars across labials.

Description.— Gymnophthalmid with maximum SVL in males of 44 mm (MPEG

14068), in females of 47 mm (MPEG 14848). Head 0.24-0.28 (n= 26) times SVL, relatively longer in juveniles, 1.5-1.7 (1.62 ± 0.07, n= 25) times as long as wide, 1.1-1.6 (1.33 ± 0.11, n= 24) times as wide as high. Snout blunt, sloping gently toward top of head. Neck slightly narrower than head and body. Body cylindrical to slightly depressed. Limbs well developed, forelimbs 0.33-0.39 (0.34 ± 0.01, n= 25) times SVL, hind limbs 0.43-0.51 (0.47 ± 0.02, n= 25) times. Tail round in cross section, tapering toward tip, 1.14-1.35 (n= 14) times SVL (mostly around 1.3 times SVL, 1.1-1.2 times SVL in some of the smallest specimens).

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid and tricuspid.

Rostral hexagonal, about three times as wide as long, visible from above. Frontonasal single, pentagonal, laterally in contact with nasal, in some specimens touching loreal (RMNH 25691). Prefrontals quadrilateral or pentagonal, with a moderately long medial suture, laterally in contact with loreal, first supraciliary, and mostly also with nasal and first supraocular. Frontal hexagonal (octagonal in RMNH 25691, where sutures with first and second supraoculars are not straight but form a wide angle), distinctly longer than wide and widest anteriorly; laterally in contact with first and second supraoculars, in MPEG 14074 also touching first supraciliary. Frontoparietals pentagonal, longer than wide, with a long medial suture; laterally in contact with second and third supraoculars (in MPEG 13918 the two frontoparietals are irregularly divided, one frontoparietal forming a small, extra scale anteriorly, and the other frontoparietal a larger, extra scale posteriorly). Interparietal heptagonal, in some specimens borders with occipitals more rounded; longer than wide, lateral borders from parallel to slightly divergent posteriorly. One parietal on each side of interparietal, irregularly polygonal, shorter and wider than interparietal. Three occipitals, median one pentagonal, behind interparietal; lateral ones irregularly polygonal, each bordering interparietal and one parietal. Three supraoculars, first largest. Four, exceptionally five, supraciliaries, first expanded dorsally. Nasal undivided, nostril just anterior to its middle, directed latero-posteriorly. Loreal and frenocular relatively large, both in contact with supralabials. One or two preoculars (separated from supralabials by frenocular), followed by three (mostly) or four suboculars, posterior one highest. Two to four, mostly three, postoculars, upper one in contact with third supraocular and parietal; lower postocular may form a short suture with supralabials. Lower eyelid with undivided semitransparent disc. Supralabials and postsupralabials form a continuous series of seven (mostly) or eight scales, fourth, or rarely fifth, below centre of eye. Temporal scales irregularly polygonal, smooth, juxtaposed; relatively small in lower temporal area, much larger in upper part. Ear-opening moderately large, vertically oval, anterior margin finely lobed, posterior margin smooth. Tympanum recessed within a relatively short external auditory meatus.

Mental approximately semicircular. Postmental undivided, heptagonal. Four pairs of chinshields, all in contact with infralabials; medially, first and second pairs in contact, third pair separated either by a pair of moderately enlarged scales, or by two or more smaller scales. Fourth pair of chinshields separated by a pair of scales larger than themselves, plus one or more small scales medially. Relatively small scales border chin posteriorly; among these, a pair of moderately enlarged scales may be present posterior to the large pair of scales medial to fourth chinshields. Five infralabials,

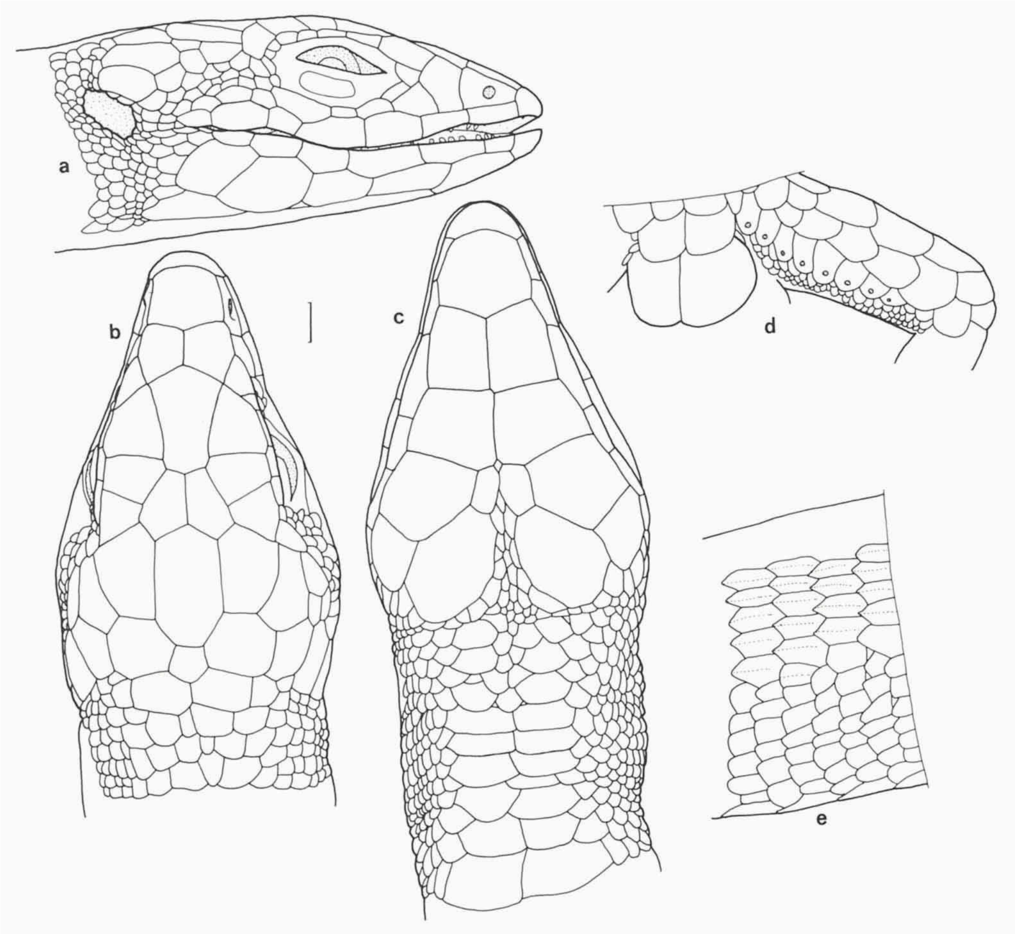


Fig. 164. *Prionodactylus eigenmanni*, MPEG 14068; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: preanal plate and right thigh, showing femoral pores; e: dorsolateral view of body, between fore- and hind limbs, showing part of dorsals, scales on flanks, and lateralmost ventrals.

fourth below centre of eye; followed by one to three, mostly two, postinfralabials. All head scales smooth, juxtaposed.

Nape with a row of four roughly squared, smooth scales bordering occipitals, followed by smaller, imbricate scales, anteriorly squarish, smooth, posteriad grading into dorsals. Scales on sides of neck relatively small, roundish to squarish, smooth, subimbricate. Gular region with 9-11 transversely enlarged pairs of smooth, imbricate scales, of which those of first to fourth anterior pairs may be separated by smaller scales; toward the sides scales smaller, roundish. Collar distinct, with median pair of scales larger than in other rows of gulars. Gular fold distinct.

Dorsals elongate-hexagonal, keeled, imbricate, in 31-36 (33.7 ± 1.2, n= 26) transverse rows, and 10-13 scales in a transverse row at midbody. Scales on flanks smaller, rounded or squarish, imbricate, in approximately transverse rows; all smooth, or upper ones weakly keeled. Most transverse rows of dorsals correspond to two rows of laterals, some to one and a bit. Ventrals smooth, shortly imbricate, in six longitudinal and 16-19 (17.4 ± 0.8, n= 26) transverse rows. Ventrals in median four rows squared, from as wide as long to slightly wider than long; those in lateral rows usually narrower, with lateral and posterior borders rounded. Scales around midbody 26-32 (29.5 ± 1.5, n= 24). Dorsals, scales on flanks, and ventrals relatively well delimited from each other. Preanal plate with two large scales, bordered anteriorly by two much smaller scales. Preanal pores absent. Femoral pores 6-7 per side in males, absent in females. Each pore enclosed in a single scale.

Scales on dorsal and lateral surfaces of tail, proximally elongate-hexagonal, keeled; distally they become smooth, posterior margin rounded. Scales on ventral surface of tail squared, smooth, in longitudinal rows. All scales imbricate, forming continuous transverse rows around tail.

Scales on forelimbs mostly imbricate, smooth, posterior margin ellipsoid, or squarish, variable in size; distinctly smaller, roundish, slightly convex on ventral aspect of upper arms, and on part of anterior aspect of forearms. Hind limbs with a row of large, trapezoidal, smooth, imbricate scales along anterior aspect of thighs, and along ventral aspect of lower legs; both bordered by relatively large, smooth, imbricate, posteriorly ellipsoid scales. Dorso-posterior and posterior aspects of thighs with granular scales. Dorsal aspect of lower legs with relatively small, subrhomboid, smooth scales, which touch, at both sides, the larger, posteriorly ellipsoid scales. Subdigital lamellae with alternating single and double tubercles under each finger or toe, except distally where lamellae are single, not tuberculate; 9-11 (9.9 ± 0.5, n= 50, 26 specimens) under fourth finger, 12-15 (13.5 ± 1.0, n= 52, 26 specimens) under fourth toe.

Colour in life of RMNH 25691 (♀) hair-brown (119A) on back, with cream (54) spots on neck; chin white, belly cream (54), underside of tail salmon (106); tip of tongue black, base white (field notes M.S. Hoogmoed). Individuals from Rondônia brown dorsally with a lateral white stripe, venter usually white or cream; tongue white on its base (which does not appear when the animal protracts its tongue), black medially, tip white. MPEG 14068, the largest male seen (44 mm SVL), was pale orange ventrolaterally, which suggests that adult males may acquire an orange belly as occurs with other gymnophthalmids.

In preservative, specimens from Rondônia with dorsal and lateral surfaces of head greyish-brown, along back grading into light brown, variegated with greyish-brown; dark brown spots may form two distinct paravertebral series. A pale light dorsolateral brown stripe from nape to base of tail. Flanks dark greyish-brown, with a white stripe from posterior corner of mouth, through lower part of ear-opening and above forelimb, to base of hind limb. Anteriorly, up to forelimb, the stripe is not straight but irregularly undulated, and may be a few times interrupted (thus forming a series of elongate spots). Alternating, white and brown vertical bars across labials form a kind of complement to the stripe. Limbs dorsally and laterally light brown, variegated with greyish-brown; small, light dots may be present. Pattern on tail similar to that on body; the dorsolateral light stripes continue for a variable extension, in some specimens changing into series of light dots. Ventral region cream, spotless.

In specimens from Bolivia the white lateral stripe is absent. Instead, anteriorly, up to forelimb, there are elongate white spots, similar to those that may occur in

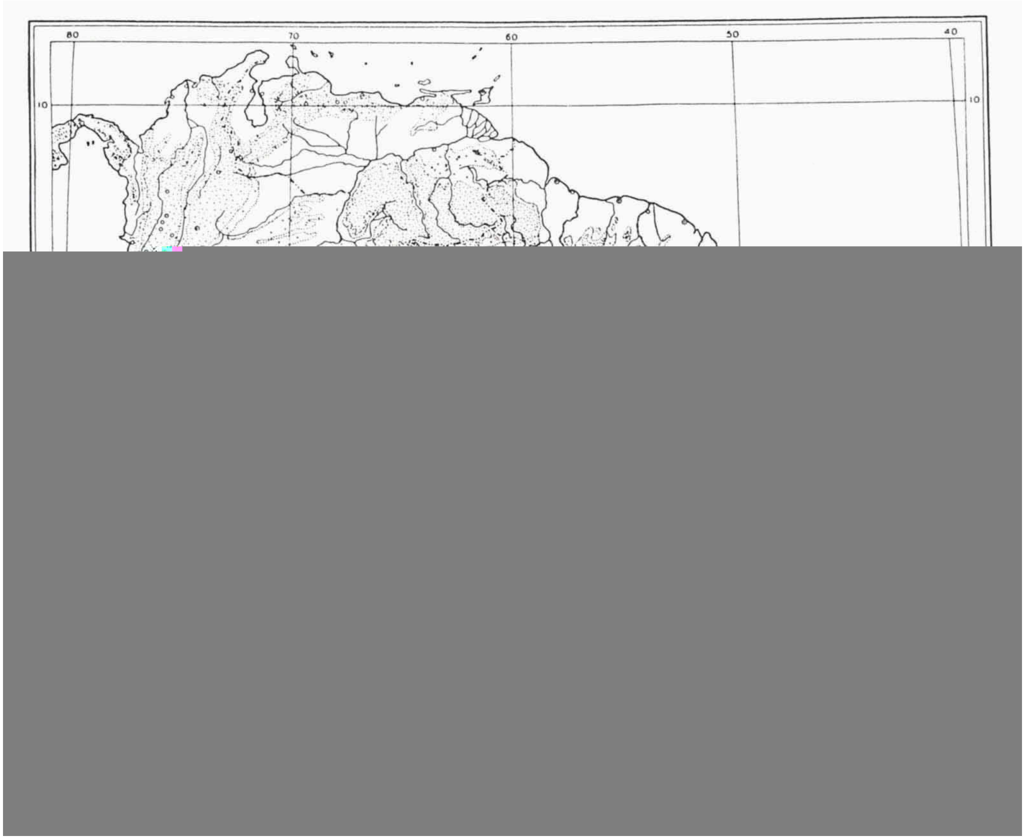


Fig. 165. Distribution of *Prionodactylus eigenmanni*. Closed symbols = material studied. Open symbols = data from literature (Uzzell, 1973; Vanzolini, 1986a; Duellman, 1987; Rodriguez & Cadle, 1990).

specimens from Rondônia; along flanks there are small white dots, at least anterior ones surrounded by dark brown, resembling small ocelli. Back in RMNH 25691 almost uniformly dark brown, in BM 1927.8.1.152 variegated, as described above. Ventral region in RMNH 25691 (a recently collected specimen) mostly white, under tail reddish; a reddish hue is also present on upper side of tail.

Habitat.— An inhabitant of the forest floor. All individuals captured in Rondônia that are now deposited in MPEG were in terra firme forest, some close to palms, MPEG 14058 about 5 m distant from an igarapé. RMNH 25691 was high on a river bank, amidst leaflitter at base of tree. MPEG 14074-075 were at the border of a road through forested area. Duellman (1987) reported one individual (out of six) in a camp clearing; the remaining ones were amidst the leaflitter in the forest.

Notes on natural history.— A diurnal lizard (collected between 09:30 and 15:30 h), from the shade of the forest.

Nascimento et al. (1988) reported the behaviour of some specimens while wandering on the forest floor. From time to time they make short stops, moving one of the forelimbs in circles, above the ground, similar to what occurs in *Cnemidophorus*; moreover, while walking they frequently protract their long, bifid tongue, that is black with white tip.

MPEG 14068 was eating something on the ground when first seen. When disturbed it fled to a palm nearby and disappeared. It was found a short while later at the base of a tree close to the palm.

Nascimento et al. (1988) recorded the species as the commonest gymnophthalmid in the forests of Rondônia, in agreement with data by Vanzolini (1986a). Duellman & Salas (1991) classified the species as uncommon in Cuzco Amazonico, Peru.

Distribution (fig. 165).— Brazil, in state of Rondônia (Vanzolini, 1986a; Nascimento et al., 1988); Cocha Cashu (Rodriguez & Cadle, 1990) and Cuzco Amazonico (Duellman, 1987; Duellman & Salas, 1991), in Peru; and Bolivia (Griffin, 1917a; Uzzell, 1973).

Prionodactylus oshaughnessyi Boulenger, 1885
(figs. 159-163, 166, 297)

Prionodactylus oshaughnessyi Boulenger, 1885b: 392 (syntypes BM 1946.8.31.18-20 and BM 80.12.8.17, type-locality: Pallatanga [probably in error] and Canelos, Ecuador).
Euspondylus oshaughnessyi; Cunha, 1961: 146.
Prionodactylus argulus; Uzzell, 1970: 235 (part), 1973: 33 (part); Hoogmoed, 1973: 347 (part); Hoogmoed & Avila-Pires, 1989: 168.

Material.— **Brazil.** AMAPA. River Lunier: 1 ♀, MHNP 1899.73, leg. Geay. Serra do Navio: 1 ♂, MPEG 15149, 19.xi.1988; 2 ♀♀, MPEG 15186-187, 1 ♀, 1 juv., RMNH 26562-563, 20.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
AMAZONAS. Igarapé Belém, near Rio Solimões, c. 70 km E of Leticia: 5 ♂♂, 5 ♀♀, AMNH 115003-012, 18-28.v.1970, leg. B. Malkin. Rio Solimões, Tabatinga: 1 ♂, MPEG 15878, 04.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões, Benjamin Constant: 1 ♀, MPEG 15887, 1 ex., RMNH 26564, 07.xii.1989; 1 ♀, MPEG 15917, 1 ♂, RMNH 26565, 10.xii.1989; 2 juv., MPEG 15944-945, 1 ex., RMNH 26566, 12.xii.1989; 1 ♀, MPEG 15951, 1 juv., RMNH 26567, 13.xii.1989; 1 ♂, MPEG 15998, 19.xii.1989; all W of city, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, 1 juv., MPEG 15964-965, 3 ♂♂, 1 juv., RMNH 26568-571, 14.xii.1989; 1 ♀, MPEG 15977, 16.xii.1989; 1 ♂, MPEG 15990, 1 ♂, 1 juv., RMNH 26572-573, 18.xii.1989; all W of city, leg. local children through M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, 1 juv., MPEG 15892-893, 1 ♀, 1 juv., RMNH 26574-575, 08.xii.1989, Santo Antônio, E of Benjamin Constant, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♂, 2 ♀♀, RMNH 24043-045, 14.xi.1985, leg. M.S. Hoogmoed; 1 ♀, 1 juv., MNRJ 2140-41.
Colombia. PUTUMAYO. Villa Garzon, 8 mi S Mocoa: 1 ♀, BM 1978.2453, 12.viii.1978, leg. M. Copper. Rio San Miguel, Quebrada El Sonejo: 1 juv., GNM 3639, 17.i.1954, leg. R. Blomberg.
Ecuador. NAPO. San Jose, Viejo de Sumaco: 1 ♂, USNM 196209 (GOV 6853), leg. J. Olalla. Santa Cecilia: 2 ♂♂, 1 ♀, ZFMK 44410-412, leg. M.L. Crump. Taracoa, between R. Taracoa and R. Indillana: 1 ♂, RMNH 24049, 04.i.1983, leg. J. Schoorl. Rio Aguarico, Puerto Libre, 570 m: 2 ♀♀, KU 119426, 119428. Lago Agrio, 330 m: 2 ♂♂, KU 126833, 126849. Coca: 1 ♂, 1 ♀, MHNG 2355.97-98, x.1983, leg. G. Onore. San Pablo Kantesiya: 2 ♀♀, MHNG 2355.99-100, 07.xi.1986; 1 ♂, MHNG 2356.1, 03.iii.1985; all leg. J.M. Touzet. PASTAZA. Canelos: syntypes, 1 ♂, 2 ♀♀, BM 1946.8.31.18-20, leg. Buckley; 1 ♂, KU 119432, 6 km W of, 700 m. Sarayacu, 400 m: 1 ♂, BM 1956.1.15.91. Vicinity El Triunfo, km 27 from Puyo: 1 ♂, RMNH 24046, 23.x.1987, leg. M.S. Hoogmoed, L. Coloma & F. Campos. Fatima, Centro de Experimentacion y Capacitacion Campesino-Indigena/CECCI, 9 km N of Puyo, 1050 m: 1 ♂, 1 ♀, RMNH 24047-048, v-ix.1987, leg. Medardo Tapia. Vera Cruz, c. 10 km E of Puyo, 3300 feet: 1 ♂, 1 juv., USNM 193950-951, 28.vii.1962, leg. P. Spoecker, R. Mullen, M. Olalla & J. Spillet. Puyo, 2.5 km SE, 3200 feet: 1 ♀, USNM 193948, 08.vii.1954, leg. J.A. Peters. Pastaza River, general region of Mera: 1 ♀, USNM 193952, leg. J.A. Peters. Mera, 1140 m: 1 ♂, RMNH 24042, i.1983, leg. R. Rageot; 1 ♂, 1 ♀, KU 119430-431. Rio Conambo: 1 ♀, USNM 193953, leg. P. Mena. MORONA-SANTIAGO. Chiguaza: 1 ♂, 2 ♀♀, USNM 196196-197, 196199, leg. G. Orces-V. Rio Cuangos, Los Tayos, 3°06'S 78°12'W: 1 ♀, BM

1976.1854, 17.vii.1976, leg. J.K. Campbell. Macas: 1 ♂, ZFMK 30380, leg. Feyer. CHIMBORAZO. ?Pallatanga: syntype, ♀, BM 80.12.8.17, leg. Buckley.
French Guiana. Crique Grégoire: 1 ♀, MHNP 1975.2436, leg. J.P. Gasc.
Peru. LORETO. Peru-Brazil frontier, Utoquinia: 2 ♂♂, 1 ♀, AMNH 56281-283. Rio Ampiyacu, Estiron: 1 ♀, MPEG 2252, v.1966, leg. B. Malkin. Colonia, village of indians Bora, right bank R. Zumun, left affluent R. Yahuasyacu: 8 ♂♂, 2 ♀, MHNP 1978.2097-2105, 1978.2108; 1 ♀, MHNP 1978.2122, v.1978; all leg. M.T. Rodrigues; 1 ♀, MHNP 1978.2121, 27.v.1978, leg. J. Lescure & Razon. Rio Yuvineto, right affluent R. Putumayo: 1 ♂, 4 ♀♀, MHNP 1978.2427-2431, leg. M.T. Rodrigues & J.P. Gasc. AMAZONAS. Rio Yutupis, Vicinity Shiringa: 1 ♂, USNM 334925, 28.i.1980, 1 ♀, USNM 334926, 02.ii.1980, both leg. R.W. McDiarmid. Rio Santiago, Vicinity Galilea: 1 ♂, USNM 334924, 04.ii.1980, leg. R.W. McDiarmid. Rio Cenepa: 1 ♂, USNM 316894, vicinity Aintami; 1 ♂, USNM 316895, vicinity Huampami; 1 ♀, USNM 316896, c. 0.5 mi W Huampami; 1 ♂, USNM 316897, vicinity Chiqkan Entsa; 1 ♂, USNM 316898, vicinity Paagat on lower upper Cenepa; 1 ♂, USNM 334919, vicinity Huampami, alt. 210m, 31.vii.1977; 1 ♂, USNM 334920, Yusa Pataqkamu, across Rio Cenepa from Huampami, 04.ix.1977; all leg. R.W. McDiarmid. Rio Caterpiza, vicinity Caterpiza, alt. 200m: 2 ♀♀, USNM 334922-923, 07-09.ii.1980, leg. R.W. McDiarmid.

Diagnosis.— Frontonasal divided. Loreal in contact with supralabials. Scales around midbody 31-45. Males with 17-28 pores in total, females with 8-15 or none; one pore in preanal position, separated from its opposite number by two ventrals in a transverse row. Subdigital lamellae not or only slightly tuberculate, 16-22 under fourth toe. A sharp delimitation on sides of head, on temporal region usually half to one scale above supralabials, between a brown dorsal surface and a white ventral surface; lower flanks with a white stripe delimited ventrally by a dark narrow band.

Description.— Gymnophthalmid with maximum SVL, among material studied, of 51 mm in males (MPEG 15149) and females (RMNH 26562). Head 0.23-0.31 (n= 109) times SVL, proportionally slightly shorter in larger specimens, 1.5-2.0 (1.72 ± 0.10, n= 107) times as long as wide, 1.1-1.4 (1.26 ± 0.07, n= 107) times as wide as high. Snout pointed, widening sharply posteriorly. Neck slightly narrower than head and body. Body cylindrical to slightly depressed. Limbs well developed, forelimb 0.29-0.38 (0.33 ± 0.02, n= 98) times SVL, hind limb 0.41-0.54 (0.47 ± 0.03, n= 94) times. Tail cylindrical, 2.0-2.3 (2.15 ± 0.09, n= 21) times SVL in specimens larger than 32 mm SVL, in smaller specimens as short as 1.5 times SVL.

Tongue lanceolate, covered with small, imbricate, scale-like papillae, except for the bifid tip, which is smooth. Anterior teeth conical, posterior teeth mostly tricuspid

Subocular series formed by one or two small preoculars, three or four suboculars, posterior one largest, and three or four postoculars, uppermost largest. Lower eyelid with semitransparent disc of 1-3, mostly two, palpebrals. Seven or eight supralabials and postsupralabials in total, fourth supralabial below centre of eye. Lower part of temporal region with relatively small scales, upper part with large scales. Ear-opening oval, surrounded by small scales or those on supero-anterior border transversely elongate, forming a smooth margin. Tympanum recessed, leaving a short auditory meatus.

Mental crescent-shaped or semicircular. Postmental large, pentagonal or heptagonal. Four pairs of chinshields, first two in medial contact, third separated at least by two moderately large scales, in some specimens with smaller scales between them. Fourth 'pair' consisting of two large scales at each side, outer ones rather than inner ones in line with anterior three pairs of chinshields, frequently inner ones reduced or in such a position that they resemble pregulars; occasionally both outer and inner scales are equivalent. Lateral scales of fourth 'pair' in contact with infralabials or not, inner ones separated medially by two to four scales. Several pregulars of variable size; occasionally an enlarged scale posterior of inner fourth chinshield may be considered a reduced fifth chinshield. Four or five infralabials, followed by two or three narrower postinfralabials; when four infralabials, third and fourth longest, suture between them below centre of eye, when five infralabials, fourth shorter than third and fifth and under the eye. A complete or interrupted row of small scales between pregulars and gulars. All scales on head juxtaposed, smooth.

Nape with two or four enlarged scales in a transverse row, followed by subimbricate to imbricate transverse series of quadrangular or slightly wider than long, not or only slightly keeled scales, which posteriad grade into dorsals. Scales on sides of neck small, rounded, juxtaposed to subimbricate, in transverse rows. Gulars in 8-11 transverse rows of imbricate to subimbricate, smooth scales, of which one to six rows (occasionally none) have a pair of enlarged median scales. Collar usually with three enlarged scales medially, occasionally two; toward the sides scales decrease gradually in size.

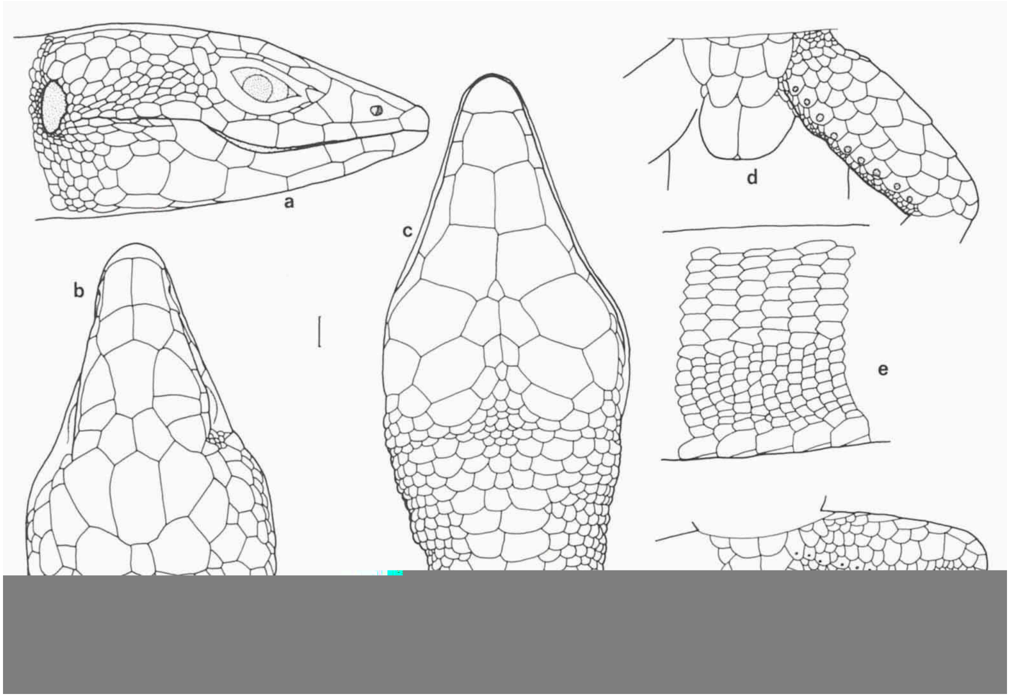


Fig. 166. *Prionodactylus oshaughnessyi*, a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: preanal plate and left thigh, with femoral pores; e: dorsolateral view of body halfway between fore- and hind limbs, showing part of dorsals, scales on flanks, and lateralmost ventrals; all in MPEG 15149 (♂); f: preanal plate and left thigh, with femoral pores, in MPEG 15887 (♀).

Scales on tail similar to dorsals, distally smooth, on underside of tail similar to ventrals but becoming gradually narrower.

Scales on upper and posterior aspects of upper arms, on most of forearms, on anterior and ventral aspects of thighs, on ventral and part of anterior and posterior aspects of lower legs large, smooth, imbricate. On remaining areas of limbs scales small, smooth and subimbricate. Subdigital lamellae not or only slightly tuberculate, in double row except for a few distal lamellae which are single; 12-18 (15.3 ± 0.9, n= 197, 101 specimens) under fourth finger, 16-21 (19.0 ± 1.3, n= 193, 100 specimens) under fourth toe.

Colour in life of MPEG 15149 (♂, Amapá), vandyke-brown (121) on dorsal surface of head, sepia (219) dorsolaterally; back dark drab (119B) with sepia (219) dorsal stripes, and a cream (54) dorsolateral stripe at each side; flanks with a crimson (108) dorsal band peppered with black and bordered on both sides by a black stripe on neck, turning to sepia (219) on body; ventrally, a cream (54) area bordered below by a sepia (219) stripe which starts on posterior infralabials. Ventral region light cream with small central dark spots on belly; ventrolateral scales on posterior half of belly, some posterior median scales, pore scales, preanals and subcaudals spinel-red (108B). Tail dorsally cinnamon-brown (33). Iris gold with black spots and an orange rim around pupil, tongue white with black anterior extremity. RMNH 26562 (♀, Amapá) with head dorsally raw-umber (223), back mars-brown (223A) with raw-umber stripes and a dorsolateral beige (219D) stripe; sides of head and flanks Prout's brown (121A), with a chamois (123D) lateral stripe and a very small spot above arm insertion of same colour. Head ventrally and gulars pearl-white, belly the same with a greenish hue. Dorsal pattern of tail and limbs similar to that of body, ventral surface of limbs cream, on tail with a chrome-orange (16) hue, paler at base. Iris greyish-brown. Tongue white with black anterior extremity.

From western Amazonas, RMNH 26565 (♂) was sepia (219) on head and anterior part of back, Prout's brown (121A) posteriorly; flanks crimson (108) with white, black-bordered ocelli, and white to yellow-ochre (123C) stripe. Ventral surface of head and chest pearl-white, belly pale sulphur-yellow (157), underside of tail pale flesh-ochre (132D), darkening distally. Forelimbs sepia (219), hind limbs Prout's well developed eggs in the abdomen. Several juveniles, smallest with 20 mm SVL (MPEG 15893), were also captured in the same locality, during November and December. In Amapá, three juveniles, SVL 22-26 mm, were collected in November.

Distribution (fig. 159).— Known from western Amazonia, in Colombia, Ecuador, Peru, and western part of Amazonas state, in Brazil, and from eastern Guianas, in French Guiana and Amapá state in Brazil.

Remarks.— See remarks under *P. argulus*.

The lack of pores in females from Amapá (condition unknown in French Guiana) and the presently known distribution of the species, which forms two separate groups (Guianas and western Amazonia) suggest that they may actually form two isolated taxa.

Ptychoglossus Boulenger, 1890

Diagnosis.— Gymnophthalmids with body slightly depressed, tail round in cross section. Limbs well developed, pentadactyl, all digits clawed. Nasals separated by frontonasal. Lower eyelid with semitransparent disc. Prefrontals present or absent, frontoparietals and occipitals present. Interparietal and parietals of approximately similar length, forming a straight posterior margin. No distinctly enlarged median anterior part of body. Body slightly depressed. Limbs well developed, forelimbs 0.20-0.22 times SVL, hind limbs 0.35-0.38 times. Tail round in cross section, tapering toward tip, incomplete in the specimens studied, 1.6 times SVL in a specimen reported by Duellman (1978).

Tongue with oblique plicae, tip bifid, smooth. Anterior teeth conical, posterior teeth bicuspid or tricuspid.

Rostral band-like, visible from above. A large, pentagonal frontonasal, laterally in contact with nasal and forming a short suture with loreal. A pair of triangular or quadrangular prefrontals, each wider than long, forming a short medial suture or just separated medially; laterally in contact with loreal, first supraocular, and in touch with second supraocular. Frontal hexagonal, about as wide as long, in contact with second supraocular, and it may touch the third. A pair of relatively large, pentagonal, frontoparietals, which form a long medial suture and laterally are in contact with third and fourth supraoculars. Interparietal approximately pentagonal, lateral margins parallel or slightly narrowing posteriad. Parietals wider than, and as long as interparietal, irregularly hexagonal. Interparietal and parietals form a straight or slightly undulating posterior suture with four or five occipitals. Four supraoculars, first smallest. Four or five supraciliaries, first widest and longest. Nasal divided. Loreal roughly rectangular, higher than long, in contact with nasal, frontonasal, prefrontals, first supraocular, first supraciliary, frenocular, and second supralabial. A small, squared frenocular. Three or four suboculars, second longest; posterior subocular may just touch a supralabial. One large postocular, either single or a smaller, lower one also present. Lower eyelid with a semitransparent disc of 2-3 palpebrals. Supralabials and postsupralabials form a continuous series of seven scales, second and fifth highest, third longest, suture between third and fourth below middle of eye. Relatively few and large temporals, irregularly polygonal, posterior ones largest. Ear-opening surrounded by small scales, with indented anterior margin, posterior margin smooth. Tympanum recessed into an auditory meatus.

Mental trapezoid, anterior border rounded. Postmental large, heptagonal, about as wide as long. Three pairs of chinshields, first and second pairs in contact medially and with infralabials, third pair separated both medially and from infralabials. They are followed by a row of scales similar to anterior gulars, from which these scales are partially separated by small scales. Five infralabials, followed by a smaller postinfralabial; suture between third and fourth infralabials below middle of eye. All head scales juxtaposed, smooth.

Scales on nape smooth, imbricate, in transverse rows. Anterior scales squarish, posteriad they gradually become longer than wide with convex posterior margins. In the first row two median scales about twice as wide as long may be present. Scales on neck more roundish and smaller than those on nape. Gulars in six transverse rows of smooth scales, posterior ones slightly larger. Collar formed by 7-9 scales.

Dorsals form transverse rows of elongate, imbricate scales, with truncate (hidden) anterior, and angulate posterior margins (causing an hexagonal impression), and with a median, low keel; in 31-33 transverse rows from occipitals to posterior margin of hind limbs. Scales on flanks gradually become (toward ventral side) rectangular and smooth. Ventrals smooth, slightly imbricate, mostly squarish, in eight longitudinal, and 18-19 transverse rows; scales on outer longitudinal row, at each

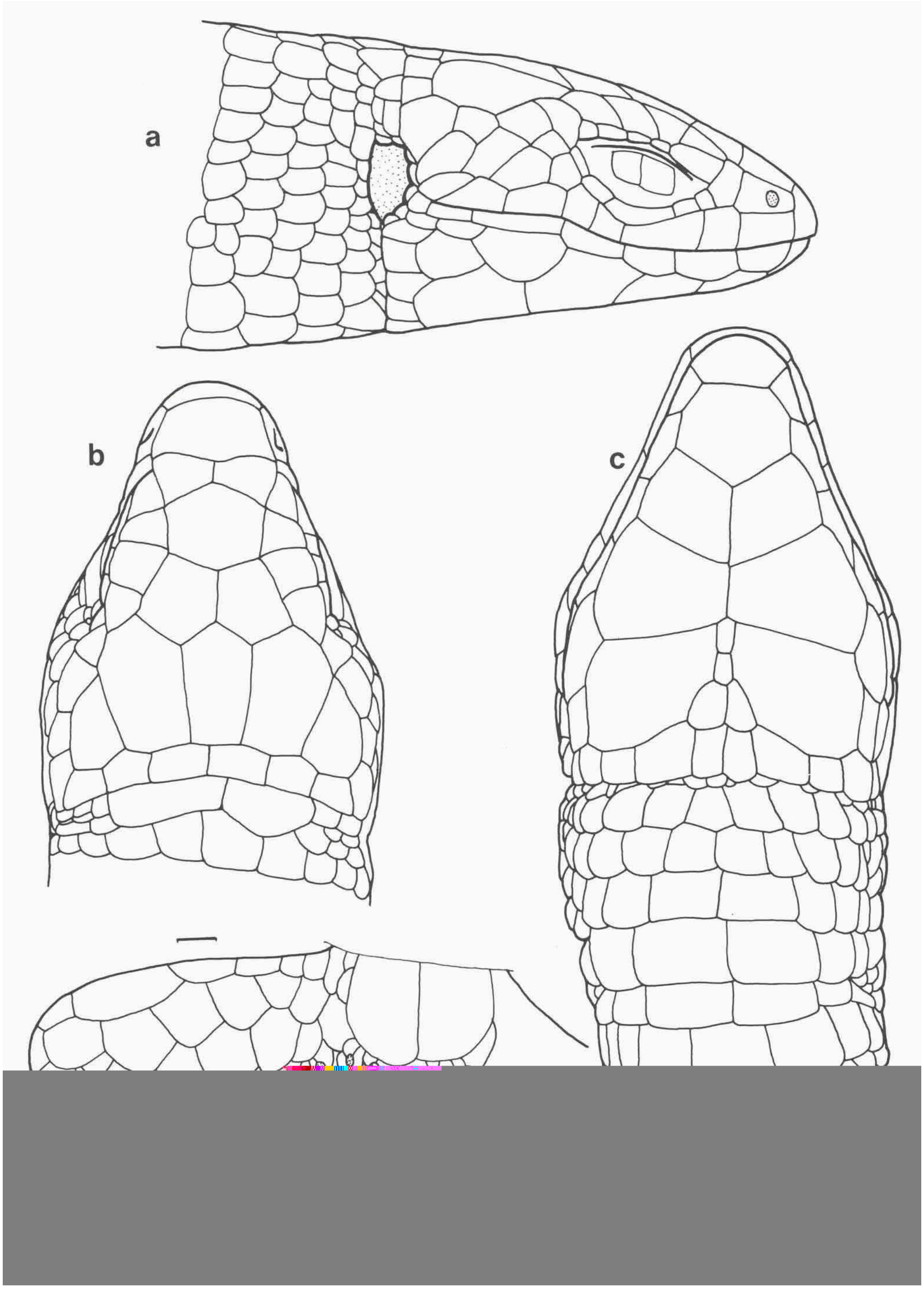


Fig. 167. *Ptychoglossus brevifrontalis*, RMNH 26390; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: preanal plate and ventral aspect of right thigh showing pores.

side, much narrower than those on other rows. A row of smaller scales between ventrals and scales on flanks. Scales around midbody 30-34 (28-38 when data by Dixon & Soini, 1975, 1986, and Harris, 1994, are considered). Preanal plate with four elongate scales. Two or three preanal pores and 10-13 femoral pores at each side (males and females).

Scales on tail in transverse rows all around tail, imbricate, rectangular, those on ventral surface widest. Scales on dorsal surface keeled (at least on proximal part, distally they may be smooth), on ventral surface smooth.

Scales on forelimbs mostly rhomboid or irregularly polygonal, smooth, imbricate, largest on anterior aspect; on ventral aspect of upper arms scales tending to granular. Hind limbs with granular scales on dorsal and posterior aspects of thighs, and dorsal aspect of lower legs; otherwise scales large, polygonal, smooth, imbricate, largest on anterior aspect of thighs. Most subdigital lamellae with a median keel; 10-12 lamellae under fourth finger, 14-17 under fourth toe.

Colour in life of RMNH 26390 (field notes of M.S. Hoogmoed): Dorsal surface of head and back brown. A pale, light brown dorsolateral stripe on head and body. Scales on flanks black, in part with cream colour spots which become larger toward belly, and more orange posteriad. Tail with a dorsolateral row of orange spots and a lateral row of white spots. Scales on lower part of neck yellowish-cream. Chin, gulars, belly, underside of limbs and of tail vivid orange. Only tip of tail on the underside black. Iris dark brown. Tongue dark grey.

In preservative, RMNH 26390 with a predominantly light brown snout, dark brown top of head. Nape brown with dark brown spots which posteriad become more sparse and mostly disappear on posterior half of back. A faint light dorsolateral stripe from posterior corner of eye to anterior part of body. Sides of head, upper part of neck and of flanks dark brown. Lower part of neck mostly covered by cream spots. Lower part of flanks predominantly light brown, with a longitudinal row of cream and dark brown spots, and a ventrolateral row of dark brown spots. Ventral surface cream, bordered ventrolaterally (on head, neck and body) by dark brown spots. Tail dorsally brown, sides dark brown, lower part with a row of relatively large, cream spots (at least anteriorly); ventral surface cream.

Habitat.— Usually found amidst leaf litter, in forest (Dixon & Soini, 1975, 1986; Duellman, 1978; Lescure & Gasc, 1986; Duellman & Salas, 1991). Dixon & Soini (1975, 1986) remarked that the species was apparently restricted to the slopes of sandy hills in deep leaf litter. RMNH 26390 was under a rotten tree trunk at border of pasture and a trail.

Notes on natural history.— *P. brevifrontalis* seems to be an uncommon species wherever it occurs. Two oviducal eggs were reported by Dixon & Soini (1975, 1986) and Duellman (1978). Dixon & Soini (1975, 1986) reported a specimen found in the stomach of the snake *Echinantera brevirostris* (Peters).

Distribution (fig. 168).— The species is known from the Suriname/Brazil border (Acarai Mountains) (Hoogmoed, 1973), Colombia, Ecuador, Peru, Bolivia, and the state of Rondônia, in Brazil (record for Brazil by Vanzolini, 1986a).

Remarks.— The locality 'New River, 750 feet', reported by Hoogmoed (1973: 352) actually refers to Kutari Head, as explained by him (1973: 8, 13/14), a locality on the headwaters of the Sipaliwini river, in Acarai Mountains, border between Suriname and Brazil.

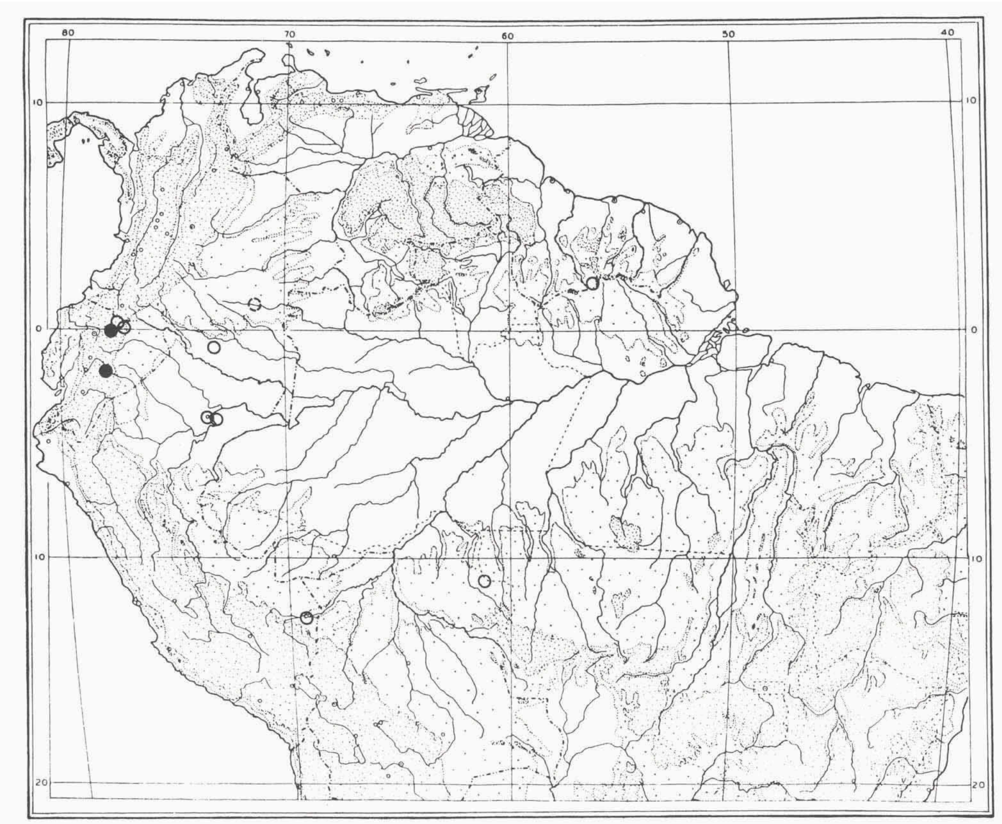


Fig. 168. Distribution of *Ptychoglossus brevifrontalis*. Closed circles = material studied. Open circles = data from literature (Hoogmoed, 1973; Dixon & Soini, 1975; Duellman, 1978; Lescure & Gasc, 1986; Vanzolini, 1986a; Duellman & Salas, 1991). Dashed circle = Vaupés state, Colombia (Ayala, 1986).

P. brevifrontalis shows a superficial resemblance to *Arthrosaura reticulata*, but on closer inspection *P. brevifrontalis* can easily be distinguished by a more elongate body, with relatively shorter limbs; by having four (versus three) supraoculars; three (versus four) pairs of chinshields; gulars in distinct transverse rows with straight posterior margins, scales in a transverse row gradually increasing toward the midventral line (transverse rows less evident, with more rounded posterior margins and a distinctly enlarged median pair in *A. reticulata*); wider and less pointed dorsals (hexagonal versus hexagonal-lanceolate); and ventrals wider, aproximately squarish (versus rectangular, longer than wide).

Tretioscincus Cope, 1862

Diagnosis.— Gymnophthalmids with cylindrical body, tail long, round in cross section. Limbs well developed, but inner finger reduced, clawless. Nasals separated by frontonasal. Lower eyelid with undivided semitransparent disc. Prefrontals and frontoparietals present (although prefrontals may be widely separated). Interparietal longer than parietals. Dorsals smooth or keeled, ventrals smooth, both posteriorly rounded, imbricate; 16 longitudinal rows of scales around body.

Distribution.— Northern South America and some offshore islands along northern coast.

Content.— Two species recognised up to the present, one of which present in Brazilian Amazonia. Here a new species is described.

Remarks.— *T. agilis* was described by Ruthven (1916) as a distinct genus, *Calliscincopus*, but Vanzolini & Rebouças-Spieker (1969) demonstrated that it should be considered as a synonym of *Tretioscincus*. These same authors (Vanzolini & Rebouças-Spieker, 1969) studied a large series from Oriximiná. I here consider these specimens, together with more material from northern Amazonas state and from southern Venezuela, as a new species. A comparison between the species of *Tretioscincus* (which includes, apart from the two mentioned above, *T. bifasciatus* (Duméril), from Venezuela and Colombia) is made under 'remarks' of *T. oriximinensis* **spec. nov.** For completeness' sake, *T. bifasciatus* is also included in the identification key, although it does not occur in Brazil.

Tretioscincus agilis (Ruthven, 1916)
(figs. 169, 170, 173, 298)

Calliscincopus agilis Ruthven, 1916: 2 (holotype UMMZ 47798, type-locality: sand ridge near Dunoon, Guyana); Burt & Burt, 1933: 58; Amaral, 1937b: 187, 1949: 111; Cunha, 1961: 152.

Tretioscincus romani Andersson, 1918: 5 (holotype NRM 3257, type-locality: Bosque Municipal, Manaus, Amazonas, Brasil, 05.viii.1914, leg. A. Roman).

Tretioscincus brasiliensis Müller, 1923: 55 (holotype ZSM 3/1922, type-locality: Lower Tocantins, Pará, Brasil).

Calliscincopus romani; Amaral, 1937a: 1739.

Tretioscincus agilis; Vanzolini & Rebouças-Spieker, 1969: 124 (part); Peters & Donoso-Barros, 1970: 262; Hoogmoed, 1973: 355, 1979: 279; Nascimento et al. 1987: 45; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.

Material.— **Brazil.** AMAPA. Serra do Navio: 1 ♂, MPEG 12173, 16.vii.1977, leg. J.L. Freire. Mazagão, Cachoeira Inajá, Rio Camaipi, affluent left bank Rio Maracá: 1 juv., MPEG 2668, 23.vi.1969, leg. F.P. Nascimento.

AMAZONAS. Rio Uatumã, reservoir area of hydroelectric dam Balbina: 2 ♂, 1 ♀, INPA 185-86, 191, Ig. Caititu, 28-30.vii.1987, leg. M. Martins; 1 ♀, MPEG 14911, 10.ii.1988, leg. 'rescue team'. Manaus, Bosque Municipal: 1 ♂, NRM 3257 (holotype *T. romani*), 05.viii.1914, leg. A. Roman. Reserva Florestal Ducke, 25 km N of Manaus: 1 ♀, MPEG 16265, area of igarapé Acará, 07.vii.1987, leg. T.R.J. Gasnier; 1 ♀, INPA/Ecol.11, 22.07.1981.

PARA. Ilha do Marajó, Município de Breves, Sítio Castanha, km 6 road PA-159 (Breves-Anajás), left bank igarapé Caruaca: 1 ♂, MPEG 14858, 21.ii.1988, leg. I.F. Santos, R.J.R. Moraes & S. Ramos. Ilha do Marajó, Município de Breves, Comunidade Tancredo Neves, km 10 road PA-159 (Breves-Anajás), c. 18 km E of Breves: 2 ♂♂, 2 ♀♀, MPEG 15729, 15739, 15763, 15785, 12-19.v.1990, leg. A.C.M. Lima, J.S. Lima-Verde, R.A.T. Rocha & J.O. Dias. Floresta Nacional de Caxiunã, Município de Portel, Rio Caxiuanã, IBAMA post (1°47'32.3"S, 51°26'01.5"W): 1 ♂, MPEG 16384, 23.x.1992; 1 ♂, MPEG 16499, 16.xi.1992; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Município de Melgaço, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 1 ex., RMNH 26576, 26.x.1992; 1 ♂, MPEG 16445, 04.xi.1992; 1 juv., RMNH 26577, 09.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; 1 ex., RMNH 26578, 10.vii.1973; 1 ex., MPEG 16663, 28.vii.1993; both leg. M.S. Hoogmoed, R.J.R. Moraes & R.R. Silva; 1 ex., MPEG

16625, 17.vii.1993, leg. M.S. Hoogmoed & R.J.R. Moraes; 1 ex., RMNH 26579, 25.vii.1993, leg. M.S. Hoogmoed. Rio Tocantins, reservoir area of hydroelectric dam Tucuruí: 1 ♀, MPEG 13496, 3-5 km S Vila Jacundá, 14.v.1984, leg. T.C.S. Avila Pires, I.J. Lopes & R. Santana; 1 ♀, MPEG 13612, igarapé Saúde, between Vila Jacundá and Ilha das Cobras, 01.vi.1984, leg. F.P. Nascimento, I.J. Lopes & R. Santana. Carajás, Serra Norte: 1 ♀, MPEG 14101, Pojuca, 31.v.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes; 1 ♂, MPEG 14111, N-1, 13.vi.1985, leg. J.M. Santos.

Suriname. BROKOPONDO. Tafelberg, SW edge airstrip: 1 ♂, RMNH 25438, 08.vi.1979, leg. M.S. Hoogmoed & W.N. Polder. MAROWIJNE. Lely Mountains, Suralco camp V, 12 km NE airstrip: 1 ♂, RMNH 25436, 18.viii.1975, leg. M.S. Hoogmoed. NICKERIE. Rechter Kabalebo River, between Grote België and Bolletrieval, left bank: 1 ♀, RMNH 25434, 23.v.1975, leg. M.S. Hoogmoed. Rechter Kabalebo River, first bush camp, 10 km S Camp Keyser: 1 ♂, RMNH 25435, 28.v.1975, leg. M.S. Hoogmoed. Kabalebo area, road to Amotopo: 1 ♀, RMNH 25444, km 212, 18.v.1981, leg. M.S. Hoogmoed & D.G. Reeder; 1 ♂, RMNH 25445, km 217.5-215, 25.v.1981, leg. M.S. Hoogmoed & J. Toto; 1 ♀, RMNH 25446, km 39, Avanavero Falls, 1981, leg. M.S. Hoogmoed & J. Toto. SARAMACCA. Tafelberg: 1 ♂, RMNH 25437, 10 km W airstrip, 12.xi.1975, leg. M.S. Hoogmoed; 1 ♂, RMNH 25439, 6.5 km NNW airstrip, 13.vi.1979; 1 ♂, RMNH 25440, 3 km NW airstrip, 13.vi.1979; 1 ♂, RMNH 25441, second camp, 13 km NW airstrip, 21.vi.1979; 1 ♂, RMNH 25442, 2 km NW second camp, 15 km NW airstrip, 21.vi.1979; 1 ♀, RMNH 25443, third camp, on top plateau, E North Ridge, 600 m, 30.vi.1979; all leg. M.S. Hoogmoed & W.N. Polder.

Diagnosis.— *Tretioscincus* with prefrontals widely separated, loreal hexagonal, narrowest ventrally, gulars in five longitudinal rows. Dorsals 25-28 in a middorsal row, ventrals 15-19 in a midventral row. All dorsals smooth. Scales on tail rounded, in 10 longitudinal rows, mostly smooth; only distal scales on ventral surface keeled. Dorsolateral stripe running on edge of second and third rows of dorsals when counted from midline. In live animals, dorsolateral stripe anteriorly salmon to pale orange, posteriorly yellowish or greenish, and blue on tail.

Description.— Gymnophthalmid with maximum SVL in males of 59 mm, in females of 62 mm (Hoogmoed, 1973). Head 0.19-0.24 (n= 24) times SVL, relatively larger in smaller specimens; 1.3-1.6 (1.40 ± 0.06, n= 24) times as long as wide; 1.1-1.5 (1.30 ± 0.08, n= 24) times as wide as high. Snout wide, rounded, rising slightly toward top of head. Neck about as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.30-0.36 (0.33 ± 0.02, n= 21) times SVL, hind limbs 0.43-0.51 (0.47 ± 0.02, n= 21) times. Inner finger reduced, clawless. Tail round in cross section, tapering toward tip; 1.4-1.6 (n= 8) times SVL, relatively shorter in smaller specimens.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth bicuspid and tricuspid.

Rostral hexagonal, two to three times as wide as long, well visible from above, in wide contact with frontonasal. Frontonasal single, irregularly hexagonal or octagonal, in contact with rostral, nasal, loreal, prefrontals, occasionally first supraocular, and frontal. Prefrontals small, distinctly separated from each other in all specimens observed, touching frontal or separated from it by a contact between first supraocular and frontonasal (in six out of 24 specimens examined, both prefrontals are separated from frontal, and in five specimens only one prefrontal is in contact with frontal). Frontal longer than wide, widest anteriorly, either irregularly pentagonal or heptagonal, or more commonly with a curved line forming contact with first supraocular and frontoparietals (approximately bell-shaped, opening pointing anteriorly). Frontoparietals irregularly pentagonal or hexagonal, longer than wide, forming a relatively wide medial suture; each in contact with frontal, first and second supraoculars, one parietal, and interparietal; usually there is a distinct suture with first supraocular, but in MPEG 14911 these scales only touch. Interparietal occasionally irregularly hexagonal, usually roughly rhomboid, with anterior sides short and straight, posterior sides longer, rounded. One parietal at each side of interparietal, wider and shorter than it. Two supraoculars, first largest and frequently extending beyond second toward middorsal line. Three, rarely two, supraciliaries, first highest, second shortest. Nasal undivided, nostril approximately halfway its length, close to suture with supralabials. Loreal relatively large, hexagonal, contact with supralabials shorter than that with frontonasal and prefrontal (which is angulate). Frenocular small (in RMNH 25444 there are two frenoculars, one behind the other), continuous with a subocular series of three to five (mostly five) scales, among which a higher preocular and a much higher postsubocular. Postsubocular in contact with posterior supralabial, and separated from parietal by one, occasionally two, scale(s) which, together with another scale posterior to supraocular and supraciliary series, can be considered as postoculars. Lower eyelid with undivided, semitransparent disc. Pupil round with long and narrow ventral and dorsal flaps projecting inwards. Five or, mostly, six supralabials, one before last below centre of eye; followed by two postsupralabials, about as high as posterior supralabial or slightly tapering posteriad. Temporal region with a few subhexagonal, smooth, imbricate scales, in some specimens wider posteriorly. Ear-opening relatively small, with smooth margins; tympanum deeply recessed within an auditory meatus.

Mental trapezoidal, convex anteriorly. Postmental undivided, irregularly pentagonal or heptagonal. Three pairs of chinshields, all in contact with infralabials and medially (in RMNH 25442 and RMNH 25444 third pair separated medially). Four infralabials, suture between third and fourth, or beginning of fourth infralabial below centre of eye; followed by two or three postinfralabials, in some specimens first postinfralabial distinctly larger than the other(s). Most head scales subimbricate, all smooth.

Scales on nape smooth, imbricate. Three scales (considered occipitals by some authors) border the interparietal and parietals, median one rhomboid, lateral ones trapezoidal. They are mostly followed by two paravertebral series of scales, anteriorly trapezoidal, posteriad grading into dorsals, but in MPEG 13946 the second pair of scales is also separated by a median scale, and in MPEG 14111 the anterior median scale separates the two first pairs of trapezoidal scales, and there is a smaller median scale posterior to third pair. Laterally scales imbricate, smooth, with rounded posterior margin, larger in dorsolateral row, smaller on sides of neck. Gulars directly in contact with posterior chinshields, smooth, imbricate, with rounded posterior margin; in five longitudinal rows with staggered scales in adjacent rows; eight (mostly) or nine, scales along midventral row. Collar indistinct. Gular fold absent.

Dorsals and scales on flanks imbricate, smooth, with rounded posterior margin, in longitudinal rows with staggered scales in adjacent rows; 25-28 (26.6 ± 0.8, n= 24) scales in a middorsal row, between interparietal and posterior margin of hind limbs. Ventrals similar to dorsals, except for pectorals which are elongate-rhomboid, and in some specimens the scales following them, which may be trapezoidal, grading posteriad into rounded scales; 15-19 (17.3 ± 1.1, n= 24) in a para-midventral row between

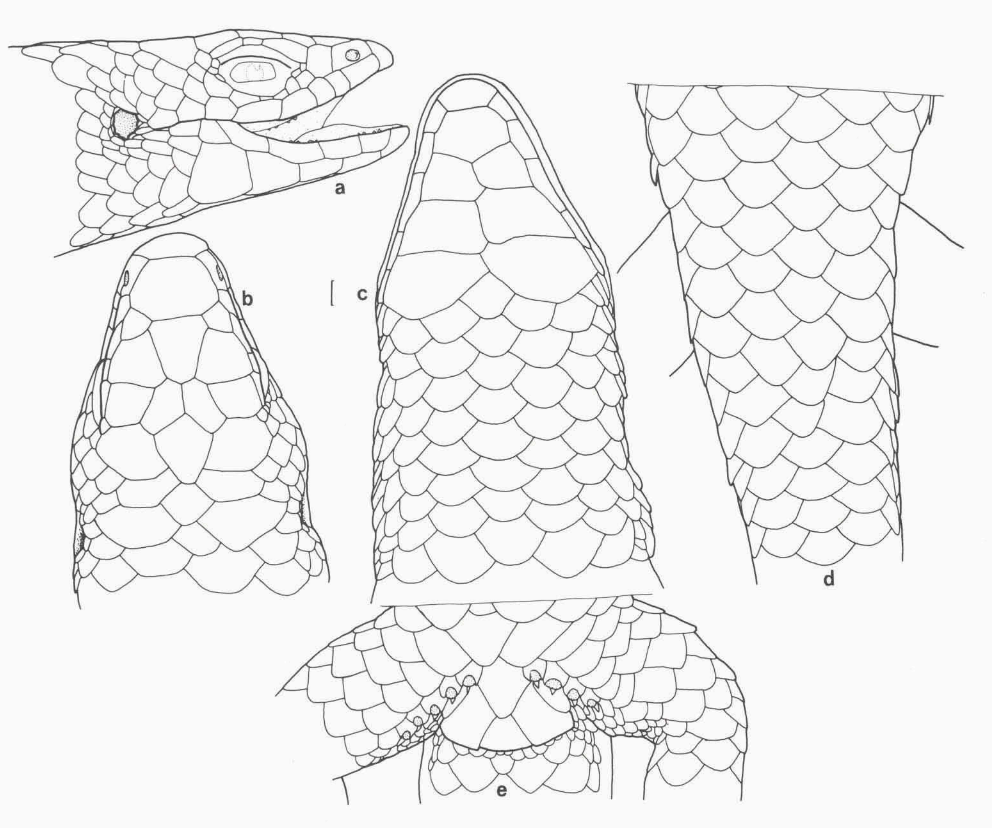


Fig. 169. *Tretioscincus agilis*; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: posterior dorsals and scales on proximal part of tail; all in MPEG 13496 (♀); e: preanal plate and ventral aspect of thighs, showing preanal and femoral pores, in MPEG 15729 (♂).

gulars and preanals. Sixteen longitudinal rows of scales around midbody. Preanal plate with one median anterior scale, and three or five posterior scales; when five, laterals may not reach border of cloacal opening. Pores absent in females, four or five on each side in males, preanal and femoral pores indistinguishable, in a continuous row (the two rows separated medially). Pores in centre of what seems to be one three-pronged scale (or, maybe, two fused scales), with an anterior, larger part (or scale) surrounding most of the pore and ending in two blunt or pointed corners, while posteriorly a smaller part (or scale) projects a pointed extremity above the pore (fig. 169e).

Scales on tail anteriorly rhomboid, smooth, imbricate, in ten longitudinal rows; on underside they are similar, but more elongate. On distal half of tail scales more pointed and, on underside, narrower and distinctly keeled, keels forming low longitudinal ridges. Regenerated tail with narrow, keeled scales.

Scales on limbs smooth, imbricate; most scales with a round posterior margin, but trapezoidal, transversely enlarged, along upper posterior aspect of forearms. Scales are smallest under forelimbs, especially upper arms, and on posterior aspect of thighs, and largest under hind limbs. Subdigital lamellae single, medially swollen;

12-15 (13.3 ± 0.7, n= 47, 24 specimens) under fourth finger, 16-18 (16.7 ± 0.6, n= 46, 24 specimens) under fourth toe.

Colour in life copper-brown on back, with dorsolateral stripe anteriorly salmon to pale orange, posteriorly yellowish or greenish, and blue on tail; it may be bordered dorsally by a black stripe. Flanks black. Ventral region pearl-white or with a greenish shine, with centre of most scales, especially posteriorly, black peppered. Tail mostly deep pastel blue, proximally with dorsal and lateral black stripes. Iris black. RMNH 26578 raw sienna (136) on back, with a dorsolateral stripe anteriorly yellow-ochre (123C), posteriorly changing to pistachio (161) and cobalt blue (168) on tail; flanks black; belly with pistachio (161) shine (description by M.S. Hoogmoed). Colour in life of MPEG 14101 was described by Nascimento et al. (1987). Other colour descriptions are given by Andersson (1918), Hoogmoed (1973), and Gasc (1990).

In preservative, upper part of head and back chestnut-brown to olive-brown, head and back either of same colour, or head lighter or darker than back. A dorsolateral light stripe on each side from rostral (on which both stripes are connected) to tail, greenish anteriorly, gradually changing to bluish posteriad; on tail the blue becomes more intense, and distally the entire tail is blue (or brown with a bluish tinge, on regenerated tails). Flanks dark brown or black. Ventral region with a stronger or weaker bluish tinge over a blackish background. Limbs dorsally similar in colour to flanks, ventrally like belly. MPEG 2668, a juvenile, is completely brown, lighter ventrally, with a faint light dorsolateral stripe (colours probably due to discolouration in preservative).

Habitat.— Most records are from forest, but MPEG 14111 was in an area of open vegetation on rocky substrate ('campos rupestres' of Carajás). They are found deep in the forest, but also at its border; MPEG 15739 was at the border of forest and plantation site, and MPEG 16499 was along a wide trail through a disturbed, open type of forest. In eight out of 16 observations the animals were on dead tree trunks, in two instances on palm stems, two others were on trunks of live trees, one was on a dead liana, three were on the ground, and two were collected in pitfalls. In most cases animals observed between ground level and two meters above it, but two juveniles (RMNH 26577 and other not collected) were seen coming down a tree (both on the same tree), probably from the canopy. These data in general are in agreement with those by Andersson (1918), Hoogmoed (1973), Gasc (1981, 1990), Zimmerman & Rodrigues (1990), and Martins (1991), although Gasc (1981, 1990) emphasized the terrestrial activity of *T. agilis*, and Martins (1991) stressed its occurrence in clearings and at the forest edge.

Notes on natural history.— A diurnal, heliothermic lizard, frequently seen basking. Among the field notes I have, active animals were recorded between 09:00 h and 14:00 h. Hoogmoed (1973) reported activity between 11:00 and 15:00 h.

Aspects of the behaviour of *T. agilis* on the forest floor are described by Gasc (1981). Hoogmoed (1973) found spiders, crickets and bugs in two stomachs, Martins (1991) one grasshopper in one stomach.

Distribution (fig. 170).— Guyana, Suriname, French Guiana, and Brazil. In Brazil in the states of Pará and Amazonas, generally north of the Amazon, but near its mouth extending far south of it.

Remarks.— The specimens recorded by Vanzolini & Rebouças-Spieker (1969)

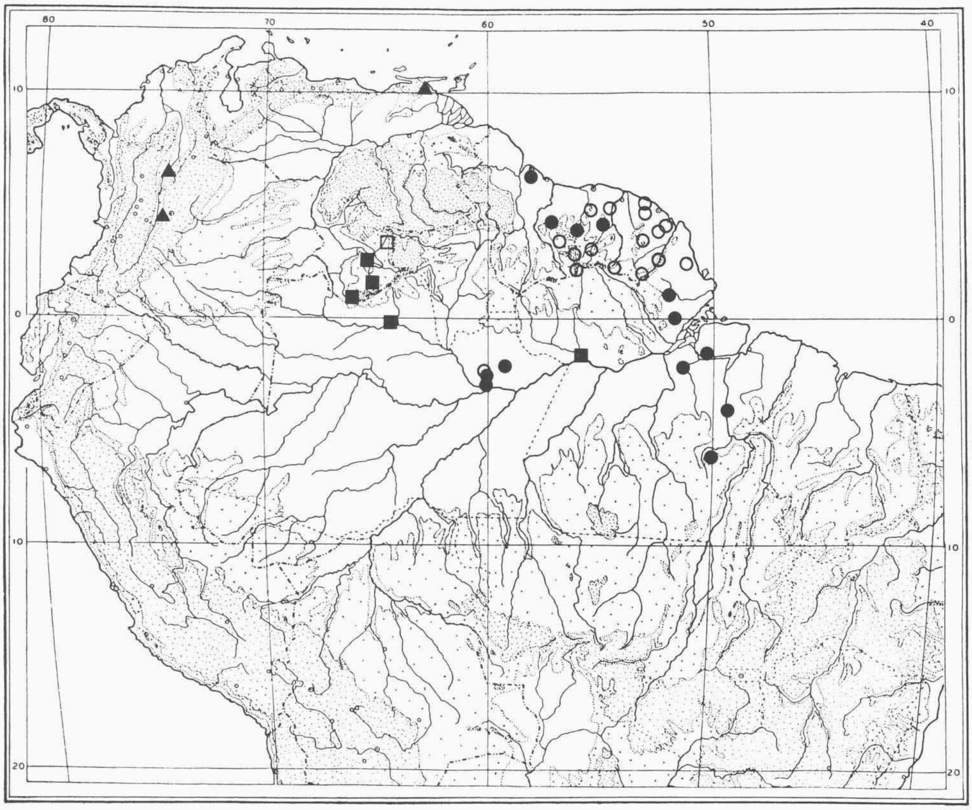


Fig. 170. Distribution of *Tretioscincus agilis* (circles) and *T. oriximinensis* spec. nov. (squares), and material studied of *T. bifasciatus* (triangles). Closed symbols = material studied; open symbols = data from literature (*T. agilis*: Ruthven, 1916; Hoogmoed, 1973; Zimmerman & Rodrigues, 1990; Hoogmoed & Avila-Pires, 1991. *T. oriximinensis*: Paolillo, 1985).

from Oriximiná, as well as those reported by Paolillo (1985) from Venezuela are here described as a new species, *T. oriximinensis*. Also the reference of *T. agilis* for Colombia by Ayala (1986) might represent this new species, although this should be confirmed by study of the specimens. Fitch (1968: 37) erroneously reported *T. agilis* from Ecuador. Hoogmoed (1973: 361) supposed this record represented *T. bifasciatus*, but Duellman (1978: 215), studying Fitch's material, identified it as *Iphisa elegans*. For a comparison among the species of *Tretioscincus*, see under 'remarks' of *T. oriximinensis*.

Tretioscincus oriximinensis spec. nov. (figs. 170-173, 299)

Tretioscincus agilis; Vanzolini & Rebouças-Spieker, 1969: 124 (part); Paolillo, 1985: 31.

Holotype.— MPEG 2351, ♀, Oriximiná, Pará, Brazil, 01.ii.1968, leg. P.E. Vanzolini.
Paratypes.— **Brazil.** AMAZONAS. Rio Negro, Tapurucuara: 1 juv. ♂, MPEG 1935, 1962, leg. F.M. Oliveira.

PARA. Oriximiná: 2 ♂♂, BM 1971.226-227, i.1967, exch. MZUSP; 3 ♂♂, 1 ♀, BM 1977.2290-2293, 15.v.1971, pres. MZUSP; 2 ♀♀, CM 65856-857, 04-08.i.1972, leg. 'Expedição Permanente da Amazônia'; 3 ♂♂, MPEG 2352-54, 01.ii.1968, leg. P.E. Vanzolini.
Venezuela. AMAZONAS. Mavaca Mission, confluence Rio Mavaca and Rio Orinoco: 9 ♂♂, 6 ♀♀, AMNH 137205-219, 29.iii.1989, leg. C.J. Cole. Tapirapecó Expedition Base Camp, upper Rio Mavaca (2°02'N 65°07'W), 150 m: 1 ♀, AMNH 134183, 18-21.iii.1989, leg. C.W. Myers, M.A. Donnelly & J.W. Daly. Neblina Base Camp on Rio Mawarinuma (0°50'N 66°10'W), 140 m: 2 ♂♂, AMNH 127823, 127824, 6-7 & 14-16.vii.1984, leg. C.W. Myers, L.S. Ford & J.A. Roze; 1 ♂, AMNH 133675, 24.ii.1984, leg. C.J. Cole.
Specimens of *T. bifasciatus* studied for comparison: 1 ♂, AMNH 57347, Venezuela, Caripito; 1 ♀, AMNH 97371, Colombia, Cundinamarca, Tocaima, i.1965; 1 ♂, ZFMK 26587, Colombia, Rio Magdalena, Opon, 30 km below Paxare, 19.x.1896, leg. Bürger.

Diagnosis.— *Tretioscincus* with prefrontals in contact or narrowly separated, loreal pentagonal and usually wider ventrally, gulars anteriorly in six, posteriorly in five longitudinal rows. Dorsals 29-32 in a middorsal row, ventrals 18-22 in a midventral row. All dorsals smooth, or posterior ones keeled. Scales on tail polygonal, keeled, in 12 longitudinal rows. Dorsolateral stripe on third row of dorsals when counted from midline. In live animals, dorsolateral stripe tan, paler posteriorly.

Description.— Gymnophthalmid with maximum SVL, in both males and females from Oriximiná, of 48 mm (Vanzolini & Rebouças-Spieker, 1969), in males from Venezuela 52 mm (AMNH 127824, AMNH 137210), in females from Venezuela 48.5 mm (AMNH 134183). Head 0.19-0.25 (n= 30) times SVL, usually 0.22-0.25 in specimens smaller than 30 mm SVL, 0.19-0.22 in larger specimens; 1.4-1.6 (1.48 ± 0.06, n= 30) times as long as wide; 1.3-1.7 (1.41 ± 0.09, n= 30) times as wide as high. Snout rounded, rising gently toward top of head. Neck about as wide as head and body. Body cylindrical. Limbs well developed, forelimbs 0.26-0.35 (0.30 ± 0.02, n= 28) times SVL, hind limbs 0.37-0.50 (0.44 ± 0.03, n= 26) times. Inner finger reduced and clawless. Tail round in cross section, tapering toward tip; 1.8 times SVL in three males, 1.5-1.6 times in two females, all from Venezuela.

Tongue lanceolate, covered with imbricate, scale-like papillae; tip smooth, bifid. Anterior teeth conical, posterior teeth conical to bicuspid.

Rostral hexagonal, two to three times as wide as long, well visible from above, in wide contact with frontonasal. Frontonasal single, irregularly pentagonal or hexagonal, in contact with rostral, nasal, loreal (usually), prefrontals, and occasionally frontal; in holotype (MPEG 2351), a median suture is present in anterior part of frontonasal. Prefrontals variable, from separated medially by a suture between frontonasal and frontal, to forming a short, but distinct, medial suture; in BM 1971.227 one prefrontal is fused with first supraocular. Frontal distinctly longer than wide, widest anteriorly, irregularly hexagonal or heptagonal, laterally in contact with first supraocular. Frontoparietals irregularly hexagonal, longer than wide, forming a moderately long medial suture; each in contact with frontal, first and second supraoculars, one parietal, and interparietal. Interparietal roughly rhomboid, sutures with frontoparietals short and straight, with parietals and nuchals longer, blunt or rounded. One parietal at each side of interparietal, wider and shorter than it. Two supraoculars, first largest and extending beyond second toward middorsal line. Two or three supraciliaries, first highest, second shortest. Nasal undivided, nostril approximately

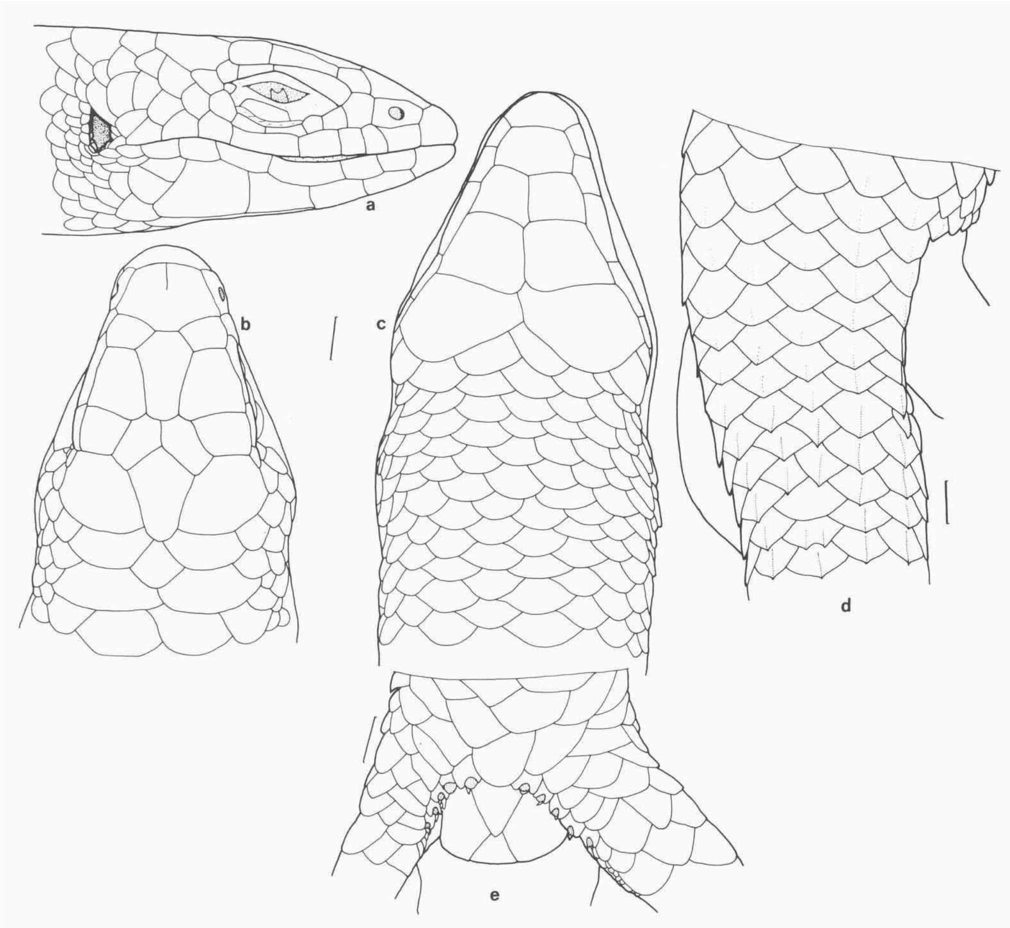


Fig. 171. *Tretioscincus oriximinensis* spec. nov.; a, b: lateral and dorsal views of head; c: ventral view of head and gulars; d: posterior dorsals and scales on proximal part of tail; all in MPEG 2351 (holotype, ♀); e: preanal plate and ventral aspect of thighs (proximal part), showing preanal and femoral pores, in MPEG 2352 (♂).

halfway its length, close to suture with supralabials. Loreal relatively large, pentagonal, suture with supralabials usually as wide as, or wider than, sutures with frontonasal and prefrontal (but distinctly shorter in AMNH 137219); borders with frontonasal (when they are in contact) and prefrontal tend to form an approximately straight line. Frenocular small, continuous with a subocular series of three to five scales, among which a slightly higher presubocular (which in some specimens is fused with frenocular) and a much higher postsubocular. Postsubocular in contact with posterior supralabial, and separated from parietal by one scale which, together with another scale posterior to supraocular and supraciliary series, can be considered as postoculars. Lower eyelid with undivided semitransparent disc. Pupil round with short and wide ventral and dorsal flaps projecting inwards. Six (rarely five) supralabials, fifth (or fourth) below centre of eye, followed by two postsupralabials about as high as posterior supralabial. Temporal region with a few subhexagonal, smooth,

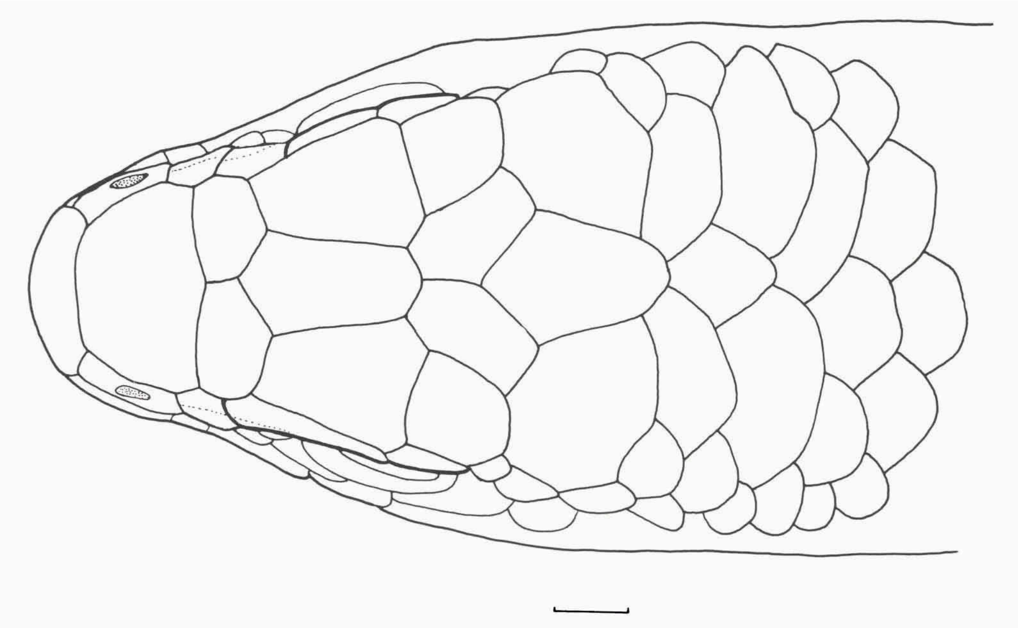


Fig. 172. *Tretiscincus oriximinensis* spec. nov., dorsal view of head in AMNH 137206, showing prefrontals in medial contact.

imbricate scales, some wider posteriorly. Ear-opening relatively small, with smooth margins. Tympanum distinctly recessed within an auditory meatus.

Mental trapezoidal, convex anteriorly. Postmental undivided, irregularly heptagonal. Three pairs of chinshields, in contact medially and with infralabials. Four infralabials, suture between third and fourth, or beginning of fourth below centre of eye; they are followed by one (rarely) to three postinfralabials. Most head scales subimbricate, all smooth.

Scales on nape smooth, imbricate. Three scales border interparietal and parietals, median one rhomboid, lateral ones trapezoidal. They are followed by two paravertebral series of scales, anteriorly trapezoidal, posteriad grading into dorsals. Laterally scales imbricate, smooth, with rounded posterior margin, larger in dorsolateral row, smaller on sides of neck. Gulars directly in contact with posterior chinshields, smooth, imbricate, with rounded posterior margin; in approximately longitudinal rows, with a discontinuity (caused by different arrangement of scales) between anterior and posterior parts, so that anteriorly there are six rows (with two para-midventral ones), posteriorly five rows (one of which midventral); 9-11, mostly 10, scales along a medial row. Collar indistinct. Gular fold absent.

Dorsals and scales on flanks imbricate, with rounded posterior margin, in longitudinal rows with staggered scales in adjacent rows; smooth anteriorly, smooth or slightly keeled on posterior part of body; 29-32 (31.0 ± 0.9, n= 29) scales in a middorsal row between interparietal and posterior margin of hind limbs. Ventrals smooth, similar to dorsals and laterals, except for pectorals which are elongate-rhomboid; 18-22 (19.8 ± 1.0, n= 26) in a midventral row between gulars and preanals. Sixteen longitudinal rows of identical scales around midbody. Preanal plate with one median anterior scale, and three or five posterior scales; when five, lateral scale at each side may not reach cloacal slit. Pores absent in females, four to six on each side in males; preanal and femoral pores in a continuous row, the two rows (from each side) separated medially; pores in centre of one or two scales, as described for *T. agilis*.

Scales on tail trapezoidal along middorsal row, rhomboid to obliquely rectangular laterally, and triangular to lanceolate ventrally; imbricate, sharply keeled, mucronate, in twelve longitudinal rows, keels forming longitudinal ridges (vertebral row originates from two paravertebral rows very close to base of tail).

Scales on limbs imbricate, mostly smooth but slightly keeled on dorsal surface of hind limbs; most scales with a round posterior margin, but trapezoidal, transversely enlarged, along upper posterior aspect of forearms. Scales smallest under forelimbs, especially upper arms, and on posterior aspect of thighs, and largest under hind limbs. Subdigital lamellae single, some may be medially swollen; 13-16 (14.5 ± 0.9, n= 59, 30 specimens) under fourth finger, 16-19 (17.3 ± 0.7, n= 57, 30 specimens) under fourth toe.

Colour in life of Oriximiná material was described by Vanzolini & Rebouças-Spieker (1969): "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 punctuation 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".

Life colour of Venezuelan specimens (under incandescent electric light bulb), as annotated by J. Cole, was the following: "Dorsum coppery brown; sides dark brown; dorsolateral light stripe of coppery tan extends beyond hips, although less conspicuous beyond midbody; tail brown at base but quickly becoming bright blue; chin cream with black flecks and copper iridescence (strong on lips); throat and belly light with black flecks and pale green and copper iridescence; arms and legs dark brown. Juveniles with less copper iridescence ventrally." C.W. Myers described them as "bronzy brown with tan-bordered, blackish brown lateral stripe. Tail bright blue. Venter pale green."

In preservative, upper part of head and back brown with a greyish-blue tinge; dorsolateral light line, from rostral to base of tail, whitish or light greyish-blue, paler posteriorly; flanks dark brown. Ventrally, scales predominantly brown or dark bluish-grey, with a lighter border which forms a reticulate pattern; underside of head and chest may be lighter, or have lighter spots. Limbs dorsally similar in colour to flanks, ventrally like belly. Tail either completely brown, or near base similar to body, posteriorly blue.

Habitat.— Vanzolini & Rebouças-Spieker (1969) reported the specimens from Oriximiná as occurring in "perianthropic environments, such as leafpalm walls of huts, empty lots, backyards, rubbish piles, etc.". Among material from Venezuela, specimens were locally abundant inside the area of Mission Mavaca, close to buildings, in the short (cut) grass and litter (field book C.J. Cole). AMNH 127823 and 127824 were in a forested area, the former on leaflitter, the latter in lab building. AMNH 134183 was at river bank on dry leaves, and it "leaped into water to escape but returned immediately to land" (field book C.W. Myers, L.S. Ford & J.A. Roze).

Distribution (fig. 170).— Known from the surroundings of the town of Oriximiná, lower Rio Trombetas, Pará, Brazil; from Tapurucuara, on the Rio Negro, Amazonas; and from Territorio Federal do Amazonas, Venezuela.

Remarks.— Vanzolini & Rebouças-Spieker (1969) reported 212 specimens of this species collected in January 1967, during the beginning of the rainy season, in Oriximiná (no specimen had been collected during a previous expedition to the same area, in September-October, the dry season). Although recognizing several differences between their sample and other specimens of *Tretioscincus agilis*, they identified them unhesitatingly as belonging to this species. Hoogmoed (1973: 361) discussed this taxon, only basing himself on the publication of Vanzolini & Rebouças-Spieker (1969), and came to the conclusion that differences in size and meristic data would set this taxon apart as a subspecies, but he did not formally name it. Paolillo (1985) reported this species (as *T. agilis*) from Venezuela, stating that the Venezuelan specimens "exhibit common characteristics with both the Suriname specimens (...) and the Brazilian [Oriximiná] specimens ..."; he also observed that in his (two) specimens the prefrontals were in medial contact. The comparison was based on the literature data of Vanzolini & Rebouças-Spieker (1969) and Hoogmoed (1973).

At present *T. agilis* is known from a relatively large number of specimens and from a large area, showing relatively uniform characteristics throughout its distributional area. The differences with the present species turned out to be substantial. Table 11 compares several characteristics in *T. agilis*, the samples of *T. oriximinensis* from Oriximiná and from Venezuela, and *T. bifasciatus* (data from three specimens). The following arises from the table:

A. Several characteristics distinguish *T. agilis* from the three other groups: (1) lower number of dorsals and ventrals; (2) scales smooth (except for posterior part of tail, ventrally); (3) scales on tail rounded, in 10 longitudinal rows; (4) gulars in five longitudinal rows and mostly eight transverse rows; (5) pupil deeply indented (dorsal and ventral flaps elongate and narrow, in some specimens slightly constricted at the base, while in the other groups flaps are shorter and distinctly wider at the base) (fig. 173); (6) prefrontals widely separated (*T. oriximinensis* from Oriximiná also have separated prefrontals, but among 199 specimens studied by Vanzolini & Rebouças-Spieker (1969) only in one case the prefrontal did not meet the frontal, and in two specimens the two prefrontals almost met medially; in *T. agilis*, among 30 specimens here studied, in nine of them both prefrontals do not contact the frontal, and in five others only one prefrontal does; Hoogmoed (1973) reported 14 specimens out of 18 with prefrontals separated from frontal; and in all cases, in *T. agilis*, there is a distinct gap between prefrontals); (7) loreal hexagonal (suture with frontonasal and prefrontal form two angulate lines) and narrowest at base (in *T. oriximinensis* and *T. bifasciatus* suture with frontonasal and prefrontal forms a straight or almost straight line, so that the scale is pentagonal, and it is usually widest at the base); (8) dorsolateral stripe bi- or tricoloured (changing colour along the body), merging into the blue area of the tail; (9) a bulkier body, with slightly larger limbs. *T. agilis* also differs from *T.*

Table 11. Comparison between *T. agilis*, two populations of *T. oriximinensis* spec. nov., and *T. bifasciatus* (asterisks refer to data based on Shreve, 1947).

	T. agilis	*T.orixim.* Oriximina	*T.orixim.* Venezuela	*T.bifasc.*
dorsals	25-28	29-32	30-32	29-31
ventrals	15-19	19-22	18-20	18-20
pores ♂	8-10	8-10	10-12	10-12*
keeled scales	distal on tail, ventrally	(post. dorsals) + tail	tail	dorsals + tail
tail	10 long. rows, roundish scales.	12 long. rows, polygonal scales	12 long. rows, polygonal scales	12 long. rows, polygonal scales
long. rows of gulars	5	6 ant.,5 post.	6 ant.,5 post.	6 ant., 5 post.
transv. rows of gulars	8-9 mostly 8	9-11 mostly 10	9-11 mostly 10	10
pre- frontals	widely separated	narrowly separated	mostly in contact	contact or narrowly sep.
loreal	narrowest ventrally	widest ventrally	widest ventrally	widest ventrally
supra ciliaries	2-4 mostly 3	2 (5×) or 3 (12×)	2 (37×), 3 (1×)	2
flaps in pupil	long and narrow	short and wide	short and wide	short and wide
dorsolat. stripe	bicol., wider, merging in tail, dorsal rows 2/3	unicol., narrow, paler post., dorsal row 3	unicol., narrow, paler post., dorsal row 3	?, wider, distinct post., dorsal rows 2/3
max. SVL ♂	59 mm	48 mm	52 mm	58 mm*
♀	62 mm	48 mm	48 mm	(34 mm)

oriximinensis (condition unknown in *T. bifasciatus*) in (10) having a shorter tail, of similar size in males and females.

B. Characteristics in common between *T. agilis* and the sample from Oriximiná, and between *T. oriximinensis* from Venezuela and *T. bifasciatus*, but different among the two pairs: (1) prefrontals separate versus usually in contact; (2) 8-10 pores in males versus 10-12; (3) predominantly three supraciliaries versus two supraciliaries.

C. Characteristics in common between *T. agilis* and *T. bifasciatus*, different in *T. oriximinensis*: (1) larger size; (2) dorsolateral light stripe wider, bold all along body and anterior part of tail, running on edge of second and third rows of dorsals when counted from midline.

D. Characteristics in common between *T. oriximinensis* samples from Oriximiná and Venezuela, that differ from *T. bifasciatus*: (1) dorsals completely or predominantly smooth; (2) dorsolateral light stripe on third row of dorsals (counted from middorsal line), narrow, and becoming paler on posterior part of body.

E. Differences between samples of *T. oriximinensis* from Oriximiná and Venezuela, besides those mentioned in "B": (1) apparently larger size in Venezuelan specimens; (2) slight difference in number of ventrals; (3) posterior dorsals may be keeled in specimens from Oriximiná, while in Venezuelan specimens the keeled scales start at base of tail.

The above observations permit the following conclusions: *T. agilis* seems to be the most distinct form within the genus. A few characteristics unite *T. agilis* and *T. oriximinensis* from Oriximiná on the one hand, and *T. bifasciatus* and *T. oriximinensis* from Venezuela on the other, but they are subject to variation, and can be attributed to

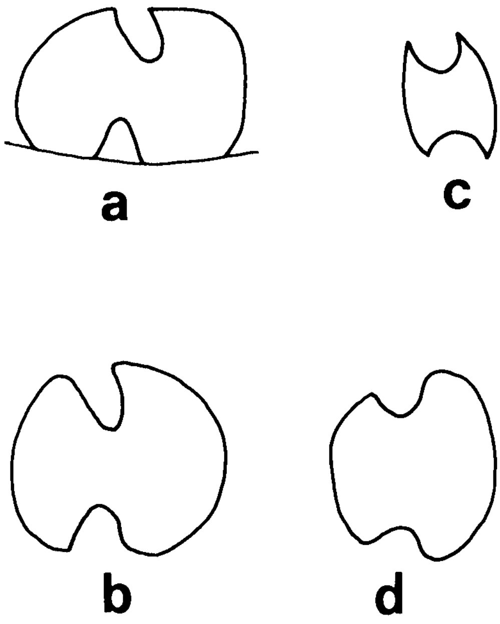


Fig. 173. Comparison of shape of pupils in *Tretioscincus agilis* (a, b) and *T. oriximinensis* (c, d); a: MPEG 15763; b: MPEG 15739; c: MPEG 2351; d: AMNH 137205.

geographic or random variation among populations. The main distinction between *T. bifasciatus* and *T. oriximinensis* is the presence of keeled dorsals in *T. bifasciatus*, but since in *T. oriximinensis* the dorsals may be keeled posteriorly, one could think of clinal variation from west to east (which could also be the case for the differences in size). However, in the Venezuelan specimens of *T. oriximinensis*, which are geographically closer to *T. bifasciatus*, the dorsals are always smooth, refuting this idea. Some differences exist between the samples of *T. oriximinensis* from Venezuela and Oriximiná. If these differences prove to be constant when material from more localities is known, then they should be considered as distinct taxa.

Vanzolini (1972) reported a specimen of '*T. agilis*' from the Igarapé Jaramacaru, Pará, "in a natural situation at the edge of the Ariramba cerrado enclave, in leaf litter under an isolated cashew tree (*Anacardium* sp.)". He gave no indication as to whether the specimen had characteristics of the Oriximiná sample (*T. oriximinensis*), or of 'the other' *T. agilis*, but since the locality is not so far from Oriximiná, it could be *T. oriximinensis*, reinforcing the idea that the species is an inhabitant of open vegetation.

The largest part of the collection of *T. oriximinensis* reported by Vanzolini & Rebouças-Spieker (1969) is deposited in the MZUSP. As explained before, access to this collection was denied, for which reason it was not possible to select the holotype from this larger collection.

Etymology.— The name refers to the first locality from where specimens were known.

Family Teiidae Gray, 1827

Classification follows Estes et al. (1988).

Content.— Nine genera divided into two subfamilies. Three genera of the Teiinae (*Ameiva, Cnemidophorus* and *Kentropyx*), and three of the Tupinambinae (*Crocodilurus, Dracaena* and *Tupinambis*) occur in Amazonia.

Ameiva Meyer, 1795

Diagnosis.— Moderately large teiids, with body cylindrical, tail round in cross section, and limbs well developed, pentadactyl, all digits clawed. Nasals divided, upper nasals in contact medially. Lower eyelid completely opaque. Dorsals granular. Ventrals quadrangular, smooth, 6-18 in a row across midbody (Vanzolini & Valencia, 1966). Femoral pores present, preanal pores absent. Tongue posteriorly only slightly notched and partially covered by a lingual sheath (Presch, 1971).

Distribution.— Mexico, Central and South America, Antilles.

Content.— According to Peters & Donoso-Barros (1970) and Vanzolini (1986b), 20 species are recognised. From these, only *Ameiva ameiva* occurs in Amazonia.

Ameiva ameiva (Linnaeus, 1758)
(figs. 174, 175, 300)

Lacerta Ameiva Linnaeus, 1758: 202 (3 syntypes, NRM 120, 124, and UUZM 12; type-locality: 'America', restricted by Hoogmoed, 1973 to the confluence of the Cottica River and the Perica Creek, Suriname).

Ameiva vulgaris; Duméril & Bibron, 1839: 100; Guichenot, 1855: 32; Müller, 1912: 34.

Ameiva surinamensis; Boulenger, 1885b: 352; Goeldi, 1896: 420, 1902: 537, 544; Hagmann, 1910: 489; Müller, 1912: 16; Procter, 1923: 1064.

Amiva (sic!) *surinamensis*; Cope, 1876: 165.

Ameiva ameiva; Griffin, 1917a: 312; Cott, 1926: 1160; Rand & Humphrey, 1968: 7; Müller, 1969: 118, 120, 1971: 25; Peters & Donoso-Barros, 1970: 18; Crump, 1971: 20; Vanzolini, 1972: 102, 1986a: 14; 1986b: 1; Hoogmoed, 1979: 278; Vanzolini et al., 1980: 106; Nascimento et al., 1988: 36, 1991: 40; Hoogmoed & Avila- Pires, 1989: 168; O'Shea, 1989: 68; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Gascon & Pereira, 1993: 181.

Ameiva ameiva ameiva; Burt & Burt, 1931: 304, 1933: 51; Amaral, 1937a: 1738, 1937b: 185, 1937c: 1723, 1949: 110; Schmidt & Inger, 1951: 453; Cunha, 1961: 113, 1981a: 14; Hoogmoed, 1973: 225; Cunha et al., 1985: 31.

Material.— **Brazil.** ACRE. 29 km N Rio Branco along road AC-010 (Rio Branco-Porto Acre), Projeto Humaitá, km. 2 RBR-304: 1 hgr., MPEG 16010, 01.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires. 17 km N Rio Branco along road AC-010: 1 ♂, RMNH 25834, 01.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Branco, Parque Zoobotânico UFAC: 1 ♀, 1 juv., RMNH 25835, MPEG 16015, 03.i.1990, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

AMAPA. Serra do Navio: 1 ex., MPEG 15110, 14.xi.1988; 1 juv., RMNH 25824, 21.xi.1988; both leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Jari, Cachoeira Santo Antônio: 1 ♀, MPEG 14999, 20.v.1987, leg. O. Vaz.

AMAZONAS. Rio Urucu, E of Porto Urucu, near Petrobrás station RUC-2: 1 juv., MPEG 15847, 20.xi.1989; 1 juv., RMNH 25829, 24.xi.1989; both leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Urucu, Porto Urucu, S of Tefé: 1 juv., MPEG 15865, 26.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões, Tabatinga: 1 ♂, RMNH 25822, 12.xi.1985, leg. M.S. Hoogmoed. Rio Solimões, W. Benjamin

RMNH 25832-833, 09.xii.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Solimões, E. Benjamin Constant (Santo Antônio): 08.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Road BR-319, Porto Velho- Manaus, 26 km NE Porto Velho, alt. 120 m: 1 ♂, RMNH 25823, 01.xii.1985, leg. M.S. Hoogmoed.

PARA. Rio Tocantins, reservoir area of hydroeletric dam Tucuruí: 1 ♀, MPEG 13217, Canoal, 35 km S of dam, 13.iii.1984, leg. A. Langutt; 1 ♂, MPEG 13227, between Rio Arapari and Cocal, 16.iii.1984, leg. M. Zanuto & R. Bittencourt N; 1 ♂, MPEG 13459, 2 km S of Jacundá, 09.v.1984, leg. T.C.S. Avila Pires & I.J. Lopes. Floresta Nacional de Caxiuanã, Rio Caxiuanã, Município de Portel, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 1 juv., MPEG 16369, 23.x.1992; 3 exs., MPEG 16498, RMNH 26502-503, 16-17.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Melgaço, Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S, 51°27'11.3"W): 19 exs., MPEG 16411, 16419, 16424-425, 16431, 16458, 16474-475, 16487, RMNH 26504-513, 27.x.1992-14.xii.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Carajás, Serra Norte: 1 ♀, MPEG 13298, surroundings N-1, 21.iii.1984, leg. T.C.S. Avila Pires & M.I.S. Assunção. Município de Oriximiná, S bank of Rio Trombetas, opposite Ilha dos Maicós: 1 ex., MPEG 15342, 1 ♀, RMNH 25826, 06.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 1 hgr., MPEG 15344, 06.xii.1988; 2 exs., MPEG 15395, RMNH 25827, 11.xii.1988; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, road from Sítio Céu Estrelado to Cruz Alta, between Rio Nhamundá and Rio Trombetas: 1 juv., RMNH 25825, 05.xii.1988; 1 ex., MPEG 15402, 12.xii.1988; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Rio Nhamundá, Sítio Céu Estrelado, 15 km N of Faro: 1 juv., MPEG 15324, 04.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Rio Nhamundá, Cabeceira Urucuxi, 16 km N of Faro: 2 juvs., MPEG 15412, RMNH 25828, 13.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.

RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 2 exs., CEPB 0107, 0130, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.

RORAIMA. Município de Boa Vista, Fazenda Bom Intento: 2 ♂♂, MPEG 4145-46, 01.vii.1970, leg. F.P. Nascimento.

In addition to specimens listed above, the MPEG has specimens from the following localities: ACRE. Sena Madureira. Rio Juruá, Seringal Oriente (12 km below Vila de Taumaturgo). AMAPA. Município Amapá, Oiapoque. Município Amapá, Rio Cujubim, road BR- 156, Cujubim. Município Amapá, Lago do Comprido. Município Amapá, Rio Tracajatuba (affluent left bank Rio Araguari), Reserva DNERu (post no. 2). Município Amapá, Igarapé Ariramba (affluent Rio Tartarugal Grande), Reserva DNERr (post no. 4). Município Amapá, road BR-156, Igarapé Agua Branca. Município Calçoene, Igarapé Flaman. Rio Urucanã (affluent Rio Uaçá, Oiapoque basin), Aldeia Palikur. Macapá, Curiaú (Porto do DNERu). Macapá, Fazendinha. Município Mazagão, Rio Maracá, Cachoeira Pancada. Município Mazagão, Rio Camaipi (afflunet left bank Rio Maracá). Porto Platon, km 92-98 road BR-156. Rio Araguari. Fazenda California (80 km SE Ferreira Gomes). AMAZONAS. Surroundings Manaus. Km 47 between Furo das Marinhas and Carananduba. Belém. Rio Tocantins, Mangabeira. Km 75 road Belém-Brasília. Rio Moju, Itacuã (near Rio Jambuaçu). Rio Moju, mouth of Rio Jambuaçu, road Malaifate. Road between Rio Tocantins and Rio Moju, 12 miles from Tucuruí dam. Cairari (between Rio Moju and Rio Tocantins). Rio Tocantins, reservoir area of hydroeletric dam Tucuruí (Jacundá; Ilha Tocantins; Igarapé Saúde; Chiqueirão). Tomé-Açu. Road Tomé-Açu to Paragominas, Vila Nova (Paraíso). Paragominas. Sítio Bela Vista, km 135 road PA-332. Itinga (road BR-010, near Maranhão border). Km 198 road PA-332 (11 km E Rio Tocantins). Road PA-332, 6 km E Rio Tocantins. Rio Araguaia, Porto Jarbas Passarinho (Transamazônica). Conceição do Araguaia, Rio Pau d'Arco. Altamira. Road Altamira-Marabá, left bank of Rio Xingu. Santarém (road to Maicá; Urumari; road PA-3, 'estrada do Palhão'; Alter- do-Chão). Oriximiná, Porto Trombetas, km 15, 38 & 43 of road to mining site. Oriximiná, Cachoeira Porteira. Caiapó Indian area, middle Rio Fresco, Gorotire (near Gradaús). Serra do Cachimbo. Almerim, Projeto Jari, São Raimundo Agroindustrial Ltda. Rio Paru de Este, Tiriós. RONDONIA. Ji-Paraná. Ouro Preto d'Oeste. Fazenda Rio Candeias, km 30 road BR-364 (Porto Velho-Cuiabá). Jaci-Paraná, km 85-88 road BR-364 (Porto Velho-Rio Branco). Forte Príncipe da Beira. RORAIMA. Parimã (Brazil-Venezuela border). Rio Uraricoera, Waicá. Município de Boa Vista, região do Taiano, Colônia Coronel Mota.

Diagnosis.— *Ameiva* with smooth dorsal head scales, frontal single, frontoparietal and parietal plates in contact with interparietal, scales between antegular and gular folds not distinctly enlarged. Ventrals in 29-33 transverse rows, 10 in a row across midbody. Juveniles with a black band on upper part of flanks, and either completely brown or with head and anterior half of body green. Adults with or without lateral black band, head and anterior part of body predominantly brown, posterior part of body and tail green.

Description.— Teiid with maximum SVL in males of 174 mm (RMNH 26505), in females of 149 mm (MPEG 2729). Echternacht (1971) reported maximum SVL, in specimens from Panama, of respectively 197 mm and 157 mm. Head 0.22-0.26 (0.25 ± 0.01, n= 23) times SVL, 1.5-1.9 (1.70 ± 0.10, n= 23) times as long as wide, 0.9-1.1 (1.05 ± 0.05, n= 23) times as wide as high. Head pyramidal, with snout elongate and bluntly pointed. Canthus rostralis well defined. Gular region usually swollen in large males. Neck about as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.3-0.4 (0.36 ± 0.02, n= 45) times SVL, hind limbs 0.7-0.9 times (n= 45, mostly 0.8-0.9 in specimens ≤ 100 mm SVL, 0.7-0.8 in larger specimens). Tail depressed proximally, round in cross section to compressed distally, tapering toward tip, 1.8-2.4 (2.22 ± 0.15, n= 37) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral approximately pentagonal, higher than wide, well visible from above. Bordered posteriorly by nasals, which form a short medial suture. Each nasal divided by an oblique suture. Nostril in its lower part, directed lateroposteriorly. Frontonasal hexagonal or nearly so, in contact with nasals, frontals, and prefrontals. Prefrontals rectangular to hexagonal, with a relatively long medial suture; laterally in contact with loreal, first supraciliary, and first supraocular. Frontal usually hexagonal, but anterior and/or posterior borders may be almost straight. Laterally in contact with first, second, and in some specimens third supraoculars. Frontoparietals, interparietal and parietals relatively small in relation to anterior dorsal head scales. Frontoparietals quadrilateral or pentagonal, longer than wide, with a long medial suture; this may be shorter or longer than suture between prefrontals. Laterally frontoparietals border second (occasionally) and third supraoculars, and small scales on posterior part of supraocular region. Interparietal roughly rectangular, pentagonal or hexagonal. Two (usually), or one, irregular parietals on each side. Interparietal and parietals bordered posteriorly by a number of small, irregular scales. Supraoculars four (exceptionally five), followed by a group of small scales. First and fourth supraoculars distinctly smaller, second slightly larger than third. Second, third, and fourth supraoculars separated from supraciliaries by a row of small scales. Supraciliaries 6-7, rarely eight, first expanded dorsally, second and third elongate, the remaining short. A large, single loreal, in contact with nasal, frontonasal, prefrontal, first supraciliary, preocular, first subocular, and supralabials. Frenocular absent. One preocular (occasionally fused with first subocular), and 3-4 (mostly three) suboculars which border the supralabials; a continuous keel runs along the preocular and the two anterior suboculars. Postoculars smaller than suboculars; they may or may not form a regular row of 4-5 scales. Lower eyelid with an opaque disc of transversely enlarged scales. Supralabials 6-8, 5-6 (rarely seven) to below centre of eye; followed to commissure of mouth by small scales. Temporal scales small, smooth, juxtaposed; peripherally scales a bit larger, and in central area slightly larger on lower than on upper part. A supratemporal row with moderately large scales, usually decreasing in size posteriad. Ear-opening large, round, with smooth margins. Tympanum recessed in a short auditory meatus. All dorsal and lateral head scales juxtaposed, smooth (except for the subocular keel).

Mental anteriorly ellipsoid, posteriorly the sutures with infralabials and postmental form two wide angles. Postmental single, pentagonal. Three pairs of larger chinshields, first pair in medial contact, first and second pairs in contact with infralabials. They are followed at each side by smaller chinshields, usually in two rows, 3-5 scales/row. Medially on chin, scales polygonal, smooth, juxtaposed, anteriorly small (except for a row bordering the chinshields), posteriorly larger. Infralabials 5-7 (mostly six), fifth (occasionally fourth or sixth) below centre of eye, followed to commissure by small scales. Antegular and gular folds well defined. Antegular fold limited at each side by an oblique neck fold, which may be continuous with an ill-defined supernumerary antegular fold. Gular scales irregular, smooth, juxtaposed to slightly imbricate. Anteriorly and laterally to the oblique folds, and along folds, scales small. Between the pair of oblique folds and between the antegular and gular folds scales larger, increasing in size posteriad.

Scales on nape and sides of neck similar to dorsals. Sides of neck with well defined oblique neck and antehumeral folds, plus several small, irregular folds. Antehumeral fold continuous with gular fold.

Dorsals and laterals small, granular, subimbricate, in approximately transverse rows. Ventrals large, smooth, rectangular (wider than long), imbricate, in 10 longitudinal and 29-33 (31.0 ± 1.1, n= 25) transverse rows. A few, progressively smaller scales extend from each transverse row of ventrals laterally. Scales around midbody 130-181 (157.6 ± 12.8, n= 25). Preanal plate with several irregular, smooth, slightly imbricate scales, medial ones larger, usually in three rows. Preanal pores absent. Femoral pores, in total (both legs), 32-49 (39.6 ± 4.3, n= 25). Each pore between 3-4 scales, medial one largest. Pores usually slightly smaller in females.

Scales on tail rectangular or pentagonal (with distal margin slightly angulate),

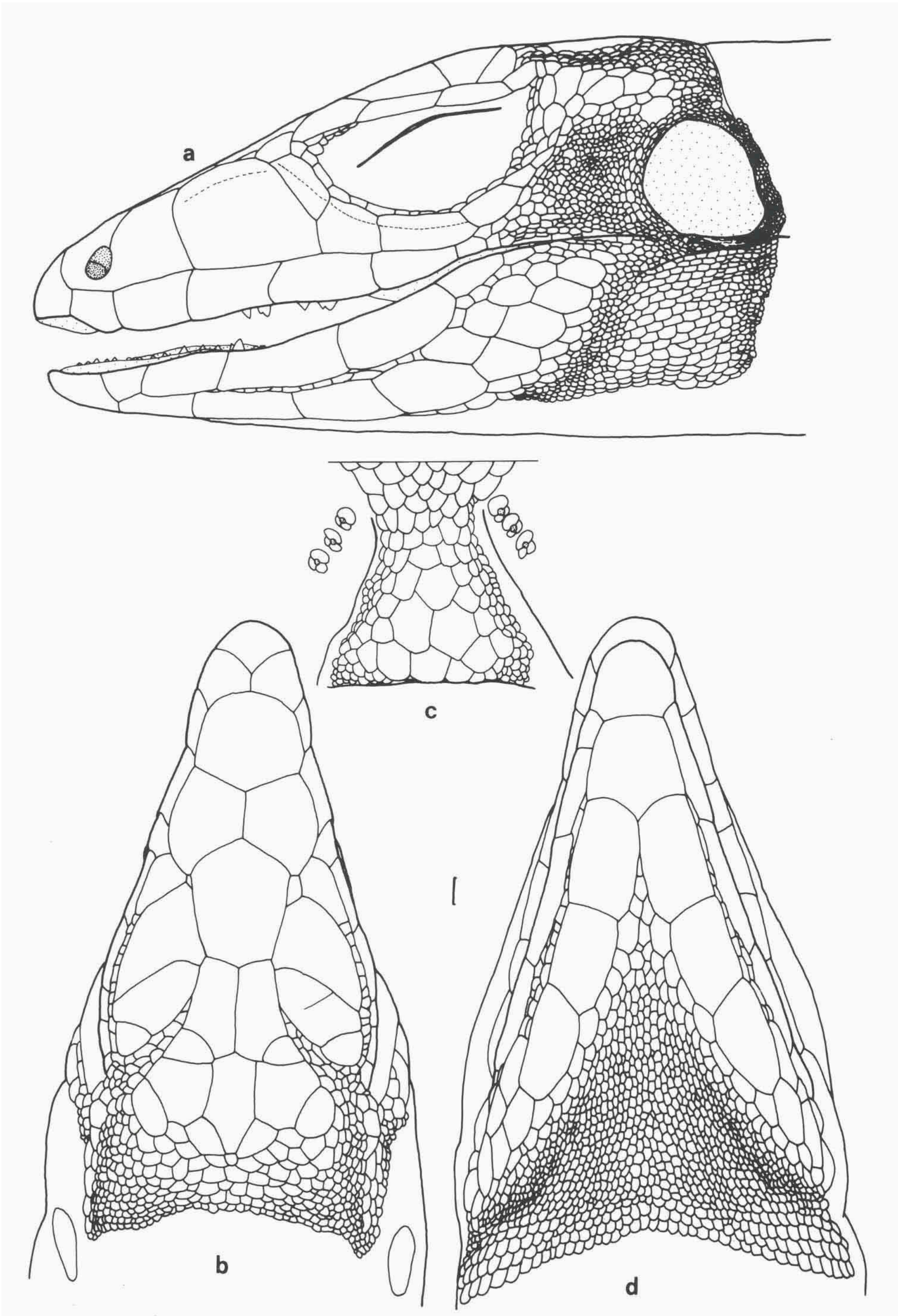


Fig. 174. *Ameiva ameiva*, MPEG 13459; a, b: lateral and dorsal views of head; c: preanal plate and proximal femoral pores; d: ventral view of head.

flanks. Lower part of flanks with light sky blue (168D) spots bordered by black. Ventral region bluish-white, on the sides sky blue (168C). Tail bunting green (150) dorsally, on the ventral surface sky blue (168C) toward the sides, whitish-blue medially (becoming blue distally).

RMNH 25831 (♀, 125 mm SVL) had dorsal surface of head and anterior part of back bunting green (150), posteriorly becoming verona-brown (223B). Upper part of flanks with a warm-sepia band, bordered dorsally and ventrally by a light stripe. Lower part of flanks walnut-brown (221B) and vinaceous-pink (221C), with some light sky blue (168D) spots. Ventral region pearl-white, with a pinkish tinge under head and along the sides. Tail pattern similar to that on body.

Among juveniles and halfgrowns, MPEG 15847 (48 mm SVL) had dorsal surface of head raw-umber (123), back verona-brown (223B). In MPEG 15865 (50 mm SVL) head and anterior part of back was brownish-olive (29), posterior part of back mars-brown (223A). MPEG 15015 (45 mm SVL), RMNH 25829 (62 mm SVL), MPEG 16016 (70 mm SVL), and RMNH 25835 (80 mm SVL) all were green anteriorly, brown posteriorly. MPEG 15886 (115 mm SVL) was completely green on head (dorsally) and back.

Habitat.— Open, sunny areas with some cover of vegetation, be it a natural savanna, natural clearings in forest, or man-made clearings. Common in perianthropic situations, it usually is frequently seen along roads that cut through forest or secondary vegetation, and it is found also in grass fields and parks inside cities (e.g., Belém, Manaus). It is a ground dwelling lizard, at most climbing on fallen tree trunks.

Notes on natural history.— *A. ameiva* is a heliotherm, with body temperature in active animals exceeding by 4-12 °C (mean around 7 °C) the air temperature (Rand & Humphrey, 1968; Fitch, 1968; Duellman, 1978). An analysis of body temperature under different circunstances was given by Magnusson (1993). The lizard basks in relatively large, open areas, and runs away, toward some cover, when someone reaches a certain distance from it. Frequently at first it makes a short run and either stops or continues slowly, to run again for a long distance or to a hole if the person gets closer. While running away, it usually makes a lot of noise, which betrays its presence, even when the animal cannot be seen. At night *A. ameiva* retreats into holes which it excavates in the ground.

A. ameiva searches actively for food, which consists of a variety of Arthropods, and occasionally snails, earthworms, smaller lizards, lizard eggs, and some vegetal matter (Beebe, 1945; Hoogmoed, 1973; Gasc & Lescure, 1977; Duellman, 1978; Magnusson et al., 1985; Vega et al., 1988; Martins, 1991; Vitt, 1991b). Among reported predators are several snakes, namely *Boa constrictor* (Linnaeus), *Clelia c. clelia* (Daudin), *Drymarchon c. corais* (Boie), *Drymoluber dichrous* Amaral, *Mastigodryas boddaerti* (Sentzen), *Oxybelis aeneus* (Wagler), *Pseudoboa coronata* Schneider, *Tripanurgos compressus* (Daudin), *Xenodon severus* (Linnaeus), and *Bothrops atrox* (Linnaeus); the lizard *Tupinambis teguixin*; and three species of hawks, *Heterospizias meridionalis* (Latham), *Buteo magnirostris* (Gmelin) and *Buteo nitidus* (Latham) (Beebe, 1945, 1946; Hoogmoed, 1973; Cunha & Nascimento, 1978; Duellman, 1978; Cunha & Nascimento, 1994). MPEG 13298 was collected while being ingested by the snake *Mastigodryas boddaerti* (MPEG 16669).

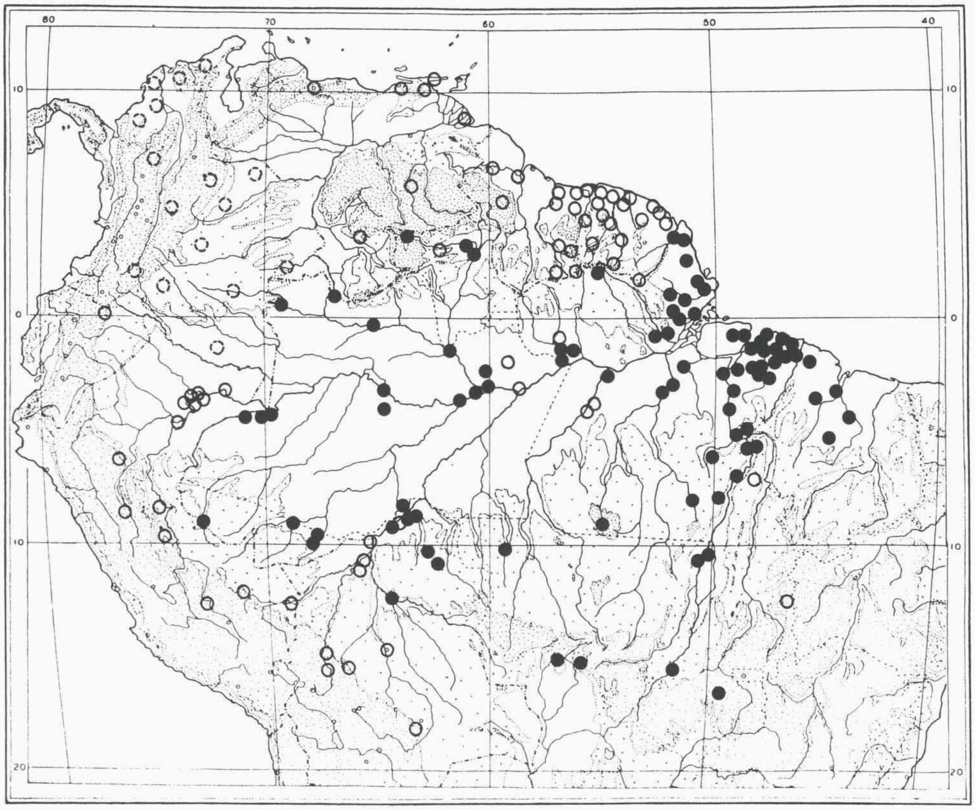


Fig. 175. Distribution of *Ameiva ameiva* in northern South America. Closed circles = material studied. Open circles = data from literature (Cope, 1876; Cott, 1926; Parker, 1935; Amaral, 1937c; Mertens, 1942; Beebe, 1945; Schmidt & Inger, 1951; Test et al., 1966; Donoso-Barros, 1968; Vanzolini, 1972; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Gasc, 1976; Duellman, 1978; Dixon & Soini, 1986; Lescure & Gasc, 1986; Fugler, 1989; Robinson, 1989; Rodriguez & Cadle, 1990; Donnelly & Myers, 1991; Ehrl, 1991; Hoogmoed & Avila-Pires, 1991; Martins, 1991). Dashed circles = data by Ayala (1986) for Colombian states.

Reproductive strategy seems to vary geographically. Data by Vitt (1982) on a caatinga population suggest reproduction year-round (although with two peaks of reproductive periods). Data by Goeldi & Hagmann (1901), from Belém, Brazil; by Fitch (1970), Simmons (1975) and Duellman (1978), from Santa Cecília, Ecuador; by Magnusson (1987) from an amazonian savanna in Pará, Brazil; and by Colli (1991) from an area of cerrado in Central Brazil, suggest one extended reproductive season per year. Data by Hoogmoed (1973) for Suriname indicate two reproductive periods per year. According to Colli (1991) such variation is related to climate type, and especially to rainfall pattern, but this is not supported by data from Santa Cecília, which has an aseasonal climate (type Af in Köppen classification). Clutch sizes of 2-6 eggs have been reported (Goeldi & Hagmann, 1901; Beebe, 1945; Hoogmoed, 1973; Duellman, 1978; Vanzolini et al., 1980; Vitt, 1982; Colli, 1991). According to Vitt (1991b) clutch size is correlated with SVL. Colli (1991) observed a difference in clutch and egg sizes (but not in relative clutch mass) between populations from cerrado and caatinga. Vitt (1992) discussed differences in reproductive characteristics of *A. ameiva* from a caatinga population in northeastern Brazil, and a forest population in Rondônia.

Distribution (fig. 175).— Panama and most of South America east of the Andes (Brazil, French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru, Bolivia, Argentina). Southern limits in southern Brazil and northern Argentina.

Remarks.— *A. ameiva*, together with *Tropidurus* spp., are among the most common lizards known to the layman in Brazil, both in Amazonia and outside. The species is commonly known in Brazil as 'lagarto verde', 'calango verde', or 'jacarepinima'.

Since the species has already been the subject of many descriptions, I have here studied only a small amount of material, from a variety of localities, as a general sample of the species. I did not try to analyze geographic variation, which probably exists considering its wide distributional area. I follow Vanzolini (1986b) in not accepting the subspecies of *A. ameiva* as presently defined. A thorough study of variation in the species, throughout its range (which is out of the scope of this paper), would be necessary to define the possible existence of subspecies, and their distribution. Even if no (or only a few) subspecies were found, an analysis of variation could peharps bring an interesting insight of the history of the species.

Cnemidophorus Wagler, 1830

Diagnosis.— Small to moderately large teiids, with body cylindrical, tail round in cross section, limbs well developed, pentadactyl, all digits clawed. Nasal divided, upper nasal in medial contact. Lower eyelid completely opaque. Dorsals granular. Ventrals rectangular, wider than long, smooth, in 8-12 longitudinal rows. Femoral pores present, preanal pores absent. Tongue posteriorly deeply notched, lingual sheath absent (Presch, 1971).

Distribution.— North, Central and South America, from Wisconsin in the United States to Argentina, absent on the Pacific slopes of South America. Antilles.

Content.— A total of 39 nominal species, of which seven occur in South America (Peters & Donoso-Barros, 1970; Vanzolini, 1986b; Mc Crystal & Dixon, 1987; Cole & Dessauer, 1993). The species present in Amazonia form part of the *C. lemniscatus* species complex, which will be dealt with here as a whole, due to their similarity and the uncertainty in the identification of some populations.

Cnemidophorus ocellifer was reported by Cunha (1961) from Amazonia, based on specimens from Imperatriz, Maranhão (MPEG 736, 737, 739, 742, 743, 744). At the time the specimens were collected (1959) the city of Imperatriz was surrounded by Amazonian forest, but the province (Município de Imperatriz) was much larger than nowadays, ranging from cerrado in the south (continuous with the cerrados of Central Brazil) to forest. Most probably these specimens came from the cerrado, outside the area considered in this study (see also remarks under *C. lemniscatus*). Moreover, MPEG 1107, 1112, 1119-20, 1122, 1126-28, 1131-32, 1136, 1139, 1142, 1144, 1148, 1150, 1152-53, according to the labels from Utinga (IPEAN), Belém, Pará, collected in 1962, collector unknown, are also *C. ocellifer*. Although the specimens are in separate jars, the numbers are intermixed with those of a large sample of *C. lemniscatus* (almost 200 specimens) from the same place and year, collected by SESP (Serviço Especial de Saúde Pública). Certainly this material was mixed during registering, and the locality for *C. ocellifer* is wrong (the material from SESP all have the abdomen open, while none of the *C. ocellifer* specimens do).

Vanzolini (1986a) reported *Cnemidophorus ocellifer* (Spix) from Rondônia, in area(s) of cerrado, with no further comment. These were later referred to by Vitt & Caldwell (1993) as *Cnemidophorus* sp., an undescribed species in the *C. ocellifer* species group. These specimens came from cerrados of southern Rondônia, which form an extension of the cerrados from central Brazil (Vitt & Caldwell, 1993), and are therefore out of the scope of the present study.

Cnemidophorus lemniscatus species complex
(figs. 176, 177, 301-303, 306)

The following citations refer to species included in this complex:

Lacerta lemniscata Linnaeus, 1758 (lectotype NRM 126, according to designation by Cole & Dessauer, 1993; type-locality: 'Guinea', restricted by Hoogmoed, 1973 to the confluence of the Cottica and Perica Creek, Suriname, and by Cole & Dessauer, 1993 to Christiaankondre and Langamankondre, on the west bank of the Marowijne River, Marowijne, Suriname).

Cnemidophorus lemniscatus; Cope, 1876: 164; Boulenger, 1885b: 363; Goeldi, 1902: 537, 543; Hagmann, 1910: 490; Griffin, 1917a: 312; Rand & Humphrey, 1968: 6; Crump, 1971: 20; Vanzolini, 1970: 63; Peccinini, 1971: 133; Peccinini-Seale & Frota-Pessoa, 1974: 439; Hoogmoed, 1979: 278; Avila-Pires et al., 1987: 40; Sites et al., 1990: 906; Vyas et al., 1990: 922; Cole & Dessauer, 1993: 18.

Cnemidophorus lemniscatus lemniscatus; Burt & Burt, 1930: 31, 1931: 324, 1933: 58; Burt, 1931: 30; Amaral, 1937a: 1739, 1937b: 187, 1949: 111; Cunha, 1961: 127, 1981a: 15; Peters & Donoso-Barros, 1970: 93; Hoogmoed, 1973: 262; Cunha et al., 1985: 32; Nascimento et al. 1991: 33.

Cnemidophorus gramivagus McCrystal & Dixon, 1987: 245 (holotype TCWC 46203, type-locality: 6.0 km W San Fernando de Apuré, at Hato de la Guanota, Apuré, Venezuela); Cole & Dessauer, 1993: 20.

Cnemidophorus cryptus Cole & Dessauer, 1993: 20 (holotype AMNH 135089, type-locality: Icabaru, State of Bolivar, Venezuela).

Cnemidophorus pseudolemniscatus Cole & Dessauer, 1993: 23 (holotype AMNH 133304, type-locality: Albina, Marowijne District, Suriname).

Material.— **Brazil.** AMAPA. Serra do Navio: 9 ♀♀, MPEG 15017, 15037, 15075-078, RMNH 25794, 25795-796, in and around Vila ICOMI, 05-10.xi.1988; 3 ♀♀, MPEG 15090-091, RMNH 25797, Rio Amapari, Pedra Preta, 11.xi.1988; 1 ♀, MPEG 15096, barragem de rejeitos do Igarapé Baixinho, 12.xi.1988; 1 ♀, RMNH 25798, near Igarapé Cancão, 13.xi.1988; 2 ♀♀, MPEG 15112, RMNH 25799, upper part of Igarapé Piçarra (near footbal field), 14.xi.1988; 1 ♀, MPEG 15190, Barragem de Agua Limpa do Igarapé Jacaré, 21.xi.1988; 2 ♀♀, MPEG 15205, RMNH 25800, Vila ICOMI, 21.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Cupixi, 50 km S of Serra do Navio: 1 ♀, MPEG 15116, 15.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Maracá, Cachoeira Pancada: 3 ♂♂, 2 ♀♀, MPEG 731- 735, 1954, leg. M. Moreira.

AMAZONAS. Rio Solimões, Manacapuru: 2 ♂♂, 1 ♀, INPA/Ecol. Man-01, Man-02, Man-05, 28.iii.1982, leg. W.E. Magnusson; 1 ♂, 1 ♀, RMNH 25791-792, 26.xi.1985; 1 ♀, RMNH 25793, 14 km NE, 28.xi.1985; all three leg. M.S. Hoogmoed & M. Hero; 1 ♀, MPEG 14536, ix-x.1985, leg. D. Peccinini-Seale. Rio Solimões, Codajás: 1 ♂, 1 ♀, BM 1965.1318-1319, 1964, leg. Guy's Hosp. Amazon Exped. Rio Negro, Cucuí: 32 ♀♀, MPEG 13821-852, 07-24.v.1983, leg. R.C. Best. Rio Uaupés, Missão Salesiana do Jauareté: 2 ♂♂, MPEG 4641-42, 01.iii.1971; 2 ♂♂, 1 ♀, MPEG 4668-70, 15.vi.1971; all leg. M. Moreira. Rio Turi (right affluent Rio Papurí which is right affluent Rio Uaupés), Jauareté, Santa Cruz: 4 ♂♂, 2 ♀♀, MPEG 4648-51, 4653-54, 12.iii.1971, leg. M. Moreira.

PARA. Ilha Mexiana: 1 ♀, BM 1907.7.25.8, leg. G. Hagmann. Ilha de Marajó, Breves: 2 ♀♀, MPEG 16279, 16280, 13.vi.1992, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Tocantins, Cametá: 6 ♀♀, NMW 20438:1-6, 19.i.1911, Museum Goeldi. Floresta Nacional de Caxiuanã, Município de Portel, Rio Caxiuanã, IBAMA post (1°47'32.3"S 51°26'01.5"W): 3 ♀♀, MPEG 16385, 23.x.1992, MPEG 16509, RMNH 26514, 19.xi.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; 4 ♀♀, MPEG 16447-448, RMNH 26515-516, 02.xi.1992, 2 ♀♀, RMNH 26517-518, 19.xi.1992, leg. E.S.B. Ribeiro. Santarém: 1 ♂, 3 ♀♀, NMW 20083, 1875, Steindachner don. Santarém, Alter-do-Chão: 2 ♂♂, 1 ♀, MPEG 14019-021, 18.xii.1984, leg. D. Peccinini-Seale. Município de Faro, Rio Nhamundá, Sítio Céu Estrelado (15 km N of Faro): 8 ♂♂, 15 ♀♀, MPEG 15308-311, 15323, 15326-334, 15410, RMNH 25801-808, 01-12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, Rio Nhamundá, Cabeceira Urucuxi (16 km N of Faro): 4 ♂♂, 5 ♀♀, MPEG 15413-421, 5 exs., RMNH 25809-813, 13.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha.

In addition to specimens listed above, the MPEG has specimens from the following localities (an asterisk indicate those localities from where males are present): AMAZONAS. Manaus*. PARA. Rio Gurupi, road BR-316, Colônia Nova. Km 224 road BR-316. Capanema, Igarapé Urucuri. Marapanim, Marudá. Marapanim, Vista Alegre, beach of Rio Camará. Curuça, Vila Marauá. Curuça, road to Maú. Belém. Rio Acará, Tomé-Açu (Massaranduba). Rio Tocantins, Mangabeira. Rio Tocantins, reservoir area of hydroeletric dam Tucuruí (Cocal, Vila Jacundá). Carajás, Serra Norte, N-4. Road Altamira-Marabá (Transamazônica). Altamira. Rio Paru de Este, Tiriós. RORAIMA. Município de Boa Vista, Região do Taiano, Colônia Coronel Mota*. Município de Boa Vista, Fazenda Bom Intento*.

Diagnosis.— A complex of at least two bisexual and two parthenogenetic (one diploid, one triploid) species, characterised by eight longitudinal rows of ventrals; frontonasal entire; 3-5, mostly 4, supraoculars; one or two larger parietals at each side of interparietal; nasal within nasal suture; males with a preanal spur at each side of preanal plate. Juveniles and adult females with 6-11 light longitudinal stripes, which may be almost completely lost in adult males.

Description.— Teiid with maximum SVL of about 80-100 mm (up to 116 mm in *C. gramivagus* from Venezuela and Colombia). Head 0.22- 0.29 (n= 56) times SVL, 1.4-1.8 (n= 53) times as long as wide, 0.9- 1.2 (n= 52) times as wide as high. Snout slightly elongate, bluntly pointed. Canthus rostralis distinct. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.3-0.4 (n= 53) times SVL, hind limbs 0.6-0.8 (n= 52) times. Tail round in cross section, tapering toward tip, 1.9-2.6 times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral pentagonal, about as wide as high, well visible from above. Bordered posteriorly by nasals, which form a medial suture. Each nasal divided by an oblique suture. Nostril in lower part of suture, directed lateroposteriorly. Frontonasal subhexagonal, or sutures with nasals and loreals tending to form a semicircle, while sutures with prefrontals form a wide angle. Prefrontals quadrilateral or pentagonal, with a medial suture longer than that between nasals; laterally in contact with loreal and first supraocular, sometimes touching first supraciliary and/or second supraocular. Frontal approximately hexagonal, longer than wide and wider anteriorly; sutures with prefrontals from sharply angulate to roundish, those with frontoparietals may form an almost straight line. Frontals laterally in contact with first (sometimes), second and third supraoculars. Frontoparietals, interparietal and parietals relatively small in relation to anterior dorsal head scales. Frontoparietals pentagonal longer than wide, with a long medial suture; laterally in contact with the third supraocular and with small scales that border the supraocular region posteriorly. Interparietal commonly hexagonal, or else tending to triangular, rectangular or pentagonal. At each side of interparietal either one parietal subequal in size to interparietal, laterally bordered by one to three smaller scales; or two subequal parietals. Posterior to interparietal and parietals a number of irregular scales variable in size, sometimes including two moderately enlarged, medial scales. Supraoculars 3-5 (usually four), second and third largest; posteriorly followed by a group of small scales. Laterally all supraoculars, except the first, separated from supraciliaries by a row of small scales. Supraciliaries 5-6, occasionally seven, anterior two (mostly) or three elongate, remaining ones short. A large, mostly single (divided in MPEG 15331), loreal, in contact with nasal, frontonasal, prefrontal, first supraocular (sometimes), first supraciliary, frenocular, and supralabials. Frenocular present, relatively large, in contact with supralabials, loreal, first supraciliary, small scales on ocular region, and first subocular. Exceptionally frenocular and first subocular fused. Suboculars 2-3 (mostly three), large, second longest; all in contact with supralabials, though one or two small scales may be present between them. A continuous keel runs from frenocular to about midlength of second subocular. Postoculars relatively small, more or less in two rows, or one of the rows with 3-4 moderately large scales. Lower eyelid with a semi-opaque disc with transversely enlarged scales. Supralabials 6-9, mostly seven, fifth or sixth below centre of eye; followed to commissure of mouth by small scales. Temporal region with subhexagonal or roundish scales, small centrally, moderately enlarged peripherally. Ear-opening large, vertically oval, with smooth margins. Tympanum recessed in a short auditory meatus. All dorsal and lateral head scales juxtaposed, smooth (surface of frontoparietals, interparietals and parietals may be occasionally rugose; also some short, irregular sulci may be present).

Mental anteriorly ellipsoid, posteriorly sutures with infralabials and postmental form two wide angles. Postmental single, pentagonal. Three to six enlarged pairs of chinshields in two divergent rows, first pair in medial contact, first and mostly second pairs in contact with infralabials. Remaining chinshields separated from infralabials by one row of scales, of which the posterior one to three scales are large. Medially on chin scales small, roundish (more elongate laterally), convex, smooth, slightly imbricate, in oblique rows. Infralabials 5-9, 3-6 to below centre of eye; followed to commissure of mouth by small scales. Gular region with an antegular and a gular fold, both continuing laterally. Anterior to folds scales similar to those on chin, except that they are smaller and in transverse rows. Between the two folds scales larger, irregular, flat, slightly imbricate.

Scales on nape and sides of neck similar to dorsals. Dorsals and scales on flanks small (slightly larger on sacral area), roundish, smooth, subimbricate, in approximately transverse rows; 190-234 (n= 55) scales from nape to base of tail. Ventrals large, smooth, rectangular (wider than long), imbricate, in eight longitudinal and 28-33 (n= 57) transverse rows. Delimitation between ventrals and scales on flanks sharp. Scales around midbody 99-127 (n= 55). Preanal plate most commonly with a large median scale, followed posteriorly by two moderately large scales, anteriorly and laterally these are surrounded by small scales. In some specimens three rows of moderately enlarged scales are present. Males with a lateral preanal spur, dorsally direct-

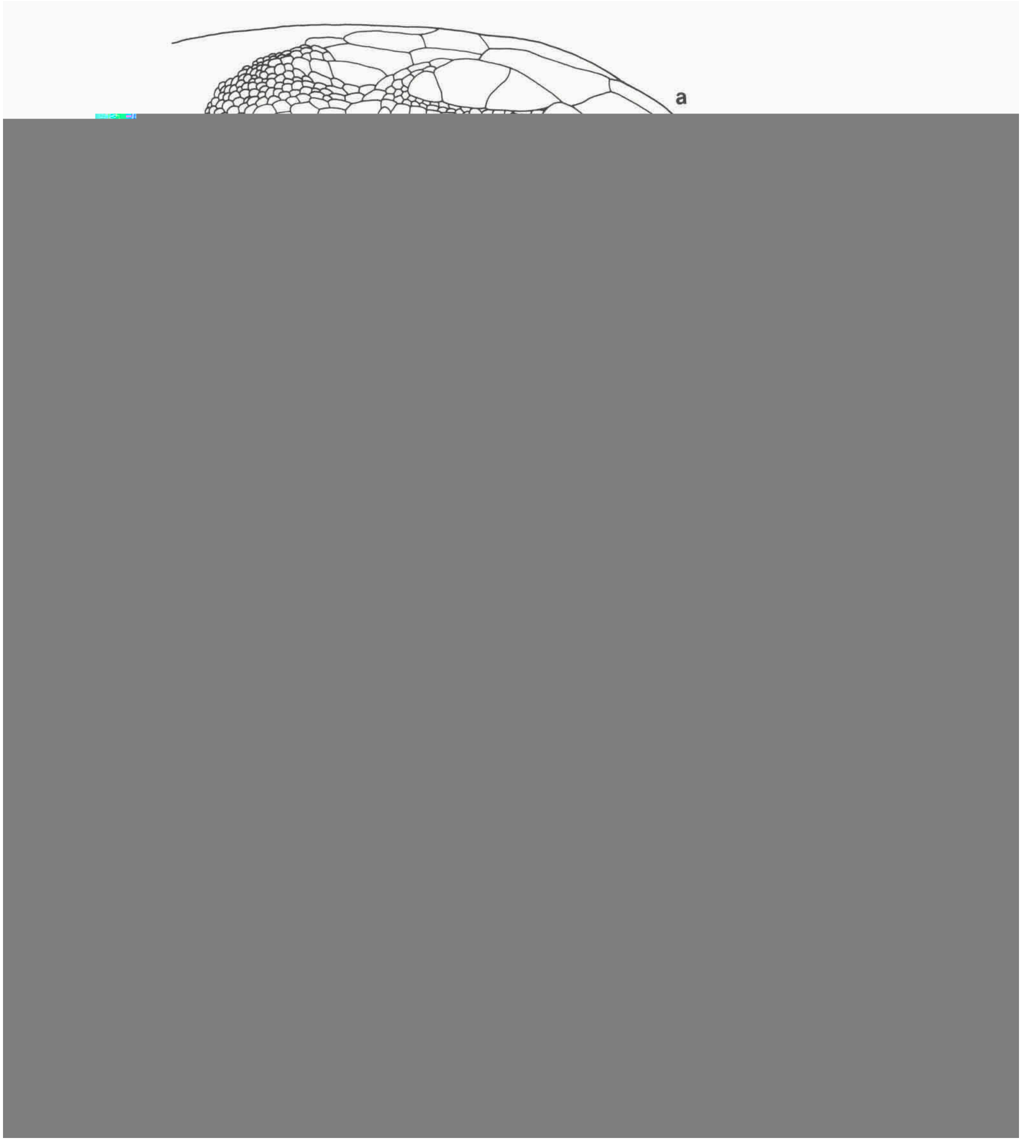


Fig. 176. *Cnemidophorus lemniscatus*, MPEG 15413 (♂); a, b: lateral and dorsal views of head; c: preanal plate and proximal pores; d: ventral view of head.

ed, at each side. Pores in a continuous row along each thigh, medially with a short gap; in total 37-52 pores, each between two to four scales, the one directed medially largest. No sexual dimorphism in number of pores was observed.

Scales on base of tail mostly rectangular (midventral ones may be trapezoidal), longer than wide, keeled, imbricate; in transverse but not longitudinal rows. Distally scales become longer and narrower, rectangular or pentagonal (with posterior margin angulate), distinctly keeled, in transverse and approximate longitudinal rows. The transverse rows are continuous all around the tail.

Limbs with large, smooth, imbricate scales on dorsal aspect of upper arms, antero-dorsal aspect of forearms, antero-ventral aspect of thighs, and ventral aspect of lower legs; elsewhere scales small, granular. Larger scales on upper arms mostly in longitudinal rows, those adjacent to the area of small scales trapezoid, those in internal rows hexagonal to rhomboid. Forearms with one to two rows of trapezoid scales. Thighs with one anterior row of large trapezoid scales, and a few ventral rows of rhomboid scales. Lower legs with two ventral rows of trapezoid or hexagonal scales. Subdigital lamellae mostly transversely enlarged and single (some medially divided), moderately to distinctly tuberculate toward the base. Under base of third toe the tubercles are most prominent, forming a distinct denticulation. Lamellae under fourth finger 14-19 (58 specimens), under fourth toe 27-37 (54 specimens). One or two basal segments under finger, and up to four under toe (which were also considered in the counts) may be divided into smaller scales.

Colour in life sexually dimorphic, with adult males more colourful than females. Among males of cytotype D (*C. lemniscatus*), those from Santarém/Curuá-Una show a vivid blue head, sides of neck and forelimbs, while those from Roraima (pers. com. D. Peccinini-Seale) and Faro, as well as males of cytotype E (*C. ?gramivagus*), have these areas green. A male from Alter-do-Chão showed a vividly blue head and forelimbs, flanks lemon-yellow, back (at least laterally), tail and hind limbs green. Another male from Curuá-Una had the head and forelimbs vividly blue, back with light brown and black stripes, flanks green with pale (yellowish) spots; dorsal aspect of hind limbs brown with light spots, anterior aspect greenish-blue; tail brown on the anterior upper surface, on the sides and posteriorly with a greenish-blue tinge (both descriptions made from slides). MPEG 15326-327 and RMNH 25803-804, from 15 km N of Faro, had the head and forelimbs laterally shamrock-green (162B), flanks chartreuse (158) with sulphur-yellow (157) spots, tail and anterior aspect of hind limbs sulphur-yellow (157) to shamrock-green (162B). A male from Manacapuru (cytotype E) showed top of head brown, snout green, back brown with black lines, and a green dorsolateral line. A horizontal series of white-green spots on neck. Spots on flanks very pale bluish, more intense toward belly. Flanks brownish (slightly purplish), side of tail green. In a female, dorsolateral line on head and neck pale greenish, changing to cream on anterior part of back. Lateral lines creamish, spots on flanks brown. Tail brown with cream lateral stripe (both descriptions by M.S. Hoogmoed, based on slides).

Among parthenogenetic individuals (*C. cryptus*) from Serra do Navio, MPEG 15017, a juvenile, had the head dorsally vinaceous- pink (221C), dorsalmost band on back of the same colour, dorsolateral band black, and the two lateral bands a mixture of vinaceous-pink and black. Stripes pale-pinkish-buff (121D). Round spots on limbs and sides of head from vinaceous-pink to pale- pinkish-buff. Tail proximally with colours similar to those on body, posteriorly becoming greyish. Body and tail ventrally pistachio (161), lighter under head. Iris grey. MPEG 15075, an adult female, showed opaline-green (162D) round spots on flanks.

In preservative, most specimens have a pattern of longitudinal light stripes over a grey (or bluish-grey, brownish-grey) to blackish background. At most there are eleven stripes: two laterals/side, from posterior border of ear-opening, passing above forelimb, until base of hind limb (the upper one may have an anterior segment between eye and ear-opening); two dorsolaterals/side, lateral one from posterior corner of eye, medial one from between level of eye and nape, both until proximal part of tail; a pair of paravertebral stripes, from nape until base of tail; and one vertebral stripe from nape until posterior part of body, reaching base of tail or not. MPEG 14021 has all mentioned stripes, but in most cases the pair of paravertebral and vertebral stripes are not present together, and commonly there is a pair of paravertebral stripes anteriorly, which somewhere along body converge into a vertebral stripe (thus with nine or ten stripes in total, at midbody). Vertebral and paravertebral stripes may show rather blurred limits. The lower lateral stripe may be missing or only be present on neck. In adults, especially males, both lateral stripes disappear and are substituted by light round spots scattered along the flanks; the remaining stripes become paler, and eventually only the lateral dorsolateral stripe may be visible. Between stripes, the darkest area occurs between the two dorsolateral stripes, sometimes extending also between these and the adjacent stripe at each side. Middorsal and lateral areas are usually lighter (either slightly or distinctly). In some adult males the anterior part of the dorsolateral black band may disappear, and the remaining part may have very irregular margins, as if in process of "disintegration". Limbs dark grey, greyish-brown or bluish-grey, with light round spots, especially on hind limbs. Tail proximally with some of the dark bands and light stripes continuing from body, distally uniformly tan or light blue. Ventral region light blue or bluish-white, spotless.

Habitat.— These lizards are inhabitants of open, sunny areas, occurring commonly on sandy beaches along the Amazon river, in natural savanna enclaves, and in perianthropic situations, commonly among grass or shrubs; they do not penetrate the forest.

Parthenogenetic populations of *C. cryptus* seem to be found especially in perianthropic situations. Vanzolini (1970), who mainly studied *C. cryptus*, stated that the lizards were never found in undisturbed situations, "but only in and around towns and sizable settlements ... foraging preferentially in open areas covered by short, sparse grass, such as back country airstrips, where population densities are characteristically high". In Serra do Navio, Amapá, animals were collected in grass fields in and around a residential village surrounded by rainforest. In Belém and in smaller cities in eastern Pará (e.g. Marudá), they are commonly found in grass fields inside the city. In the area presently inundated by the hydroelectric dam Tucuruí, in the Tocantins river, *Cnemidophorus* was found on beaches along the river and in adjacent areas covered with grass.

In Serra Norte, Carajás, the lizards seem to occur only in a restricted area of the 'campo rupestre N-4', one of the enclaves of open vegetation which are characteristic of this mountain chain. The area is largely covered with grasses and other vegetation, mostly densely covering the ground, and it apparently has a larger amount of soil than the more common rocky fields around (Cunha et al., 1985, and pers. obs.). Since 'N-4' was the site of the first larger camp for mineral exploration made in the area (in the late sixties), there is the possibility that specimens have been introduced into the area with material transported there, and since then established a population.

Habitat preference of a population of *C. lemniscatus* (cytotype D, bisexual), from a peninsula forming the eastern bank of the Tapajós river, near Alter-do-Chão, was studied by Magnusson et al. (1986). They concluded that the lizards were more abundant in open places near bushes, on sandy substrate, either in the area of savanna or on the beach that bordered the river. They suggested that open sandy savannas were probably the natural habitat of the species, and that lack of sandy soils may have prevented it from colonizing newly cleared areas. *C. lemniscatus* near Faro occurs both in savanna enclaves with loose sandy soil, between bushes and a kind of wild ananas common in the area, and in large man-made grass fields near the river and houses.

RMNH 25791-25792, from Manacapuru (*C. ?gramivagus*; cytotype E, bisexual), were collected in a grass field, in a park inside the city. RMNH 25793 was found close to Manacapuru, near houses, in an area with white sand substrate. An area recently colonized by specimens of cytotype E was reported by Avila-Pires et al. (1987), in the city of Manaus (where no *Cnemidophorus* originally occurred); the area was a scrap metal yard, and the animals were most probably introduced with material carried to the area by trucks.

Notes on habitats occupied by these lizards in Suriname are given by Hoogmoed (1973) and Serena (1984).

Notes on natural history.— It is a diurnal, heliothermic lizard, which actively searches for food, and hides and sleeps in burrows or crevices. A very characteristic behaviour of these animals is the almost constant hand-waving while they walk, which gave them the popular name 'violeiro' (= guitar-player) in some areas of Pará. Rand & Humphrey (1968) showed that active individuals have a body temperature distinctly higher than that of the air. Magnusson (1993) studied variation of body temperature in active animals, under different circunstances. Intensity of foraging, and other supposedly related characteristics, were studied by Magnusson et al. (1985).

Food consists of insects, spiders, and other invertebrates (Beebe, 1945; Rand & Humphrey, 1968; Hoogmoed, 1973; Gasc & Lescure, 1977). Hoogmoed (1973) reported (from his own data and literature) *Tupinambis teguixin* (= *T. nigropunctatus*), the colubrid snake *Oxybelis a. aeneus* (Wagler), hawks *Leucopternis* and *Gampsonyx*, and the common egret (*Egretta alba* (Linnaeus)) as predators. Beebe (1945) reported a specimen from the stomach of *Tupinambis teguixin*, and Beebe (1946) another one eaten by *Boa constrictor* Linnaeus.

Beebe (1945) and Hoogmoed (1973) gave some data on reproduction. Magnusson (1987) studied the reproductive cycle of a bisexual population from Alter-do-Chão, concluding that reproduction is seasonal, egg deposition occurring mostly during the wet season, growth of juveniles during the dry season.

Distribution (fig. 177).— Amazonian Brazil, French Guiana, Suriname, Guyana, Venezuela, NW Colombia, lower Central America. In Brazil, parthenogenetic forms (at least in part *C. cryptus*) occur in eastern Amazonia, including the states of Amapá and Pará; southward they are present along the Tocantins river at least up to the area presently inundated by the hydroelectric dam Tucuruí, in Serra Norte, Carajás, and along the lower Xingu river; westward along the north bank of the Amazon they reach Oriximiná, but much further west they are also present in Cucuí, along the Rio Negro. Bisexual populations of cytotype D (*C. lemniscatus*) are reported from the

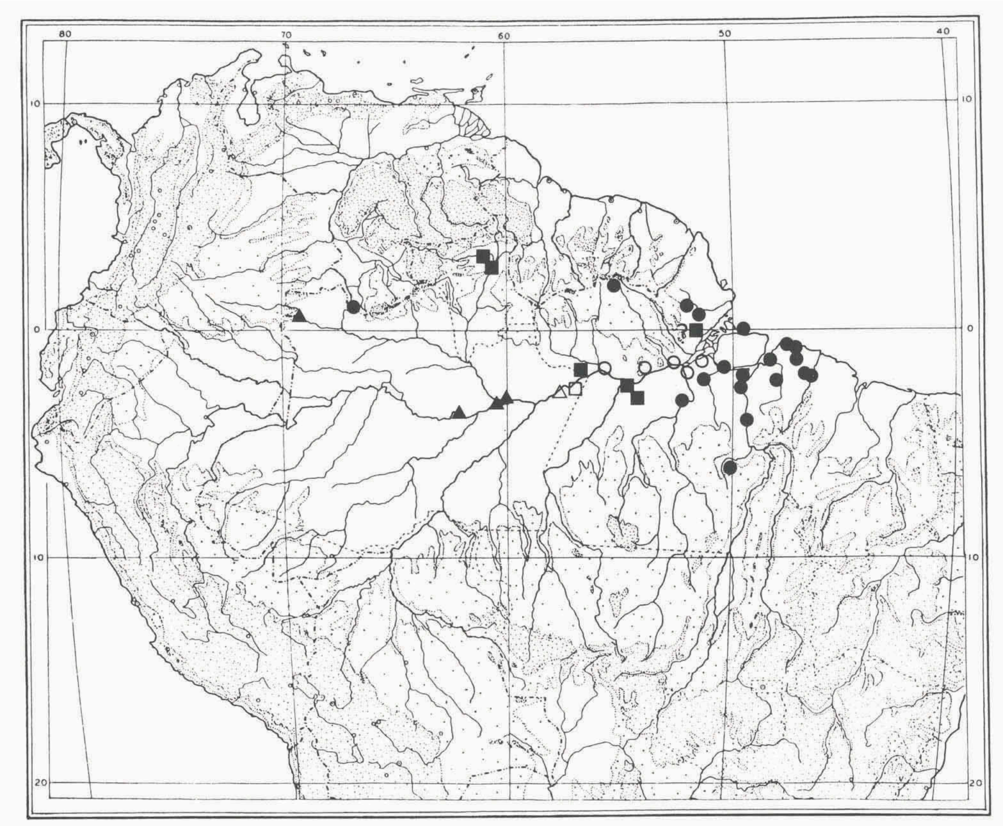


Fig. 177. Distribution of *Cnemidophorus lemniscatus* species complex in Brazil. Closed symbols = material studied (locality Curuá-Una: from slide by W.E. Magnusson). Open symbols = data by Peccinini-Seale (1989). Circles = only females known (supposedly or confirmed parthenogenetic populations, all possibly *C. cryptus*). Squares = bisexual populations of cytotype D (*C. lemniscatus*). Triangles = bisexual populations of cytotype E, or with specimens morphologically alike to those (*C. ?gramivagus*).

Amazon valley, between Curuá-Una/Santarém and Parintins, and from Boa Vista, Roraima. Bisexual populations in Amapá should be confirmed, but if they do occur there, cytotype D would be the most likely. Bisexual populations of cytotype E (*C. ?gramivagus*) are reported from Urucurituba and Manacapuru, in the Amazon valley, from Manaus (as a recent introduction; Avila-Pires et al., 1987), and possibly the specimens here studied from Codajás (further west, on the Amazon) and Jauareté (Uaupés river) also belong to this type.

Remarks.— The presence of parthenogenetic *Cnemidophorus* in Amazonia was first noted by Vanzolini (1970). Since then, the Brazilian populations of *C. lemniscatus* complex have been the object of several cytogenetic studies, especially by Peccinini-Seale (Peccinini, 1971; Peccinini-Seale, 1972, 1989; Peccinini- Seale & Almeida, 1986; Peccinini-Seale & Frota-Pessoa, 1974). She also participated in the studies by Sites et al. (1990) and Vyas et al. (1990), which gave good evidence that the two bisexual cytotypes ("D" and "E") first recognized by Peccinini-Seale & Frota-Pessoa (1974) represented two distinct species, and were probably the parent species of the parthenogenetic forms. Besides, Vyas et al. (1990), studying mitochondrial DNA, showed that parthenogenetic cytotypes A-C arose from a female of cytotype D, and that they probably shared a common maternal lineage. These results indicated that, following Frost & Wright (1988), cytotypes A-C should be regarded as a single species. Not included in these studies were parthenogenetic populations from Suriname, which were shown by Serena (1985) to be triploids. Cole & Dessauer (1993) made electrophoretic analyses of samples from Brazil, Suriname and Venezuela. Besides, they compared the morphology of specimens from these samples, from Guyana, and of *C. gramivagus* from Colombia. Cole & Dessauer's (1993) studies recognised two diploid bisexual and two parthenogenetic (one diploid, one triploid) species. The two diploid bisexual species they identified as *C. lemniscatus* (cytotype D) and *C. gramivagus* (cytotype E). The two parthenogenetic species, for which no names were available, they named *C. cryptus* (diploid forms) and *C. pseudolemniscatus* (triploid forms).

C. pseudolemniscatus is only known from coastal Suriname, and it may also occur in French Guiana (from where triploids also are known: Serena, 1985). Up till now it is not known from Brazil. It is here assumed, therefore, that all Brazilian parthenogenetic populations are *C. cryptus*, although not all have been studied cytogenetically (e.g., those from Amapá and from Upper Rio Negro).

The identification of cytotype E specimens with *C. gramivagus*, which was made only on morphological grounds, in my opinion is doubtful. I examined the holotype (TCWC 46203) and nine paratypes (TCWC 44850, 46151, 46176, 46175, 46182, 46187, 46190, 46193, 46199) of *C. gramivagus*, and compared them with 21 specimens from Manacapuru, Codajás and Uaupés (the latter two morphologically resemble populations of cytotype E). *C. gramivagus* apparently reaches a larger size (SVL 116 mm versus 101 mm) and it differs consistently in colour pattern, with a smaller number of light stripes both in juveniles (six versus seven) and in adults (usually 2 versus usually 4-6). Also the round spots on flanks, in adult males, are larger. I suggest that the recognition of Brazilian populations of cytotype E as *C. gramivagus* remains an open question until more studies have been done. Protein electrophoretic analyses comparing the two groups probably would give an answer to that question. Besides, better samples of Brazilian populations should be obtained, as well as data on life animals. Populations identified with certainty as *C. gramivagus* should be studied cytogenetically.

In external morphology, *C. cryptus* (parthenogenetic) and *C. lemniscatus* (diploid, cytotype D) are much alike, while specimens of cytotype E differ especially in size (maximum SVL 101 mm, versus 80-85 mm in *C. lemniscatus*) and colour pattern. Considering juveniles and at least subadults, the following differences exist between "E"-specimens (a) and *C. lemniscatus* plus *C. cryptus* (b): (1) a. lower lateral light stripe usually missing (or represented only on neck), total number of stripes on midbody usually 7; b. lower lateral stripe present, total number of stripes on midbody 9-11; (2) a. lateral dorsolateral stripe bold, other stripes slightly less; between stripes one or two dorsolateral blackish bands, while middorsal and lateral regions are distinctly lighter; b. all stripes, except vertebral and/or paravertebral ones, approximately equally bold and separated by blackish bands. Among the material studied, MPEG 14535, a female from Manacapuru ("E"-type population), is an exception to the above-mentioned character separation, with ten bold longitudinal stripes separated by black to dark grey bands (*C. lemniscatus* pattern).

In the MPEG collection there are three jars with *Cnemidophorus* from Imperatriz, Maranhão, and one with specimens from "km 75 of road Belém-Brasília", all collected by J. Hidasi. As other collections by J. Hidasi have been shown to be mislabelled, I did not consider this material here.

Kentropyx Spix, 1825

Diagnosis.— Medium-sized teiids, with body cylindrical, tail round in cross section, limbs well developed, pentadactyl, all digits clawed. Nasal divided, upper nasal in medial contact. Lower eyelid completely opaque. Dorsals keeled, either small and irregularly arranged, or large and in longitudinal rows (scales on flanks small). Ventrals phylloid, keeled, in 12-16 longitudinal rows. Preanal pores absent, femoral pores present.

Distribution.— South America east of the Andes, southward reaching southern Brazil (at least until São Paulo), Paraguay, and northern Argentina (Tucumán).

Content.— Eight species which, according to Gallagher & Dixon (1980), can be divided into three groups (*calcarata*, *paulensis*, and *striata* groups). All three species of the *calcarata* group (*K. altamazonica*, *K. calcarata*, and *K. pelviceps*) and one of the two species of the *striata* group (*K. striata*) occur in Amazonia.

Kentropyx altamazonica Cope, 1876
(figs. 178, 179, 307)

Centropyx altamazonicus Cope, 1876: 162 (holotype ANSP 13105, type-locality: Moyabamba, Peru); Boulenger, 1885b: 342.

Centropyx calcaratus; Guichenot, 1855: 32 (part?); Boulenger, 1885b: 341 (part); Goeldi, 1902: 537, 543 (part).

Kentropyx williamsoni Ruthven, 1929: 1 (holotype UMMZ 56850, type-locality: Manaus, Brazil); Burt & Burt, 1933: 67; Amaral, 1937a: 1740, 1937b: 192, 1949: 111; Cunha, 1961: 111; Hoogmoed, 1979: 278.

Centropyx alto-amazonicus; Goeldi, 1902: 537, 543.

Kentropyx calcaratus; Cunha, 1961: 107 (part); Vanzolini, 1972: 105 (part); Hoogmoed, 1979: 278 (part).

Kentropyx altamazonicus; Peters & Donoso-Barros, 1970: 151.

Kentropyx altamazonica; Gallagher & Dixon, 1980: 616, 1992: 130; Vanzolini, 1986b: 11; Gallagher et al., 1986: 179.

Material.— **Brazil.** AMAZONAS. Rio Negro, Arquipélago de Anavilhanas: 2 ♂♂, 1 ♀, INPA 268-270, v.1988, leg. U. Collati. Mouth of Rio Purus: 3 exs., MPEG 2274-76, 1 ♂, 2 ♀♀, MPEG 2278- 80, iv.1967, leg. Milton. Rio Solimões, Codajás: 1 ♂, BM 1965.1317, 1964, leg. Guy's Hospital Amazon Expedition. Rio Japurá (left bank), Município de Maraã, Santa Rita: 7 ♂♂, MPEG 15243-244, 15275, 15287, 15292, 15294, 15299; 7 ♀♀, MPEG 15231- 232, 15252, 15274, 15282, 15288, 15295; 28 exs., MPEG 15210-212, 15219-222, 15229-230, 15233-237, 15239, 15241, 15253-255, 15260, 15262-263, 15268, 15283, 15289, 15296-298; all 07-24.xi.1988, leg. S. Ramos; 2 ♂♂, MPEG 15285-286, 23.xi.1988, leg. E.R. Duarte. Rio Negro, Cucuí: 2 ♂♂, 1 ♀, USNM 80685-87, 02- 08.ii.1930, leg. E.G. Holt. Mouth of Rio Maturaca: 1 ♂, USNM 83550, 08.xi.1930, leg. E.G. Holt. Rio Juruá, Carauari: 1 ♀, BM 1979.133, 09.viii.1978, leg. W.H. Timmis, Wallace Expedition to Amazonas. Rio Solimões, Benjamin Constant: 3 ♂♂, 1 ♀, MPEG 15884- 885, RMNH 25370-371, 07.xii.1989; 1 ♂, 2 ♀♀, 1 juv., MPEG 15921- 922, RMNH 25376-277, 10.xii.1989; 1 ♂, RMNH 25380, 19.xii.1989; all W of city, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 3 ♂♂, 1 ♀, 1 juv.,

MPEG 15902-904, RMNH 25372-373, 08.xii.1989; 3 ♀♀, 1 juv., MPEG 15906-907, RMNH 25374-475, 09.xii.1989; 3 ♂♂, 1 ♀, MPEG 15982-983, RMNH 25378-379, 16.xii.1989; all W of city, leg. M.S. Hoogmoed & T.C.S. Avila Pires through local children; 2 ♀♀, MNRJ 1739a, 1739c, ii.1942, leg. A. Parko. Rio Javari, Estirão do Equador: 2 ♂♂, 4 ♀♀, MPEG 1214-19, 5 exs., MPEG 1221-25, ii.1961, leg. J. Hidasi. Rio Javari, Lago Socó, 140 mi. up from mouth of river: 1 ♂, 3 ♀♀, CM 55641, 20-22.v.1967, leg. N. Richmond.
MATO GROSSO. Rio Papagaio, Salto Utiariti: 1 ex., MNRJ 1740, 20.iv.1909, leg. A. Miranda Ribeiro.
PARA. Lower Rio Xingu, Baía de Souzel (close to Senador José Porfírio): 2 ♂, 3 ♀♀, MPEG 13136-137, 13142-143, 13150, Ilha Cipó-Pitanga (tabuleiro), 06-08.xii.1983; 3 ♂♂, MPEG 13138-140, Ilha Grande, Tabuleiro Embaubal, 06.xii.1983; all leg. T.C.S. Avila Pires; 1 ♂, MPEG 13141, Ilha Cipó-Pitanga (seringal), 07.xii.1983, leg. A.L. Nunes & J.M. Rosa.
Bolivia. LA PAZ. San Fermin (13°58'S 68°58'W): 1 ♂, NRM NNN/1904.809.5224, 1904, N. Holmgren. COCHABAMBA. Provincia Yuracares, upper Rio Chaparé, Puerto San Mateo: 1 ♀, NMW 20424, 1892, Staudinger.
Peru. Percu, 2,600 ft.: 1 ♀, BM 1900.11.27.28, leg. P.O. Simons. LORETO. Rio Cayaru, Paraná Yahú, W of Puerto Alegria (close to Colombian and Brazilian border): 1 ♂, RMNH 25369, 05.xii.1989, leg. M.S. Hoogmeod & T.C.S. Avila Pires. AMAZONAS. Rio Cenepa, vicinity of Huampami, alt. 210 m: 1 ♀, USNM 334982, 31.vii.1977, 1 ♀, USNM 334983, 30.viii.1977, both leg. R.W. McDiarmid. Rio Cenepa, vicinity of Sua: 1 ♂, USNM 334984, 18.viii.1977, leg. R.W. McDiarmid. Rio Santiago, vicinity of Galilea: 1 ♂, USNM 334985, 10.ii.1980, leg. R.W. McDiarmid. Rio Santiago, La Poza: 1 ♂, USNM 334987, 22.i.1980; 1 ♀, USNM 334989, 29.i.1980; 1 ♀, USNM 334991, 12.ii.1980; all leg. R.W. McDiarmid. SAN MARTIN. Sarayacu (6°55'S 77°25'W): 1 ♀, BM 81.5.13.14, pres. Messrs. Veitch. HUANUCO. Rio Huallaga, Tingo Maria, Universidad Agraria de la Selva, 670 m: 1 ♀, USNM 193659, 29.xi.1967, leg. W.C. Sherbrooke. CUZCO. Marcapata Valley (13°31'S 70°52'W): 1 ♀, BM 1902.5.29.182, leg. Ockenden. MADRE DE DIOS. Puerto Maldonado: 1 ♂, ZFMK 33339, vii.1980, leg. Lenkenholff.
Venezuela. T.F. AMAZONAS. Rio Orinoco, Boca Mavaca, 68 km SE Esmeralda: 1 ♀, USNM 162803, 17.ii.1966, leg. M.D. Tuttle. Rio Mavaca, 108 km SSE Esmeralda, 140 m: 1 ♀, USNM 217208, 05.iv.1967, leg. C.O. Handley Jr., Smithsonian Venezuela Project. Rio Negro county, Neblina Base Camp on left bank of Rio Baria (= Rio Mawarinuma), alt. 140 m: 1 ♂, USNM 334993, 10.ii.1984; 1 ♀, USNM 334994, 07.iii.1984; 1 ♂, USNM 334995, 12.iii.1984; 1 ♀, USNM 334996, 09.ii.1985; all leg. R.W. McDiarmid.

Diagnosis.— Dorsals only slightly larger than scales on flanks, not in longitudinal rows. Scales around midbody 107-145 (123.0 ± 8.0, n= 79). Femoral pores 28-42 (33.8 ± 2.9, n= 81) in total. A light, straight, vertebral stripe in juveniles and some adults. At each side a black dorsolateral band, bordered dorsally and ventrally by light stripes, upper one starting on nape, lower one at posterior corner of eye. Lamellae under fingers homogeneously swollen. Sides of toes with well developed denticulate fringe (increasing from first to fourth toe).

Description.— Teiid with maximum SVL in males of 114 mm, in females of 105 mm (Gallagher & Dixon, 1992); among material studied respectively 100 mm (MPEG 15946) and 95 mm (MPEG 15921). Head 0.23-0.28 (n= 82) times SVL, relatively smaller in adults (mostly 0.25-0.27 in ♂♂, 0.23-0.25 in ♀♀); 1.4-1.8 (1.63 ± 0.09, n= 82) times as long as wide; 1.0-1.3 (1.14 ± 0.07, n= 82) times as wide as high. The high sides, long, pointed snout, and distinct canthus rostralis give the head a pyramidal form. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.32-0.44 (0.38 ± 0.03, n= 81) times SVL, hind limbs 0.61-0.88 (0.75 ± 0.05, n= 79) times. Tail round in cross section, tapering toward tip, 1.8-2.6 (2.20 ± 0.17, n= 56) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth tricuspid.

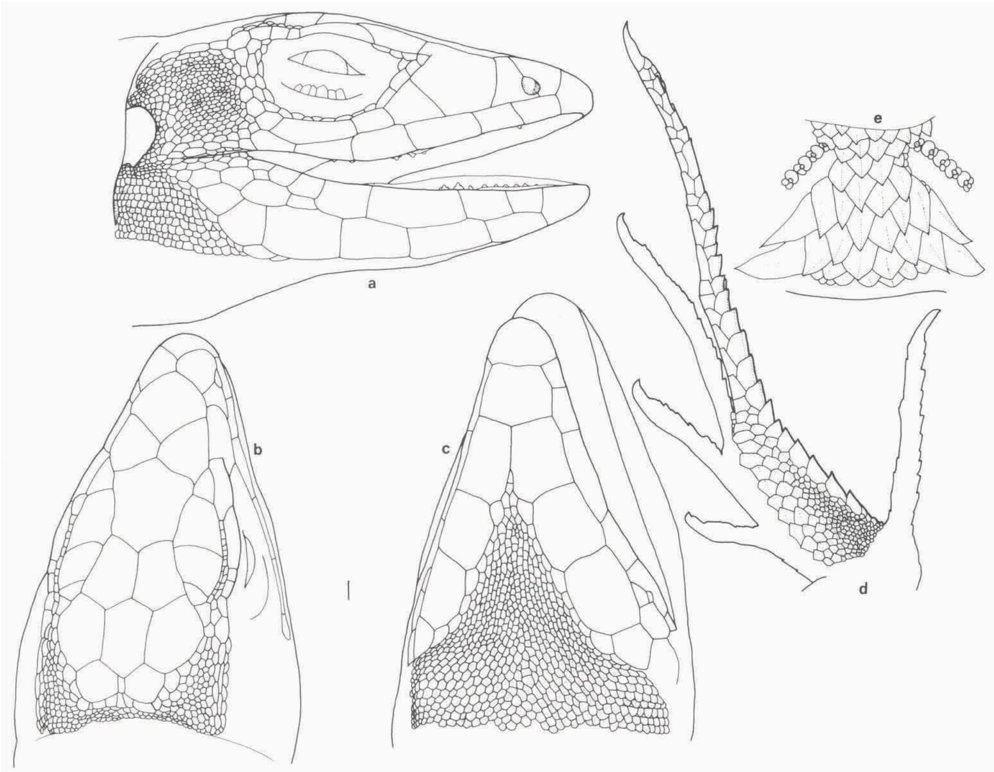


Fig. 178. *Kentropyx altamazonica*; a, b, c: lateral, dorsal, and ventral views of head; d: dorsal view of fourth toe of right foot; all in MPEG 15921; e: preanal plate and proximal femoral pores in MPEG 15946 (♂).

Rostral pentagonal, about as wide as high, distinctly visible from above. Bordered posteriorly by nasals, which form a medial suture. Each nasal divided by an oblique suture, with nostril in its lower part, close to first supralabial, directed latero-posteriorly. Frontonasal hexagonal, about as long as wide. A pair of trapezoid prefrontals, medial suture from slightly to distinctly longer than that between nasals. Frontal hexagonal, longer than wide, laterally mainly in contact with second supraoculars. Frontoparietals irregularly pentagonal, longer than wide, forming a long medial suture. Interparietal and a pair of parietals irregular in shape, followed by two occipitals, with a zigzag border between them. The five scales together show an anteriad divergent, "U"-shaped contour, and are surrounded by small, polygonal, distinctly keeled scales. In RMNH 25373 four scales completely separate the frontoparietals from interparietal/parietals, and three smaller scales separate the interparietal from occipitals. Large specimens with a key-hole shaped ridge along sides of prefrontals (less evident), frontal, frontoparietals, parietals, and posterior border of occipitals. Three supraoculars, first smallest; posteriorly in contact with a group of small scales, laterally second and third supraoculars usually separated from supraciliaries by a row of granules. A small scale may be present on medial corner between first and second supraoculars. Supraciliaries 4-6, mostly five, of which anterior two (exceptionally one) are elongate and reach level of third supraocular, remaining two to four short, small. A very large loreal, in contact with nasal, frontonasal, prefrontal, first supraocular, first supraciliary, some small preoculars, frenocular, and supralabials. Frenocular irregularly quadrilateral, continuous with row of suboculars. Suboculars 2-4, second or third longer, smooth to broadly keeled. Two more-or-less regular series of small, broadly keeled postoculars, ending in a larger scale at level of supraciliaries. Lower eyelid with an opaque disc with some transversely enlarged scales. Pupil may show a ventral and a dorsal shallow concavity, and small indentations in the outline. Supralabials 5-7, mostly six, one before last below centre of eye; between them and commissure of mouth 3-5 smaller, broadly keeled, scales. Temporal scales mostly small, polygonal, distinctly keeled; scales may become larger peripherally, with at least one row of larger scales near border of ear-opening. One or two rows of larger, elongate, keeled supratemporals. Ear-opening relatively large, rounded, with smooth margins. Tympanum recessed in a short auditory meatus. All dorsal and lateral head scales juxtaposed and, except for those already noted, smooth. Not uncommonly there are extra, usually small, scales among those regularly present, especially in parietal/occipital region.

Mental trapezoid with anterior margin convex, or semicircular. Postmental irregularly heptagonal, followed by three pairs of large chinshields which are in contact with infralabials, plus at each side one or a few smaller, but still relatively large scales, usually in two rows, which can also be considered as chinshields. First pair of chinshields usually in contact medially, in some specimens separated by a row of small scales. Posterior chinshields widely separated by small, convex to broadly keeled scales, anterior ones elongate, juxtaposed, posterior ones shorter, imbricate. These scales gradually increase in size toward centre of area, and decrease again near anterior gular fold and toward sides. Infralabials 5-7, 4-5 to below centre of eye; followed to commissure of mouth by small scales. Gular and antegular folds present. Between the two folds a few rows of larger, flat, distinctly keeled, imbricate, pointed scales; posteriad the scales become larger, and the rows wider. Posterior row with 14-22 scales. Gular and antegular folds extend laterally into, respectively, an antehumeral and an oblique neck fold. Other smaller, irregular folds may also be present on sides of neck.

Scales on nape small, convex, hexagonal, distinctly keeled, juxtaposed, grading into dorsals. On sides of neck they are about as large as, or smaller than, scales on nape, more irregular in shape, and they may be partially smooth. Dorsals similar to, but more elongate than scales on nape, in approximately transverse rows; 133-190 (163.2 ± 10.3, n= 73) scales along the middorsal line from nape to base of tail. Toward flanks scales decrease in length and size, and become more irregular in shape and more broadly keeled. Ventrals large, phylloid, sharply keeled and shortly mucronate, imbricate, in 14 (mostly) or 16 longitudinal, and 31-38 (34.2 ± 1.5, n= 81) transverse rows. Laterals and ventrals sharply delimited. Scales around midbody 107-145 (123.0 ± 8.0, n= 79). Preanal plate with scales approximately similar to ventrals, bordered on each side by small scales in females, and by two preanal spurs, directed dorsally, in males. Preanal pores absent, femoral pores 28-42 (33.8 ± 2.9, n= 81) in total (males and females), each pore occupying the centre of a group of scales.

Scales on tail rectangular, obliquely keeled, shortly mucronate, imbricate, except near base on the underside, where they are phylloid. Arranged in complete transverse rings across tail, and in longitudinal rows. Keels form low longitudinal ridges.

Scales on dorsal aspect of upper arms, anterodorsal aspect of forearms, anterior aspect of thighs, and ventral aspect of lower legs large, rhomboid, distinctly keeled, slightly to distinctly mucronate, imbricate. They grade into distinctly smaller and more feebly keeled scales on ventral aspect of thighs. Elsewhere scales small, keeled or smooth, convex, from slightly imbricate to juxtaposed. Fingers with single, transversely enlarged subdigital lamellae, mostly (except distally) with a median tubercle, of which some slightly more prominent than others. Lamellae under toes single, transversely enlarged, mostly (except a few distally) keeled; proximal lamellae tuberculate. Lamellae under fourth finger 14-21 (17.7 ± 1.2, n= 156, 81 specimens), under fourth toe 22-32 (25.7 ± 1.8, n= 159, 81 specimens). Toes with a denticulate fringe along outer side (on both sides at base of fifth toe), especially well developed on fourth toe, and in adults in relation to juveniles.

Colour in life among several specimens from Benjamin Constant, Amazonas, and a neighbouring Peruvian site: on dorsal surface, head and back of a similar or different shade of brown (all dark drab [119B]; head mars-brown [223A] to raw-umber [223], back antique-brown [37] to tawny [38]; head raw-umber [223], back mars-brown [223A] anteriorly, hair-brown [119A] posteriorly). In large specimens (both males and females) a green area may be present on anterior part of back (bunting-green [150] in MPEG 15921). Vertebral stripe (present in ♂♂ 43, 59, 63, 74 mm SVL, ♀♀ 67, 72 mm; absent in ♂♂ 87, 99 mm SVL, ♀ 95 mm) peacock-green (162C), olive-yellow (52), yellow-green (58), sulphur-yellow (157), or sayal-brown (223C) anteriorly and straw-yellow (56) posteriorly. Dorsolateral band maroon (31), more vivid anteriorly, or, more commonly, brick-red (132A) and black (one or the other predominating). Colour of stripes bordering the dorsolateral band similar to, or different from that of vertebral stripe (olive-yellow [52], pale yellow-green [58], pale sulphur-yellow [157], straw-yellow [56] anteriorly and light russet- vinaceous [221D] posteriorly). Flanks dark drab (119B), mars- brown (223A), or hair-brown (119A), in adults (same individuals without vertebral stripe) with light blue spots (in MPEG 15921 sky-blue [168C] anteriorly, light sky-blue [168D] posteriorly). RMNH 25371 (♂, 74 mm SVL) with some pale brown spots on anterior part of flanks. On ventral surface head pinkish-white, belly beige (219D), very pale beige, or pale beige to pale buff (124). Iris orange-brown or pale brown. W.E. Magnusson photographed an adult individual, probably of *K. altamazonica*, in an area of varzea in Lago Jacaretinga (Amazonas), with a completely green back (up to base of tail).

In preservative general dorsal colour dark olive-brown or dull brown, sometimes with a bluish hue. In juveniles and some adults a light vertebral stripe from snout to anterior part of back, at most reaching midbody. At each side one black, or brown with irregular black spots, dorsolateral band, from posterior corner of eye to hind limbs, bordered by light stripes, of which dorsal one starts on nape, ventral one on posterior corner of eye. In large specimens the longitudinal stripes tend to disappear. In most extreme cases (males), the vertebral stripe disappears completely, and of the dorsolateral band only irregular black spots are left. Moreover, large specimens show light blue dots on sides of head and on anterior part of flanks, which on posterior part of flanks coalesce into irregular, vertically elongate spots. Specimens from Peru tend to be more variable: longitudinal stripes frequently have waving margins or interruptions, a paired series of transversely enlarged spots may be present on back, and the light stripe on dorsal side of dorsolateral band may start on supraciliaries. Forelimbs mostly uniformly olive- or dull brown, sometimes with scattered black flecks. Hind limbs with pale light dots, and black flecks which can be rather sparse or form a reticulation. Colour of tail similar to that on back or slightly lighter, either uniform or, more frequently, with darker, irregular spots. Ventral region completely light blue, or a mixture of light blue and cream or white.

Habitat.— *K. altamazonica* is predominantly an inhabitant of relatively open situations, as forest edge, secondary growth, river margins, plantation sites, etc. It seems to be well adapted to seasonally flooded forest, to which environment it is apparently restricted in eastern and central Amazonia, where it is sympatric (but not syntopic) with *K. calcarata*. In western Amazonia it occupies a broader spectrum of the environment, although in places of sympatry with *K. pelviceps* it seems to be restricted to more open situations than the latter (Dixon & Soini, 1975, 1986; Meede, 1984; Gallagher et al., 1986). In the lower Rio Xingu, I observed *K. altamazonica* on some islands with seasonally flooded forest and sandy soil. Unlike *K. calcarata*, individuals (all juveniles and halfgrowns; large specimens not seen) were frequently seen some distance from the ground on vertical surfaces (tree trunks, roots). Probably when the forest is flooded they are restricted to the trees, in a similar way as mentioned by Dixon & Soini (1986) in seasonally flooded lowlands in Peru. Magnusson & Lima (1984) stated that "in the Manaus area, the form *K. altamazonica* occurs only around major rivers (Rio Amazonas, Rio Negro)". Martins (pers. com.) reported these lizards to be common in areas of varzea, where he saw several individuals active on islands of aquatic macrophytes and floating trunks. In the more western locality Benjamin Constant the species was found in terra firme forest, but in all cases either near creeks, in forest edges, or on plantation sites and in secondary growth, while *K. pelviceps* were mostly in the forest itself. In Puerto Alegria, Peru (close to Benjamin Constant), the species was at the edge of (dry) varzea forest and an agricultural area. Rodriguez & Cadle (1990) identified the habitat of *K. altamazonica* in Cocha Cashu, Peru, as primary alluvial forest.

Habitat preference in *K. altamazonica* seems to be indicated by some morphological characteristics. Gallagher et al. (1986) discussed the relationship between habitat preference in *Kentropyx* and number of femoral pores. The well developed denticulate fringe on the sides of toes in *K. altamazonica* seems to be a good adaptation for flooded environments (see Luke, 1986, for a comparison among lizard toe fringes). Dixon & Soini (1986) and Martins (pers. obs.) reported on the ability of the species to run across the water surface and to swim.

Notes on natural history.— As its congeners, *K. altamazonica* is a heliotherm, frequently seen basking. As already discussed above, when in sympatry with either *K. calcarata* or *K. pelviceps*, *K. altamazonica* is the species that occupies the more open sites.

Dixon & Soini (1986) gave some data on reproduction. Although these authors interpreted their data as indicating year-round reproduction, the data do not deny the possibility of a seasonal reproductive cycle. This would be more likely in a seasonally flooded environment.

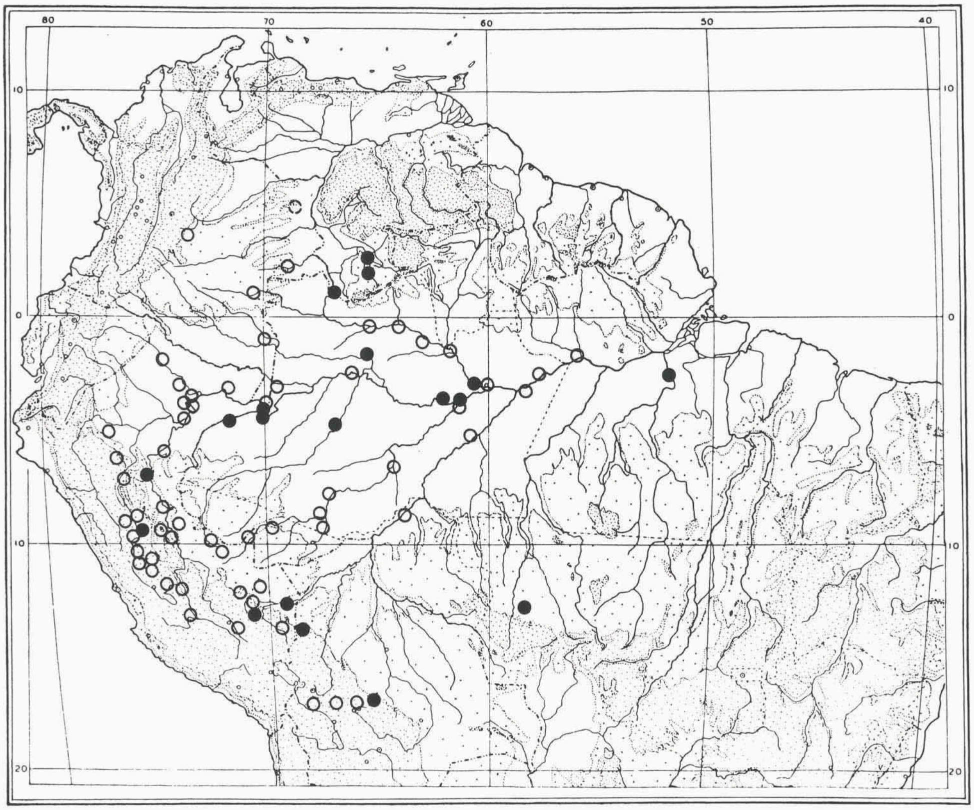


Fig. 179. Distribution of *Kentropyx altamazonica*. Closed symbols = material studied. Open symbols = data from literature (Cope, 1876; Ruthven, 1929; Meede, 1984; Dixon & Soini, 1986; Rodriguez & Cadle, 1990; Gallagher & Dixon, 1992). Dashed symbols = data by Ayala (1986) on Vichada state, Colombia.

Meede (1984) reported as food small arthropods, especially beetles, ants and termites.

Dixon & Soini (1986) reported a coral snake, *Micrurus spixii* Wagler, as predator.

Distribution (fig. 179).— Mainly western Amazonia, in Brazil, Venezuela, Colombia, Peru, and Bolivia. In Brazil extending eastward along the Amazon valley until the lower Rio Xingu. Also a specimen is known from Mato Grosso (MNRJ 1740).

Remarks.- *K. altamazonica*, *K. pelviceps* and *K. calcarata* are closely related species, the first two occupying the western part of the Amazonian region, the latter the eastern part and the Atlantic forest. In central Amazonia *K. altamazonica* and *K. calcarata* seem to come into sympatry. The three species together were considered under the name "*K. calcaratus*" by both Cunha (1961), Vanzolini (1972), and many previous authors. Sometimes *K. pelviceps* was recognized as a separate species, but *K. altamazonica* and *K. calcarata* were not distinguished. Gallagher & Dixon (1980) recognized three species groups in *Kentropyx*, including a "*calcarata* group" formed by the three above mentioned species. A list of synonymies and a key to the species of *Kentropyx* were presented. Within the *calcarata* group, species were separated by their colour pattern. Gallagher et al. (1986) analyzed the geographical variation of the *calcarata* group, reinforcing the distinction between the three species. Gallagher & Dixon (1992) presented a general revision of the whole genus.

The material of the three species examined by me does not permit firm conclusions about variation of scale and pore counts. I agree with Gallagher et al. (1986) that number of pores is the most distinct quantitative character among the species, although with some overlap. On the basis of colour pattern it is always possible to separate *K. pelviceps* from the other two, and in most cases to separate *K. altamazonica* from *K. calcarata*. Exceptions are some large specimens (mainly males), where the light longitudinal stripes disappear completely. On the other hand, two other characters, both linked to the digits, separate *K. altamazonica* from *K. calcarata* and *K. pelviceps*: (1) in the three species the lamellae under the fingers are swollen medially, but they are rather uniform in the first species, and distinctly heterogeneous in the latter two; (2) *K. altamazonica* presents a well developed lateral fringe on the toes, which is only moderately developed in *K. calcarata*, and poorly developed in *K. pelviceps*. One interesting aspect of these differences is that they are probably closely associated with the ecological niche occupied by each species.

Due to the confusion in the identification of the species, several records in the literature were not considered for the delimitation of the geographic distribution of each species.

Stavenhagen (in Gallagher & Dixon, 1980) showed that the name *Kentropyx* was from Greek derivation and of feminine gender, so requiring the alteration of some of the specific endings which were being used in the masculine.

Kentropyx calcarata Spix, 1825
(figs. 180, 181, 304)

Kentropyx calcaratus Spix, 1825: 21 (type(s) lost, type-locality: Rio Itapicuru, Maranhão, Brasil); Burt & Burt, 1930: 34 (part), 1931: 343 (part); Amaral, 1937a: 1940, 1937b: 192, 1949: 111; Cunha, 1961: 107 (part); Rand & Humphrey, 1968: 7; Peters & Donoso-Barros, 1970: 151; Crump, 1971: 20; Vanzolini, 1972: 105 (part); Hoogmoed, 1973: 293, 1979: 278 (part); Hoogmoed & Gruber, 1983: 393; Magnusson & Lima, 1984: 73; O'Shea, 1989: 68.

Lacerta striata; Wied, 1825: 186.

Teius intermedius Gray, 1831: 31 (lectotype, according to designation by Hoogmoed, 1973, RMNH 3379a; type-locality: Suriname).

Centropyx calcaratus; Duméril & Bibron, 1839: 149; Guichenot, 1855: 32 (part?); Boulenger, 1885b: 341 (part); Goeldi, 1902: 536, 543 (part); Müller, 1912: 14, 39; Cott, 1926: 1160.

Kentropyx calcarata; Gallagher & Dixon, 1980: 616, 1992: 137; Vanzolini, 1986b: 11; Cunha et al., 1985: 33; Gallagher et al. 1986: 179; Nascimento et al. 1988: 38, 1991: 33, 40; Hoogmoed & Avila-Pires, 1989: 168; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182.

Kentropyx grupo *calcarata*; Vanzolini, 1986a: 14 (part?).

Material.— **Brazil.** AMAPA. Município Calçoene, road BR-156, Colônia do Torrão: 1 ♂, MPEG 3499, 17.xi.1969, leg. F.P. Nascimento. Município Amapá, Rio Tracajatuba, affluent right bank Rio Araguari, Reserva D.N.E.Ru posto no. 2: 3 ♂♂, MPEG 2709-10, 2713, 10-11.vii.1969; 1 ♀, MPEG 2717, 14.vii.1969; all 4 leg. F.P. Nascimento. Município Amapá, Igarapé Ariramba, affluent right bank Rio Tartarugal Grande, Reserva D.N.E.Ru posto no. 4: 2 ♀♀, MPEG 2719, 2121, 19.vii.1969, leg. F.P. Nascimento. Serra do Navio: 1 ♂, KU 97864, x.1964; 3 ♂♂, 1 ♀, 1 juv., MPEG 15015-016, 15040, RMNH 25831, RMNH 26519, 05-06.xi.1988; 2 juv., MPEG 15082, RMNH 25382, 10.xi.1988; 1 ♀, MPEG 15097, 12.xi.1988; 1 ♂, 1 ♀, MPEG 15111, RMNH 25383, 14.xi.1988; 2 ♂♂, MPEG 15123-124, 17.xi.1988; 2 ♂♂, 3 ♀♀, MPEG 15138, 15173-174, RMNH 26520, RMNH 25385, 19.xi.1988; 2 ♂♂, 1 ♀, MPEG 15180-181, RMNH 25386, 20.xi.1988; all leg. M.S. Hoogmoed & T.C.S. Avila Pires. Road Serra do Navio-Araguari, igarapé Caneco, 1 km W of Rio Araguari: 2 ♂♂, MPEG 15129, RMNH 25384, 18.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Porto Platon: 1 ♀, KU 97865, xi.1964.

AMAZONAS. Município Nhamundá, region of Matias, west bank Rio Nhamundá, opposite Sítio Céu Estrelado (15 km N of Faro): 1 ♂, MPEG 15317, 02.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Uatumã, reservoir area of hydroelectric plant Balbina: 2 ♂♂, MPEG 14711-712, 5 km from dam, 18.xii.1987, leg. R.J.R. Moraes & rescue team; 1 ♂, 1 ♀, MPEG 14826-827, Base I, 26.i.1988, leg. F.P. Nascimento & F. Braga; 1 ♂, MPEG 14906, Base I, 10.ii.1988, leg. rescue team. Reserva Florestal Ducke, 25 km N Manaus: 1 juv., INPA/Ecol. w/o no., 31.iii.1984, leg. W.E. Magnusson. Rio Aripuanã, Vista Alegre, mouth of Rio Guariba: 1 ♂, MPEG 9187, 31.x.1975, leg. F.C. Novaes.

MARANHAO. Município do Arari, road BR-222, Gancho do Arari: 1 ♂, MPEG 11519, ii.1978, leg. O.R. Cunha & F.P. Nascimento; 2 ♂♂, 1 ♀, MPEG 11965, 11970, 11973, x.1978, leg. F.P. Nascimento & Rosemiro. Road BR-222, Puraqueú (27 km E of Vitória do Mearim): 1 ♀, MPEG 12661, 03.ii.1980, leg. O.R. Cunha & F.P. Nascimento. Road BR-226, Aldeia Sapucaia (Guajajara indians), c. 60 km E of Barra do Corda: 1 ♀, MPEG 12454, 13.viii.1979, leg. F.P. Nascimento & R.J.R. Moraes. Road BR-316, Paruá: 2 ♀♀, MPEG 10516-517, x.1976, leg. O.R. Cunha & F.P. Nascimento; 2 ♂♂, MPEG 11221, 11225, 22.x.1977, leg. F.P. Nascimento.

MATO GROSSO. 12°51'S 51°46'W: 1 ♂, 1 ♀, BM 1972.385-386, 1967-69, Xavantina-Cachimbo Expedition. Barra dos Bugres, Estação Ecológica Serra das Araras: 1 ♂, MPEG 14328, 29.i.1986, leg. R.J.R. Moraes.

PARA. Ilha de Marajó: 1 ♂, BM 1900.4.2.1, leg. E. Goeldi; 1 ♂, BM 1924.2.28.11, purch. W. Ehrhardt. Trombetinha, road to Salinópolis: 1 ♀, MPEG 6215, 17.iii.1973, leg. O.R. Cunha & F.P. Nascimento. Belém: 2 exs., ZFMK 30374-375, Utinga, 25- 27.xii.1909, leg. L. Müller; 1 ♂, MNRJ 1737, Aurá, v.1940, leg. A.L. Carvalho; 1 ♂, USNM 158068, 10.vii.1965, leg. P.S. Humphrey; 1 ♀, USNM 159227, 02.vii.1964, leg. P.S. & S.S. Humphrey. Município de Abaetetuba, Piratuba: 1 ♂, MNRJ 1741, xii.1937, leg. A.L. Carvalho. Rio Tocantins, reservoir area of hydroelectric plant Tucuruí: 1 ♀, MPEG 13406, Chiqueirão, 16.iv.1984, leg. R.J.R. Moraes; 2 ♂♂, 1 ♀, MPEG 13448, 13473, 13489, 2-8 km S Jacundá, 08-13.v.1984, leg. T.C.S. Avila Pires, I.J Lopes & R. Santana; 2 ♂♂, MPEG 13776-777, Ilha Tocantins, 15-17.vii.1984, leg. R.J.R. Moraes; 2 ♀♀, MPEG 13784, 13789, Ilha Tocantins, 21-23.vii.1984, leg. I.J. Lopes. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna/MPEG (1°44'10.7"S 51°27'11.3"W): 1 ♀, MPEG 16357, 22.x.1992; 1 ♀, MPEG 16396, 26.x.1992; 1 ♂, RMNH 26521, 28.x.1992; 2 exs., MPEG 16418, RMNH 26725, 29.x.1992; 1 ♀, RMNH 26522, 30.x.1992; 1 ♂, MPEG 16426, 31.x.1992; 2 ♀♀, MPEG 16437, RMNH 26523, 03.xi.1992; 1 ♀, MPEG 16451, 06.xi.1992; 1 juv., RMNH 26524, 09.xi.1992; 2 ♀♀, MPEG 16464, RMNH 26525, 10.xi.1992; 1 ♀, MPEG 16469, 11.xi.1992; 1 ♀, MPEG 16476, 1 ♂, 1 juv., RMNH 26526-527, 13.xi.1992; 1 ♂, MPEG 16484, 1 ex., RMNH 26528, 14.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA post (1°47'32.3"S 51°26'01.5"W): 1 ex., RMNH 26529, 23.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, W margin Caxiuanã bay, archeological site "Munduquinha" (SW IBAMA post, 1°51'20.0"S 51°25'59.0"W): 2 ♀♀, MPEG 16389-390, 2 exs., RMNH 26530-531, 24.x.1992; 1 ♀, MPEG 16497, 1 ex., RMNH 26532, 16.xi.1992; all leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Rio Trombetas, reservoir area of hydroelectric plant Cachoeira Porteira: 1 ♂, INPA 010, Rio Mapuera, 08.v.1985, leg. R.C. Best; 1 ♀, INPA 131, mouth of igarapé Tramalhetinho, 01.xi.1985, leg. A.L. Queiroz. Município de Oriximiná, Cruz Alta, 6 km S of Rio Trombetas: 1 ♀, MPEG 15364, 08.xii.1988; 1 ♂, RMNH 25387, 10.xii.1988; both leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Município de Faro, road from Sítio Céu Estrelado to Cruz Alta, between Nhamundá and Trombetas rivers, near Igarapé Jamari: 1 ♀, MPEG 15430, 14.xii.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.

RONDONIA. Rio Jamari, reservoir area of hydroelectric plant Samuel: 2 exs., CEPB 0120, 0133, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.

French Guiana. R. Sinnamary, Petit Saut: 1 ♂, RMNH 25388, 08.xi.1989; 8 juv. (collected as eggs),

MPEG 16162-165, RMNH 25389-391, 26533, 10.xi.1989; 1 ♂, MPEG 15831, 12.xi.1989; all leg. M.S. Hoogmoed & T.C.S. Avila Pires.
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Município Calçoene, Igarapé Flaman. Município de Amapá, road BR-156: Cujubim; Igarapé Agua Branca. Macapá, Fazendinha. Município de Mazagão, Rio Camaipi (affluent left bank Rio Maracá), Cachoeiras Inajá, Itaboca and Amapá. Município de Mazagão, Rio Maracá, Cachoeira Pancada. AMAZONAS. Km. 47 road Manaus-Itacoatiara. MARANHAO. Grajaú, Fazenda da Onça, km. 36 road Transmaranhão. Paruá, road BR-316. Igarapé Gurupi-Una, Aldeia Yavaruhu (Araçu), c. 50 km from Canindé. Rio Gurupi, Canindé. Nova Vida (25 km from Rio Gurupi). PARA. Ilha Mexiana. Ilha de Marajó: Salvaterra; Município de Chaves, Fazenda Marajá; Anajás, Rio Aramá, Vila Nova do Aramá; Município de Breves, km 6 road Breves-Anajás. Viseu, Bela Vista. Viseu, Rio Piriá, Curupati. Km 224 of road BR-316 (Pará- Maranhão). Município Augusto Correa, Fazenda Cacoal. Bragança, Bom Jesus. Capitão Poço, Santa Luzia. Capitão Poço, São Pedro. Capanema. Peixe-Boi. Castanhal, Rio Apeú, Macapazinho. Castanhal Rio Apeú, Boa Vista. Curuçá, Vila Marauá. São Caetano de Odivelas (igarapé Repartimento). Santa Rosa (road to Vigia). Benevides, Genipaúba. Road Belém-Mosqueiro, between Santa Bárbara and Furo das Marinhas, and between Furo das Marinhas and Carananduba. Ilha do Mosqueiro. Km 16 road to Acará (PA-252). Rio Parajauara, road to Acará. Acará, Jacarequara. Vila Nova, km 71 road PA-256 (Tomé- Açu to Paragominas). Kms 32 and 42 road PA-332. Km 198 road PA- 332 (11 km from Rio Tocantins). Sítio Bela Vista, km 135 road PA- 332. Rio Moju, Itacuã, near Rio Jambuaçu. Road PA-332, near Vila Rondon. Road between Rio Tocantins and Rio Moju, 12 miles from Tucuruí dam. Rio Moju, mouth of Rio Jambuaçu, road Malafaite. Km 3-4 road secondary from Transamazônica, c. 7 km from Porto Jarbas Passarinho. Carajás, Serra Norte. Transamazônica, between Marabá and Altamira, Igarapé do Jôa. Transamazônica, between Altamira and Itaituba, Kms 74 and 100. Santarém, road to Cachoeira do Palhão, surroundings Igarapé Curupira. Almerim, São Raimundo Agroindustrial Ltda (Projeto Jari). RONDONIA. Jaci-Paraná. Porto Velho, Fazenda Rio Candeias. Ouro Preto d'Oeste. Ji-Paraná.

Diagnosis.— Dorsals only slightly larger than scales on flanks, not in longitudinal rows. Scales around midbody 112-154 (130.6 ± 9.0, n= 54). Femoral pores 32-43 (37.1 ± 3.0, n= 55) in total. A light, straight, vertebral stripe in juveniles and some adults. At each side a light stripe which starts on lower border of eye, rises gently to a dorsolateral position, and reaches the base of the tail. A light stripe between limbs either absent or intermittent. Lamellae under fingers tuberculate, with tubercles more developed on some lamellae than on others of same digit. Sides of toes with moderately developed denticulate fringe.

Description.— Teiid with maximum SVL in males of 110 mm (MPEG 9178), in females of 105 mm (MPEG 15430). Head 0.23-0.28 (n= 58) times SVL, relatively smaller in adults (mostly 0.25-0.27 in ♂♂, 0.23-0.24 in ♀♀ ≥ 90 mm SVL; in juveniles 0.26-0.28); 1.5-1.8 (1.60 ± 0.07, n= 58) times as long as wide; and 1.1-1.3 (1.17 ± 0.05, n= 58) times as wide as high. The high sides, elongate, pointed snout, and distinct canthus rostralis give the head a pyramidal form. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.34-0.46 (0.39 ± 0.02, n= 55) times SVL, hind limbs 0.67-0.91 (0.78 ± 0.06, n= 55) times. Tail round in cross section, tapering toward tip, 1.9-2.5 (2.23 ± 0.13, n= 37) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral pentagonal, about as wide as high, distinctly visible from above. Bordered posteriorly by nasals, which form a medial suture. Each nasal divided by an oblique suture, with nostril in its lower part, close to first supralabial, directed latero-posteriorly. Frontonasal hexagonal, about as long as wide. A pair of trapezoid prefrontals, medial suture from as long as, to distinctly longer than that between nasals. Frontal hexagonal, longer than wide, laterally in contact with first and second supraoculars. Frontoparietals irregularly pentagonal, longer than wide, forming a long medial suture (in RMNH 25384 there is a relatively small, subtriangular scale between frontoparietals and interparietal). Interparietal and a pair of parietals irregular in shape, followed by two occipitals, with a zigzag border between them. The five scales show an anteriad divergent, "U"- shaped contour, and are surrounded by small, polygonal, distinctly keeled scales. Large specimens with a key-hole shaped ridge along sides of prefrontals (less evident), frontal, frontoparietals, parietals, and posterior border of occipitals. Three supraoculars, first smallest; posteriorly in contact with a group of small scales, laterally second and third supraoculars are usually separated from supraciliaries by a row of granules. Supraciliaries 4-6, mostly five, of which the anterior two are elongate and reach level of third supraocular, the remaining two to four short, small. A very large loreal, in contact with nasal, frontonasal, prefrontal, first supraocular, first supraciliary, preoculars, first subocular, and supralabials. Frenocular usually absent, exceptionally present as a relatively small, irregular scale. Preoculars 1-2, one of which usually elongate, keeled. Suboculars 2-4, second or third longest, smooth to broadly keeled. Two more-or-less regular series of small, smooth to broadly keeled postoculars, ending in larger scale at level of supraciliaries. Lower eyelid with opaque disc with some transversely enlarged scales. Pupil with a ventral concavity and in some specimens an undulating dorsal outline. Six, rarely seven, supralabials, one before last below centre of eye. Followed to commissure of mouth by 3-5 smaller, keeled, scales. Temporal scales mostly small, polygonal, distinctly keeled; they may become larger peripheraly, with at least one row of larger scales near border of ear-opening. One or two rows of elongate, keeled supratemporals, larger than temporal scales. Ear-opening relatively large, rounded, with smooth margins. Tympanum recessed in a short auditory meatus. All dorsal and lateral head scales juxtaposed and, except for those already noted, smooth.

Mental trapezoid with anterior margin convex, or semicircular. Postmental irregularly heptagonal, followed by three pairs of large chinshields which are in contact with infralabials, plus at each side one or a few smaller, but still relatively large scales, usually in two rows, which can also be considered as chinshields. First pair of chinshields usually in contact medially, in some specimens separated by a row of small scales. Posterior chinshields widely separated by small, convex to broadly keeled scales, anteriorly elongate, juxtaposed, posteriorly short, imbricate. They gradually increase in size toward centre, and decrease again near anterior gular fold and toward sides. Infralabials 5-7, exceptionally 8, 4-5 to below centre of eye. Followed to commissure of mouth by small scales. Gular and antegular folds present. Between gular folds a few rows of larger, flat, distinctly keeled, imbricate, pointed scales, which become larger, in wider rows, posteriad; 14-22 scales in posterior row. Gular and antegular folds extend laterally into, respectively, an antehumeral and an oblique neck fold. Other smaller, irregular folds may also be present on sides of neck.

Scales on nape small, convex, hexagonal, distinctly keeled, juxtaposed, grading into dorsals; on sides of neck smaller, more irregular in shape, and they may be less distinctly keeled. Dorsals slightly larger and more elongate than scales on nape, in approximately transverse rows; 137-182 (155.8 ± 10.5, n= 53) scales along the middorsal line from nape to base of tail. Toward flanks scales decrease in length and size,

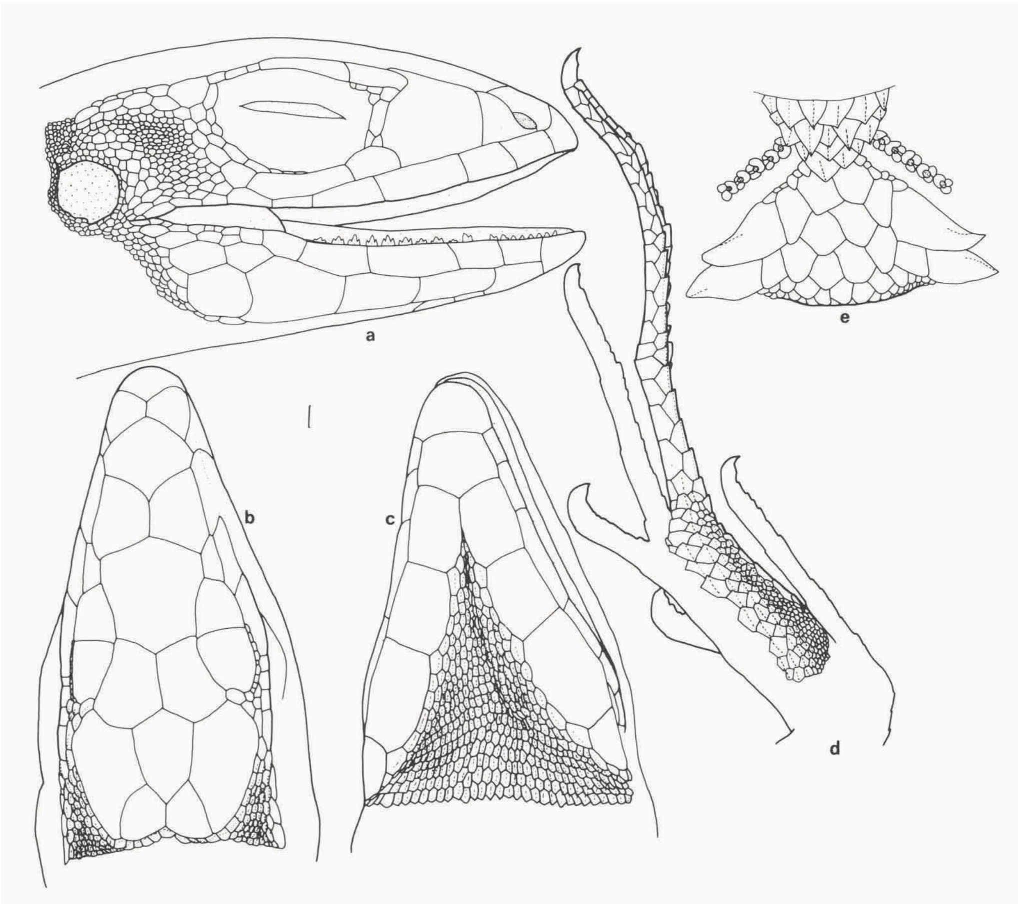


Fig. 180. *Kentropyx calcarata*, MPEG 14711 (♂); a, b, c: lateral, dorsal, and ventral views of head; d: dorsal view of fourth toe of right foot; e: preanal plate and proximal femoral pores.

and become more irregular in shape and more broadly keeled. Ventrals large, phylloid, sharply keeled and shortly to distinctly mucronate (small juveniles may have only very faint keels and no mucro), imbricate, in 14 (mostly) or 16 longitudinal, and 30-35 (32.7 ± 1.2, n= 55) transverse rows. Laterals and ventrals sharply delimited. Scales around midbody 112-154 (130.6 ± 9.0, n= 54). Preanal plate with scales approximately similar to ventrals, or smooth and blunt; bordered on each side by small scales in females, and by two preanal spurs, directed dorsally, in males. Preanal pores absent, femoral pores 32-43 (37.1 ± 3.0, n= 55) in total (males and females). Each pore occupies the centre of a group of scales.

Scales on tail rectangular, obliquely keeled, mucronate, imbricate, except near base on the underside, where they are phylloid. Arranged in complete transverse rings across tail, and in longitudinal rows. Keels form low longitudinal ridges.

Scales on dorsal aspect of upper arms, anterodorsal aspect of forearms, anterior aspect of thighs, and ventral aspect of lower legs large, rhomboid, distinctly keeled, slightly to distinctly mucronate, imbricate. They grade into smaller but similar scales on ventral aspect of thighs. Elsewhere scales distinctly smaller, keeled or smooth, convex, from slightly imbricate to juxtaposed. Fingers with single, transversely enlarged subdigital lamellae, mostly (except distally) with a median tubercle, of which some distinctly more prominent than others. Toes with single, transversely enlarged subdigital lamellae, mostly (except a few distally) keeled; proximal lamellae tuberculate. Lamellae under fourth finger 15-20 (16.7 ± 1.0, n= 107, 54 specimens), under fourth toe 23-31 (26.9 ± 1.5, n= 105, 54 specimens). A moderately developed denticulate fringe is present on third and fourth toes, along outer side, and on both sides (near base) of fifth toe. Fringe better developed in fourth toe, and more conspicuous in adults than in juveniles.

In life, most specimens (except largest ones) with dorsal surface of head and neck black, back mahogany-red (132B), or head Prout's brown (121A), back anteriorly black, posteriorly light russet-vinaceous (221D) middorsally to cinnamon-rufous (40) dorsolaterally, or else head dull brown, back olive-brown (28) and Pratt's rufous (140). Back frequently with two series of transversely elongate black spots. A vertebral stripe on anterior part of back lime-green (59), olive-green (52) to yellow-green (58), sulphur-yellow (57), yellow-green (58) to olive-brown (28), or anteriorly green to gold, posteriorly ferrugineous. Dorsolateral stripe, on each side, yellow-green (58), anteriorly chartreuse (158) and posteriorly trogon-yellow (153), or anteriorly yellow-green (58), posteriorly ferrugineous. Lateral to the dorsolateral stripe a regular or irregular black band, which ventrally may be bordered by a thin, dashed, tan or Pratt's rufous (140) stripe. Flanks vandyke-brown (121), Prout's brown (121A), or upper flanks drab (27), lower flanks hazel (35); in RMNH 25382 with a line of trogon-yellow (153) spots. On ventral surface, head either completely pistachio (161) or medially with a light russet-vinaceous (221D) hue. Belly usually salmon (106) or light russet-vinaceous (221D), plumbeous (78) in MPEG 15015. Tail dorsally Prout's brown (121A) and vandyke-brown (121), vinaceous-brown and black, or olive-grey (42) with black spots and, proximally, with some Pratt's rufous (140) dots. Ventral surface of tail proximally plumbeous (78) with black spots, distally vandyke-brown (121), or proximally salmon, distally greyish-brown. Tongue dark grey. Iris vivid reddish-brown, or dark.

In large specimens, especially males, some or all of the following characteristics may develop: absence of vertebral stripe; dorsolateral stripes less conspicuous, brown; anterior part of back green; flanks with vertical rows of pale blue, paris-green (63), or lime-green (59) round spots, some of which may coalesce; ventral surface of head completely pink, flesh colour (5), or salmon (106), or else labials and chinshields pink, medial area salmon. Belly salmon (6 or light 106) (frequently the head is deep salmon, while belly, limbs and tail are ligther).

In preservative, juveniles and half-growns with a light blue (in some specimens yellowish on head) vertebral stripe, from rostral to posterior part of back (in the smallest specimens until base of tail, posterior segment paler). At each side a narrow, light blue stripe starts on lower border of eye, rises gently along upper margin of ear-opening, until about level of forelimbs, and continues as a dorsolateral stripe from forelimbs to base of tail. Head, between stripes, dull brown. Anterior part of back, between stripes and in a band lateral to dorsolateral stripes, black. Posteriorly the black vanishes and leaves only irregular black spots on a dark olive-brown background. A lower light stripe either is completely missing or appears as a dashed (rarely continuous) line, especially between limbs. Sides of head light blue, flanks dark olive-brown, in some specimens with a bluish hue.

Adult specimens with longitudinal stripes fainter than in juveniles. In the largest specimens, especially males, the vertebral stripe may disappear completely and the dorsolateral stripes become almost indistinguishable. Head dorsally and laterally dull brown, bluish on infralabials. Back dark olive-brown, with a variable number of transversely elongate, irregular, usually paired, paravertebral black spots. Lateral to dorsolateral light stripe (especially from forelimbs to slightly beyond middle of body), a black band with very irregular, undulating lateral margin (similar to dorsolateral stripes, this band may be very faint in large males). Adult males may also have a series of light blue dots and/or vertically elongate spots along flanks between limbs.

Forelimbs, both in juveniles and adults, mostly uniformly dark olive-brown, sometimes with scattered black flecks. Hind limbs with light blue dots, and black flecks which can be rather sparse or form a reticulation. Tail colour similar to that on back, a bit lighter, or bluish, either mainly uniform or, more commonly, with irregular black flecks over its entire length. Ventral region from light blue, more intense and metalic in smaller specimens, to bluish-tan in some larger specimens. Large males may present a pale salmon tinge on part of chin and gulars; underside of tail, and in some specimens that of hind limbs, may be darker (with a greyish-brown hue in specimens with blue belly).

Habitat.— *K. calcarata* is a forest inhabitant, usually found in open, sunny places, as near creeks, clearings caused by fallen trees, and forest edge situations. It is found in primary and secondary forests, and in terra firme and areas of varzea surrounded by terra firme forest. Crump (1971) observed this lizard in terra firme, várzea, igapó, and capoeira, but not in non-forest sites. They are frequently seen walking on fallen branches, on fallen trunks above creeks, or on the ground, in or near sunny spots. Sleeping animals were found, at night, on a fern leaf near a creek, three juveniles together under moss on the buttress of a large tree (edge of terra firme forest near swamp), and two other animals were probably among the leaf litter (they were seen running on the ground, probably after being disturbed).

BM 1972.385-386, from Mato Grosso, were in dry forest, no. 386 in soil pit. MPEG 14328, from the same state, was in gallery forest, near a creek.

Notes on natural history.— A heliothermic lizard, which mostly searches activily for its food. Rand & Humphrey (1968) showed that cloacal temperature in active lizards is distinctly higher than air temperature.

Hoogmoed (1973) studied eight stomachs and reported mainly spiders, cockroaches and crickets, but also a caterpillar, remains of a snail shell, and a small lizard, *Iphisa elegans* Gray. Beebe (1945) reported several insects, especially ants, termites and beetles, from three stomachs. In thirteen stomachs examined by Martins (1991) orthopterans were highly predominant (84%), followed by spiders (15%).

Kentropyx calcarata was reported by Cunha & Nascimento (1978) in the stomach of the snakes *Drymoluber dichrous* (Peters) and *Tripanurgos compressus* (Daudin).

Two clutches of four eggs each (glued together) were found close to each other in a rotten log which was in an open sunny spot in primary forest (French Guiana,

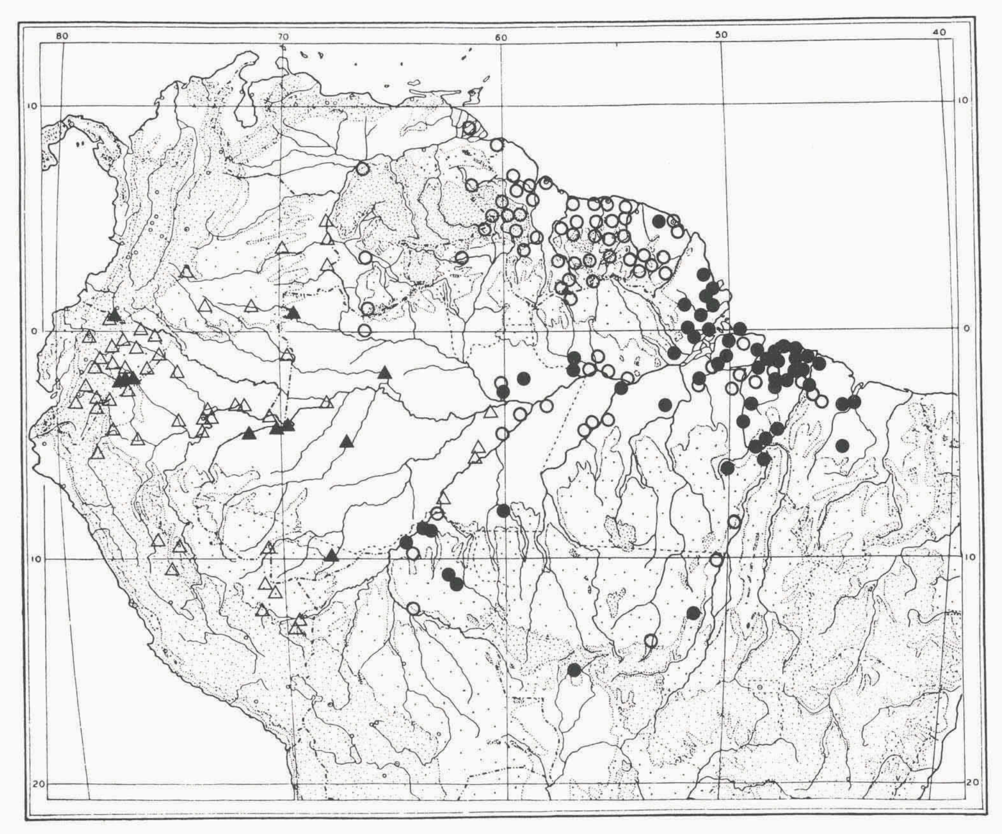


Fig. 181. Distribution of *Kentropyx calcarata* (circles) in northern South America (localities in eastern Brazil not shown) and *K. pelviceps* (triangles). Closed symbols = material studied. Open symbols = data from literature (*K. calcarata*: Hoogmoed, 1973; Hoogmoed & Lescure, 1975; O'Shea, 1989; Zimmerman & Rodrigues, 1990; Gallagher & Dixon, 1992. *K. pelviceps*: Boulenger, 1885b; Duellman, 1978, 1978; Meede, 1984; Dixon & Soini, 1986; Rodriguez & Cadle, 1990; Henle & Ehrl, 1991; Gallagher & Dixon, 1992).

10.xi.1989). One of the eggs hatched about half-an-hour after collecting. The others from this clutch hatched on the 15th (2) and 17th, while the eggs in the other clutch hatched on the 23rd (2) and 24th (2) of November. Length of eggs varied between 18 and 21 mm, width 13 mm. Weight of the intact clutch of eggs (with some earth on it) was 8.3 g. Measurements of hatchlings: SVL 34-37 mm, tail length 66-76 mm (1.9-2.2 times the SVL); weight: 1.0-1.3 g.

MPEG 13239 (Carajás, 10.iii.1984) had three relatively large eggs in the abdomen, MPEG 13311 (Carajás, 13.iii.1984) five. A total of 4-7 eggs in the abdomen has been reported (Beebe, 1945; Hoogmoed, 1973; Magnusson & Lima, 1984).

Magnusson & Lima (1984) observed (north of Manaus) three communal nests of *K. calcarata*, one of which with 800 (old and new) eggs, the other two with 45 and 136 eggs. All were in rotten trunks. A fourth nest with six eggs was also reported. The new eggs hatched mostly in June and July. More eggs were laid in the nest with the largest number of eggs between October and January.

Distribution (fig. 181).— Mainly in central and eastern Amazonia (Brazil, Guyana, French Guiana, and Suriname) and Atlantic Forest (coastal Brazil). In Amazonian Brazil known from Maranhao, Para, Amapa, eastern Amazonas, Roraima (O'Shea, 1989), and Rondonia. Also known from Mato Grosso.

Remarks.— Boulenger (1885b) and Goeldi (1902) reported *'Centropyx intermedins'* from Brazil. *Teius intermedins* (Gray) in the meantime has been shown to be a synonym of *K. calcarata*. Boulenger (1885b), however, used *K. intermedins* in the sense of *K. borckiana* Peters, in which he was apparently followed by Goeldi (1902). *K. borckiana* does not occur in Brazil, and probably the references to Brazil by Boulenger (1885b) and Goeldi (1902) were due to the confusion in names.

Lacerta vittata Schinz, 1822 was considered a synynym of *Kentropyx calcarata* by Hoogmoed (1973) who, however, opted for not changing the species name and for making a proposal to the International Commission of Zoological Nomenclature to suppress *Lacerta vittata*. Although such proposal has not yet been made, *K. calcarata* continues to be the name generally in use in the literature. Gallagher & Dixon (1992), who revised the genus, adopted the same position. In view of the wide acceptance of Spix's name, I agree with Hoogmoed that L. *vittata* should be suppressed.

See also under *K. altamazonica*.

Kentropyx pelviceps Cope,1868
(figs. 181,182,308)

***Centrovyx pelviceps* Cope, 1868: 98 (holotype ANSP 9556, type- locality: Rio Napo, Ecuador); Boulenger, 1885b: 342.**

***Centropyx calcaratus)* Guichenot, 1855:32 (part).**

***Kentropyx calcaratus;* Burt & Burt, 1931: 343 (part); Cunha, 1961:107 (part).**

***Kentropyx pelviceps;* Peters & Donoso-Barros, 1970: 152; Gallagher & Dixon, 1980: 616,1992: 145; Gallagher et al., 1986:179.**

Material.— Brazil. ACRE. Rio Branco, Parque Zoobotanico UFAC: 2 22, MPEG 16016, RMNH

nal rows. Scales around midbody 113-151 (132.4 ± 9.1, n= 34). Femoral pores 36-52 (43.0 ± 4.1, n= 36) in total. A vertebral band from rostral to base of tail, which widens from nape to rump where it is about as wide as the area between hind limbs. Margins of vertebral band between limbs deeply indented. A dorsolateral light stripe from posterior lower corner of eye to about middle of body. Lamellae under fingers tuberculate, with tubercles on some lamellae more developed than on others of same digit. Sides of toes with poorly developed denticulate fringe.

Description.— Teiid with maximum SVL in males of 122 mm, in females of 120 mm (Gallagher & Dixon, 1992); among material studied 119 mm in both sexes (MPEG 15228, ♂, RMNH 25397, ♀). Head 0.23-0.28 (n= 36) times SVL (with negative allometric growth, except in the largest males where it becomes again relatively larger); 1.4-1.8 (1.58 ± 0.09, n= 35) times as long as wide; and 1.0-1.3 (1.17 ± 0.08, n= 34) times as wide as high. The high sides, elongate, pointed snout, and distinct canthus rostralis give the head a pyramidal form. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.35- 0.43 (0.39 ± 0.02, n= 32) times SVL, hind limbs 0.70-0.84 (0.78 ± 0.04, n= 29) times. Tail round in cross section, tapering toward tip, 1.8-2.3 (2.06 ± 0.12, n= 23) times SVL. Both limbs and tail seem to show a small degree of allometric growth, positive in case of tail, negative in case of limbs.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Anterior teeth conical, posterior teeth tricuspid.

Rostral pentagonal, about as wide as high, distinctly visible from above. Bordered posteriorly by nasals, which form a medial suture. Each nasal divided by an oblique suture, with nostril in its lower part, directed lateroposteriorly. Frontonasal hexagonal, about as long as wide (irregular in shape in MPEG 15967, which shows an extra pair of scales between it and nasals). A pair of trapezoid prefrontals, medial suture from as long as, to distinctly longer than that between nasals. Frontal hexagonal, longer than wide, laterally in contact with first (usually) and second supraoculars. Frontoparietals irregularly pentagonal, longer than wide; they form a long medial suture. Interparietal and a pair of parietals irregular in shape, usually followed by two occipitals, with a zigzag border between them. The five scales show an anteriad divergent, "U"-shaped contour, and are surrounded by small, polygonal, distinctly keeled scales. Irregular, extra scales may be present in the parietal/occipital region. Large specimens with a key-hole-shaped ridge along sides of prefrontals (less evident), frontal, frontoparietals, parietals, and posterior border of occipitals. Usually three supraoculars, first smallest. One or two (transversely arranged) scales may separate the second and third supraoculars partially or completely, or an extra, small supraocular may be present posteriorly (in MPEG 15875 both situations occur, so that there are five supraoculars). Supraoculars in contact posteriorly with a group of small scales. Laterally a row of granules separates most of second and third supraoculars from supraciliaries. Supraciliaries 4-6, mostly 5, of which the anterior two are elongate and reach level of third supraocular, the remaining two to four are short, small. A very large loreal, in contact with nasal, frontonasal, prefrontal, first supraocular, first supraciliary, small preoculars (occasionally a larger one), frenocular or first subocular, and supralabials. Frenocular usually present, continuous with suboculars, absent in some specimens. Preoculars small, or 2-3 slightly enlarged. Suboc-

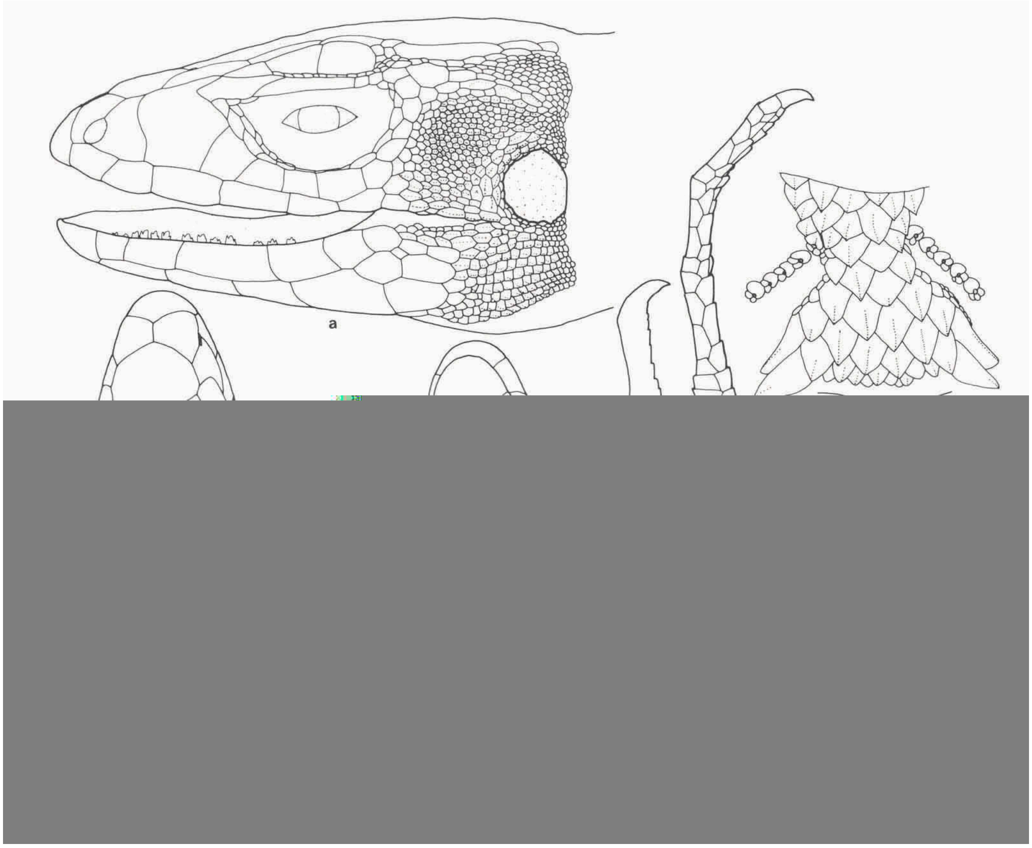


Fig. 182. *Kentropyx pelviceps*, MPEG 15256 (♂); a, b, c: lateral, dorsal, and ventral views of head; d: dorsal view of fourth toe of right foot; e: preanal plate and proximal femoral pores.

ulars 2-5, mostly three, convex to broadly keeled (except anterior one), second frequently longest. Two more-or-less regular series of small, smooth to broadly keeled postoculars, which end in a larger scale at level of supraciliaries. Lower eyelid with an opaque disc with some transversely enlarged scales. Pupil may show a ventral shallow concavity or a squared outline. Supralabials 6-8, 5-6 to below centre of eye; followed to commissure of mouth by 3-6 smaller, convex or keeled, scales, which may not form a regular row. Temporal scales relatively small, centrally smaller than peripherally, polygonal, distinctly keeled. One or two rows of larger, elongate, keeled supratemporals. Ear-opening relatively large, rounded, with smooth margins. Tympanum recessed in a short auditory meatus. All dorsal and lateral head scales juxtaposed and, except for those already noted, smooth.

Mental trapezoid with anterior margin convex, or semicircular. Postmental irregularly heptagonal, followed by 3-4 (mostly three) pairs of large chinshields in contact with infralabials, plus at each side one or a few smaller, but still relatively large scales, usually in two rows, which can also be considered as chinshields. First pair of chinshields usually separated by one or two rows of small scales, or anteriorly in medial contact. Posterior chinshields widely separated by small, convex to broadly keeled scales, which anteriorly are elongate, juxtaposed, and posteriorly become shorter and imbricate. They increase gradually in size toward the centre, and decrease again near gular fold and toward the sides. Infralabials 5-7, 4-6 to below centre of eye; followed to comissure of mouth by small scales. Gular and antegular folds present. Between the two, a few rows of larger, flat, distinctly keeled, imbricate, pointed scales, which become larger, in wider rows, posteriad; 15-22 scales in the posterior row. Gular and antegular folds extend laterally into, respectively, an antehumeral and an oblique neck fold. Other smaller, irregular folds also may be present on sides of neck.

Scales on nape small, convex, hexagonal, distinctly keeled, juxtaposed, grading into dorsals; on sides of neck smaller, more irregular in shape, and they may be less distinctly keeled. Dorsals more elongate and at least twice as large as scales on nape, in approximately transverse rows; 129-166 (144.9 ± 9.1, n= 36) scales along middorsal line from nape to base of tail. On flanks scales decrease in length and size, and become more irregular in shape and more broadly keeled. Ventrals large, phylloid, sharply keeled and shortly mucronate, imbricate, in 14 (mostly) or 16 longitudinal and 30-34 (32.6 ± 1.2, n= 36) transverse rows. Laterals and ventrals sharply delimited. Scales around midbody 113-151 (132.4 ± 9.1, n= 34). Preanal plate with scales approximately similar to ventrals, in some specimens partially smooth; bordered on each side by smaller scales in females, and by two preanal spurs, directed dorsally, in males. Preanal pores absent, femoral pores 36-52 (43.0 ± 4.1, n= 36) in total (males and females). Each pore occupies the centre of a group of scales.

Scales on tail rectangular, obliquely keeled, mucronate, imbricate, except near base on the underside, where they are phylloid. Arranged in complete transverse rings across tail, and in longitudinal rows. Keels form low longitudinal ridges.

Scales on dorsal aspect of upper arms, anterodorsal aspect of forearms, anterior aspect of thighs, and ventral aspect of lower legs large, rhomboid, distinctly keeled, slightly to distinctly mucronate, imbricate. They grade into much smaller but similar scales on ventral aspect of thighs. Elsewhere scales small, keeled or smooth, convex, from slightly imbricate to juxtaposed. Fingers with single, transversely enlarged subdigital lamellae, mostly (except distally) tuberculate medially. Some tubercles distinctly more prominent than others. Toes with single, transversely enlarged subdigital lamellae, mostly (except a few distally) keeled; proximal lamellae tuberculate. Lamellae under fourth finger 13-19 (16.3 ± 1.1, n= 70, 36 specimens), under fourth toe 22-28 (24.3 ± 1.4, n= 70, 36 specimens). A poorly developed denticulate fringe along outer side of third, fourth and fifth toes.

Colour in life, vertebral band lime-green (159) on head, pistachio (161) on nape, and between vinaceous-pink (221C) and walnut-brown (221B) along back; or pale antique-brown (37) on snout, yellow-green (58) on top of head and nape, and sayal-brown (223C) to mars-brown (223A) along back; or else copper on snout, yellow-green (58) on top of head, and bright straw-yellow (56) to walnut-brown (221B) along back. In RMNH 25398 (♂, 110 mm SVL), vertebral band with a green segment between forelimbs and midbody, which in MPEG 15873 (♂, 110 mm SVL) only appears as a pale tinge, and in MPEG 15874 (♂, 107 mm SVL) is totally missing. Vertebral band bordered by a black, black and brick-red (132A), or black and burnt-sienna (132) band. MPEG 16016 with lime-green (159) labials, apple-green (61) temporal area. MPEG 15895 with head ventrolaterally pistachio (161). A yellow-green (58) stripe, always present in juveniles, present or absent in adults, ventrally delimits the black band between ear-opening and a short distance posterior to arm level. Flanks fuscous (21) with some salmon (106) tinge and black spots, warm sepia (221A), or walnut- brown (221B). RMNH 25398 with bluish-green spots on flanks, also present but less numerous in RMNH 25397 (♀, 119 mm SVL). Ventral surface of head beige (219D), light vinaceous (6), pale rose-pink (108D), or labials and chinshields pale pinkish-buff (121D) or greenish-white, gular region light russet-vinaceous (221D). Belly beige (219D), light russet-vinaceous (221D), flesh-ochre (132D), or salmon (106). In some juveniles posterior part of belly sepia. Limbs dorsally sepia (219) with black or walnut-brown (221B) spots, ventrally usually with same colour as belly. Tail dorsally sepia (219) or hair-brown (119A), with or without black spots. Ventrally, base of tail with colour similar to that of belly, distally sepia (119 and 219) or olive-grey (42) and glaucous (79).

In preservative head brown, back dull brown or olive-brown, in some specimens with a pale to a strong blue tinge. A vertebral band from rostral to base of tail, which widens from nape to rump where it is about as wide as the area between hind limbs. Vertebral band light blue or tan on head, light blue on nape. Posteriad along back colour becomes similar to that of back outside the band, either similar to or slightly lighter than flanks. Along back a vertebral band bordered by a black band, anteriorly straight or undulating, posteriorly deeply indented, both margins with medially directed digitlike projections which may form irregular transverse links between the black bands. A dorsolateral light blue stripe from posterior lower corner of eye, through upper border of ear-opening, until somewhere between level of forelimbs and midbody. Occasionally a short segment close to hind limbs can be seen. In large specimens the anterior part of vertebral band, especially on snout, and the dorsolateral stripe may eventually disappear completely, while the black band partially fades out toward extremities, leaving irregular, isolated black spots. On sides of head and along flanks there may be a series of light blue dots and/or vertically enlarged spots (the latter usually posteriorly), better developed in adult males. Forelimbs either uniformly brown or with a pattern similar to that on hind limbs. Hind limbs with light blue dots, and small black flecks which can be rather sparse or form a reticulation. Tail brown, sometimes with a bluish tinge, with irregular black flecks. Ventral region from light blue, more intense blue and in some cases metalic in smaller specimens, to tan. Distally underside of tail may become darker or have dark irregular spots.

Habitat.— An inhabitant of primary and secondary forest, where it is usually found in sunny spots on or near the ground. Among 24 individuals, 21 were on the forest floor, one on a palm leaf 40 cm above ground, one on a fallen tree 50 cm above ground, and one in a hollow trunk 10 cm above ground. Among 16 individuals, only one (Benjamin Constant, Amazonas) was noted to be near a creek, and two (Rio Branco, Acre) were in a secondary forest at the edge of a flooded area. All the others were not associated with water (see *K. altamazonica* for a comparison). Duellman (1978), Meede (1984) and Dixon & Soini (1986) reported these lizards mainly from inside (primary or secondary) forest. Duellman (1978) found a few individuals in clearings and plantations. They were usually on the ground, but could climb (especially juveniles) up to 3 m high. A juvenile was found sleeping (at night) on a bush about one meter above the ground (Duellman, 1978).

Notes on natural history.— As its congeners, it is a heliotherm, with body temperature in active lizards about 7°C above air temperature (Fitch, 1968, as *K. calcaratus*).

Some data on reproduction are given by Fitch (1970, as *K. calcaratus*), Duellman (1978), and Dixon & Soini (1975, as *K. calcaratus*, 1986), and Meede (1984, as *K. calcaratus*). Data suggest that reproduction occurs at least during several months of the year, maybe year-round. Clutch sizes of 3-6 eggs, and hatchlings with 35-40 mm SVL were reported.

Food consists mainly of arthropods, with a large predominance of Orthoptera, but it may also include frogs and lizards like *Eleutherodactylus ockendeni* (Boulenger) and *Anolis trachyderma* Cope (Duellman, 1978).

Reported predators are *Oxyrhopus petola digitalis* (Reuss) (Duellman, 1978), *Micrurus spixii* Wagler, and *Bothrops atrox* (Linnaeus) (Dixon & Soini, 1986).

Meede (1984) made some general observations on behaviour.

Distribution (fig. 181).— Western Amazonia, in Brazil (Amazonas, Acre), Colombia, Ecuador, and Peru.

Remarks.— Gallagher & Dixon (1992) discussed a nomenclatorial problem involving *K. pelviceps*.

See also under *K. altamazonica*.

Kentropyx striata (Daudin, 1802)
(figs. 183, 184, 309)

Lacerta striata Daudin, 1802: 247.

Centropyx decodon Cope, 1862: 495 (lectotype, according to designation by Hoogmoed, 1973, ANSP 9557; type-locality: Suriname); Cope, 1876: 162.

Centropyx striatus; Boulenger, 1885b: 340.

Kentropyx striatus; Cunha, 1961: 110, 1981a: 16; Müller, 1971: 24; Vanzolini, 1972: 106; Hoogmoed, 1979: 278; O'Shea, 1989: 68.

Kentropyx striatus striatus; Hoogmoed, 1973: 302.

Kentropyx striatus viridicervis Hoogmoed, 1973: 312 (holotype RMNH 16421, type-locality: Sipaliwini, 4 km E of Meyer's farm, Suriname).

Kentropyx striata; Gallagher & Dixon, 1980: 616, 1992: 149; Nascimento et al. 1991: 33.

Material.— **Brazil.** AMAPA. Município Amapá, road BR-156, Cujubim: 1 ♂, 2 ♀♀, MPEG 3205, 3207-08, 30.x.1969; 1 ♀, MPEG 3210, 03.xi.1969; 2 ♂♂, MPEG 3398, 3400, 06.xi.1969; all leg. F.P. Nascimento. Município Amapá, Lago Comprido: 1 ♂, MPEG 3645, 11.xi.1969, leg. F.P. Nascimento. Município Amapá, Rio Tracajatuba, Reserva DNERu, posto 2: 1 ♀, MPEG 3139, 18.viii.1969, leg. F.P. Nascimento. Road Macapá-Porto Platon, km 82: 1 ♀, MPEG 2227, 21.i.1967, leg. P. Ledoux. Road Macapá-Porto Santana, Museu Costa Lima: 1 ♂, MPEG 15208, 23.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires.
PARA. Ilha do Marajó, Município de Soure, Fazenda Aruã: 2 ♂♂, 3 ♀♀, MPEG 15707-711, 22-25.v.1989, leg. F.P. Nascimento, R.A.T. Rocha & P. Acatauassu. Ilha de Marajó, Rio Arari, São Joaquim: 5 ♂♂, 5 ♀♀, MPEG 6470, 6476-77, 6481, 6484, 6486-88, 6491, 6493, 04.iv.1973, leg. M. Moreira. Município de Almerim, São Raimundo Agroindustrial Ltda. (Projeto Jari): 1 ♀, MPEG 12793, 25.ix.1980, leg. F.P. Nascimento & R.J.R. Moraes. Santarém, Alter-do-Chão: 1 ♂, MPEG 13903, 18.x.1984, leg. W.E. Magnusson & M. Yamakoshi.
RORAIMA. Município Boa Vista, Fazenda Bom Intento: 4 ♂♂, 4 ♀♀, MPEG 4317-19, 4321-22, 4324, 4326, 4328, 09.vii.1970; 1 ♀, MPEG 4338, 10.vii.1970; 1 ♂, MPEG 4399, 13.vii.1970; all leg. F.P. Nascimento. Ilha de Maracá: 1 ♀, MR 188, 12.viii.1987, 1 ♀, MR 266, 20.ix.1987, leg. M. O'Shea.
Suriname. Holotype, ♀, MHNP 4191, leg. M. Roze. NICKERIE. Airstrip Kayser Mountains: 1 ♀, RMNH 15202, 12.vii.1968, leg. M.S. Hoogmoed. SE New Nickerie: 1 ♂, 1 ♀, RMNH 22664-665,

23.x.1975, leg. M.S. Hoogmoed. BROKOPONDO. Tafelberg, W of airstrip: 1 ♂, 1 ♀, RMNH 22465-466, 06.vi.1979, leg. M.S. Hoogmoed & W.N. Polder.
Guyana. DEMERARA DISTRICT. Ogle, just W of Georgetown: 1 ♂, 1 ♀, RMNH 25405-406, 21.ii.1986 & 03.iii.1986, leg. L.G. Hoevers.
In addition to specimens listed above, the MPEG has specimens from the following localities: AMAPA. Município Calçoene, Igarapé Flaman. Município Amapá, road BR-156, Igarapé Agua Branca. Porto Platon. Macapá, Fazendinha. PARA. Ilha de Marajó, Município Cachoeira do Arari, Ilha de Tia Bita; Baixa do Alecrim. RORAIMA. Município de Boa Vista, Região do Taiano, Colônia Coronel Mota.

Diagnosis.— Dorsals large, in longitudinal rows, distinctly larger than, and well demarcated from laterals. Scales around midbody 58-75 (67.0 ± 4.3, n= 42). Femoral pores 12-16 (13.2 ± 1.2, n= 42) in total. No vertebral stripe. At each side two dorsolateral dark bands and two light stripes, at least on anterior part of body. Subdigital lamellae not tuberculate. Toes with poorly developed denticulate fringe.

Description.— Teiid with maximum SVL in males of 127 mm (RMNH 22665), in females of 107 mm (Gallagher & Dixon, 1992); among material studied, maximum SVL in females 105 mm (MPEG 4318, RMNH 22664). Head 0.22-0.27 (n= 41) times SVL, of which 0.25-0.27 in two juvenile males, 0.24-0.27 in adult males, and 0.22-0.24 in adult females; 1.5-1.8 (1.70 ± 0.06, n= 40) times as long as wide; and 1.0-1.2 (1.07 ± 0.05, n= 40) times as wide as high. The high sides, elongate, pointed snout, and distinct canthus rostralis give the head a pyramidal form. Neck slightly narrower than head and body. Body cylindrical. Limbs well developed, forelimbs 0.32- 0.39 (0.36 ± 0.02, n= 39) times SVL, hind limbs 0.55-0.7- (0.64 ± 0.04, n= 39) times. Tail round in cross section, tapering toward tip, 2.1-3.0 (2.59 ± 0.17, n= 32) times SVL.

Tongue lanceolate, covered with imbricate, scale-like papillae, with a smooth, bifid tip. Teeth conical anteriorly, posteriad changing to bicuspid and tricuspid.

Rostral pentagonal, about as wide as high, distinctly visible from above. Bordered posteriorly by nasals, which form a medial suture. Each nasal divided by an oblique suture, with nostril in its lower part, directed lateroposteriorly. Frontonasal hexagonal or arrow-head shaped, about as long as wide. A pair of irregular prefrontals, medial suture longer than that between nasals. Frontal roughly hexagonal, about as long as its maximum (anterior) width, sutures with prefrontals usually forming a convex border; laterally in contact with first and second supraoculars (or first, second and third, when an intermediate supraocular occurs). Frontoparietals irregularly pentagonal, distinctly longer than wide, forming a long medial suture. A small scale may be present between frontoparietals and interparietal. Interparietal and a pair of parietals irregularly polygonal, followed by two occipitals, with a zigzag border between them. The five scales show an anteriad divergent, angulate, "U"-shaped contour, and are surrounded by distinctly smaller, polygonal, keeled scales. In large specimens there is a poorly developed ridge along sides of prefrontals, frontal, frontoparietals, parietals, and occipitals. Supraoculars 3-5, posteriorly usually in contact with a group of small scales, laterally separated from supraciliaries (except anterior one) by a row of granules. Supraciliaries 3-5, usually four. When three supraciliaries are present, all are elongate; when more, the first two are elongate, the remaining ones short. A very large loreal, in contact with nasal, frontonasal, prefrontal, first supraocular (occasionally not), first supraciliary, preoculars, frenocular or

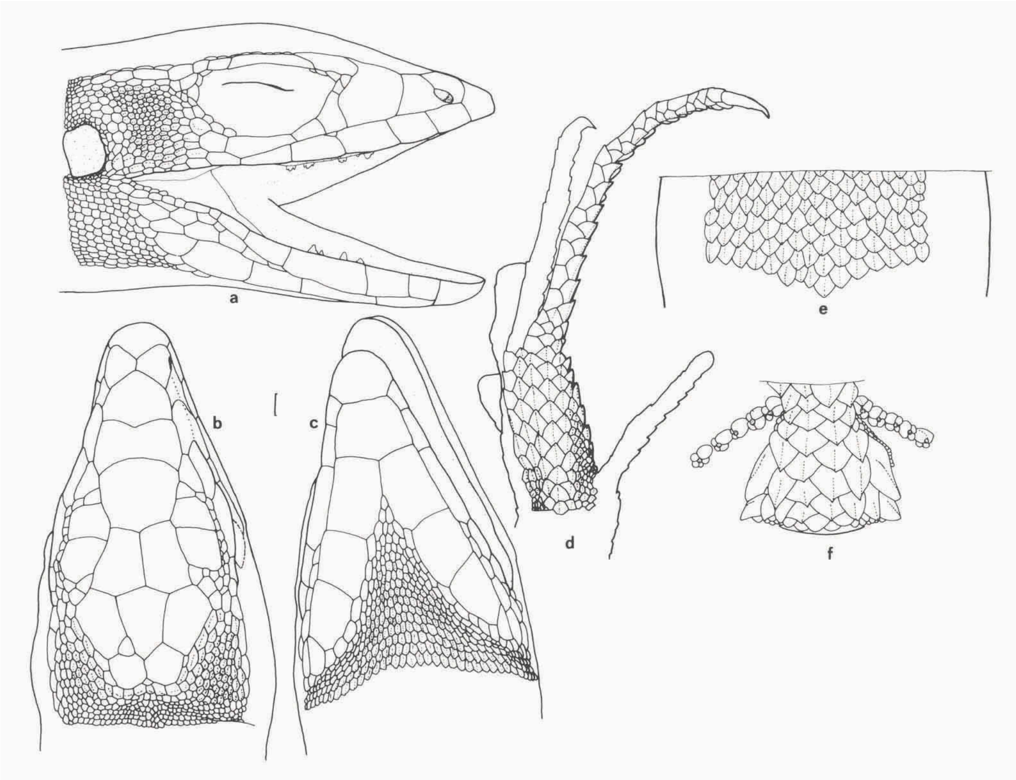


Fig. 183. *Kentropyx striata*, MPEG 15208 (♂); a, b, c: lateral, dorsal, and ventral views of head; d: dorsal view of fourth toe of right foot; e: dorsals near midbody; f: preanal plate and proximal femoral pores.

first subocular, and supralabials. Frenocular usually present, small, fused with the lower, elongate preocular, in some specimens absent. One or two short preoculars plus a longer one which may be fused to the frenocular. Three, exceptionally four, smooth to broadly keeled suboculars, second longest. Two more-or-less regular series of small, smooth to broadly keeled postoculars, which end in a larger scale at level of supraciliaries. Lower eyelid with an opaque disc with some relatively small, transversely enlarged scales. Pupil round except for a shallow ventral indentation, or with upper and lower sides flattened. Six, occasionally seven, supralabials, five (occasionally six) to below centre of eye; followed to commissure of mouth by relatively small scales. Temporal region with scales relatively small, polygonal, keeled, those on centre of region smaller than those peripherally. One or two rows of larger, elongate, keeled supratemporals. Ear-opening relatively large, round or vertically oval, with smooth margins. Tympanum recessed in a short auditory meatus. All dorsal and lateral head scales juxtaposed and, except for those already noted, smooth.

Mental approximately semicircular. Postmental irregularly pentagonal or heptagonal. Three pairs of large chinshields, plus at each side one or a few smaller, but still relatively large scales, usually in two rows, which can also be considered as chinshields. Anterior 2-3 chinshields at each side in contact with infralabials. First pair of chinshields in contact medially. Posterior chinshields widely separated by small, convex to broadly keeled scales, which are longer than wide, anteriorly juxtaposed, posteriorly imbricate. They increase in size toward the centre of the area, and decrease again near the gular fold and toward the sides. Infralabials 5-6, 4-5 to below centre of eye; followed to commissure of mouth by small scales. Gular and antegular folds present. Between the two, a few rows of larger, flat, distinctly keeled, imbricate, pointed scales, which become larger, in wider rows, posteriad; 11-15 scales in posterior row. Antegular fold very shallow or interrupted medially. Gular and antegular folds extend laterally into, respectively, an antehumeral and an oblique neck fold. Other smaller, irregular folds also may be present on sides of neck.

Scales on nape anteriorly small, convex, hexagonal or rounded, juxtaposed to slightly imbricate, grading into dorsals. On sides of neck scales similar to those on nape, to slightly smaller. Dorsals large, although smaller than ventrals, subhexagonal, flat except for a distinct median keel, imbricate, in 12-16 (13.9 ± 1.1, n= 40) longitudinal and 70-92 (83.2 ± 4.4, n= 40) transverse rows. The keels are aligned and form low longitudinal ridges. Scales on flanks small, roughly rhomboid or phylloid, keeled, slightly imbricate. Ventrals large, phylloid, sharply keeled and mucronate, imbricate, in 14 (mostly) or 16 longitudinal and 31-35 (33.0 ± 0.9, n= 42) transverse rows. Dorsals, laterals and ventrals sharply distinguished. A row of scales of intermediate size may be present both between dorsals and laterals, and between laterals and ventrals. Scales around midbody 58-75 (67.0 ± 4.3, n= 42). Preanal plate in females with scales about similar to ventrals, in males scales feebly keeled to smooth, blunt, laterally with two preanal spurs directed dorsally. Preanal pores absent, femoral pores 12-16 (13.2 ± 1.2, n= 42) in total (males and females), each pore occupying the centre of a group of scales.

Scales on tail approximately rectangular, obliquely keeled, mucronate, imbricate. Arranged in complete transverse rings across tail, and in longitudinal rows. Keels form low longitudinal ridges.

Scales on dorsal aspect of upper arms, anterodorsal aspect of forearms, anterior and ventral aspect of thighs, ventral and part of anterior aspect of lower legs large, subhexagonal, keeled (may be partially smooth anteriorly on thighs), some mucronate, imbricate. Elsewhere scales similar but much smaller, or granular. Fingers with single, transversely enlarged, not tuberculate subdigital lamellae. Toes with single, transversely enlarged, proximally slightly tuberculate subdigital lamellae, smooth under first toe, broadly keeled (except distally) under the others. Lamellae under fourth finger 14-18 (15.8 ± 0.8, n= 83, 42 specimens), under fourth toe 22-28 (24.8 ± 1.3, n= 81). A poorly developed denticulate fringe along outer side of third, fourth and fifth toes.

A discussion on colour morphs in *K. striata* is given by Gallagher & Dixon (1992). Among material studied, MPEG 15208 (♂, 70 mm SVL) was dark drab (119B) on dorsal surface of head and anterior part of back, verona-brown (223B) on posterior part of back. Dorsolateral stripes brick-red (132A) with black spots. Sides of head gradually changing from brown to white, with pinkish and greenish hues. Some green spots around ear-opening. Flanks verona-brown (223B). Ventral surface of head pearl-white, which gradually turns into salmon (106) on sides and posterior part of belly. Limbs and tail with colours similar to those on adjacent parts of body, with black spots on dorsal surface of tail. Tongue greyish-brown. Iris greyish-brown peripherally, orange-brown around pupil.

Colour description of MPEG 15707-711 was made within one week of their preservation. Dorsal surface of head either brown with a greenish hue, or mostly grass green. Back grass-green. Dorsolateral band, from eye to anterior part of body, brick-red (132A) to black. Flanks brick-red to dark drab (119B), with some blackish irregular and ill-defined spots on upper part anteriorly, and small, round, pale blue spots. A very pale blue lateral stripe from ear-opening to base of tail. Ventral region pearl-white under head and chest, belly and underside of tail salmon colour (106) in females, peach red (94) in males.

In preservative, head dorsally dull brown, back olive-brown or blue, sometimes with two paravertebral, interrupted, dark brown stripes. At each side, from dorsally to ventrally, the following sequence (which may not be completely distinct in larger specimens): (a) a dorsolateral dark brown band from posterior corner of eye until about midbody, dorsally bordered at least anteriorly by a faint light blue stripe; (b) a light blue stripe from posterior lower corner of eye until posterior part of body where it fades away; (c) a light or dark brown lateral band which starts at temporal region, is interrupted by ear-opening, and continues again until base of tail, with irregular black spots especially between level of forelimbs and midbody, and in some specimens with light blue dots; (d) a light blue stripe from lower posterior margin of ear-opening to base of hind limbs; and (e) an olive-brown area, either uniform or with light blue dots. Forelimbs either uniformly brown or mottled with brown and light blue. Hind limbs with an olive-brown reticulation surrounding light blue spots. Tail brown or blue, sometimes spotless, frequently with a vertebral row of irregular black spots. Ventral region either mostly light blue but under preanal plate, hind limbs and tail cream, or mostly white with light blue flecks on belly and in some specimens under head.

Habitat.— *K. striata* is an inhabitant of open formations, where it is found both on the ground and on the vegetation, frequently associated with water (Müller, 1971; Boos & Quesnel, 1971; Vanzolini, 1972; Hoogmoed, 1973; Cunha, 1981; Magnusson, 1987; O'Shea, 1989). MPEG 15208 was on the ground, in an area with low, dry type of forest and dry swamp, close to a building. An individual (not collected) was observed in the city of Macapá (Amapá), among herbaceous vegetation near the walls of an old fort (relatively close to border of water).

Notes on natural history.— It is a heliothermic lizard. Body temperatures of 32-42°C were registered in active lizards by Magnusson et al. (1985). Magnusson (1993) found a significant difference among body temperatures in different months of the year. According to Boos & Quesnel (1971), *K. striata* is active early in the morning, but it retreats from sight in the hottest parts of sunny days. These authors also observed that these lizards are excellent swimmers and, when possible, they frequently flee into the water.

Food consists of a variety of arthropods, with some predominance of Orthoptera and Araneae (Boos & Quesnel, 1971; Hoogmoed, 1973; Magnusson et al., 1985).

Reproduction was shown to be seasonal, with most egg deposition occurring in the wet season (March to August), in Alter-do-Chão, Santarém (Magnusson, 1987). Data by Hoogmoed (1973), although inconclusive, also seem to indicate seasonal reproduction. Clutch sizes of 3-5 eggs were reported by Hoogmoed (1973), and of 8-9

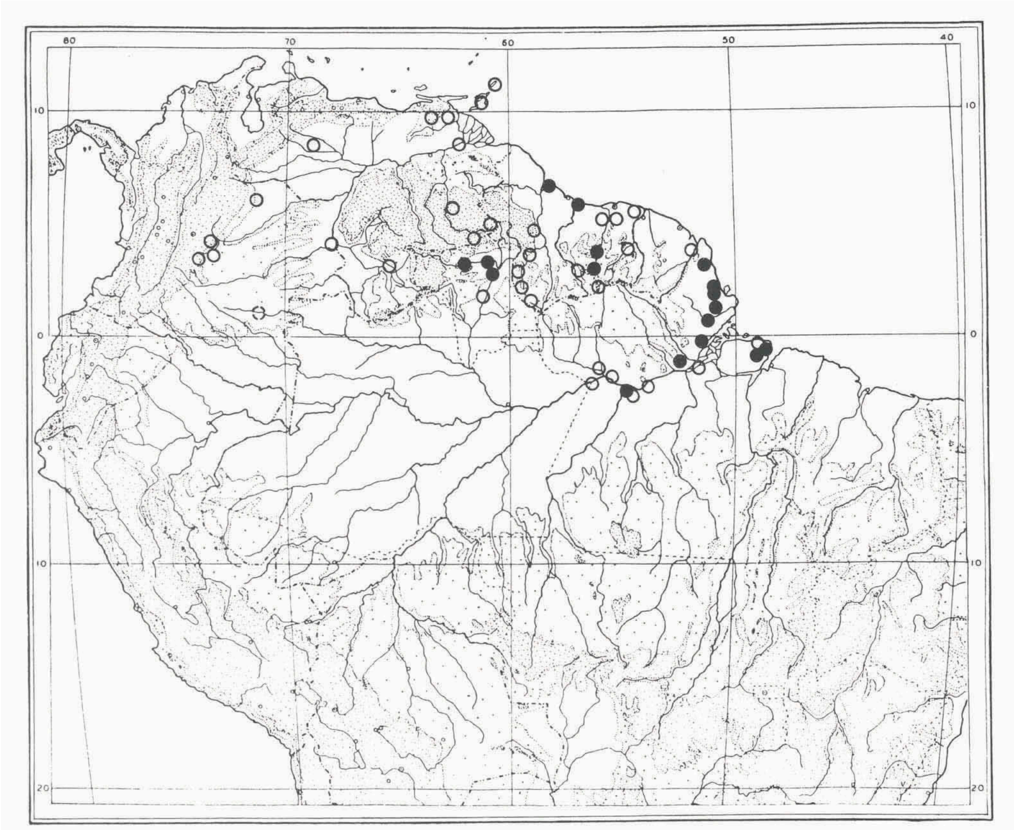


Fig. 184. Distribution of *Kentropyx striata* in northern South America (localities in eastern Brazil not shown). Closed symbols = material studied. Open symbols = data from literature (Burt & Burt, 1931; Boos & Quesnel, 1971; Vanzolini, 1972; Hoogmoed, 1973; Gallagher & Dixon, 1992). Dashed symbols = data by Ayala (1986) on Vaupés state, Colombia.

eggs by Boos & Quesnel (1971). Three distinctly gravid females I examined contained seven, eight and nine eggs. An incubation period of three months, and hatchlings of 31-34 mm SVL were reported by Boos & Quesnel (1971).

Distribution (fig. 184).— Northern South America, in Brazil (Pará, Amapá, Roraima), Suriname, Guyana, Venezuela, and Colombia. Also in Trinidad. Up to the present not confirmed in French Guiana (Hoogmoed & Lescure, 1975), although it could be expected to occur in the country, especially in areas of open formations along the coast. Gallagher & Dixon (1992) reported the species also from NE Brazil, in Bahia and Pernambuco.

Remarks.— The species was divided into two subspecies by Hoogmoed (1973). However, Cunha (1981a) already argued that recognition of subspecies should await an analysis of variability in the species as a whole, and Gallagher & Dixon (1992) noted that other colour morphs, besides those described for *K. s. striata* and *K. s. viridicervix* existed, and that they did not deserve subspecific recognition. Gallagher & Dixon (1992) also described two basic dorsal patterns, one with a wide vertebral band bordered at each side by a dark dorsolateral stripe (which includes all specimens known from Brazil), the other with four longitudinal dark stripes (present in specimens from Colombia and southern Venezuela, plus some specimens with intermediate patterns in Guyana).

Crocodilurus Spix, 1825

Diagnosis.— See diagnosis of the species.

Distribution.— Northern South America, along Amazon and Upper Orinoco basins, and in coastal Pará (Brazil) and French Guiana.

Content.— Genus monotypic.

Crocodilurus lacertinus (Daudin, 1802)
(figs. 185, 186, 310)

Tupinambis lacertinus Daudin, 1802: 85 (holotype MHNP 8372, type-locality: 'Cayenne').
Crocodilurus amazonicus Spix, 1825: 19 (holotype ZSMH 638/0, type-locality: São Paulo de Olivenças, Rio Solimões); Cope, 1876: 162.
Crocodilurus ocellatus Spix, 1825: 20 (lectotype, according to designation by Hoogmoed & Gruber, 1983, ZSMH 639/0; type-locality: Tefé, Rio Solimões).
Crocodilurus lacertinus; Duméril & Bibron, 1839: 46; Guichenot, 1855: 29; Boulenger, 1885b: 380; Goeldi, 1902: 537, 546; Burt & Burt, 1931: 326; Cunha, 1961: 116; Vanzolini, 1972: 105, 1981a: xxi, 1986a: 14; Hoogmoed & Lescure, 1975: 157; Hoogmoed, 1979: 278; Hoogmoed & Gruber, 1983: 392.
Crocodilurus lacertina; Crump, 1971: 20.

Material.— 1 ♂, ZFMK 22969, locality unknown.
Brazil. AMAPA. Município de Amapá, Lago Comprido: 1 ♂, MPEG 3650, 14.xi.1969, leg. F.P. Nascimento.
AMAZONAS. Rio Madeira, Nova Olinda: 1 ♂, 1 ♀, USNM 200688-689, 19-20.ii.1972, leg. Expedição Permanente da Amazônia/MZUSP. Rio Negro, Arquipélago de Anavilhanas, Ilha de Sao Sebastião, SEMA Reserve: 1 juv., MPEG 16195. Rio Negro, Arquipélago de Anavilhanas, Igapó Lago da Marcelina: 1 ♀, INPA 295, 13.iii.1989, leg. R.C. Vogt. Rio Negro (right bank), Pedra do Gavião, near Moura: 1 ♂, MPEG 2287, 08.v.1967, leg. F.C. Novaes.
PARA. Belém (shipped from): 2 exs., AMNH 125576-577. Belém, Utinga: 1 ♂, MPEG 1879; 1 ♀, MPEG 1905, year 1962, leg. SESP; 1 ♂, USNM 159226, 01.ix.1964, leg. P.S. & S.S. Humphrey; 1 juv., CM 65050, 02.i.1961, leg. SESP. Vicinity of Belém: 1 ♂, KU 127240, 12.vii.1969, leg. M.L. Crump. Km 16 road to Acará: 1 juv., MPEG 11510, 16.ii.1978, leg. F.P. Nascimento. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA post (1°47'32.3"S, 51°26'01.5"W): 1 juv., MPEG 16506, 19.xi.1992, leg. E.S.B. Ribeiro & C.L. Ribeiro.
RONDONIA. Município de Porto Velho, area of Rio Jamari: 1 juv., MNRJ 4439. Município de Porto Velho, area of Rio Jamari, Vila Cachoeira do Samuel: 6 exs., MNRJ 4534 and f.n. 44-45,48-50, 1944, leg. Parko.
French Guiana. 'Cayenne': holotype, MHNP 8372.

Diagnosis.— A large, semi-aquatic teiid, with body cylindrical, tail compressed with a double prominent dorsal crest, limbs well developed, pentadactyl, all digits clawed. Nasal semi-divided, in contact medially. Lower eyelid completely opaque. Dorsals small, homogeneous in size. Ventrals rectangular, longer than wide, 19- 23 in a row across midbody. Colour predominantly brown; in juveniles flanks and limbs black with large orange spots.

Description.— Teiid with maximum SVL, among material studied, of 218 mm in males (KU 127240), 203 mm in females (MPEG 1905). Head 0.18-0.24 (0.20 ± 0.01, n= 21) times SVL, 1.5-1.8 (1.57 ± 0.08, n= 21) times as long as wide, 1.0-1.2 (1.11 ± 0.07, n= 21) times as wide as high. Snout elongate. Neck long, almost as wide as head and anterior part of body. Body cylindrical. Limbs well developed, forelimbs 0.28-0.31 (0.30 ± 0.01, n= 22) times SVL, hind limbs 0.44-0.53 (0.49 ± 0.02, n= 19) times. Tail compressed, with a double prominent dorsal crest, 1.9-2.3 (2.11 ± 0.12, n= 9) times SVL.

Tongue arrow-shaped, covered with small, scale-like papillae; tip bifid, smooth. Anterior teeth conical, posterior teeth tricuspid.

Rostral pentagonal, well visible from above. Nasals semi-divided, in contact medially. Frontonasal hexagonal, wider than long. A pair of prefrontals about as long as wide, forming a short to moderately long medial suture. Frontal longer than wide, wider anteriorly, laterally in contact with first, second, and in some specimens third supraoculars. Frontoparietals irregularly polygonal, longer than wide, with a long medial suture. Interparietal triangular or trapezoidal, wider anteriorly. At each side an irregular parietal, the three scales subequal in size. Interparietal and parietals posteriorly in contact with either one small, medial scale, or with up to five small scales that can separate them completely from occipitals. Two relatively large occipitals, wider than long. Four or five supraoculars, when five, fifth smallest. First supraocular longer than wide, second, third and fourth wider than long; third shorter than second and fourth. Supraciliaries 7-10, rectangular, except anterior and posterior ones which are wider, irregularly polygonal. One large loreal. One frenocular, followed by 3-6 suboculars in direct contact with supralabials. A weak subocular ridge may be present along frenocular and anterior suboculars. Postoculars 2-3. Lower eyelid with an opaque disc of several irregular scales. Pupil with shallow dorsal and ventral concavities. Supralabials 7-9, fifth and/or sixth below centre of eye; mostly large, except those below eye. They are followed to commissure of mouth by 3-4 scales, of which anterior one relatively large, posterior ones decreasing steadily in size. Temporal scales irregular, smooth, slightly convex, larger peripherally than centrally. Two large supratemporals. Ear-opening very large, round (except posterior border which is straight), with smooth margin. Tympanum superficial.

Mental large, trapezoid, with round anterior border. Postmental pentagonal. Five to seven pairs of chinshields, anterior 3-4 larger, posteriad they gradually decrease in size. First pair in medial contact, only first, or first, second, and more rarely a small portion of third pair of chinshields in contact with infralabials. Posteriorly chinshields and infralabials separated by a row of moderately large scales. Infralabials 6-8, of which anterior three wider; 5-6 to below centre of eye. Medial to chinshields scales small, rectangular, longer than wide, in longitudinally oblique rows. Posteriorly they increase in size and form transverse rows also. Gular region with a poorly defined supernumerary antegular fold, and distinct antegular and gular folds. Scales between folds mostly hexagonal, in transverse rows, larger between antegular and gular folds. Six or seven rows of gular scales anterior to supernumerary antegular fold, 6-9 between the two antegular folds, 3-5 between antegular and gular folds.

Scales on nape, anteriorly, small, roundish to hexagonal, about as long as wide, slightly convex; posteriad they grade into dorsals. Scales on sides of neck roundish,

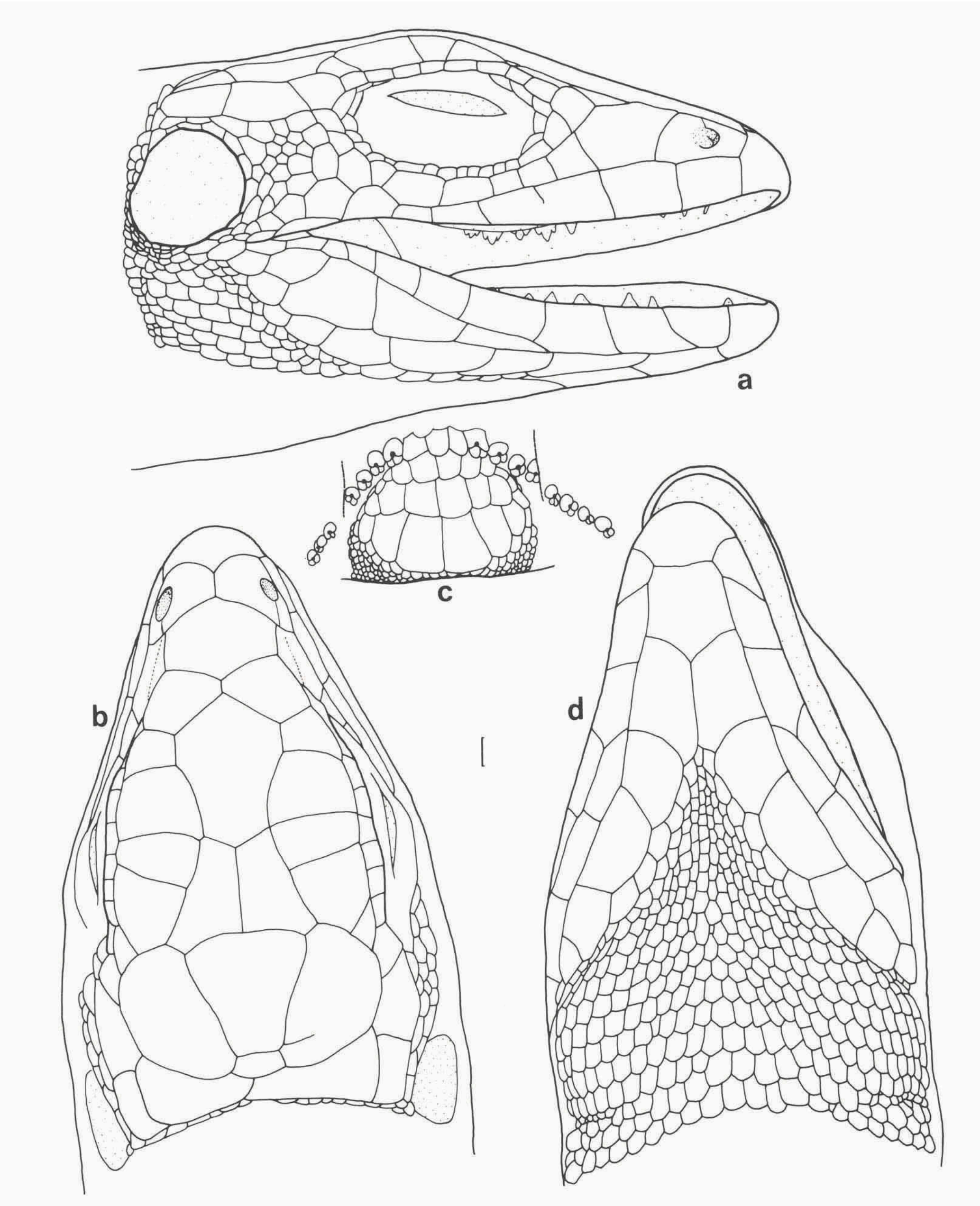


Fig. 185. *Crocodilurus lacertinus*, MPEG 16506; a, b: lateral and dorsal views of head; c: preanal plate, preanal pores, and proximal femoral pores; d: ventral view of head.

toward ear-opening smaller than those on nape. Dorsals convex, small, rectangular to hexagonal, longer than wide, anteriorly smooth, posteriorly keeled; in 116-137 (124.1 ± 7.2, N= 14) slightly imbricate, transverse rows (from nape to posterior margin of hind limbs). On flanks scales progressively smaller, with groups of transverse rows which narrow ventrad and interdigitate with similar groups that start from ventrals and narrow dorsad. Ventrals rectangular, longer than wide, smooth, imbricate, in approximately longitudinal, and 33-38 (35.7 ± 1.3, n= 21) transverse rows (between gular fold and anterior margin of hind limbs); 19-23 (20.6 ± 1.3, n= 22) ventrals in a row at midbody (between areas with intermediate rows). Scales around midbody 77-106 (92.2 ± 7.3, n= 22). Preanal plate with two or, more often, three transverse rows of polygonal, smooth scales, larger posteriorly. Preanal pores 2-5, mostly 3-4, per side. Femoral pores 6-12 per side, 12-23 (15.8 ± 2.5, n= 18) in total. Pores usually between one large and two small scales, occasionally one large, one small.

Scales on dorsal surface of tail mostly small, rectangular, longer than wide, keeled, in transverse rows. Near base three or four longitudinal rows of scales, at each side, form prominent ridges. Posteriorly one dorsolateral ridge per side enlarges into a crest and continues up to tip of tail (or to a regenerated part), while other ridges disappear. On ventral surface scales smooth near base, keeled posteriorly, longer than wide, with posterior border round or "W"-shaped. Three transverse dorsal and lateral rows of scales correspond to two ventral rows.

Scales on forelimbs large, smooth, imbricate, hexagonal on antero-dorsal aspect of upper arms, similar but squarish on antero-dorsal aspect of forearms. Smaller, rhomboid on postero-dorsal and posterior aspects of forelimbs, smallest and roundish on ventral aspect. On posterior aspect of forelimbs scales may be keeled. Scales large, square to hexagonal, smooth, imbricate on anterior aspect of thighs, similar but narrower on ventral aspect, decreasing slightly in size toward pores. On ventral surface of lower legs a row of wide, trapezoid scales, on its posterior surface scales smaller and rhomboid, all smooth, imbricate. Dorsal and posterior aspects of thighs, and anterior and dorsal surfaces of lower legs with smallest, rhomboid or hexagonal, imbricate, keeled scales. Subdigital lamellae under fingers smooth, proximally divided into several scales, distally medially divided. Under toes, except distally, lamellae developed only along inner (toward first toe) side, where near base, especially of third and fourth toes, they form a prominent denticulation. Along outer side toes covered by numerous small scales, in transverse rows, and distally by medially divided, smooth lamellae. Third and fourth toes with a denticulate fringe along their dorsal outer side. Lamellae under fourth finger 19-22 (20.4 ± 1.0, n= 28, 14 specimens), under fourth toe 26-31 (28.6 ± 1.2, n= 26, 13 specimens).

Colour in life of MPEG 16506, dark olive-brown with black spots on dorsal surface of head, dark brown with black reticulation on back. Sides of head brown on upper part, greenish-yellow and black on lower part. Neck with greenish-yellow round spots surrounded by black. Flanks and limbs black with large orange round spots. Digits with transverse black and orange bands. Tail proximally black with orange spots, distally orange on dorsal surface, dark grey ventrally. Iris pale orange with a posterior grey area.

In preservative largest specimens predominantly dark brown, with irregular, darker spots along back and base of tail. Flanks with larger darker brown areas and

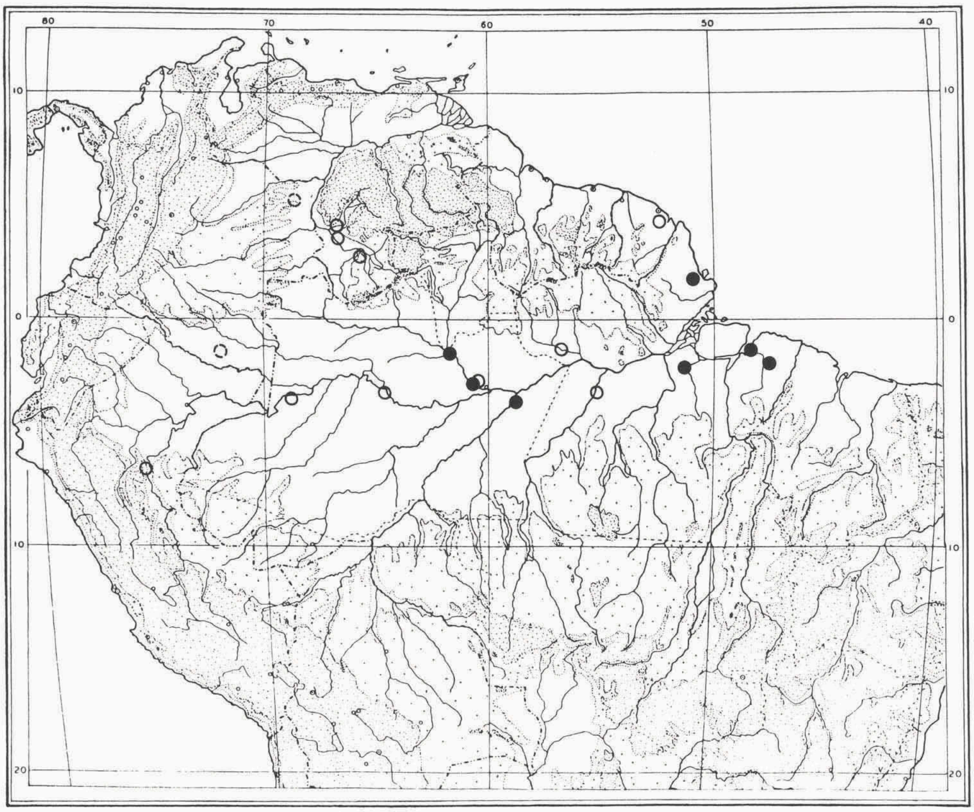


Fig. 186. Distribution of *Crocodilurus lacertinus*. Closed circles = material studied. Open circles = data from literature (Spix, 1825; Guichenot, 1855; Burt & Burt, 1931; Vanzolini, 1972; Hoogmoed & Lescure, 1975; M. Martins, *in lit.*: Rio Cuieiras, Amazonas state, Brazil; M.S. Hoogmoed, *in lit.*: Canaripó, Rio Ventuari, and Caño Cotua, at base of Cerro Yapacana, both T.F. Amazonas, Venezuela). Dashed circles = data by Ayala (1986) for Colombian states.

relatively small, white, round spots. Ventral surface cream, with irregular grey and black spots. Under limbs and tail grey areas may predominate. In juveniles flanks and limbs black with large white spots (smaller on neck), sides of head with a black reticulation, and ventral surface with black, irregular spots. Digits with transverse black and cream bands.

Habitat.— A semi-aquatic lizard which, according to Goeldi (1902), only lives in places with much water, like rivers and flooded fields. MPEG 16506 was in the forest edge on a branch overhanging water, 1.5 m above its surface, along the shore of Caxiuanã bay. A large specimen, not collected, was seen on a small beach along this same bay, fleeing into a burrow in the sand below tangled roots. According to local inhabitants, during the rainy season this lizard may be found in areas of igapó. Marcio Martins (in lit.) observed several specimens in Cuieiras, Amazonas, in area of igapó, either swimming close to the bank, on logs in the water, or out of water on leaflitter, always in the sun. Crump (1971) reported it from varzea forest, and Vanzolini (1972) from muddy banks of rivers, creeks and lakes. In French Guiana, Hoogmoed & Lescure (1975) reported two specimens, one on the bank of a creek, the other crossing this same creek, while Gasc (1990) stated that it occurs in estuaries and in the marshy zone of the country. Hoogmoed (in lit.) observed two specimens in Venezuela, one swimming in a creek, in an area of open, dry vegetation, the other one at edge of water with riverine forest between river and savanna.

Notes on natural history.— Swimming was described by Hoogmoed & Lescure (1975) as strong, undulating movements of body and tail, and by M. Martins (in lit.) as lateral movements of tail, while limbs are kept adpressed along body. In both cases with head above water.

Some notes on behaviour were given by Goeldi (1902).

M. Martins (in lit.) reported ten recently metamorphosed *Bufo marinus* Linnaeus, a large dragonfly, and one Hemiptera in the stomach of an adult specimen.

Distribution (fig. 186).— Along the Amazon and in Upper Orinoco basins, in coastal Pará and coastal French Guiana. In Brazil (Amapá, Pará, Amazonas, and Rondônia), French Guiana, Venezuela, Colombia, and Peru.

Remarks.— About the type-locality, see Brygoo (1989). *Crocodilurus lacertinus* is popularly known as 'jacarerana'. This name may also be applied for the smaller *Neusticurus* spp.

Dracaena Daudin, 1802

Diagnosis.— Large, semi-aquatic teiids with body cylindrical, tail compressed with a double dorsal crest, limbs well developed, pentadactyl, all digits clawed. Nasal divided, upper nasal in medial contact. Lower eyelid completely opaque. Gular and antegular folds present, supernumerary antegular fold present or absent. Dorsals mostly small, with large tubercles interspersed. Ventrals rectangular, longer than wide, 35-45 in a row across midbody. Preanal and femoral pores present or absent. Posterior teeth molariform.

Distribution.— South America, along the Amazonian drainage and in Mato Grosso and Paraguay.

Content.— Two species, one in Amazonia.

Dracaena guianensis Daudin, 1802
(figs. 187, 188, 311)

Dracaena guianensis Daudin, 1802 (holotype MHNP 8385, type- locality: Cayenne, French Guiana, corrected by Hoogmoed & Lescure, 1975 to Amapá, Brasil, north of Rio Araguari); Boulenger, 1885b: 338; Hagmann, 1910: 486; Burt & Burt, 1931: 330 (part), 1933: 61; Goeldi, 1897: 649, 1902: 537, 541; Amaral, 1937a: 1739; 1937b: 189, 1949: 111; Cunha, 1961: 106; Müller, 1969: 118; 1971: 24; Crump, 1971: 20; Hoogmoed & Lescure, 1975: 165; Vanzolini, 1961b: 237; Vanzolini & Valencia, 1966: 15; Peters & Donoso-Barros, 1970: 111; Dixon & Soini, 1975: 43, 1986: 48; Duellman, 1978: 214; Hoogmoed, 1979: 278; Nascimento et al., 1991: 33.

Material.— **Brazil.** 2 ex., RMNH 5039-5040. ACRE. Rio Branco, Road 364, km 5: 1 ex., ZUEC 570, 02.xi.1987, leg. O.C. Oliveira.
AMAPA. Holotype, MHNP 8385 (stuffed), 1 ex., RMNH w/no. (stuffed), "Cayenne", leg. De la Borde (see Hoogmoed & Lescure, 1975 for a discussion on the locality).

PARA. Belém: 1 ♂, MPEG 1883, 26.iii.1965, leg. A. Pinheiro; 1 ♀, MPEG 1912, IPEAN, Utinga, 1960, leg. SESP; 1 ♂, MPEG 2467, 06.xi.1968, leg. M.M. Moreira; 1 ♂, NHM 157, c. 1900, leg. Goeldi.
Peru. 1 ex., ZFMK 14301, date and leg. unknown (from animal dealer).

Diagnosis.— Besides those characteristics indicated in the generic diagnosis, *D. guianensis* can be recognised by the presence of a pair of post-nasals, and by body tubercles arranged in 4-6 rather irregular longitudinal rows. Colour predominantly brown, with head orange and brown.

Description.— Teiid with maximum SVL of at least 360 mm (♂, MPEG 1883; Vanzolini & Valencia, 1965, reported SVL in *Dracaena* - species not specified - reaching 450 mm). Head approximately 0.2-0.3 (0.24 ± 0.02, n= 7) times SVL, 1.4-1.6 (1.49 ± 0.10, n= 7) times as long as wide, and 1.0-1.1 (1.07 ± 0.07, n= 7) times as wide as high. Head pyramidal, with a blunt, high snout, canthus rostralis rounded. Neck narrower than head, about as wide as anterior part of body. Body cylindrical. Limbs well developed, strong, forelimbs 0.3-0.5 (0.35 ± 0.05, n= 6) times SVL, hind limbs 0.4-0.6 (0.50 ± 0.06, n= 5) times. Tail strongly compressed (except near base), with a double dorsal crest, tapering toward tip; 1.6-1.9 (n= 3) times SVL.

Rostral pentagonal, slightly wider than high, hardly seen from above. Bordered posteriorly by nasals, which form a medial suture. Each nasal divided by a suture approximately at level of canthus rostralis, nostril at midlength, directed dorsolaterally. A pair of large post-nasals, with a median suture longer than that between nasals. Nasal and post-nasal sutures not aligned, but connected by a short oblique line. Posterior to post-nasals, snout covered by a variable number (6-9) of irregularly polygonal scales, usually including one central scale surrounded by 5-6 other scales, or by five scales plus the post-nasals. Frontal quadrilateral, pentagonal or hexagonal, about as long as wide, in contact with first (occasionally) and second supraoculars. A pair of pentagonal or hexagonal, longer than wide, frontoparietals, with a median suture as long as, or longer than that between post-nasals. Interparietal and parietals (one at each side of interparietal) irregularly polygonal and subequal in size. Each parietal may be separated from frontoparietals by a small scale. Posterior to interparietal and parietals two transverse rows of moderately large, irregular scales, which laterally and posteriorly are surrounded by smaller scales. Supraocular region with a variable number of scales. Anterior and posterior scales relatively small, and connected by a row of small scales which separate the median supraoculars from the supraciliaries. Among the median supraoculars, anterior one largest; it may be followed by 2-3 scales of similar width, or the internal ones may be longitudinally divided into smaller scales. Supraciliaries 11-15 (mostly 12), first and occasionally second expanded dorsally. Remaining supraciliaries quadrangular, toward the extremities wider than long, toward the middle squared. Loreal region with 3-4 large scales, plus some smaller scales posteriorly. A continuous row of 3-5 squarish preoculars, and 4-5 wider suboculars in contact with supralabials. Postoculars 5-8. Lower eyelid with an opaque disc of transversely enlarged scales. Supralabials 7-9 to below centre of eye, which may be followed by another one or two relatively large scales (7-10 in total). Except for those below eye, supralabials very high and usually rectangular. One or a few smaller, triangular scales (not counted) may be present between supralabials. They are followed to commissure of mouth by numerous small scales. Temporal scales variably polygonal, smaller toward the centre than peripherally. A

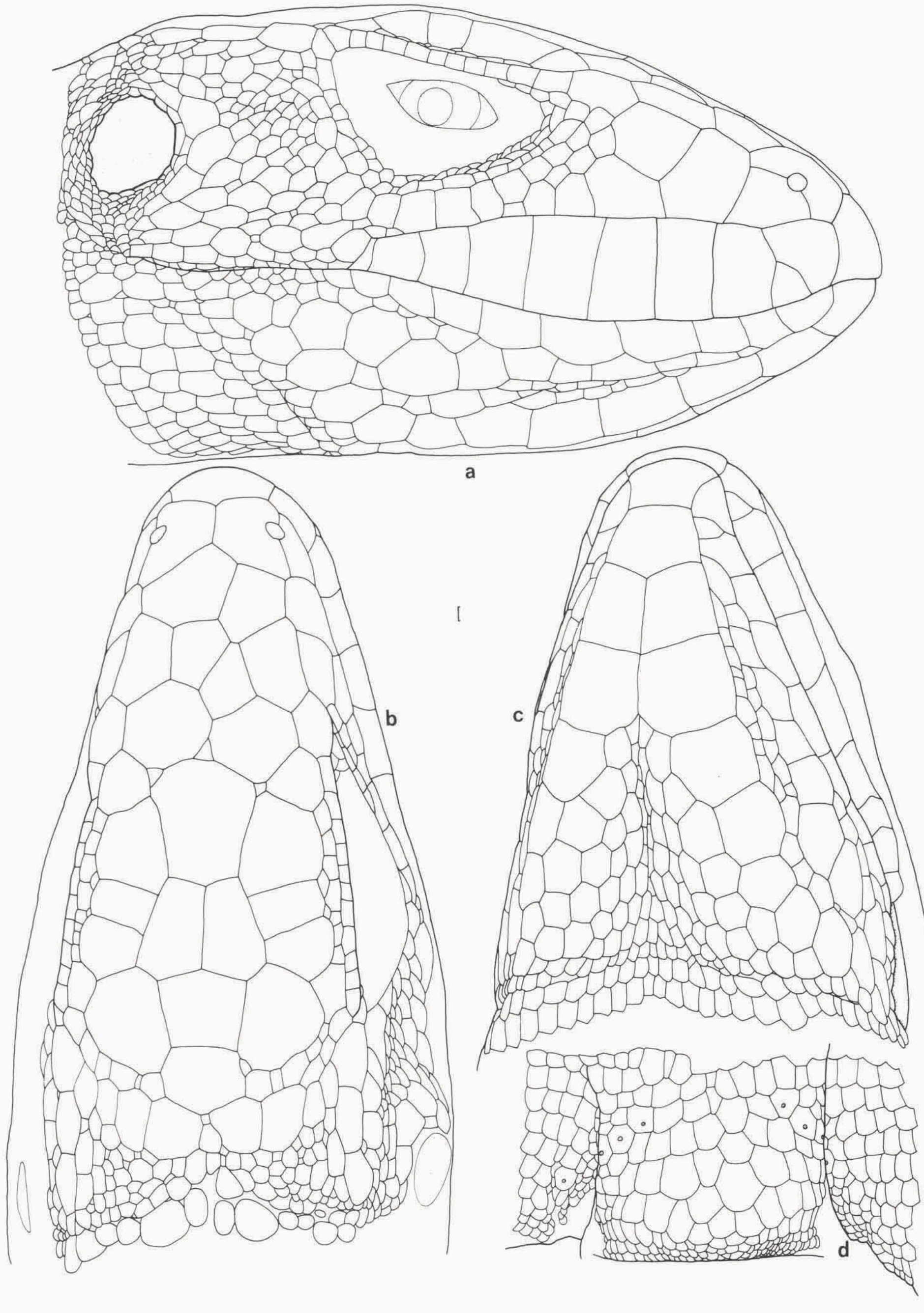


Fig. 187. *Dracaena guianensis*, MPEG 2467. a, b: lateral and dorsal views of head; c: ventral view of head; d: preanal plate and partial view of thighs, showing preanal and femoral pores.

row of 3-4 large, roughly rectangular, longer than wide, supratemporal scales, bordered at each side by rows of smaller scales. Ear-opening round, with smooth margin; tympanum superficial. All dorsal and lateral scales of head smooth, juxtaposed.

Mental roughly trapezoid, with concave sides. Postmental single, pentagonal, distinctly wider than long. Two divergent rows of 4-7 large chinshields, followed by smaller chinshields which gradually decrease in size. Anterior 2-3 pairs in medial contact. Chinshields of first pair may touch infralabials, or all chinshields may be separated from them by 1-4 rows of scales, those in the row adjacent to infralabials moderately large, remaining ones small. Medially on chin, scales variably polygonal, smooth, juxtaposed to subimbricate, decreasing in size toward midventral line. Infralabials 9-12, 8-11 to below centre of eye. Chin and gular regions separated by a transverse row of small scales.

Well developed gular and antegular folds. Antegular fold medially shallow and defined only by one or two rows of small scales, laterally it turns into a deep oblique neck fold which covers partially the antehumeral fold (which continues from gular fold). A supernumerary antegular fold may also be present, in which case it divides the anterior gular area at its midlength. This fold may be completely absent, or present only ventrolaterally, defined by two rows of small scales. Scales on the anterior, larger, gular area smooth, subimbricate, mostly hexagonal, in transverse rows. Posterior gular area with 3-4 transverse rows of similar, but larger, scales, anteriorly and posteriorly bordered by small scales.

Nape with a dorsolateral row (at each side) of very large, irregular, smooth, moderately convex scales, medially separated by a double row of similar but smaller scales. Each of these scales partially or completely surrounded by small scales. On sides of neck scales continuous to gulars, dorsally becoming more rounded and convex, and some of them larger. Dorsals heterogeneous, with 4-6 approximate (in some specimens very irregular) rows of tubercles: two paravertebral, and at each side two dorsolateral rows. Tubercles roughly oval, with a median keel, surface rising from sides toward the keel (roof-shaped); 18-24 (21.8 ± 1.8, n= 8) in a longitudinal row from nape to posterior level of hind limbs. Scales between tubercles similar, but smooth to weakly keeled and distinctly smaller, although variable in size. Scales form undulating transverse rows, and between large tubercles distinct folds follow the border of the rows. Flanks with similar scales of small and medium sizes, the transverse rows of medium-sized scales separated by folds of skin. Ventrals rectangular, longer than wide, posterior border slightly convex; imbricate, smooth or feebly keeled, in 30-34 (32.1 ± 1.5, n= 9) transverse rows. Laterally ventrals decrease in size and merge into laterals; 35-41 (38.1 ± 2.2, n= 7) ventral scales across a midbody row, when reduced (lateral) scales not considered. Preanal plate with several squarish scales, wider than ventrals, in transverse rows. Pores small, in the centre of a scale; at each side 0-5 preanal and 0-3 femoral pores.

Base of tail with two dorsolateral crests of projecting, fin-like scales, at each side, which a short distance from the base turn into a double dorsal crest, mostly separated by three (proximally) to zero (distally) small scales in a transverse row. Scales between crests and on sides elongate, rectangular, keeled, in transverse rows. On ventral surface scales similar but smooth proximally, distally becoming larger, distinctly keeled and roof- shaped, forming longitudinal ridges. Transverse rows proximally continuous across sides and ventral surface. Distally intermediate rows appear laterally, and two ventral rows correspond to three lateral rows.

Forelimbs with rhomboid to hexagonal, smooth to feebly keeled, imbricate scales, in oblique to transverse rows; scales smaller on ventral aspect. Anterior aspect of thighs with rectangular to hexagonal, longer than wide, feebly keeled, imbricate scales, in oblique rows, which ventrally grade into smaller, squarish, smooth scales, and on ventral aspect of lower legs turn into smooth, rhomboid or (in a distal, anterior row) wide-hexagonal scales. Dorsal and posterior aspects of hind limbs, and anterior aspect of lower legs, with rhomboid, keeled, imbricate scales, smaller posteriorly. Lamellae under fingers mostly single, multicarinate; near base divided into several scales. Under toes only distal lamellae single, others divided into several small scales. On inner side of third and fourth toes the lamellae form a prominent denticulation. Lamellae under fourth finger 22-27 (24.5 ± 1.7, n= 15, 8 specimens), under fourth toe 32-39 (34.9 ± 2.0, n= 13, 8 specimens).

The following description of colour in life is based on Goeldi (1902), Vanzolini (1961b), Dixon & Soini (1975, 1986), and Duellman (1978). Dorsal surface of head orange, dark reddish-tan, or (in adult specimens) similar to back. Back olive, greenish-copper, dull brown or greyish-brown. Sides of head with some orange or red areas, especially around eyes, flanks with reddish and olive, or yellowish-tan spots. Ventral region variegated with orange, yellow and olive-green (Vanzolini, 1961b, in specimens from eastern Pará), or adult females grey, adult males with throat mottled orange and black, belly yellowish-brown (Duellman, 1978, specimens from Ecuador). Vanzolini (1961b) also observed that the limbs were predominantly green, with red areas on anterior aspect of forearms and thighs, and light spots ventrally, and that tail was similar in colour to back, with blackish transverse bars especially conspicuous distally. Iris dull brown (Duellman, 1978). Young specimens were described by Dixon & Soini (1975, 1986) as having bright green bodies and reddish brown heads. In general, smaller specimens seem to have a more vivid colour than larger ones. A colour photo is shown by Goulding (1989).

In preservative, dorsal region completely olive-brown, ventral region a mixture of olive, dark olive, and yellow, predominantly yellow under head and on gular region, olive on belly and under limbs. Tail yellowish close to base, changing into tan distally; a yellow spot is present on the lower border of the eye.

Habitat.— A semi-aquatic lizard, inhabiting seasonally flooded lowlands, swamps, and margins of rivers and streams, found either in the water, on the ground, or on branches of low trees. Goeldi (1902) mentioned a specimen found in a muddy pool, along a trail, in an area inundated during part of the year, on the northern coast of Marajó Island. Vanzolini (1961b) and Vanzolini & Valencia (1966) reported the species from the same region on Marajó Island, in swampy areas sparsely covered with low trees and bushes; according to local inhabitants, the lizard would be particularly found in areas having as dominant vegetation a Convolvulaceae, *Ipomoea fistulosa* Mart. Müller (1969, 1971) also reported *D. guianensis* from Marajó, in 1969 from swampy forest in the western part of the island, and in 1971 from innundated campos near Santa Cruz do Arari, where animals were sleeping on bushes (of *Ipomoea fistulosa*) emerging from water. Crump (1971) observed one or a few (not more than four) specimen(s) in the surroundings of Belém, in what she identified as 'major area open and edge', which included swampy areas in open fields, ponds along forest edges, and second growth vegetation. Dixon & Soini (1975, 1986) observed several specimens in the Iquitos region, most of them in or near water, and two young males on manioc stalks in a cultivated field. Duellman (1987) reported that in the 'Reserva Ecológica Cuzco Amazónico', southern Peru, *D. guianensis* seemed restricted to the banks of the Madre de Dios river and Mariposa creek. In Ecuador, Duellman (1978) reported specimens observed on the ground, near the bank of the Aguarico river, one of which took refuge in a hole in the river bank.

Notes on natural history.— Through the observation of specimens kept in captivity, Vanzolini (1961b) concluded that *D. guianensis* spends most of its time in low trees. It can also rest in the water, in both cases presenting a cryptic coloration, helped by its behaviour. A specimen on a branch of a large shrub overhanging a small forest stream was observed by Dixon & Soini (1975, 1986), in a behaviour similar to that described by Vanzolini (1961b). The specimen dived into the stream when chased.

D. guianensis has been reported to feed on snails, which may be taken underwater. The lizard crushes the shell with its strong, molariform teeth, expelling the fragments with its tongue (Conant, 1955; Vanzolini, 1961b; Rand, 1964; Dixon & Soini, 1975, 1986). Goulding (1989), however, stated that in igapó forest, especially during the dry phase, the 'jacuruxi-lizard' forages for arboreal invertebrates, eggs and other animal prey. Goeldi (1897) reported a specimen in captivity, in Museu Goeldi, to accept fish meat after it had refused any food for two months.

Goeldi (1897, 1902) described two eggs of this species found in a cavity in a termite nest at the margin of a river, on Marajó Island. The eggs had an average length of 74.5 mm and an average width of 38.25 mm.

Distribution (fig. 188).— Along the Amazon valley, eastward possibly reaching, along the coast, the states of Maranhão and Amapá; westward up to Amazonian Colombia, Ecuador and Peru; in Peru it occurs southward at least until the Madre de Dios river. Its occurrence in French Guiana is doubtful (Hoogmoed & Lescure, 1975). Contrary to what is stated by Burt & Burt (1931, 1933) and Amaral (1937a, b), the species is not present in northeastern Brazil.

Remarks.— *D. guianensis* is known in Pará under the name 'jacuruxi'. De la Borde named it 'lézard-cayman' (Lacépède, 1788: 248), which turned into the English 'caiman lizard'.

Although *D. guianensis* is remarkable for its size and caiman-like appearance, and references to it appeared in the literature very early, reports of actual observation of the animal in the field are relatively few and scant, as well as locality records, especially in central Amazonia. Much of the material in scientific collections came from animals kept in zoos, which had no precise collecting data. The same is true for some studies on behaviour (e.g., Conant, 1955; Vanzolini, 1961b, in part; Rand, 1964).

Among the five characteristics listed by Vanzolini & Valencia (1965) as diagnostic for each of the two species of *Dracaena*, two are not supported by the specimens studied — parietal-temporal edge was similar to that described for *D. paraguayensis* (formed by a series of regular scales), and 2-3 pairs of chinshields were in medial contact. Dixon & Soini (1986) reported 33-35 transverse rows of ventrals in specimens from Peru, a slightly higher count than found in animals from eastern Amazonia (30-

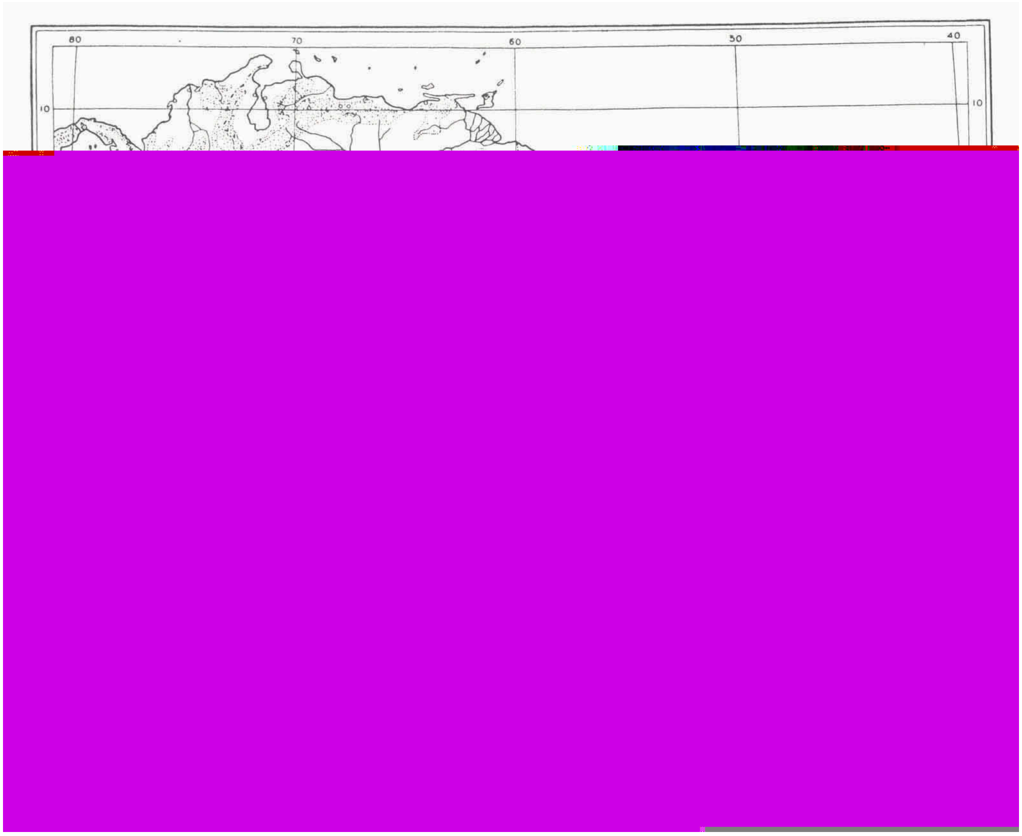


Fig. 188. Distribution of *Dracaena guianensis*. Closed circles (Belém and Rio Branco) = material studied. Half-open circle (Amapá, north of Rio Araguari) = type-locality, as proposed by Hoogmoed & Lescure (1975). Open circles = data from literature (Vanzolini & Valencia, 1965; Müller, 1971; Duellman, 1978, 1987; Dixon & Soini, 1986) and pers.com. M. Martins for Carero, Manaus, and Tefé Lake, both Amazonas state. Dashed circle = record by Ayala (1986) for state Amazonas, Colombia. Stars = possible occurrences: São Luiz, Maranhão, according to Vanzolini & Valencia (1965); Capanema, Pará, oral record by a local inhabitant and collector; São Sebastião da Boa Vista, Ilha do Marajó, specimen kept in an artificial lake in a public square (pers. obs.), probably collected in the surroundings of the city.

33). Vanzolini & Valencia (1965) reported 32-33 for *D. guianensis*, 34-39 for *D. paraguayensis*.

A detailed synonymy, together with a general revision of the literature, was presented by Vanzolini & Valencia (1966).

The genus *Dracaena* is included in Appendix II of CITES (Schouten, 1992) because of the trade in skins. Large amounts of skins seem to have been smuggled out of Brazil (port of shipment Belém) to Guyana (Gorzula to Hoogmoed, in lit.).

Tupinambis Daudin, 1803

Diagnosis.— Large teiids with body cylindrical, tail round in cross section, limbs well developed, pentadactyl, all digits clawed. Nasal divided, upper nasal in contact medially. Lower eyelid completely opaque. Dorsals relatively small, homogeneous in size. Ventrals rectangular, longer than wide, smooth, 20-40 in a row across midbody. Preanal and femoral pores present.

Content.— Five species, one of which described here as new. The conclusions by Presch (1973), who reduced the genus to two species, are not followed, and the four species reported by Peters & Donoso-Barros (1970) are accepted. However, due to the recognition that the name *T. teguixin* (Linnaeus) refers to the Amazonian species, that was called *T. nigropunctatus* Spix by Peters & Donoso-Barros (1970), *T. nigropunctatus* and *T. teguixin* (Linnaeus) are here renamed, respectively, *T. teguixin* (Linnaeus) and *T. merianae* (Duméril & Bibron). See under *T. teguixin* for a more thorough discussion on this subject, and under *T. longilineus* **spec. nov.** for a comparison among the species.

Distribution.— In most part of South America east of the Andes, to the south reaching Uruguay and northern Argentina.

Tupinambis longilineus spec. nov.
(figs. 189-192)

Holotype.— MPEG 14560, ♀, Alvorado d'Oeste (road BR-429, km 87, line 64), Rondônia, Brazil, 14.xi.1986, leg. F. Braga & J.M. Rosa.

Diagnosis.— *Tupinambis* with head elongate; body slender, slightly depressed, rectangular in cross section; limbs long (especially hind limbs) and slender. One loreal scale. All supraoculars in contact with supraciliaries. Temporals relatively large, upper temporals only slightly smaller than lower ones. A supratemporal row of scales much larger than temporal scales. Supernumerary antegular fold present. Scales around midbody 93, of which 20 ventrals. Femoral pores 22. Lamellae under fourth finger 10, under fourth toe 28-29. Back with relatively large, irregular black spots, flanks with a wide, black longitudinal band. Gular region spotless.

Description.— The holotype and single specimen known has 202 mm SVL and 425 mm tail length (2.1 times SVL). Head elongate, 0.22 times SVL, 1.6 times as large as wide, 1.2 times as wide as high. Forelimbs 0.35 times SVL, hind limbs 0.67 times. Neck and body about as wide as head. Body slightly depressed, rectangular in cross section. Base of tail almost as wide as body, distally tail tapers toward tip.

Anterior teeth conical, posterior teeth tricuspid, with median cusp much higher than lateral ones.

Rostral pentagonal, well visible from above. Nasals divided, nostril largely in lower nasal. Upper nasal trapezoid, in contact with the one from the other side middorsally. Frontonasal hexagonal. A pair of irregularly hexagonal prefrontals, which form a moderately long medial suture. Frontal hexagonal, longer than wide, anterior part wider; in contact laterally with first and second supraoculars. A pair of irregularly pentagonal frontoparietals, laterally in contact with second, third, and fourth supraoculars; medial suture distinctly longer than that between prefrontals. Interparietal pentagonal, longer than wide, wider anteriorly. One parietal on each side, irregular in shape, slightly shorter, and distinctly wider, than interparietal. Three wide and short occipitals, with a smaller scale in between each of them. Left occipital partially fused with parietal. Four supraoculars, first narrower, second largest. Posterior to the fourth supraocular a triangular, distinctly smaller scale. Eight supraciliaries, first wider, pentagonal, posterior ones rectangular; in direct contact with supraoculars. A large loreal, in contact with nasal (especially lower nasal; only in touch with upper nasal), frontonasal, prefrontal, first supraciliary, frenocular, and second and third supralabials. Frenocular trapezoid, moderately large. Five suboculars at each side. A subocular ridge along frenocular and anterior suboculars. Lower eyelid with an opaque disc with four oval, higher than long palpebrals on one side, on the other side scales irregular. Eight supralabials at each side, six to below centre of eye; followed to commissure of mouth by small scales. Temporal scales variably polygonal, those in upper part slightly smaller. A supratemporal row of three scales several times larger than temporal scales. Ear-opening large, oval, slightly oblique, with smooth margin. All scales juxtaposed and (except for subocular ridge) smooth.

Mental trapezoid, with convex anterior border. Postmental irregularly heptagonal. Four pairs of chinshields, first pair in contact medially, first and second pairs in contact with infralabials. Infralabials seven on one side, eight on the other, anterior four on each side distinctly wider than posterior ones. Between posterior (narrower) infralabials and third and fourth pairs of chinshields a row of three moderately large scales. Between chinshields scales small, approximately rectangular, longer than wide (larger, irregularly polygonal at border with chinshields), from juxtaposed to slightly imbricate. Posteriorly these scales merge into gulars.

Gular region divided into three parts by a feebler, supernumerary antegular fold at level of posterior margin of ear-opening, and a stronger antegular fold. Posteriorly the region is delimited by a well developed gular fold. Gular scales mostly hexagonal, some medially, on anterior and median parts, squarish. All smooth, slightly imbricate. Anterior, median, and posterior parts of gular region with, respectively, seven, eight, and four transverse rows of scales. Scales largest in posterior part, in general those in median part slightly smaller than those in anterior part.

Scales on nape smooth, slightly imbricate, in transverse rows. Anterior scales hexagonal, posterior ones with more rounded (sub- hexagonal or squarish) contour, grading into dorsals. Scales on sides of neck similar to those on nape. Dorsals hexagonal, slightly longer than wide, imbricate, in 110 transverse rows (from nape to posterior margin of hind limbs). Toward rump posterior border of scales round instead of angulate. On flanks triangular groups of transverse rows of scales narrow ventrad and interdigitate with similar triangular groups which start from ventrals and narrow dorsad. Ventrals rectangular (except in a few anterior rows on chest, where they are hexagonal), mostly longer than wide, subimbricate, in approximately longitudinal, and 33 transverse rows (between gular fold and preanal plate). Twenty scales in a transverse row at midbody (ventrals counted here are those scales that are not involved in the area of interdigitating triangles at the border between belly and flanks). Scales around midbody 93. Preanal plate with three transverse rows of irregularly polygonal, relatively large scales. Four preanal pores at each side, in a curved line, with a short medial gap between them. Eleven femoral pores per side, with a distinct gap between them and preanal pores. Pores between 1-3, mostly two, scales, one of which much larger than the others. When only one scale, there is a sulcus from border to pore.

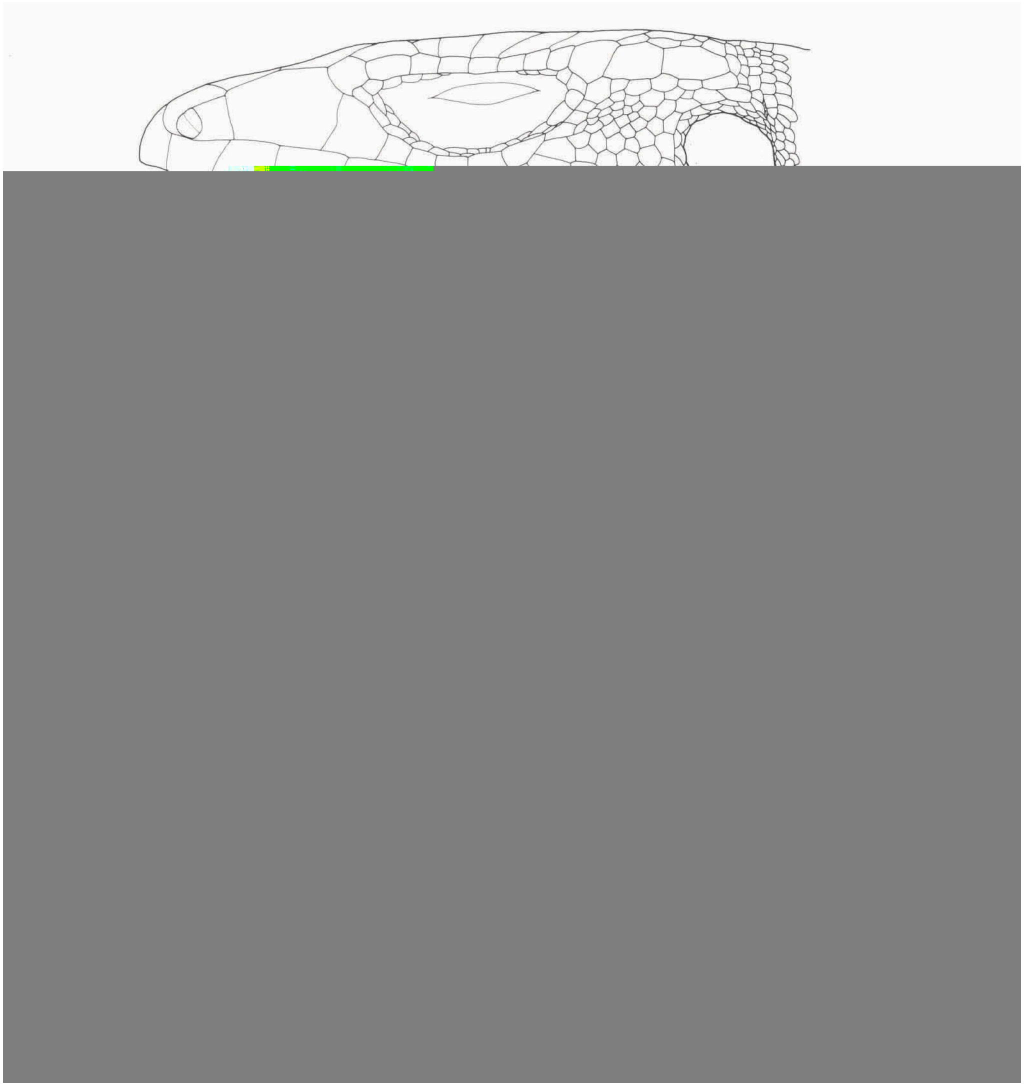


Fig. 189. *Tupinambis longilineus* spec. nov., MPEG 14560 (holotype); a, b: lateral and ventral views of head; c: preanal plate, preanal pores, and proximal femoral pores; d: dorsal view of head.

Tail with narrow and elongate scales, proximally rectangular and smooth, distally hexagonal and keeled. Scales slightly imbricate, in transverse rows. On sides of tail, in most cases, of each three transverse rows, one widens into a ventral row, the

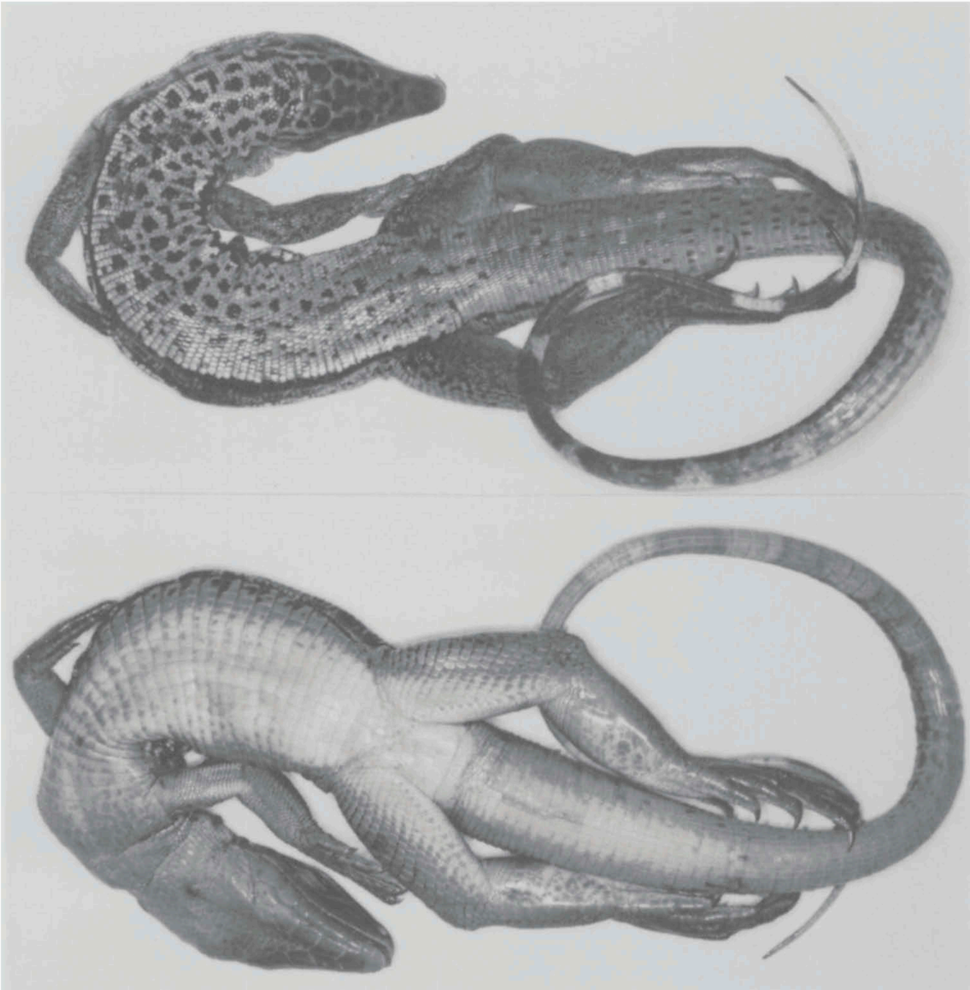


Fig. 190. *Tupinambis longilineus* spec. nov., MPEG 14560, holotype, Alvorada d'Oeste, RO, Brazil: upper figure dorsal view, lower figure ventral view (T.C.S. Avila Pires).

scales, in oblique rows, largest in a longitudinal row on ventral aspect of lower legs. Scales on dorsal and posterior aspects of hind limbs small, roundish. They increase gradually in size on anterior aspect of lower legs. A prominent fold of skin along distal part of thigh and knee, following limit between large and small scales. Lamellae under fingers smooth, some single, some medially divided. Under toes smooth, all medially or submedially divided; they form a prominent, denticulate border along inner side of most of first toe and of proximal parts of second, third, and fourth toes. Ten lamellae under fourth fingers, 28-29 under fourth toes.

Colour in life unknown. In preservative, dorsal surface of head light brown with relatively large, irregular black spots (fewer spots toward snout). Back light brown medially to bluish toward the dorsolateral area, anteriorly with irregular black spots similar to those on head, which posteriorly become smaller. Flanks with a wide black

Fig. 191. *Tupinambis longilineus* spec. nov., MPEG 14560, holotype, Alvorada d'Oeste, RO, Brazil: lateral view of head and neck (T.C.S. Avila-Pires).

band (enclosing some irregular lighter areas) between limbs. Between ear-opening and forelimbs the band is narrower, only upper part present, and below it a bluish-tan area. Limbs predominantly light brown with small and irregular black spots, anterior aspect of thighs bluish. Proximal part of tail light brown with approximately regularly spaced black spots in transverse rows; distally with alternate dark brown and cream transverse bands, dark bands wider. Ventral surface of head, part of chest, ventrolateral surface of belly, of limbs and of base of tail, and ventral surface of tail distally light blue. Belly medially, part of ventral surface of limbs and of base of tail cream (almost white), with some light blue spots toward the sides of belly, and under limbs and base of tail.

Habitat.— Alvorada d'Oeste is in a zone of contact and complex interaction between extensions of cerrados from Central Brazil and Amazonian forest. MPEG 14560 was at border of terra firme forest (cut by several creeks) with an area partially cultivated, partially covered by secondary growth (capoeira), not far from a road.

Distribution (fig. 192).— Only known from the type-locality.

Remarks.— Although *Tupinambis* contains large lizards, some of them relatively common, the taxonomy of the genus is still confusing, and apparently some undescribed species exist. The review of *Tupinambis* by Presch (1973) resulted in more confusion than clarification. In spite of this, I have no doubt that *T. longilineus* is an undescribed species, for its distinctive characteristics. *T. longilineus* differs from *T. merianae*, *T. rufescens* (Günther), and *T. duseni* Lönnberg by the presence of only one loreal scale (two loreals in the latter three species); supraciliaries in direct contact with supraoculars (second to fourth supraoculars separated from supraciliaries by a

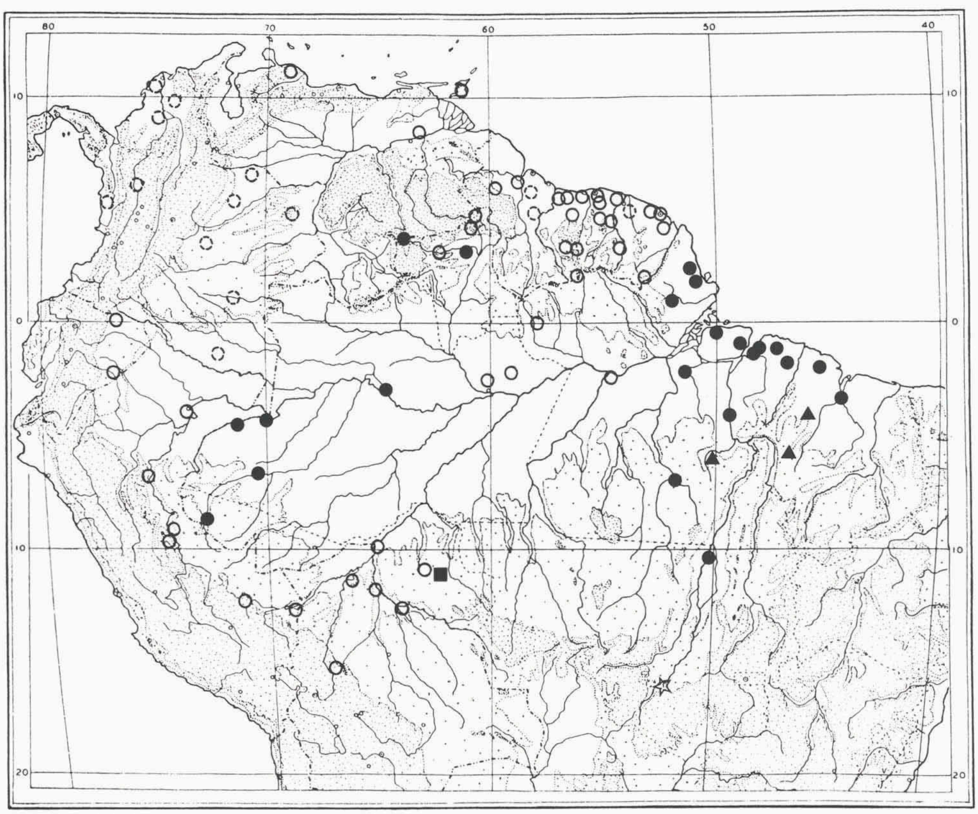


Fig. 192. Distribution of *Tupinambis* spp. in Amazonia and surroundings (most localities east and south of Amazonia not included). Circles = *T. teguixin*. Triangles = *T. merianae*. Square = *T. longilineus* spec. nov. (type-locality). Closed symbols = material studied (Palhano, in Ceará, and Ilha Fernando de Noronha outside the area represented in the map). Open circles = data from literature for *T. teguixin* (Boulenger, 1885b; Beebe, 1945; Presch, 1973; Hoogmoed, 1973; Hoogmoed & Lescure, 1975; Duellman, 1978, 1987; Meede, 1984; Dixon & Soini, 1986; Vanzolini, 1986a; Almendáriz, 1987; Fugler, 1989; O'Shea, 1989; Rodriguez & Cadle, 1990; Zimmerman & Rodrigues, 1990; Martins, 1991). Dashed circles = data by Ayala (1986) for Colombian states, and for non specified localities along rivers by Boulenger (1885b), Parker (1935), and Duméril & Duméril (1851). Star = Record of sympatry between *T. teguixin*, *T. merianae* and *T. duseni* by Abe et al. (1992).

row of scales); presence of a supernumerary antegular fold (absent); smaller number of ventrals across midbody (20 in *T. longilineus*, 30-38 in *T. merianae* according to my counts; 36-40 in *T. merianae*, 46-50 in *T. rufescens* according to Boulenger, 1885b; 46 in *T. duseni* according to Lönnberg, in Lönnberg & Andersson, 1909). In all these characteristics, *T. longilineus* is closer to *T. teguixin*. These two species also differ from *T. merianae* in having distinctly larger supratemporals, larger gular scales, lower number of dorsals and scales around midbody, lower number of pores (see table 12), and gular region spotless or with small, black or grey spots (large black spots in *T. merianae*). *T. longilineus* differs from *T. teguixin* in the slender body and limbs, with body compressed and rectangular in cross section (cylindrical in *T. teguixin*); temporal scales comparatively larger; higher number of femoral pores (table 12); slightly lower

Table 12. Comparison of scale counts between *T. longilineus* spec. nov., *T. teguixin* and *T. merianae*.

	Tupinambis longilineus	*Tupinambis teguixin*	*Tupinambis merianae*
scs. around midbody	93	94-122 (107.4 ± 7.5)	133-172 (159.0 ± 12.1)
dorsals	110	102-126 (113.5 ± 5.6)	123-145 (138.2 ± 7.8)
transv.r. ventrals	33	32-38 (35.4 ± 1.5)	34-40 (36.2 ± 1.7)
ventrals across midbody	20	21-28 (24.8 ± 1.5)	30-38 (34.2 ± 2.7)
femoral pores (total)	22	10-17 (13.4 ± 1.8)	25-42 (34.6 ± 4.8)
lamellae under fourth finger	10	13-18 (15.9 ± 1.1)	15-21 (17.5 ± 1.3)
lamellae under fourth toe	28-29	29-39 (34.0 ± 2.0)	29-38 (33.3 ± 2.4)

numbers of scales around midbody and of ventrals across midbody (table 12); lower number of subdigital lamellae, especially under fourth finger (table 12); and in colour pattern (no transverse bands on back and a wide black band along flanks).

T. longilineus seems to be sympatric with *T. teguixin*.

Etymology.— From the Latin 'longus' + 'linea', which means elongate line, in reference to its slender habitus.

Tupinambis merianae (Duméril & Bibron, 1839)
(figs. 192, 193, 305)

"Le Tupinambis" Lacépède, 1788: 251 (part).

Lacertus Tupinambis Lacépède, 1788: Synopsis methodica Quadrupedum oviparorum (part).

Salvator merianae Duméril & Bibron, 1839: 85 (lectotype, by present designation, MHNP 8388; type-locality: Brazil, here restricted to the state of Rio de Janeiro).

Teius teguexim; Gray, 1845: 16.

Tupinambis teguixin; Boulenger, 1885b: 335; Burt & Burt, 1931: 380; Amaral, 1937a: 1741, 1937b: 196; Peters & Donoso-Barros, 1970: 272; Vanzolini et al., 1980: 119; Cunha et al., 1985: 36; Abe et al., 1992: 128.

Tupinambis rufescens; Presch, 1973: 743 (part).

Material.— **Brazil.** CEARA. Palhano: 1 ♀, MPEG 14631, 12.x.1986, leg. J.O. Mateus.

MARANHAO. Road BR-226 between Porto Franco and Grajaú: 1 ♂, MPEG 12187, ii.1977, leg. O.R. Cunha & F.P. Nascimento. Reserva Florestal de Buriticupu/CVRD: 1 ♂ (skin), MPEG 14539, 06.ix.1985, leg. M. Santa-Brígida (through local inhabitants).

PARA. Carajás, Serra Norte, N-1: 1 ♂, MPEG 12920, iv.1983, leg. B.M. Mascarenhas, W.M.S. França & R. Bittencourt N.; 1 ♀, MPEG 13020, vi.1983, leg. P. Sá; 1 ♂, MPEG 13021, x.1983, leg. P. Sá; 1 ♂, MPEG 13236, ii.1984, leg. J.C.S. Pinto; 1 ♀, MPEG 13256, 14.iii.1984, leg. T.C.S. Avila Pires, M.I.S Assunção & J.C.S. Pinto; 1 ♀, MPEG 13954, 20.ix.1984, leg. J.C.S. Pinto; 1 ♂, MPEG 13955, 15.x.1984, leg. J.M. Santos; 1 ♀, MPEG 14142, 09.ix.1985, leg. F.P. Nascimento, R. Bittencourt N. & M.G.M. Nery; 1 ♂, MPEG 14188, 19.vii.1985, leg. M. Zanuto. Carajás, Serra Norte, N-5: 1 ♂, MPEG 14234, 04.xi.1985, leg. T.C.S. Avila Pires & R.J.R. Moraes.

RIO GRANDE DO NORTE. Ilha Fernando de Noronha: 1 ♀, MPEG 14797, 01-05.vii.1986, leg. F. Rebelo.

Diagnosis.— *Tupinambis* with a blunt head, cylindrical body, and strong limbs. Two loreal scales. Second, third and fourth supraoculars separated from supraciliaries by a row of small scales. Temporals small. Supratemporal scales only moderately larger than temporals. Supernumerary antegular fold absent. Scales around midbody 133-172, of which 30-38 ventrals. Femoral pores 25-42. Lamellae under fourth finger

15-21, under fourth toe 29-38. Back with transverse bands or, in some large specimens, irregularly vermiculated. Gular region with large black spots.

Description.— A very large teiid, maximum SVL in males 402 mm, in females 375 mm (Mercolli & Yanosky, 1989), respectively 395 mm (MPEG 13236) and 325 mm (MPEG 14707) among material studied. Head 0.20-0.27 (0.24 ± 0.02, n= 13) times SVL, 1.3-1.7 (1.53 ± 0.11, n= 13) times as long as wide, and 1.0-1.4 (1.15 ± 0.13, n= 12) times as wide as high; pyramidal in shape, with a blunt snout, adult males with a swollen gular region. Neck as wide as head, except in adult males, and as wide as anterior part of body. Body cylindrical. Limbs well developed, strong, forelimbs 0.31-0.36 (0.34 ± 0.02, n= 12) times SVL, hind limbs 0.52-0.61 (0.57 ± 0.03, n= 12) times. Tail round in cross section, tapering toward tip, 2.0-2.2 (2.11 ± 0.06, n= 7) times SVL.

Tongue lanceolate, covered dorsally with small, imbricate, scale-like papillae; tip bifid, smooth, each tip with a longitudinal, middorsal sulcus. Ventral surface of tongue with narrow plicae laterally, medially with a double row of wider, scale-like plicae, forming chevrons. Anterior teeth very small, conical; one large, conical ("canine") tooth anterolaterally at each side in the upper jaws. Posterior teeth bi- and tricuspid, laterally compressed, in older specimens becoming bluntly conical (for a detailed description of the teeth see Dessem, 1985).

Rostral pentagonal, visible from above. Bordered posteriorly by nasals, which form a short medial suture. Nasal divided by an oblique suture, nostril in its lowest part. Frontonasal approximately pentagonal. A pair of roughly rectangular prefrontals, longer than wide, forming a long suture. Frontal irregularly octagonal, slightly wider anteriorly, in contact laterally with first and second supraoculars. A pair of irregularly pentagonal frontoparietals, which form a long medial suture. Interparietal irregularly pentagonal or hexagonal, or with irregular shape, distinctly to slightly longer than wide, wider anteriorly, posterior margin mostly slightly convex. Parietals wider than, and as long as or slightly longer than, interparietal, irregular in shape. Frontoparietals, interparietal and parietal all distinctly smaller than frontonasal, prefrontals or frontal. Interparietal and parietals followed by relatively large, irregularly polygonal, smooth scales, which decrease in size posteriorly. Head delimited posteriorly by a sulcus linking ear-openings. Four supraoculars, first narrower and in direct contact with supraciliaries, other three wider, separated from supraciliaries by a row of granules; third supraocular shortest. Posterior to the fourth supraocular, a few distinctly smaller scales, which in MPEG 13236 could be considered on one side as a fifth, on the other side as fifth and sixth, supraoculars. Supraciliaries 11-14, mostly quadrangular. Two large loreals, anterior one narrower. Frenoculars 1-3, mostly two, either in contact with preoculars or fused with them. Suboculars 5-8, relatively large, with a subocular ridge along preoculars and anterior suboculars. One row of postoculars, slightly larger than temporal scales. Lower eyelid with an opaque disc with several relatively small palpebrals. Seven, occasionally eight, supralabials to below centre of eye, posterior one distinctly smaller. Posteriorly scales decrease in size and become indistinguishable from temporal scales. Temporal scales irregularly polygonal, smooth, very small in upper part, distinctly larger toward supralabials. A supratemporal row of five or more, only moderately enlarged, scales. Ear-opening large, oval, slightly oblique, with smooth margin.

Mental trapezoid, with convex anterior border. Postmental irregularly pentago-

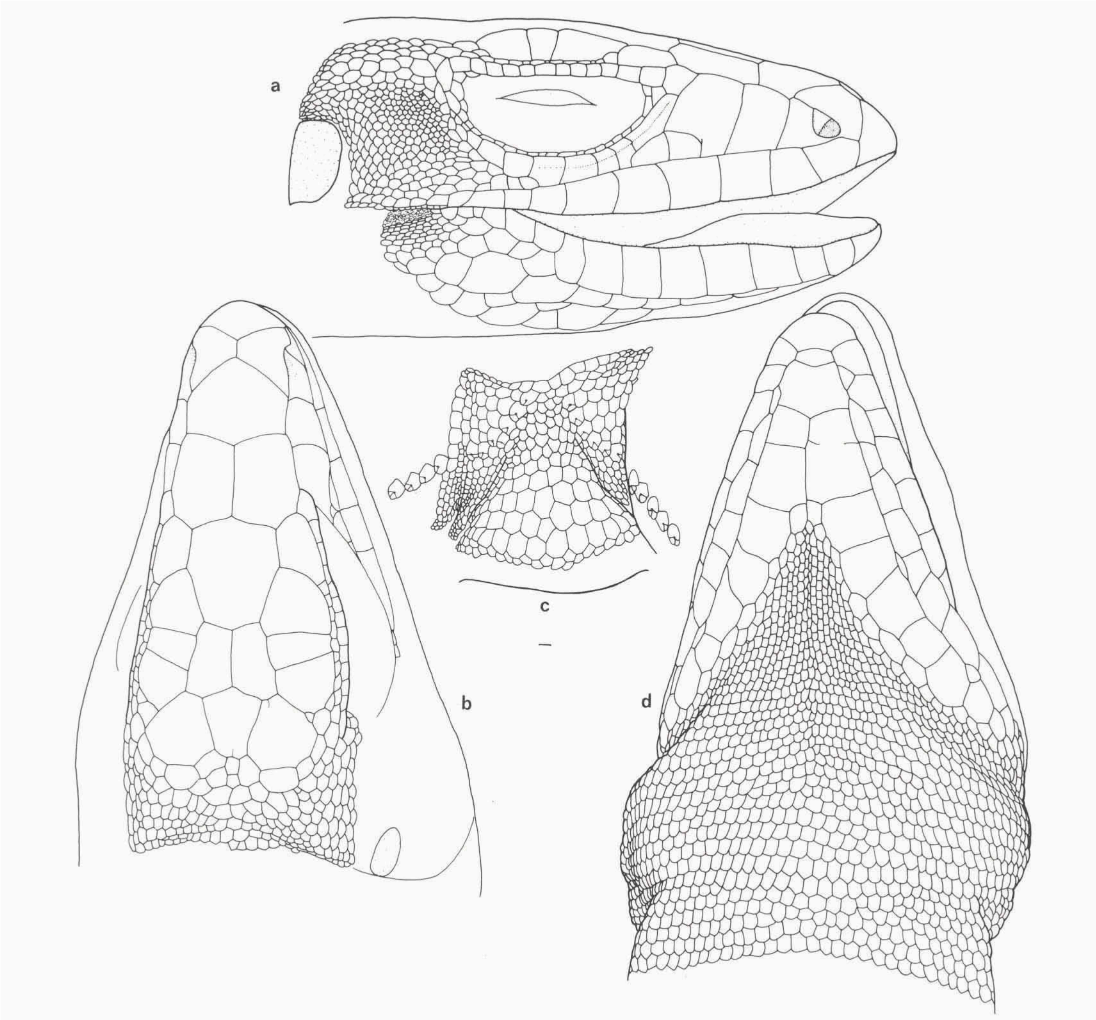


Fig. 193. *Tupinambis merianae*, MPEG 13256; a, b: lateral and dorsal views of head; c: preanal plate, preanal pores, and proximal femoral pores (halfgrown specimen); d: ventral view of head.

nal to heptagonal; in some specimens transversely divided, forming an extra, short anterior scale. Chinshields 4-8 at each side, followed by gradually smaller scales; first one or two pairs form a medial suture. All chinshields, except in some specimens first pair, separated from infralabials by a row of relatively large scales, increasing in size posteriad. Between chinshields, small, oval to rectangular scales, in longitudinal, posteriorly divergent, rows. Infralabials 7-10, 7-9, exceptionally six, to below centre of eye; mostly very large, decreasing sharply in size at level of eyes.

Gular scales oval or hexagonal, in transverse rows, larger than small scales on chin, with a short transition between them. About 20-24 rows of gular scales until antegular fold. Well developed antegular and gular folds, covered with small scales and enclosing 3-6, more commonly four or five, rows of larger, hexagonal scales.

Scales on nape roundish, smooth, subimbricate, in transverse rows. Similar, but distinctly smaller, on sides of neck. Dorsals slightly smaller than scales on nape, oval to squarish, in some specimens slightly narrower on posterior part of body; smooth, subimbricate, in 123-145 (138.2 ± 7.8, n= 13) transverse rows from nape to posterior level of hind limbs. Scales on flanks smaller, with triangular groups of transverse rows which narrow ventrad and interdigitate with similar triangular groups that start from ventrals and narrow dorsad. Ventrals rectangular, longer than wide, subimbricate, except on anterior part of chest, where they are rhomboid to hexagonal, juxtaposed; in 34-40 (36.2 ± 1.7, N= 13) transverse rows between gular fold and preanal plate, and 30-38 (34.2 ± 2.7, n= 13) scales in a transverse row at midbody (ventrals counted here are those scales that are not involved in the area of interdigitating triangles at the border between belly and flanks). Scales around midbody 133-172 (159.0 ± 12.1, n= 13). Preanal plate with several transverse rows of irregularly polygonal scales, scales larger posteriorly. Preanal pores 5-9 at each side, in a curved line (in some cases part of them out of line, in adjacent scales). Femoral pores 12-20 at each side, separated from preanal pores on same side by a short gap. Total number of pores (both sides) 35-57 (47.6 ± 6.8, n= 13). Pores between two or three scales, one of which much larger than the others.

Tail with narrow, rectangular scales, smooth proximally, keeled distally, in transverse, subimbricate rows. Underside of tail with similar, but larger scales. On sides of tail, in most cases, of each three transverse rows, one widens into a ventral row, the other two narrow slightly and are in contact with another ventral row, so that each three dorsal and lateral rows correspond to two ventral rows.

Anterior surface of forelimbs with rhomboid or squarish, smooth, subimbricate scales, squarish and increasing in size toward hand, on forearms; elsewhere with roundish, juxtaposed, smooth scales, smallest on posterior surface of upper arms. Hind limbs with squarish, smooth, subimbricate scales on antero-ventral surface of thighs; larger, rhomboid scales on ventral surface of lower legs, with a row of obliquely enlarged scales from base of first toe to about middle of lower leg. Elsewhere scales roundish, juxtaposed, smooth, mostly very small, slightly larger adjacent to line of pores. Knee with a fold of skin toward thigh, which follows limit between large and small scales. Subdigital lamellae mostly divided medially or submedially, proximal lamellae divided into several scales; 15-21 (17.5 ± 1.3, n= 24, 12 specimens) lamellae under fourth finger, 29-38 (33.3 ± 2.4, n= 26, 13 specimens) under fourth toe (counted along denticulate side). Some proximal, inner (toward first toe) lamellae under third and fourth toes form a prominent, denticulate border.

General colour in preservative (which is not very different from colour in life) black or dark brown, with olive-brown or cream spots. This results in a transverse banded pattern along back and flanks, with alternating predominantly dark, almost spotless bands and densely spotted bands. Flanks may be lighter than back. In some specimens the bands become rather inconspicuous, with irregularly distributed light spots. A dorsolateral band may be present, formed by two black lines, upper one beginning at posterior corner of eye, lower one at posterior margin of ear-opening; both delimit elongate, irregular, light spots. Head dorsally mostly uniformly olive-brown, except labials (or part of them), which have vertical black-and-white bands. Head and gular region ventrally white or cream, with large, roughly oval, black spots. Belly cream, with black transverse, irregular bands which continue from flanks and may either occupy most of belly width, or be restricted to the sides, median area with relatively large, irregular spots. Limbs predominantly black, with scattered, round, light spots. Tail pattern near base similar to that on body, distally with white rings which widen toward tip, separated by wider black areas.

Habitat.— It occurs in a variety of environments, including cerrados, caatinga, chaco, and also in the domain of the Atlantic forest, where it probably occupies relatively open, sunny places (e.g., it may be seen on top of Pão de Açúcar, in Rio de Janeiro, on rocks surrounded by forested areas). In Carajás, southern Pará, the species occurs in areas of open vegetation which grows on a rocky substrate. It was seen basking on naked stone or on short grasses, running to places with higher grasses or under bushes when disturbed. MPEG 14142 was at the border of a road through forest, not very far from an area of open vegetation.

Notes on natural history.— The stomach content of five specimens from Carajás were studied and contained: MPEG 12920 - one *Bufo* sp.; one fruit and other vegetable matter; an ant head and the abdomen of another insect; pieces of egg shell; a small stone. MPEG 13020 - many seeds which occupied a large part of stomach and intestine; bone remnants of a frog; remains of one or more insects; a small stone. MPEG 31021 - remnants of a small owl, probably *Otus* sp., and of a frog; a spider; remnants of insects; a small amount of vegetable fibres. MPEG 13954 - two frogs, one Orthopteron, vegetable matter. MPEG 31955 - vegetable matter (maybe of fruits). The presence of stones in the stomach may not be accidental. Sokol (1971) reported lithophagy in *T. rufescens* (Günther), suggesting that the stones would work as an abrasive, to facilitate digestion.

Milstead (1961) provided some data on specimens from Rio Grande do Sul, and Vanzolini et al. (1980) on specimens from northeastern Brazil. Achaval & Langguth (1973) observed an individual that stayed submerged for long periods. Lema (1983) reported bipedal posture and movement in *T. merianae* (as *T. teguixin*) under certain circumstances. Mercolli & Yanosky (1989) studied the behaviour of this species in an area of Chaco, in Argentina, and Mercolli & Yanosky (1994) reported on the diet of this same population.

Distribution (fig. 192).— In Brazil, northern Argentina, and Uruguay. In Brazil mostly south of Amazonia, in coastal, central, and southern Brazil. Present in enclaves of open vegetation in Carajás, southern Pará, in the southeastern part of Amazonia.

Remarks.— This species was called by Boulenger (1885b) *T. teguixin*, a concept which was in use until recently, but which was not correct, taking into account the identity of the lectotype of *T. teguixin* (Linnaeus). See under *T. teguixin* for a more detailed discussion and for designation of lectotype.

T. merianae is predominantly non-Amazonian. It is commonly known, in southern Brazil, as 'teiú'. The genus *Tupinambis* is included in Appendix II of CITES (Schouten, 1992), because skins of this genus (mostly *T. merianae*) enter trade in the millions (as *T. teguixin*). Locally individuals may also be eaten.

T. merianae seems to be sympatric, in different places, with *T. teguixin*, *T. rufescens*, and *T. duseni* (the latter according to Abe et al., 1992).

Tupinambis teguixin (Linnaeus, 1758) (figs. 192, 194, 312)

Lacerta teguixin Linnaeus, 1758: 208 (lectotype, according to designation by Presch, 1973, UUZM 13 [= no. 14 of 'Donatio Caroli Gyllenborg' in Lönnberg, 1896]; type-locality: 'Indiis', restricted by Presch, 1973, to the vicinity of Paramaribo, Suriname).
Seps marmoratus Laurenti, 1768: 59 (holotype: specimen represented in Seba, 1734, pl. 97, fig. 5; type-locality: "Indiis").
Lacerta Monitor Latreille, 1801a: 220 (lectotype, by present designation, specimen represented in Merian, 1719, pl. 70, type-locality: Suriname).
Tupinambis monitor Daudin, 1802a: 20.
Tupinambis nigropunctatus Spix, 1825: 18 (lectotype, according to designation by Hoogmoed & Gruber, 1983, ZSMH 629/0; type-locality: Pará, interpreted by Vanzolini, 1981a, as Belém, Pará); Boulenger, 1885b: 337; Goeldi, 1897: 648, 1902: 537, 541; Hagmann, 1906: 310, 1910: 488; Müller, 1912: 28; Cott, 1926: 1160; Burt & Burt, 1930: 38, 1931: 379; Amaral, 1937a: 1741, 1937b: 196, 1949: 112; Cunha, 1961: 39, 1981: 21; Rand & Humphrey, 1968: 7; Müller, 1969: 118, 1971: 27; Peters & Donoso- Barros, 1970: 271; Crump, 1971: 20; Hoogmoed, 1973: 362, 1979: 279; Vanzolini, 1981a: xxi; Hoogmoed & Gruber, 1983: 391; O'Shea, 1989: 68; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Nascimento et al., 1991: 33; Florindo & Abe, 1992: 128; Abe et al., 1992: 128; Manzani & Abe, 1992: 131.
Teius teguixin; Gray, 1838: 276.
Salvator nigropunctatus; Duméril & Bibron, 1839: 90; Guichenot, 1855: 31.
Teius nigropunctatus; Gray, 1845: 16.
Teius teguexim; Bates, 1864: 233; 1876: 192.
Tupinambis tegnixin (sic!); Müller, 1912: 24.
Tupinambis teguixin; Presch, 1973: 741 (part?); Vanzolini, 1986a: 14; 1986b: 24 (part?).
Tupinambis teguixin nigropunctatus; Müller, 1971: 24.

Material.— 2 ♂♂, 1 ♀, ZFMK 26651-653, Göttingen coll.
Brazil. 1 ♀, ZFMK 8395. ACRE. Município Cruzeiro do Sul, Rio Juruá, Novo Oriente (former Seringal Oriente): 1 ♀, MPEG 155, viii.1956, leg. F.C. Novaes. Upper Rio Juruá, Reserva Alto Juruá, Colocação Alegria: 1 ex., ZUEC 1605, 10.vii.1993, leg. P.R. Manzani & Rubenir.
AMAPA. Município Calçoene, road BR-156, km 464, Colônia do Torrão: 1 ♂, MPEG 3506, 18.xi.1969, leg. F.P. Nascimento. Município Amapá: 1 ♀, MPEG 221, 25.i.1958, leg. J. Hidasi. Município Amapá, road BR-156, Cujubim: 2 ♂♂, MPEG 3209, 3234, 01.xi.1969, leg. F.P. Nascimento. Serra do Navio, ICOMI Hospital: 1 ♂, MPEG 2473, x.1968, leg. P.F. Buhrnhein.
AMAZONAS. Rio Solimões, Tefé, Mamirauá Reserve: 1 ex., MPEG 16668, 07.ix.1993, leg. R.B. Barthem. Rio Juruá (left bank), Condor (6°45' S, 70°51' W): 1 ex., INPA 458, 04.x.1991, leg. C. Gascon. Rio Solimões, W. Benjamin Constant: 1 ex., MPEG 15930, 11.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires. Rio Javari, Estirão do Equador: 2 ♀♀, MPEG 892-93, 1959, 1 ♀, MPEG 1926, 02.i.1961; all leg. J. Hidasi.
GOIAS. Ilha do Bananal, Macaúba: 1 ♀, MPEG 1899, 1962, leg. J. Hidasi.
MARANHAO. Município do Arari, road BR-222, Gancho do Arari: 1 ♂, MPEG 11731, vii.1978, leg. O.R. Cunha & F.P. Nascimento; 2 ♂♂, 1 ♀, MPEG 11951-953, x.1978, leg. F.P. Nascimento & R. Pereira; 1 ♂, MPEG 12385, 14.viii.1979, leg. F.P. Nascimento & R.J.R. Moraes. Road BR-316, Paruá: 2 ♀♀, MPEG 10511-512, x.1976, leg. O.R. Cunha & F.P. Nascimento.
PARA. Ilha Mexiana, Fazenda Santana: 1 ♂, 1 juv., MPEG 16345, 16354, 4-16.xii.1992, leg. R.R. Silva. Ilha de Marajó, Município de Cachoeira do Arari: 1 ex., MPEG 15675, Fazenda Tuyuyu (right bank Rio Arari), 19.viii.1989, leg. R.A.T. Rocha & S. Ramos; 1 hgr., MPEG 16038, Localidade da Sé, "Campininha", 05.xii.1990, leg. R. Carlos. Ilha de Marajó, Município de Chaves, Fazenda Marajá: 1 ♂, MPEG 14995, 02.viii.1988, leg. I.F. Santos, R.J.R. Moraes & S. Ramos. Road BR-316 (Pará-Maranhão), km 224: 1 ♂, MPEG 8422, 10.vii.1974, leg. O.R. Cunha & F.P. Nascimento. Road to Maracanã, km 23: 1 ♀, MPEG 6125, 13.iii.1973, leg. O.R. Cunha & F.P. Nascimento. Benevides, Genipauba: 1 ♀, MPEG 1907,

18.viii.1964. Belém: 1 ♀, MPEG 1885, 1960; 1 ♂, MPEG 1891, 1961; 1 ♀, MPEG 1906, 1962; all Utinga, IPEAN, leg. SESP; 1 ♂, MPEG 12852, Passagem Pires Franco, Almirante Barroso, 24.vii.1981, leg. Motoki. Rio Tocantins, reservoir area of hydroelectric dam Tucuruí, igarapé Cotovelo (near Vila de Jacundá): 1 ♀, MPEG 13586, v.1984, leg. E. Frazão & H.R. Silva. Floresta Nacional de Caxiuanã, Município de Portel, Rio Caxiuanã, IBAMA post (1°47'32.3"S, 1°26'01.5"W): 1 ♀, MPEG 16481, 1 ♂, RMNH 26534, 13.xi.1992, leg. E.S.B. Ribeiro. Rio Fresco, Gorotire: 1 ♂, MPEG 15563, 19.x.1985, leg. W.L. Overal.

RORAIMA. Município de Boa Vista, região do Taiano, Colônia Coronel Mota: 1 ♂, MPEG 3995, 18.vi.1970, leg. F.P. Nascimento. Rio Uraricoera (right bank), Waicá (03°35'N 63°10'W), alt. 300 m: 1 head, MPEG 246, iii.1962, leg. J. Hidasi.

Suriname. 3 ♂♂, 2 ♀♀, ZFMK 26654-658, 1845, leg. Nolte (Göttingen coll.).

Diagnosis.— *Tupinambis* with a moderately elongate head, cylindrical body, and strong limbs. One loreal scale. All supraoculars in contact with supraciliaries. Upper temporals distinctly smaller than lower ones. A supratemporal row of scales much larger than temporal scales. Supernumerary antegular fold present. Scales around midbody 94-122, of which 21-28 ventrals. Femoral pores 10-17 in total. Lamellae under fourth finger 13-18, under fourth toe 29-39. Back with transverse bands or, in large specimens, irregularly vermiculated. Gular region spotless or with small dark spots.

Description.— A very large teiid, although smaller than its congener *T. merianae*, with maximum SVL in males of 345 mm (MPEG 14995), in females of 307 mm (Duellman, 1978). Head 0.20-0.28 (0.24 ± 0.02, n= 39) times SVL, 1.2-1.8 (1.59 ± 0.12, n= 38) times as long as wide, 1.0-1.3 (1.16 ± 0.07, n= 37) times as wide as high; pyramidal in shape, with a blunt snout. Large adult males with swollen gular region. Except in this case, neck as wide as head and anterior part of body. Body cylindrical. Limbs well developed, strong, forelimbs 0.29-0.40 (0.35 ± 0.02, n= 37) times SVL, hind limbs 0.55-0.74 (0.64 ± 0.04, n= 38) times. Tail round in cross section, tapering toward tip, 1.6-2.1 (1.82 ± 0.13, n= 19) times SVL.

Tongue lanceolate, covered dorsally with small, imbricate, scale-like papillae; tip bifid, smooth, each tip with a longitudinal, middorsal sulcus. Ventral surface of tongue laterally with narrow plicae, medially with a double row of wider, scale-like plicae, forming chevrons. Anterior teeth very small, conical; one or two large, conical ("canine") teeth antero-laterally at each side in the upper jaws. Posterior teeth bi- and tricuspid, laterally compressed, large specimens with lateral cusps very reduced.

Rostral pentagonal, visible from above. Bordered posteriorly by nasals, which form a medial suture. Nasal divided by an oblique suture, nostril in its lowest part. Frontonasal hexagonal. A pair of irregularly polygonal prefrontals, which form a moderately long medial suture. Frontal longer than wide, wider anteriorly, in contact laterally with first and second supraoculars. A pair of irregularly pentagonal frontoparietals, with a long medial suture. Interparietal irregularly pentagonal, distinctly to slightly longer than wide, wider anteriorly, with straight to concave posterior margin. Parietals irregular in shape, wider than, and as long as or longer than, interparietal. Frontoparietals, interparietal and parietals all slightly to distinctly smaller than frontonasal, prefrontals or frontal. Interparietal and parietals followed by relatively large, irregularly polygonal, smooth scales, which may form a regular arrangement of three anterior scales in a semicircle (median largest), followed by three scales in a transverse row, of which median one is squarish, laterals transversely enlarged.

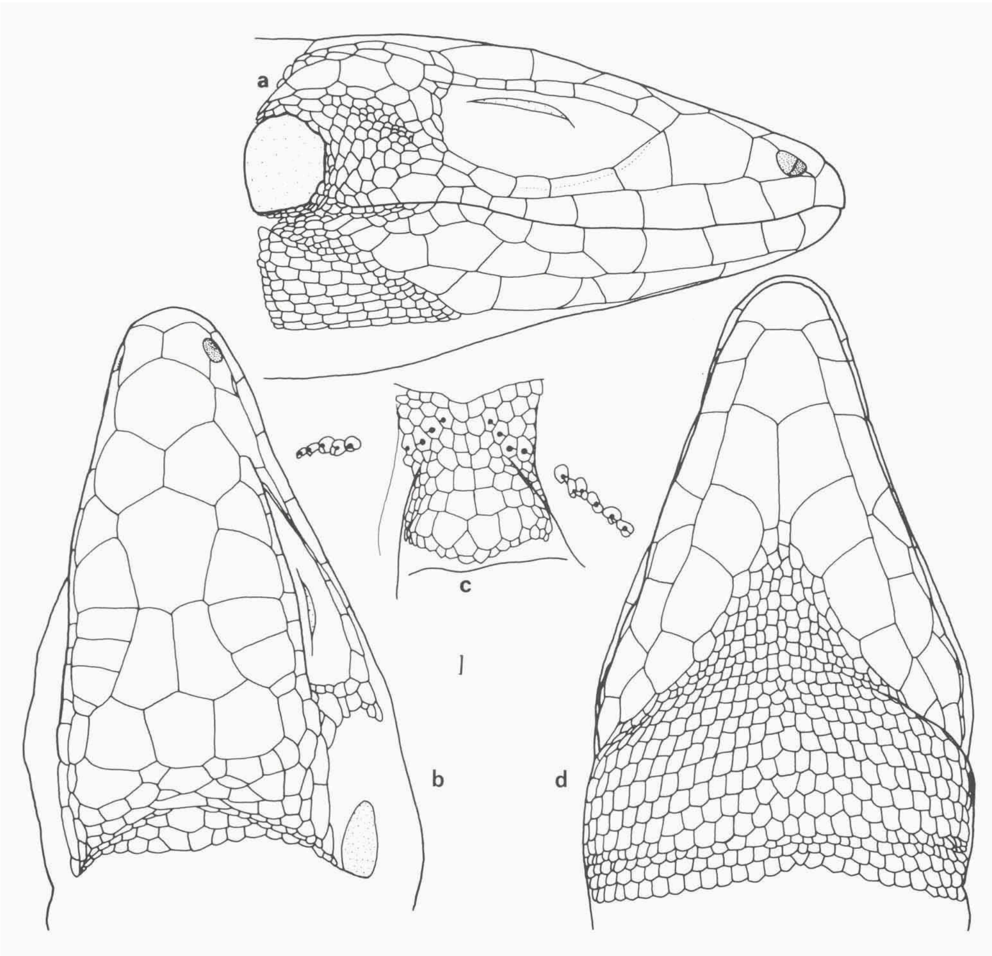


Fig. 194. *Tupinambis teguixin*, MPEG 3234; a, b: lateral and dorsal views of head; c: preanal plate, preanal pores, and proximal femoral pores (juvenile); d: ventral view of head.

Head delimited posteriorly by a sulcus linking ear-openings. Four supraoculars, first narrowest, third slightly to distinctly shorter than second and fourth. All are in contact with supraciliaries, with or without a few, isolated granules between them. Fourth supraocular followed by one or two scales, which in some specimens may appear as extra supraoculars. Supraciliaries 6-10, more commonly eight, approximately quadrangular to rectangular. One large loreal and a frenocular, which in most cases reaches border of eyelids. Some specimens with an extra triangular scale between loreal, frenocular and one or more supralabials. Suboculars 3-8, mostly 5-6, relatively large. A subocular ridge along frenocular and anterior suboculars. Lower eyelid with an opaque disc with 2-5 larger, or several relatively small, palpebrals. Supralabials 7-9, anterior ones very large; 5- 6, rarely seven, to below centre of eye. They are followed to commissure of mouth by scales indistinguishable from those on temporal region. Temporal scales variably polygonal, distinctly smaller in upper part than in lower part. A supratemporal row of 2-4 (usually 3) enlarged scales. Ear-opening large, oval, slightly oblique, with smooth margin. All scales juxtaposed and (except for the subocular ridge) smooth.

Mental trapezoid, with convex anterior border. Postmental irregularly heptagonal. Chinshields 3-6 at each side, followed by gradually smaller scales. First pair of chinshields forms a medial suture. First, and in some cases second pair, in contact with infralabials, other chinshields separated from infralabials by a row of large scales. Between chinshields, small, approximately rectangular scales, in longitudinal, posteriorly divergent, rows. Infralabials 6-8, exceptionally five, followed by small scales; 5-7 to below centre of eye. Anterior 3-4 infralabials very wide, posterior ones narrowing sharply.

Gular scales hexagonal, in transverse rows, larger than small scales on chin, with a short transition between them. Gular region divided into three parts by a feebler, supernumerary antegular fold at level of posterior margin of ear-opening, and a stronger antegular fold. Posteriorly the region is delimited by a well developed gular fold. Eight to 13 rows of gular scales until anterior fold, 7-11 medially, and 3-6, mostly 4-5, between antegular and gular folds. Scales on anterior part subequal to, or larger than those on median part; scales on posterior part largest.

Scales on nape squarish to slightly wider than long, smooth, in transverse, subimbricate rows. Squarish to rounded, and slightly smaller, on sides of neck. Dorsals squarish to slightly longer than wide, or hexagonal, smooth, in 102-126 (113.5 ± 5.6, n= 39) transverse, subimbricate, rows from nape to posterior level of hind limbs. Scales on flanks smaller, with triangular groups of transverse rows which narrow ventrad and interdigitate with similar triangular groups that start from ventrals and narrow dorsad. Ventrals rectangular, longer than wide, subimbricate, except on anterior part of chest, where they are rhomboid to hexagonal, juxtaposed; in 32-38 (35.4 ± 1.5, n= 38) transverse rows, and with 21-28 (24.8 ± 1.5, n= 39) scales in a transverse row at midbody (ventrals counted here are those scales that are not involved in the area of interdigitating triangles at the border between belly and flanks). Scales around midbody 94-122 (107.4 ± 7.5, n= 39). Preanal plate with four or five transverse rows of irregularly polygonal, relatively large scales. Preanal pores 3-6, mostly four, at each side, in a straight or curved line (occasionally one or two pores out of line, in adjacent scales). Femoral pores 5-8 (nine on one side of MPEG 1899) at each side, separated from preanal pores on same side by a distinct gap. Total number of pores 18-26 (21.3 ± 2.2, n= 30). Pores between 1-3, usually 2, scales, mostly one of the scales much larger than the others. When only one scale, with a sulcus from border to pore.

Tail with elongate and narrow scales, smooth proximally, keeled distally; in transverse, subimbricate rows. Underside of tail with similar, but larger, smooth scales. On sides of tail, in most cases, of each three transverse rows, one widens into a ventral row, the other two narrow slightly and are in contact with another ventral row, so that each three dorsal and lateral rows correspond to two ventral rows.

Anterior surface of forelimbs with rhomboid or squarish, smooth, subimbricate scales, squarish and increasing in size toward hand, on forearms; elsewhere with rhomboid or roundish, juxtaposed, smooth scales, smallest on posterior surface of upper arms. Hind limbs with squarish, smooth, subimbricate scales on antero-ventral surface of thigh; larger, rhomboid scales on ventral surface of lower leg, with a row of obliquely enlarged scales from base of first toe to about middle of lower leg;

elsewhere scales roundish, juxtaposed, smooth, mostly very small, slightly larger adjacent to line of pores. A fold of skin along distal part of thigh and knee, which follows limit between large and small scales. Subdigital lamellae medially divided (proximally they may be divided into several scales); they form a prominent, denticulate border along internal (toward first toe) side of third and fourth toes proximally, less developed along first and second toes. Lamellae under fourth finger 13-18 (15.9 ± 1.1, n= 76, 39 specimens), under fourth toe 29-39 (34.0 ± 2.0, n= 76, 39 specimens).

Colour in life of MPEG 16481 and RMNH 26534 black and brown on dorsal surface, cream on ventral surface. In MPEG 15930 dorsal surface black and pale pinkish buff (121D), with a dorsolateral stripe formed by cream coloured scales. Ventral surface cream. Beebe (1945) presented detailed colour descriptions of several individuals.

General colour in preservative mostly black (in some specimens dark brown), and olive-brown (salmon in MPEG 14995 and MPEG 16345). Scales on dorsal surface of head most commonly black centrally and olive-brown peripherally, in some specimens anterior scales uniformly olive-brown. Body with a pattern of transverse bands, well defined in juveniles, where uniformly black or brown bands alternate with olive-green bands all along body and tail (bands on body regular or irregular). As the animal grows, the bands become progressively less defined, with olive-green spots spreading over the black areas and vice-versa, to a point that, in large specimens, the banded pattern may be totally concealed, except toward distal part of tail. A dorsolateral and a paravertebral row of small white spots may be present in juveniles and subadults, mostly absent in large specimens. The juvenile MPEG 1899 has irregularly scattered small white spots over body, limbs (also occurring in other specimens), and proximal part of tail. Head and gular region ventrally cream and light blue, or completely light blue, sparsely or densely covered with small dark blue or black spots. Body ventrally cream, with irregular black bands laterally, which continue from flanks, and relatively small, irregular black spots medially. Limbs predominantly black, with scattered, irregular to roundish, light spots. Tail following body pattern at base, distally with white rings, which widen toward tip, separated by wider (except near tip) black areas.

Habitat.— A ground dweller, it inhabits both forest and open vegetation. It is frequently seen near water. MPEG 14995, 15675, 16038, from Ilha de Marajó, were in areas of 'campos' (grassfields), where Cott (1926) mentioned the species to be common. The first specimen was in partially flooded area, the third one near a creek. Müller (1971) found individuals on bushes emerging out of water in inundated 'campos' in the island of Marajó. MPEG 15930, from Benjamin Constant, was in secondary vegetation along a creek, among cassava fields. MPEG 16481 and RMNH 26534, a couple from Floresta Nacional de Caxiuanã, were in a burrow in the ground, in an area of secondary growth, not far from an open, grassy area with houses at the river margin; one of them was first seen outside the burrow, on the ground. In Belém the species occurs on the research campus of MPEG (a grassy, open area), and Rand & Humphrey (1968) and Crump (1971) reported it, moreover, from secondary growth, terra firme and varzea forest. In Roraima it was found in areas of savanna, among long grass along edge of lagoon, in Ilha de Maracá (O'Shea, 1989), and in capoeira near a creek close to habitation (Cunha, 1981a). In Balbina, Amazonas, it was reported by Martins (1991) from forest edge, clearings and open areas. Duellman (1987) reported it from Cuzco Amazonico, Peru, 'in more open forest near the river', and Duellman (1978) in forest and (more often) in clearings (Santa Cecilia, Ecuador). Hoogmoed (1973), besides mentioning habitats similar to those already listed, also reported gardens in Paramaribo (Suriname) and sea beach. Ruthven (1922) referred to its presence in cacao plantations, in Colombia. Dixon & Soini (1975, 1986) observed these animals to occupy the emergent top of small trees and shrubs in flooded areas.

Notes on natural history.— A heliothermic, wide-ranging lizard, which searches actively for its food. At night, and when seeking refuge during the day, it retreats into burrows in the ground. According to Gasc (1990), juveniles are capable of bipedal running. Müller (1912) reported on the ability of this species to swim. MPEG 16668 was found in the middle of the Solimões river, eyes closed, as if sleeping; only when disturbed it tried to swim away (pers. com. R.B. Barthem).

Food is variable, and includes plants (leaves and fruits) and a wide range of animals, from arthropods to frogs, lizards, small birds and mammals, and their eggs (Beebe, 1945; Valdivieso & Tamsitt, 1963; Medem, 1969; Hoogmoed, 1973; Duellman, 1978; Gasc, 1990; Zimmerman & Rodrigues, 1990; Martins, 1991). On river beaches in the Floresta Nacional de Caxiuanã, it is apparently one of the predators of eggs of *Podocnemis unifilis* Troschel, which are burrowed in the sand. It may also act as a scavenger (Ruthven, 1922; Beebe, 1945).

Haverschmidt (in Hoogmoed, 1973) reported the grey hawk, *Buteo nitidus* (Latham), as predator.

Goeldi (1897, 1902), Hagmann (1906), Reese (1922), Beebe (1945) and Dixon & Soini (1975, 1986) reported eggs of *T. teguixin* in termite nests, some of them high in trees. Medem (1969) also observed eggs high in trees. Number of eggs in a nest varied from four to 32 (besides above authors, also Köhler, 1986a, b). Largest numbers undoubtedly refer to communal nests. According to Goeldi (1897) and Hagmann (1906), mean egg size varied among clutches from 49.6 to 57.5 mm in length, 27.7 to 35.9 mm in width, and 21.3 to 43 grams in weight; a hatchling of 21 grams was reported. Köhler (1986b) observed eggs 42-54 mm in length, 25.5-31 mm in width, and 17-24 grams in weight (measurements made soon after the eggs were laid), increasing up to 25% in width and 55% in weight before hatching; hatchlings weighed 18-20 grams. Köhler (1989a,b) described mating behaviour in the terrarium, and reported an incubation period of 152 to 171 days in damp sand at 30 °C and 80-100% of humidity. Most data on ecology presented by Köhler (1986b) are difficult to interpret, because they consist of a mixture of data for *T. merianae* and *T. teguixin*.

Distribution (fig. 192).— In northern South America (French Guiana, Suriname, Guyana, Venezuela, Colombia, Ecuador, Peru, Bolivia, and Brazil), southward extending in gallery forests to the state of São Paulo (Manzani & Abe, 1992). Besides, it is known in Brazil from the states of Acre, Amapá, Amazonas, Goiás, Maranhão, Mato Grosso, Pará, Rondônia, and Roraima.

Remarks.— The name *T. teguixin* was for a long time applied in the literature for the species here named *T. merianae*, while the species here under discussion was called *T. nigropunctatus*. Presch (1973) considered *T. nigropunctatus* a synonym of *T. teguixin*, for which he selected as lectotype specimen UUZM 13. This specimen was examined at my request by M.S. Hoogmoed, who sent me photos and data on scale counts and on some scale characteristics. We both agreed that it represents a juvenile of the species called *T. nigropunctatus* by Spix (1825), therefore in agreement with Presch (1973). Contrary to Presch (1973), however, and in agreement with Vanzolini (1981a: xxi), I do not consider '*T. teguixin*' sensu Boulenger (1885b) the same as *T. rufescens* (Günther). As a consequence, a replacement name for the former taxon should be found, which led me to revise the old names available for *Tupinambis*.

The first name applied for a *Tupinambis* after Linnaeus was *Seps marmoratus* Laurenti, 1768, based on pl. 97, fig. 5 of Seba (1734). Presch (1970) argued that this figure resembles his '*T. rufescens*', but I disagree. The pattern shown is quite similar to that of a juvenile *T. teguixin*, and I therefore consider it a junior synonym of this species.

Lacertus Tupinambis Lacépède, 1788, as already discussed by Presch (1973), was based on a mixture of *Varanus* and *Tupinambis*. Lacépède's (1788) description and Plate 17 clearly represent *Varanus niloticus* (Linnaeus, 1758), and in order to stabilise nomenclature I here designate Plate 17 in Lacépède (1788) as the lectotype of *Lacertus Tupinambis*.

Lacerta Monitor Latreille, 1801 was based in large part on the report by Merian (1719) of a *Tupinambis* from Suriname, and plates 4 and 70 of this book were mentioned. I therefore designate pl. 70 of Merian (1719) as the lectotype of *Lacerta Monitor*, fixing this name as a synonym of *T. teguixin*. Brygoo (1989a) considered *Lacerta monitor* a **nomen oblitum**, but this category is no longer in use by the present International Code of Zoological Nomenclature.

Tupinambis monitor Daudin, 1802 is a junior homonym of *Lacerta Monitor* Latreille, 1801 and therefore cannot be used as a valid name.

Monitor meriani Blainville, 1816, listed by Presch (1973) and some former authors in the synonymy of *T. teguixin*, is a **nomen nudum**, thus not available for nomenclatural purposes. The same is true for *Monitor (Tutor) americanus* Goldfuss, 1820.

Salvator merianae Duméril & Bibron, 1839 was based on a mixture of *T. teguixin* Linnaeus and *T. teguixin* sensu Boulenger, 1885b (see Hoogmoed, 1973). The concept of the species, however, was clearly that of the latter, since the species was distinguished from '*Salvator nigropunctatus*' by the presence of two, instead of one, loreal scales. In order to establish without any doubt the identity of this name, I here designate as its lectotype MHNP 8388, collected in Brazil by Delalande. As Delalande has travelled only through the state of Rio de Janeiro, during his single visit to Brazil in 1816 (Papavero, 1971), type-locality is here restricted to Rio de Janeiro. This is the first name available for the taxon under consideration and called by Boulenger (1885b) *T. teguixin*. Consequently this taxon from now on should be called *Tupinambis merianae*.

T. teguixin is commonly known in northern Brazil as 'jacuraru' or 'jacruaru'. The genus *Tupinambis* is in Appendix II of CITES (Schouten, 1992), because skins of this genus enter trade in large quantities. However, *T. teguixin* contributes only minimally to this trade, most skins are from *T. merianae*. Locally, in the interior, it may be consumed as food.

T. teguixin seems to be sympatric in some areas with *T. merianae* and with *T. longilineus* **spec. nov.** Abe et al. (1992) reported sympatry between *T. teguixin*, *T. merianae*, and *T. duseni* in the locality Baliza, Goiás. *T. teguixin* was in gallery forest, the other two in cerrado.

Family Scincidae Gray, 1825

Greer (1970) presented a general overview of the family. Estes et al. (1988) listed diagnostic characteristics.

Content.— Only one genus (*Mabuya*), included in the subfamily Lygosominae, occurs in South America.

Mabuya Fitzinger, 1826

Diagnosis.— South American *Mabuya* are characterized by cycloid scales underlain by bony plates (osteoderms); dorsals and ventrals similar to each other; no distinct boundary between gulars and ventrals. Dorsal head scales mostly flat and subimbricate, with a pair of internasals, and prefrontals and frontoparietals paired or fused. Lower eyelid with an undivided, semitransparent disc, bordered below directly by one (or more) supralabial(s). Pupil round. Ear-opening relatively small, with tympanum recessed in moderately deep auditory meatus. Teeth relatively small, pleurodont; tongue wide, lanceolate, covered with irregularly shaped papillae, its tip feebly nicked. Subdigital lamellae mostly undivided, smooth. Pores absent. All South American species for which data on reproduction are available are live-bearing.

Distribution.— America, Africa, and Asia.

Content.— The genus consists of about 85 species (Peters & Donoso-Barros, 1970). In Amazonia, Dunn (1936) registered two species — *M. mabouya* (Lacèpéde) and *M. nigropalmata* Andersson, of which the latter has been recorded from only two localities in western Amazonas (Brazil) and NW Bolivia. Some specimens from Venezuela were also identified by Dunn (1936) as *M. nigropalmata*, but they were later described by Horton (1973) as a distinct species, *M. croizati*. The common Amazonian *Mabuya* was recognized as *M. mabouya* which, according to Dunn (1936), was widespread from Mexico through Central America and the Lesser Antilles to a large part of South America. Subsequent authors followed Dunn (1936), until Williams & Vanzolini (1980), Vanzolini (1981a,b), Vanzolini & Williams (1981), and Rebouças-Spieker (1981a) resurrected the name *Mabuya bistriata* (Spix) for the species occurring in Amazonia and the northern part of the Atlantic Forest. No explanation was given for the change, except that the group was under study, and the results would be presented later. Rebouças-Spieker (1981b) described a new species, *M. ficta*, from Amazonia; she compared it with *M. bistriata*. The description of *M. ficta* was based on material from Pauiní, Rio Purus, Amazonas, but the author mentioned that the species was widespread in Brazilian Amazonia and sympatric with *M. bistriata*. Again there is a reference to a revision of the group which was in preparation, and where more information would be given. The use of the name *M. bistriata* for the common *Mabuya* from Amazonia was then adopted by several subsequent authors — e.g., Hoogmoed & Gruber (1983; "until a more complete study of the group is available"), Cunha (1981), Cunha et al. (1985), Nascimento et al. (1988), O'Shea (1989), Hoogmoed & Avila-Pires (1991). Hoogmoed & Gruber (1983) selected RMNH 2512 as lectotype of *M. bistriata*.

Although no modern revision of the South American *Mabuya*'s has yet been published, it is reasonable to suppose that *M. mabouya* as defined by Dunn (1936) represents a complex of species. I follow Williams & Vanzolini (1980; and subsequent papers) and Rebouças-Spieker (1981a, b) in the recognition of a species in Amazonia distinct from that of the Antilles (the type-locality of *M. mabouya*). However, having had the opportunity to examine the lectotype of *M. bistriata*, it became clear that it agreed with the characteristics of *M. ficta* Rebouças-Spieker, and not with *M. bistriata* auctorum. Consequently, *M. ficta* is here considered a synonym of *M. bistriata* (Spix), and for the taxon which has recently been called *M. bistriata* the name *M. nigropunctata* (Spix) is adopted.

Recently a new species, *M. carvalhoi*, was described by Rebouças- Spieker & Vanzolini (1990), from the state of Roraima, Brazil.

Finally, a specimen of *Mabuya* deposited in the MPEG collection, from Serra do Cachimbo, southern Pará, turned out to represent *M. guaporicola*, a species until now only known from south of the Amazon area.

Thus, at present, five species of *Mabuya* are known to occur in Brazilian Amazonia — *M. bistriata* (Spix), *M. carvalhoi* Rebouças-Spieker & Vanzolini, *M. guaporicola* Dunn, *M. nigropalmata* Andersson, and *M. nigropunctata* (Spix).

Mabuya bistriata (Spix, 1825)
(figs. 195-197, 313)

Scincus bistriatus Spix, 1825: 23, pl. xxvi fig. 1 (lectotype RMNH 2512, designated by Hoogmoed & Gruber, 1983; type-locality: Belém, Pará, Brazil).
Eumeces Spixii Duméril & Bibron, 1839: 642 (partly) (lectotype RMNH 2512, designated by Hoogmoed & Gruber, 1983; type-locality: Belém, Pará, Brazil).
Mabuia agilis; Goeldi, 1902: 534 (part).
Mabuya agilis; Burt & Burt, 1931: 299 (all but one specimen seen).
Mabuya mabouya mabouya; Dunn, 1936: 544 (part); Amaral, 1937b: 203 (part); 1949: 114 (part); Schmidt & Inger, 1951: 455 (part); Cunha, 1961: 96 (part); Peters & Donoso-Barros, 1970: 199 (part).
Mabuya agilis agilis; Amaral, 1937a: 1743 (part).
Mabuya mabouya; Hoogmoed, 1979: 278.
Mabuya ficta Rebouças-Spieker, 1981b: 161 (holotype MZUSP 37198, type-locality: Pauiní, Amazonas, Brazil); Vanzolini, 1986: 17; Nascimento et al., 1991: 40. **New synonym.**
Mabuya bistriata; Hoogmoed & Gruber, 1983: 396.

Material.— 2 ex., MHNP 5407-5407A, 'Amazone', 1869, leg. Lübbe.
Brazil. AMAPA. 2 ex., MHNP 1899.105-106, leg. Dr. Villecourt. Igarapé Agua Branca, road BR-156, Município de Amapá: 1 ex., MPEG 3176, 26.x.1969, leg. F.P. Nascimento. Tracuá (as 'Taracúa'): 1 ex., KU 97859.
AMAZONAS. Maués: 1 ex., AMNH 91639, xii.1962, leg. Cooper. Itacoatiara: 1 ex., CAS 49769, 1911, leg. F. Baker & W.M. Mann. Manaus: 1 ♀, MPEG 15808, 12.vii.1989, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ♀, INPA/Ecol. 27, leg. W.E. Magnusson; 1 juv., FMNH 64391, 1911, leg. F. Baker & W.M. Mann. Mouth of Rio Purus: 1 ex., MPEG 2273, iv.1967, leg. M. Gonçalves. Tefé: 1 ex., MPEG 1668, viii.1960, leg. J. Hidasi. Cucuí: 2 ♂♂, 3 ♀♀, MPEG 13816- 820, 07-24.v.1983, leg. R.C. Best; 5 ex., AMNH 36553-554, 37852- 854, leg. W.J. La Varre. Jauareté, Rio Uaupés: 3 ♂♂, 2 ♀♀, MPEG 1654-1658, iv.1960, J. Hidasi; 2 ex., MPEG 4671-72, 'Missão Salesiana do Jauareté', 15.iv.1971, leg. M. Moreira. Lago Ucayali, 10 mi down the Amazon from Leticia: 1 ex., CM 55650, 04.vi.1967, leg. N. Richmond.
PARA. Ilha de Marajó: 1 ♂, 1 ♀, MPEG 2403-2404, Vila Nova do Aramá (antiga Quinta do Aramá), rio Aramá, 22-27.ix.1968, leg. O.R. Cunha; 1 ♂, MPEG 15499, Fazenda Bita, Mata Araticum, Cachoeira do Arari, 14.iii.1989, leg. R.A.T. Rocha, S. Ramos & I. Fiock; 3 ex., MPEG 1986-88, Baixa do Alecrim, Cachoeira do Arari, 09-13.ii.1966, leg. M. Moreira; 1 ex., MPEG 1952, Fazenda Vencedora, Cachoeira do Arari, 20.i.1966, leg. M. Moreira; 1 ♀, MPEG 16219, Breves, 13.vi.1992, leg. M.S. Hoogmoed &

T.C.S. Avila Pires. Cacoal, Município de Augusto Correa: 1 ♀, MPEG 2098, 19.vi.1971; 1 ♀, MPEG 5668, 29.vi.1972; 1 ♀, MPEG 6048, 12.i.1973; 1 ♀, MPEG 6436, 24.v.1973; all leg. O.R. Cunha & F.P. Nascimento. Igarapé-Açu: 1 ♂, MPEG 5194, 19.ix.1971, leg. O.R. Cunha & F.P. Nascimento. Bela Vista, Viseu: 1 ♂, MPEG 10341, vi.1976; 1 ♀, MPEG 10950, x.1976; both leg. O.R. Cunha & F.P. Nascimento. Belém: 1 ex., RMNH 2512 (lectotype), leg. J.B. Spix; 1 ♂, 2 ♀, MPEG 12964, 14056, 14534, Travessa Nina Ribeiro, bairro Canudos, 15.vi.1983, 11.iii.1985 & 06.viii.1985, leg. M. Santa- Brígida; 1 ♂, 1 ♀, MPEG 14561, 14564, Campus de Pesquisa do MPEG, bairro Terra Firme, 12.xii.1986 & i.1987, leg. F.P. Nascimento; 1 ex., MPEG 16135, Travessa Barão do Triunfo, bairro Sacramenta, 28.xii.1991, leg. R.A.T. Rocha. Cametá, Rio Tocantins: 1 ♀, NMW 9568:6, 1911, 'Mus. Göldi'. Corcovado, near Breves: 1 ex., USNM 217644, x.1965, leg. unknown. Tabuleiro Cipó-Pitanga, Baía de Souzel, baixo rio Xingu: 1 ♂, 3 ♀♀, MPEG 13144, 13146-148, 09.xii.1983, leg. T.C.S. Avila Pires & J.M. Rosa. Santarém: 1 ♂, NMW 9568:7, 1875, leg. Steindachner.
RONDONIA. Porto Velho: 1 ♀, FMNH 64392, 1911, leg. F. Baker & W.M. Mann.

Diagnosis.— *Mabuya* with paired prefrontals and frontoparietals, one pair of nuchals, dorsals smooth, fore- and hind limbs almost touching each other when adpressed against body. Scales around midbody 28-33, dorsals 53-59, ventrals 36-43. Scales on tail similar to dorsals. Four supraciliaries, second longest. Palms and soles light, covered by moderately large tubercles, subequal in size (especially on palms). Lamellae under fourth finger 11-15, under fourth toe 15-19. At each side a wide, dark lateral band bordered by light stripes, the dorsal one at least anteriorly well defined and partially bordered by a dark stripe.

Description.— Skink with maximum SVL in males of 75 mm (MPEG 1657), in females of 83 mm (MPEG 14534). Head 0.16-0.20 (n= 38) times SVL, proportionally shorter in larger specimens; 1.3-1.6 (1.43 ± 0.07, n= 38) times as long as wide; 1.2-1.6 (1.33 ± 0.10, n= 38) times as wide as high. Snout blunt, sloping gently toward parietal region; canthus rostralis roundish; supraocular region flat or only slightly convex. Neck as wide as head and anterior part of body. Body cylindrical. Limbs well developed, fore- and hind limbs (almost) touching when adpressed against body; forelimbs 0.22-0.28 (0.25 ± 0.02, n= 38) times SVL, hind limbs 0.29-0.38 (0.34 ± 0.02, n= 36) times (in both cases smallest values refer to larger specimens; data are not conclusive, but it seems that in specimens larger than 60-65 mm SVL limbs are relatively smaller). Tail round in cross section, tapering toward tip, 1.4-1.8 (1.68 ± 0.12, n= 16) times SVL.

Rostral visible from above, twice as wide as high or more, pentagonal or band-like with posterior border medially convex. A pair of internasals, forming a short medial suture. Frontonasal rhomboid, wider than long, laterally in contact with anterior loreal scale. A pair of quadrilateral prefrontals, medially separated by a short suture between frontonasal and frontal; besides these two scales, they border on the two loreals, first supraciliary, and first and second supraoculars. Frontal elongate, rhomboid-lanceolate, forming a long suture with second supraocular. A pair of frontoparietals, with a long medial suture; each in contact with frontal, second, third and fourth supraoculars, one parietal, and interparietal. Interparietal relatively small, rhomboid-lanceolate; parietal eye distinct, occupying the posterior part of the scale. Parietals irregular in shape, much larger than interparietal, and in contact with each other behind it. Four supraoculars, first smallest, second largest. Four supraciliaries, second longest. Nasal small; nostril almost as wide as the scale itself, in its posterior part, directed latero-posteriorly. A small postnasal, roundish posteriorly, and besides

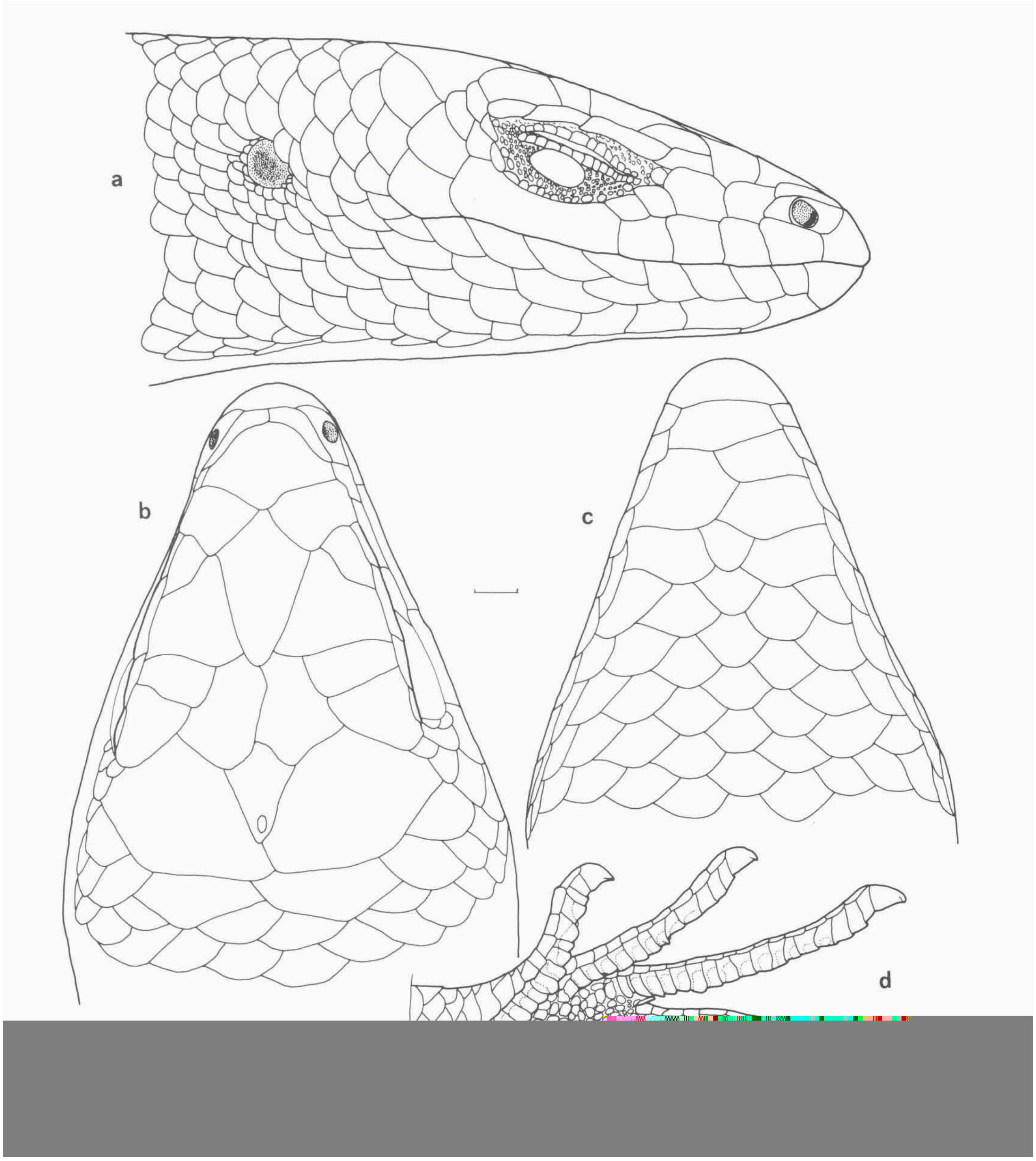


Fig. 195. *Mabuya bistriata*, MPEG 14561; a, b, c: lateral, dorsal, and ventral views of head; d: ventral view of left foot (dotted lines correspond to swollen areas).

nasal bordered by supranasal, anterior loreal, and first supralabial. An anterior and a posterior loreal, subequal or posterior one larger. A frenocular and a pre- subocular. Seven (mostly) or eight supralabials, respectively fifth or sixth largest and forming lower border of eyelid. Postoculars similar to temporal scales, but smaller. Temporal scales imbricate, smooth, round, not distinctly delimited from scales on nape and on sides of neck. Ear-opening relatively small, round, with smooth margin. All dorsal and lateral scales of head smooth, subimbricate (temporal scales distinctly imbricate).

Mental trapezoid, with convex anterior margin. Postmental short, approximately trapezoid. Two pairs of chinshields in contact with infralabials, mostly only anterior one in contact medially, second pair separated by one round scale. They are followed by a third pair of chinshields that are wider than long, medially separated by a round scale, and separated from infralabials by a row of elongate scales. Posteriorly, and continuing on gular region, scales round, smooth, imbricate, in longitudinal rows. Infralabials 6-8, mostly 7; when seven, fifth and sixth below eye; when six or eight, fourth/fifth, or sixth/seventh, respectively.

A pair of wide nuchal scales borders parietals posteriorly. They are followed on nape by subhexagonal, smooth, imbricate scales that are wider than long and grade into dorsals. Sides of neck with round, smooth, imbricate scales, slightly smaller than dorsals. Dorsals, laterals and ventrals similar to each other, round, imbricate, smooth, in longitudinal and oblique rows; 53-59 (56.3 ± 1.5, n= 38) middorsal scales in a line between interparietal and posterior margin of hind limbs; 36-43 (38.6 ± 1.8, n= 39) scales along a midventral line between anterior margin of forelimbs and cloacal slit; 28-33 (30.4 ± 1.1, n= 38) scales around midbody. Preanal plate with scales similar to ventrals.

Scales on tail and limbs similar to those on body, but smaller on limbs. Palmar and plantar regions with moderately large, irregular, tubercular scales; subequal on palmar region, subequal to distinctly smaller toward third-fifth toe on plantar region. Plantar region delimited by a row of larger and flatter scales continuous with the subdigital lamellae of first and fifth digits; a similar row, but less conspicuous, may also be present on palmar region. Subdigital lamellae smooth, single, 11-15 (12.9 ± 1.0, n= 71, 39 specimens) under fourth finger, 15-19 (17.4 ± 1.0, n= 75, 39 specimens) under fourth toe (in both cases counted from level of membrane between third and fourth digits).

Colour in life, in MPEG 16135, drab (27, slightly darker) on dorsal surface of head, back, and tail; a dark lateral band on each side, raw-umber (23) to dark drab (119B); dark band bordered in its anterior part, both dorsally and ventrally, by beige (219D) to drab-grey (119D) stripes; between the band and the stripes, and bordering the stripes partially, there are fuscous (21) lines. An irregular fuscous spot is present on top of head. Ventral region cream-colour (54), ventrolaterally with a drab-grey (119D) area. Iris black. MPEG 16219 had dorsum varying from raw-umber (23) in snout and anterior part of body, to vandyke-brown (121) in posterior part of body and tail. Rostral scale cream-colour (54), continuous with an upper, pinkish buff (121D) light stripe, and a lower, whitish to pale pinkish buff light stripe, both bordered by black. Between the light stripes, a fuscous (21) band. Ventrolateral area pale vandyke-brown (121). Ventral region cream. Iris black.

In preservative dorsal surface of head, back and tail brown (dark drab, brownish-olive, brownish-citrine), either spotless or (back and tail) with scattered blackish spots (usually in the midposterior area of a scale). A dark brown lateral band, approximately two scales wide, starts near the nostril, crosses the eye and the upper half of ear-opening, continues above forelimb and hind limb (just touching dorsal part of insertion of hind limb), and either ends at base of tail or from there on continues as a paler band. The dark band is bordered dorsally and ventrally by a light stripe, in some specimens with a blackish line between the brown band and the light stripes. The dorsal light stripe starts faintly on supraciliaries, becoming bolder on nape, about four to seven scales from parietal; from there on, for some distance on anterior part of body, it is two half scales wide and bordered dorsally by a blackish stripe; posteriad the light stripe becomes paler, and the dorsal blackish stripe becomes broken up into spots or disappears; both light stripe and accompanying blackish spots may continue for a short distance on tail, then fading away. The ventral light stripe starts on anterior labials, continues through lower half of ear-opening and above insertion of forelimbs, and ends close to hind limbs; it is one half to two half scales wide, and it may be bordered by a very thin blackish line; as the dorsal light stripe, it tends to become paler posteriorly. Lower part of flanks light brown. Limbs dorsally either uniformly dark brown, or variegated with light and dark spots. Ventral region cream or bluish-white. Palms and soles cream or tan, underside of digits slightly darker. In the four embryos of MPEG 16219 the light stripes bordering the dark lateral band are well visible and bordered by dark lines along the length of the body, also continuing, but paler, on tail.

The lectotype, RMNH 2512, is almost uniformly dull brown, with the longitudinal lateral band and stripes very pale and only distinguishable anteriorly, to a short distance posterior of the forelimbs.

Habitat.— MPEG 13144, 13146-148 were collected in an area of varzea forest with open beaches where *Podocnemis expansa* (Schweigger) used to lay their eggs; all specimens seen were in predominantly open places, either on the ground covered with dry leaves, on fallen branches or trunks, or on standing trunks up to 1.5 m from the ground; some were seen hiding among aerial roots of tree trunks. The MPEG specimens collected in Belém (see Material) were in grass fields in the city, among piles of wood, and MPEG 16135 was on the floor inside a house. MPEG 16219, from Breves, Ilha de Marajó, was collected within the city limits, sunning on a fence along a wet meadow near the river bank, 30 cm above the ground. MPEG 15808, from Manaus, was along a road with grassy vegetation and trees, near houses, at the base of a lamppost. All the remaining localities from where specimens are known are close to relatively large rivers, suggesting that the species originally inhabited predominantly varzea vegetation. Although *M. bistriata* and *M. nigropunctata* are largely sympatric in Amazonia, there is no evidence that they are syntopic, and the present data seem to indicate the opposite, that is, *M. bistriata* being found in more open habitats, especially varzea vegetation, and *M. nigropunctata* in denser, terra firme forest.

Notes on natural history.— Like *M. nigropunctata*, the species is viviparous. MPEG 12964 (svl 68 mm) and MPEG 16219 (svl 78 mm) each had four embryos in the abdomen; MPEG 13820 (svl 72 mm) and MPEG 5668 (77 mm) five; MPEG 15808 (svl 78 mm) eight embryos (four on each side). In MPEG 16219, which was dissected after two weeks in preservative, the embryos were all well formed, and the rich vascularization of the membrane enveloping each embryo (possibly similar to the chorioallantoic placenta described by Blackburn & Vitt (1992) for *M. nigropunctata* (= *M. bistriata*) and *M. heathi*) was still well visible, with one main capillary giving off several lateral branches (visible by the naked eye).

Distribution (fig. 196).— Available data indicate that the species occurs in Brazil

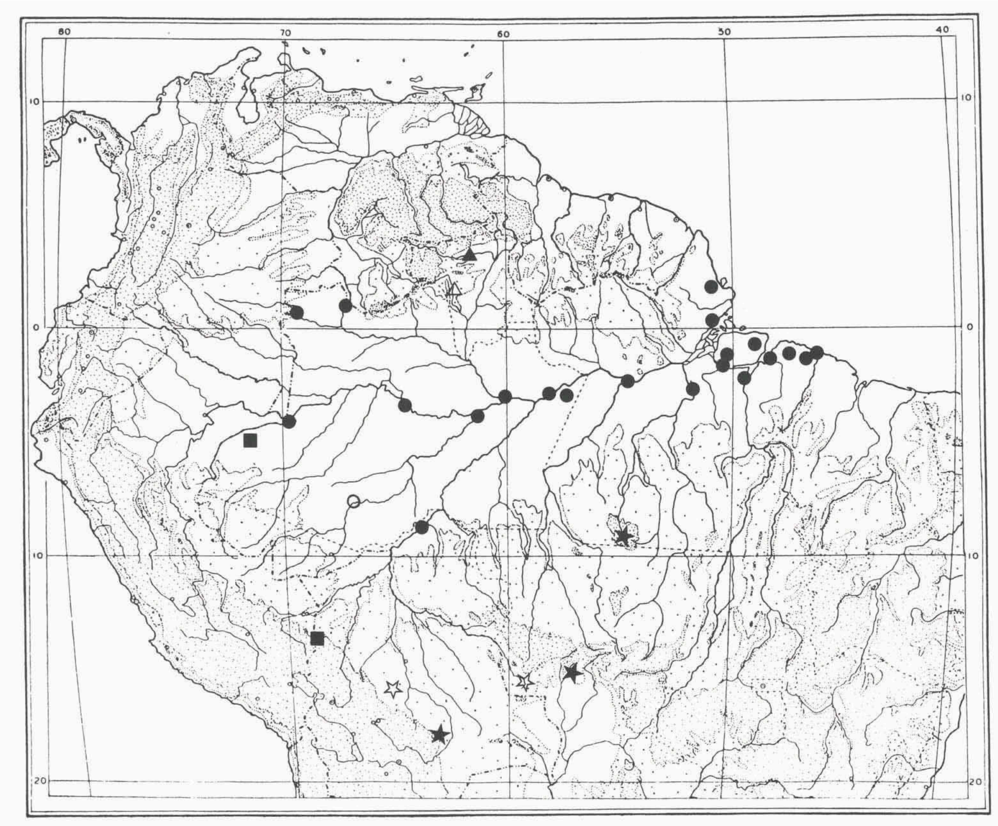


Fig. 196. Distribution of *Mabuya bistriata* (circles), *M. carvalhoi* (triangles), *M. guaporicola* (stars), and *M. nigropalmata* (squares). Closed symbols = material studied; open symbols = data from literature (Dunn, 1936; Rebouças-Spieker, 1981; Fugler, 1989; Rebouças-Spieker & Vanzolini, 1990).

along the Amazon valley and some of its affluents (at least in the lower Rio Xingu, middle Rio Madeira and Rio Purus, and upper Rio Negro and Rio Uaupés), eastward into eastern Pará and Amapá. Two Brazilian localities are close to the borders of Colombia and Venezuela; probably the species also occurs in these two countries (at least close to the border, but not much farther, if the species is in fact restricted to the river valleys). As for the possible occurrence in the Guianas, see Remarks.

Remarks.— As explained in the generic account, the name *M. bistriata* has recently been used for the taxon which is here called *M. nigropunctata*. *M. ficta* Rebouças-Spieker is a synonym of *M. bistriata* (Spix). These conclusions resulted from examination of the lectotype of *M. bistriata*, which has four supraciliaries, of which the second longest; dorsals smooth, 56 along a middorsal line; 41 ventrals; a lateral dark band bordered dorsally and ventrally by distinct light stripes (at least anteriorly), of which the dorsal one is partially delimited dorsally by a dark line; snout blunt.

M. bistriata and *M. nigropunctata* differ respectively in the following characters: (1) four supraciliaries, second longest/mostly five subequal supraciliaries (occasionally four or six; if four, second may be longest); (2) dorsals smooth/dorsals usually

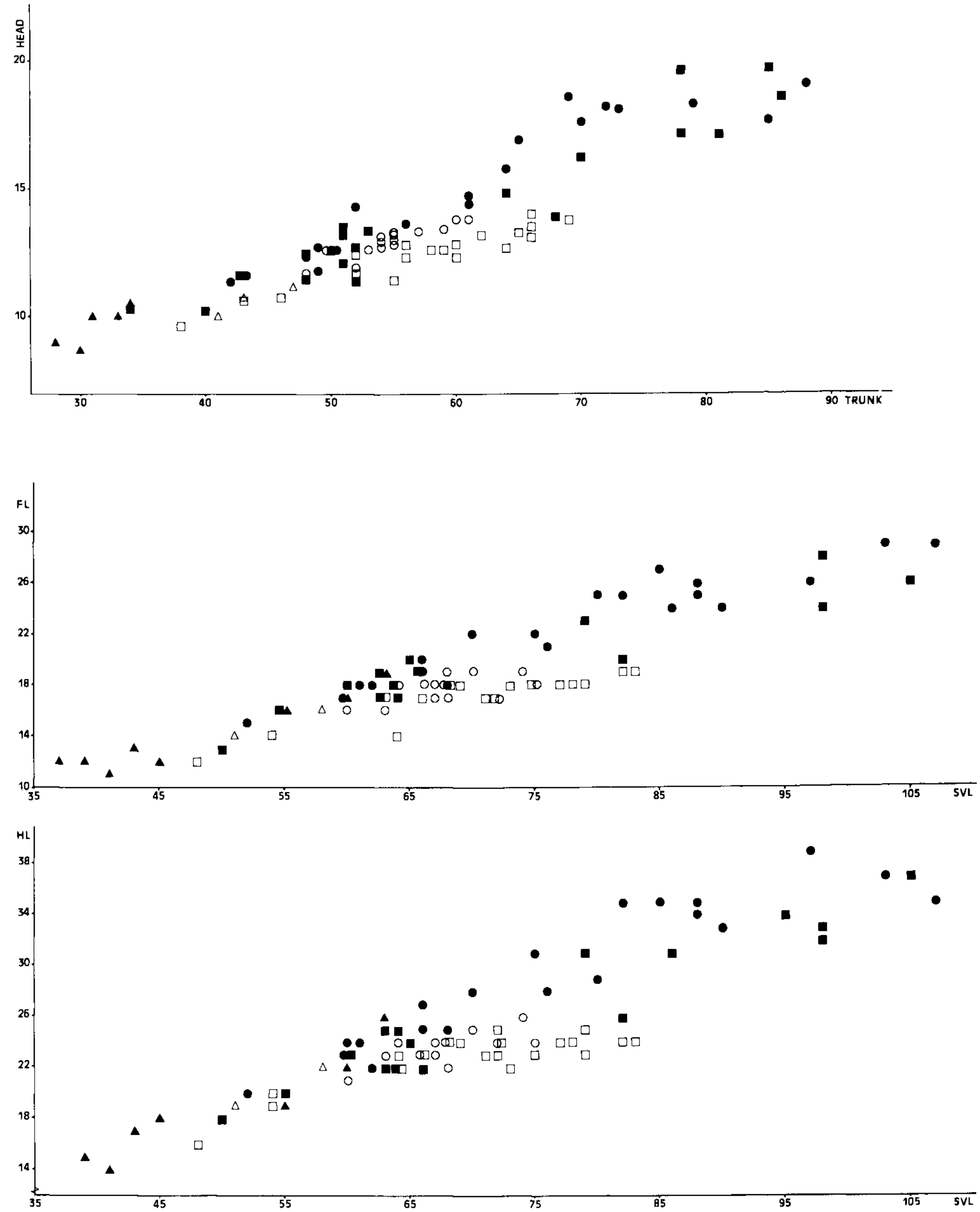


Fig. 197. Comparison between *Mabuya bistriata* (open symbols) and *M. nigropunctata* (closed symbols); upper: head length versus trunk length; middle: forelimb versus svl; lower: hind limb versus svl (circles = males; squares = females; triangles = sex unknown).

tricarinate (among specimens from western Amazonia dorsals may be smooth or nearly so); (3) snout narrower, blunt/snout wider, round; (4) dorsals 53-59 (56.3 ± 1.6)/48-57 (52.4 ± 1.9); (5) ventrals 36-43 (38.5 ± 1.8)/33-40 (36.7 ± 1.7); (6) palms covered by relatively large and subequal tubercles, partially or totally delimited by a rather inconspicuous row of slightly larger scales/tubercles heterogeneous in size, delimited by a (usually) distinct row of larger scales; (7) dark lateral band bordered at each side by a distinct light stripe (at least anteriorly), the dorsal light stripe partially delimited by a dark line/dark lateral band bordered or not by light stripes, the dorsal one, when present, mostly ill-defined and only rarely bordered by dark spots; (8) dark lateral band with rather straight borders/borders commonly quite irregular; (9) lower part of flanks uniformly light brown/lower part of flanks mostly variegate with light and dark spots; (10) palms and soles cream or tan, digits slightly darker/palms, soles, and digits blackish; (11) general colour lighter/darker; (12) largest SVL 75 mm (♂), 83 mm (♀)/107 mm (♂), 113 mm (♀); (13) longer tail (1.4-1.8, mean 1.68, times the SVL)/shorter (1.2-1.6, mean 1.38, times); (14) head and limbs proportionally smaller in larger specimens/proportionally larger (fig. 197).

Some specimens from French Guiana (MG 1569.50, MHNP 735-735A, 1902.266-268, 1902.272) seem to be *M. bistriata*, but some characteristics, including the supraciliaries, are more variable in these specimens. Among many from Suriname, only one, the smallest of three specimens registered as RMNH 2510, has characteristics of *M. bistriata*; unfortunately, it is a half- grown specimen with no exact locality data, that has been preserved for more than 100 years. If the species does occur in Suriname, it apparently occurs in a restricted area.

O.R. Cunha (pers. com.) remarked that about thirty or fourty years ago skinks, localy known as "lagarto-cobra" (= lizard- snake), were very common in Belém, in the yards of houses and in empty lots with sparse vegetation. Since some specimens of *M. bistriata* have recently been collected in similar situations, I believe this might be the species referred to (although *M. nigropunctata* is also known from Belém, but in general from more wooded areas).

Mabuya carvalhoi Rebouças-Spieker & Vanzolini, 1990
(figs. 196, 198, 314)

Mabuya carvalhoi Rebouças-Spieker & Vanzolini, 1990: 378 (holotype MZUSP 66679, type-locality: Ilha de Maracá, Roraima).
Mabuya sp. nov.; O'Shea, 1989: 68.

Material.— **Brazil.** RORAIMA. Ilha de Maracá: 3 ex., MR 038, 07.vii.1987, MR 385, 22.x.1987, MR 570, 16.ii.1988, all leg. M. O'Shea.

Diagnosis.— *Mabuya* with fused prefrontals and frontoparietals, three to five pairs of nuchals, dorsals slightly multicarinate, fore- and hind limbs almost touching each other when adpressed against body. Scales around midbody 23-27, dorsals 45-57, ventrals 34-44. Scales on tail distinctly multicarinate, proximally forming two rows of widened dorsals, four rows of laterals and two of ventrals, distally eventually reduced to four scales around tail. Palms and soles covered by conical, relatively large tubercles. Lamellae under fourth finger 11-15, under fourth toe 14-18. Body with five longitudinal light stripes, of which one vertebral, and at each side one dorsolateral and one lateral.

Description.— Skink with maximum SVL of 63 mm (Rebouças-Spieker & Vanzo-

Fig. 198. *Mabuya carvalhoi*, MR 038; a, b, c: lateral, dorsal, and ventral views of head.

there is a double row of wider dorsals, four (but at a short distance from base only three) laterals, and two ventrals. Distally first ventrals and then dorsals reduce to one each, more or less having same width. The lateral scales decrease gradually in number until only one at each side remains. Thus, near tip of tail there are only four scales around.

Scales on limbs similar to those on flanks and belly, but smaller and, on hind limbs, more distinctly multicarinate. Palmar and plantar regions with conical, relatively large (and few), juxtaposed granules, which are delimited by a regular row of scales continuous with subdigital lamellae of first and fifth digits; in the middle of this row occurs a large, round scale. Subdigital lamellae smooth, single, 11-12 under fourth finger, 14-15 under fourth toe.

A colour plate of the holotype before fixation was published by Rebouças-Spieker & Vanzolini (1990). O'Shea (1989) described the species as having a dark brown body, amber (or yellow) stripes, and blue tail. The specimens here studied, when examined, still seemed to retain relatively well their life colouration. Five longitudinal light stripes are present, of which a vertebral one starting on top of head continues to somewhere on posterior half of body; one dorsolateral stripe on each side, from head to tail, where distally the pair fuses into a single one; and one lateral stripe at each side, from head to groin. Lateral stripes less distinct than dorsolateral and vertebral ones, especially regarding their ventral delimitation, where a variegated, predominantly dark band separates them from the light belly. The light stripes, as well as some ventro-lateral areas on head and body, have a metallic colouration, changing between greenish, bluish and salmon; on tail they are bright blue. Dorsal region between the stripes black. Ventral region pale yellowish or bluish.

Habitat.— Ilha de Maracá, where all but one of the known specimens of *M. carvalhoi* were collected, has a variety of habitats, including seasonally flooded forest and some areas of savanna, but with a high predominance of dry (terra firme) forest, with a relatively low (20-25 m) canopy (O'Shea, 1989; Rebouças-Spieker & Vanzolini, 1990). All *M. carvalhoi* specimens for which data are available were collected near the ecological station on the island — either among cans or on fallen vegetation, up to two meters above the ground (Rebouças-Spieker & Vanzolini, 1990), or in holes made by carpenter bees, in the timber framework of verandas (O'Shea, 1989). O'Shea (1989: 64) in discussing the isolated occurrence of this species suggested that it might have been imported into the area by means of eggs laid in wood that came from elsewhere. Considering that all American species of *Mabuya* seem to be viviparous (Vitt & Blackburn, 1983; Blackburn & Vitt, 1992) this supposition cannot be accepted. It is more likely that the presence of this species on Ilha de Maracá is natural.

Distribution (fig. 196).— State of Roraima, Brazil, where it is known from Maracá Island and from a Yanomami Indian area in the Rio Catrimani (01°41'N, 62°17'W) (Vanzolini & Rebouças-Spieker, 1990).

Remarks.— The species was originally described on the basis of 14 specimens (Rebouças-Spieker & Vanzolini, 1990). Rebouças-Spieker & Vanzolini's (1990) data showed sexual dimorphism in number of dorsals, males having 47-53 (50.2 ± 2.2, n= 6) dorsals, females 54-57 (55.5 ± 1.3, n= 4). Accordingly, the three specimens studied here are all males. Numbers of ventrals and scales around midbody were similar in both sexes, respectively 35-44 (37.3 ± 1.2, n= 14) and 23-27 (24.7 ± 1.0). Subdigital lamellae varied from 11 to 15 (12.4 ± 1.2, n= 14) under fourth finger, and from 14 to 18 (15.4 ± 1.3, n= 14) under fourth toe. Nuchals in the sample varied from three to five pairs. Some analyses on body proportions were also presented.

Mabuya guaporicola Dunn, 1936
(figs. 196, 199, 200)

Mabuya guaporicola Dunn, 1936: 549 (holotype CM P962, type- locality: "Headwaters of Rio Guaporé in

Western Matto Grosso. More specifically near Bastos Farm on Rio Alegre (...) which is above and not far from Villa Bella de Matto Grosso."); Amaral, 1937b: 204; Cunha, 1961: 98; Peters & Donoso-Barros, 1970: 199; Nascimento et al., 1988: 36.

Material.— **Brazil.** MATO GROSSO. Serra das Araras (near, but outside, the ecological station), Município de Barra do Bugres: 1 ♀, MPEG 14321, 27.i.1986, leg. R. Moraes.
PARA. Serra do Cachimbo: 1 ex., MPEG 1753, vi.1962, leg. M. Alvarenga.
Bolivia. Buenavista, Departamento de Santa Cruz: 1 ex., UMMZ 83171, leg. J. Steinbach.

Diagnosis.— *Mabuya* with paired prefrontals and frontoparietals, one pair of nuchals, dorsals smooth, fore- and hind limbs distinctly separated from each other when adpressed against body. Scales around midbody 30-34, dorsals 65-68, ventrals 45-48. Scales on tail similar to dorsals. Palms and soles with relatively small, irregular, tubercular scales. Lamellae under fourth finger 9-10, under fourth toe 12-13. Body with seven longitudinal dark stripes or bands, of which one vertebral, and on each side one dorsolateral and two laterals.

Description.— Skink with maximum SVL of 98 mm (Dunn, 1936). Head 0.15-0.16 (n= 3) times SVL, 1.3-1.4 (n= 2) times as long as wide, 1.3 (n= 2) times as wide as high. Snout blunt, sloping gently toward parietal region; canthus rostralis roundish; supraocular region only slightly convex. Neck as wide as head and anterior part of body. Body cylindrical. Limbs relatively short, fore- and hind limbs do not touch each other when adpressed against body. Forelimbs 0.18-0.21 (n= 3) times SVL, hind limbs 0.25-0.27 (n= 3) times. Tail round in cross section, tapering toward tip, 1.8 times SVL in MPEG 1753.

Rostral well visible from above, twice as wide as high or more, pentagonal or with posterior border medially convex. A pair of internasals, forming a short medial suture. Frontonasal rhomboid, wider than long, laterally in contact with anterior loreal scale. A pair of quadrilateral prefrontals, medially separated by frontonasal and frontal (which form a suture), and besides in contact with the two loreals, first supraciliary, and first and second supraoculars (just touching the latter). Frontal elongate, rhomboid-lanceolate, forming a long suture with second supraocular. A pair of pentagonal or irregular frontoparietals, with a long medial suture; each in contact with frontal, second, third and fourth supraoculars, one parietal, and interparietal. Interparietal rhomboid, with posterior margins longer than anterior ones; parietal eye distinct, occupying the posterior part of the scale. Parietals irregular in shape, much larger than interparietal and forming a short suture behind it. Four supraoculars, first smallest, second largest. Four supraciliaries, second longest. Nasal small; nostril in its posterior part, almost as high as the scale itself, directed latero-posteriorly. A small postnasal, bordered by nasal, supranasal, anterior loreal, and first supralabial, in some specimens touching the second supralabial. An anterior and a posterior loreal, subequal or posterior one larger. A frenocular and a pre-subocular. Supralabials 6-7, respectively fourth or fifth largest and forming lower border of eyelid. Postoculars similar to temporal scales, but smaller. Temporal scales subrhomboid or subhexagonal, smooth, imbricate, not distinctly delimited from scales on nape and sides of neck. Ear-opening round, with undulating anterior margin, and smooth posterior margin. All dorsal and lateral scales of head smooth, subimbricate (temporal scales distinctly imbricate).

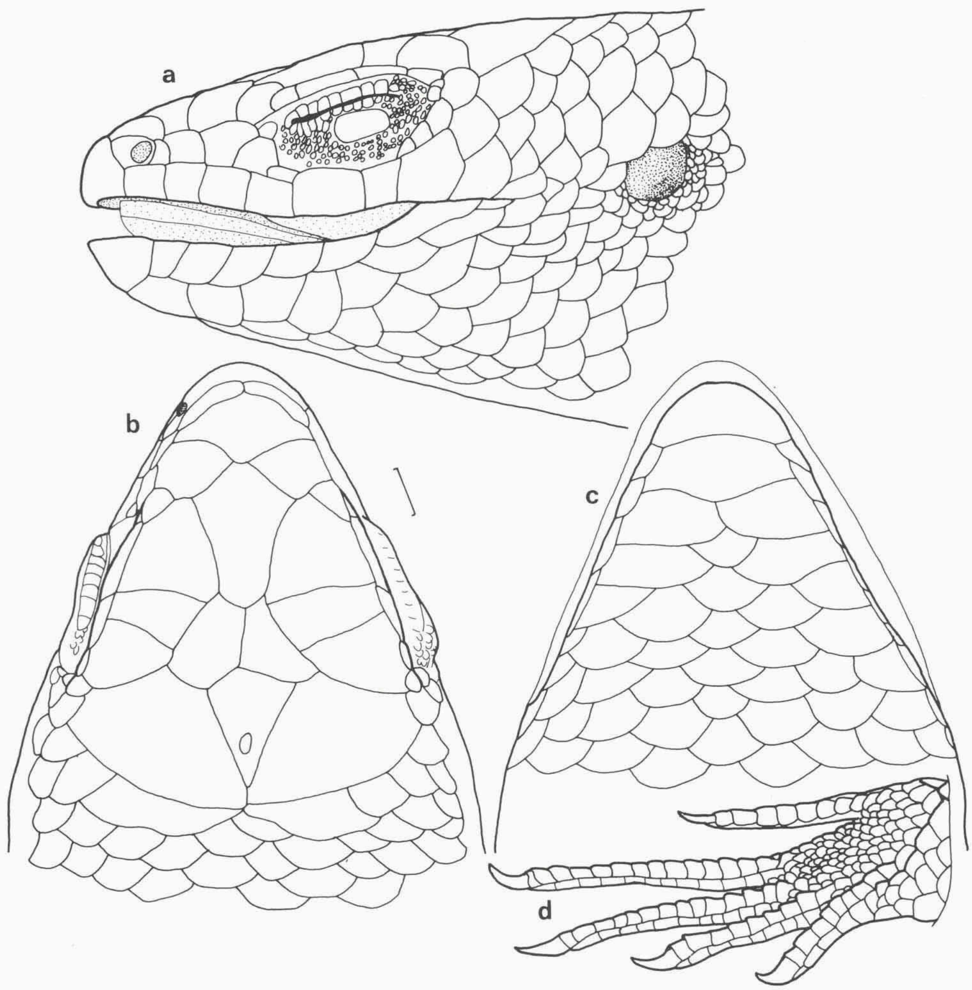


Fig. 199. *Mabuya guaporicola*, MPEG 1753; a, b, c: lateral, dorsal, and ventral views of head; d: ventral view of left foot.

Mental semicircular. Postmental pentagonal, more than twice as wide as long. Three pairs of chinshields, all in contact with infralabials; medially first pair in contact, second separated by one round scale, third, which is about half the width of the second, separated by three scales. Posteriorly, and continuing on gular region, scales round, smooth, imbricate, in longitudinal rows. Infralabials 5-6, respectively the suture between fourth and fifth, or between fifth and sixth, below centre of eye.

A pair of wide nuchal scales bordering parietals posteriorly. Nape with subhexagonal, smooth, imbricate scales, slightly to distinctly wider than long, grading into the dorsals. Sides of neck with round, smooth, imbricate scales, slightly smaller than dorsals. Dorsals, laterals and ventrals similar to each other, roundish to subrhomboid, smooth, imbricate, in longitudinal and oblique rows; 65-68 (n= 3) middorsal

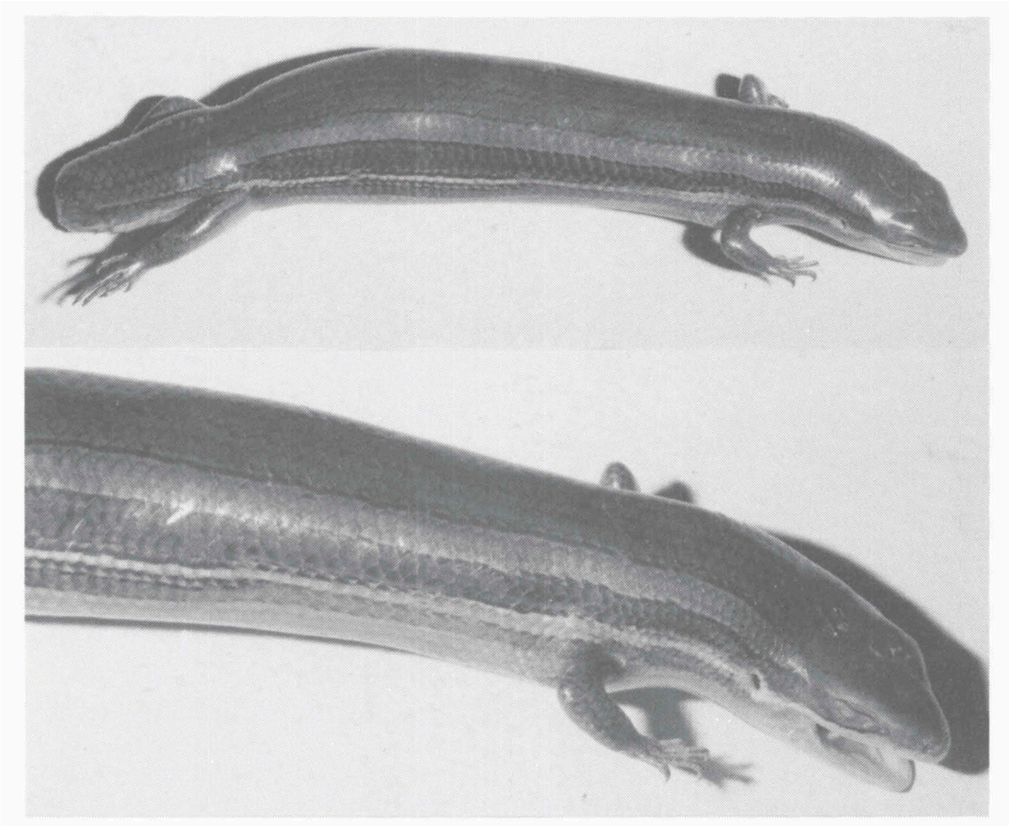


Fig. 200. *Mabuya guaporicola*, ♀, MPEG 14321, Serra das Araras, MT, Brazil: upper figure dorsolateral view of entire animal, lower figure nearly lateral view of head and anterior part of body (T.C.S. Avila-Pires).

scales in a line between interparietals and posterior margin of hind limbs; 45-48 (n= 3) scales along a midventral line between anterior margin of forelimbs and cloacal slit; 30-34 (n= 3) scales around midbody. Preanal plate with scales similar to ventrals.

Scales on tail and limbs similar to those on body, except that they are smaller on limbs. Palmar and plantar regions with relatively small, irregular, tubercular scales; plantar region delimited, completely or partially, by a row of slightly larger and flatter scales continuous with subdigital lamellae of first and fifth toes. Subdigital lamellae smooth, single, 9-10 (n= 6, 3 specimens) under fourth finger, 12-13 (n= 5, 3 specimens) under fourth toe.

No information available on colour in life; judging from preserved specimens, life colours (but not pattern) will probably be similar to those of *M. nigropunctata* and *M. bistriata*. General colour in preservative brown with dark brown bands in MPEG 14321 and UMMZ 83171, light grey with brown bands in MPEG 1753 (probably due to discolouration). Seven dark stripes or bands run along body, part of them continuing along tail: (1) a vertebral thin stripe, with several interruptions, from about level of forelimbs (slightly anterior or posterior to it) till base of tail; (2) on each side, a dorsolateral stripe, from nape (with an anterior, rather inconspicuous part starting at supraciliaries) till half or more of tail, in its posterior part the two stripes merging into one single middorsal stripe; in MPEG 1753 and MPEG 14321 the stripe is represented along body by a thin line, becoming wider on tail, while in UMMZ 83171 it forms a narrow band about half scale wide all along its length, with darker brown margins; (3) on each side an upper lateral band, with darker brown margins, about 2-3 scales wide at midbody, running from nostril (although less conspicuous between nostril and eyes), along body, and through most of tail; (4) on each side a lower lateral band, dorsally and ventrally or only dorsally with darker brown margins, about 1-1.5 scale wide, running from corner of mouth, below ear-opening and above forelimb, till insertion of hind limb, and from hind limb till at least half, or most of tail. The two lateral bands are separated by a whitish band. Limbs, especially hind limbs, also with stripes, which may be almost continuous or consist of dashes. Ventral region whitish, spotless.

Habitat.— The only data available on habitat is from MPEG 14321, which was collected in a grassy field, near a farm. The type-locality, the headwaters of Rio Guaporé, in Mato Grosso, is in an area of predominantly open formations, but also close (on a large scale map) to semideciduous, submontane forests. Serra do Cachimbo, which is at the southern border of Amazonia, is an area of complex interdigitation between open and forest vegetations.

Notes on natural history.— UMMZ 83171 was found in the stomach of a snake, *Oxyrhopus trigeminus* Duméril, Bibron & Duméril (UMMZ 67948).

Distribution (fig. 196).— Brazil and Bolivia. Brazil in western Mato Grosso (headwaters of Rio Guaporé; Barra do Bugres), and Serra do Cachimbo, in southern Pará. Bolivia in Departamento Santa Cruz, and Departamento Beni at the confluence of Isidoro and Ichoa rivers (Fugler, 1989).

Remarks.— MPEG 1753, from Serra do Cachimbo, Pará, is the first Amazonian record for this species. Serra do Cachimbo is in an area of complex interdigitation between open and forest vegetation at the southern border of Amazonia. Thus, the presence there of species of southern origin is expected. Unfortunately, only few specimens were available for comparison with MPEG 1753, and a direct comparison with the holotype (CM P962) and paratype (UMMZ 68099, now lost) was not possible. The late Dr. C.J. McCoy kindly sent me photographs and counts of dorsals and ventrals of the holotype. I used these and the data given by Dunn (1936) on the holotype and the paratype for comparison with specimens.

Colour pattern in all specimens similar in most aspects; the main difference seems to be in dorsolateral stripe, which is thin in MPEG 1753 and MPEG 14321, and wide in CM P962, UMMZ 83171, and possibly also in UMMZ 68099 (Dunn, 1936 did not mention this character as different in the two types). The degree of development of the vertebral stripe and of the lower lateral band seems to be slightly different in each specimen, probably this represents intraspecific, non-geographic variation. Tail length/SVL in types, according to measurements given by Dunn (1936), is 1.7, thus close to that found in MPEG 1753 (more precisely, respectively 1.70-1.71 versus 1.76). Length of fore- and hind limbs/SVL in holotype respectively 0.17 and 0.27, also close to those in studied material (0.18-0.21 and 0.25-0.27). Among scale counts, number of scales around midbody agrees in all specimens (30-32 in holotype and paratype, respectively; 30-34 in specimens studied); number of dorsals (64 in holotype, 65-68 in specimens studied) certainly falls within range of variability of one species; number of ventral scales in holotype (34) distinctly lower than that in specimens examined (45-48). Dunn (1936) did not give number of ventrals as here considered, but he counted all scales from chin to vent: 57 in holotype, 68 in UMMZ 68099; in MPEG 1753 and MPEG 14321 these counts are, respectively, 65 and 72, thus close to that in UMMZ 68099. A difference observed between UMMZ 83171 and MPEG 1753/MPEG 14321 is in shape of nuchal scales, which are distinctly wider than long in the latter specimens, only slightly so in the former.

Except for the lower count of ventrals in the holotype, differences among specimens are relatively small, and I believe they all represent the same species, *Mabuya guaporicola*.

Several authors, including Peters & Donoso-Barros (1970), mentioned the date of publication of the original description of *M. guaporicola* as 1935. However, although vol. 87 of the Proceedings of the Academy of Natural Sciences of Philadelphia corresponds to the year 1935, it is clearly stated on its front page that it was published in 1936. A reprint of this paper shows the date February 11, 1936.

Mabuya nigropalmata Andersson, 1918
(figs. 196, 201)

Mabuia nigropalmata Andersson, 1918: 8 (syntypes NRM 23258, 4 ex., NRM 23259, 1 ex.; type-localities: Rio Curuçá, tributary of Rio Javari, Brazil, and San Fermin, NW Bolivia, forest district).
Mabuya nigropalmata; Burt & Burt, 1933: 86 (part); Amaral, 1937a: 1743, 1937b: 204; Cunha, 1961: 96; Peters & Donoso-Barros, 1970: 200; Horton, 1973: 76; Fugler, 1989: 66.

Material.— **Brazil.** AMAZONAS. Rio Curuçá, tributary of Rio Javari: 1 ex., NRM 23259 (formerly 3259), syntype, 1914, leg. V.M. de Oliveira.
Bolivia. San Fermin, NW Bolivia: 4 ex., NRM 23258 (formerly 3259), syntypes, 1904, leg. N. Holmgren.

Diagnosis.— *Mabuya* with paired prefrontals and fused frontoparietals, two or three pairs of nuchals, dorsals smooth, fore- and hind limbs almost touching each other when adpressed against body. Scales around midbody 25-28, dorsals 54-55, ventrals 39-45. Tail with a middorsal and a midventral row of tranversely enlarged scales. Palms and soles covered with minute and relatively high scales. Lamellae under fourth finger 14-18, under fourth toe 19-22. Body at each side with a paravertebral series of dark spots, and a wide dark lateral band.

Description.— Skink with maximum SVL, among the five known specimens, of 60 mm (NRM 23529). Head 0.19-0.23 (n= 5) times SVL, 1.6-1.7 (n= 5) times as long as wide, 1.4-1.5 (n= 4) times as wide as high. Snout blunt, sloping gently toward parietal region; canthus rostralis roundish; supraocular region flat or slightly convex. Neck slightly narrower than head, and about as wide as anterior part of body. Body slightly depressed. Limbs well developed, fore- and hind limbs almost touching when adpressed against body. Forelimbs 0.27-0.29 (n= 5) times SVL, hind limbs 0.36-0.41 times (n= 5). Tail round in cross section, tapering toward tip, 1.5-1.6 (n= 3) times SVL.

Rostral visible from above, twice as wide as high or slightly more, with round or moderately sinuous posterior border; suture with supralabials slightly oblique, slanting posteriorly. A pair of internasals, separated medially. Frontonasal approximately rhomboid (with anterior corner truncate), anterior borders longer and forming an acute angle, posterior ones shorter, forming a wide angle; in contact with rostral, internasals, anterior loreal, and both prefrontals. A pair of quadrilateral prefrontals, medially in contact (posterior border of the two together form, when seen from behind, an open 'W'); each one in contact with frontonasal, the two loreals, first supraciliary, first supraocular, and frontal. Prefrontal (at each side), first and second supraoculars, and frontal meet in one point, where each one touches (or just not) the other three. Frontal relatively small, elongate, rhomboid-lanceolate, forming a long suture with second supracular. Frontoparietals fused into a single shield, in contact with frontal, second, third and fourth supraoculars, parietals and interparietal. Interparietal triangular or rhomboid (with posterior margins much longer than anterior ones). Parietal eye distinct, in posterior corner of interparietal. Parietals irregular in shape, distinctly larger than interparietal and forming a suture behind it. Four supraoculars, first smallest, second largest. Five supraciliaries, subequal or first smaller than the others. Nasal small, nostril in its posterior part, directed latero-posteriorly. A small postnasal, enclosed between nasal, supranasal, anterior loreal, and first supralabial; in one case (one side) it also touches the second supralabial. An anterior and a posterior loreal, anterior one smaller and squarish, posterior one larger, roughly quadrilateral, with upper posterior corner extending posteriorly (toward anterior corner of eye). A frenocular and a pre-subocular. Supralabials 7-8, fifth or sixth largest and forming lower border of eyelid (in NRM 23259, on one side, this scale is divided into two). Postoculars similar to temporal scales, but smaller. Temporal scales roundish (tending to rhomboid), smooth, imbricate. Ear-opening small, round, with undulating anterior margin and smooth posterior margin. All dorsal and lateral scales of head smooth, subimbricate (temporal scales distinctly imbricate).

Mental semicircular. Postmental short, roughly pentagonal (borders with each chinshield of first pair distinctly concave). Four or five pairs of chinshields, all or at least anterior three pairs in contact with infralabials; medially first two in contact, third separated by one scale, posterior pair(s) by more. Scales in anterior pairs wider than long, in fourth, or fourth and fifth, pair(s) longer than wide. Posterior to chinshields, and continuing on gular region, scales round, smooth, imbricate, in longitudinal rows. Infralabials 6-7, one but last, or suture between the two scales before last, below centre of eye.

Nape with three pairs of wide nuchal scales (2/3 scales in NRM 23259). Each nuchal of a pair followed by two longitudinal rows of scales, anteriorly hexagonal, wider than long, posteriorly grading into dorsals. Scales on sides of neck similar to dorsals, but smaller. Dorsals, laterals and ventrals similar to each other, roundish (subrhomboid or subhexagonal), smooth, imbricate, in longitudinal and oblique rows; 54-55 (n= 5) middorsal scales in a line between interparietals and posterior margin of hind limbs; 39-45 (n= 5) scales along a midventral line between anterior margin of forelimbs and cloacal slit. Scales around midbody 25-28. Preanal plate with scales similar to ventrals.

Scales on tail similar to dorsals, but mostly wider. A middorsal and a midventral row of transversely enlarged scales (ventrals larger) present, starting shortly behind the base, to tip of tail.

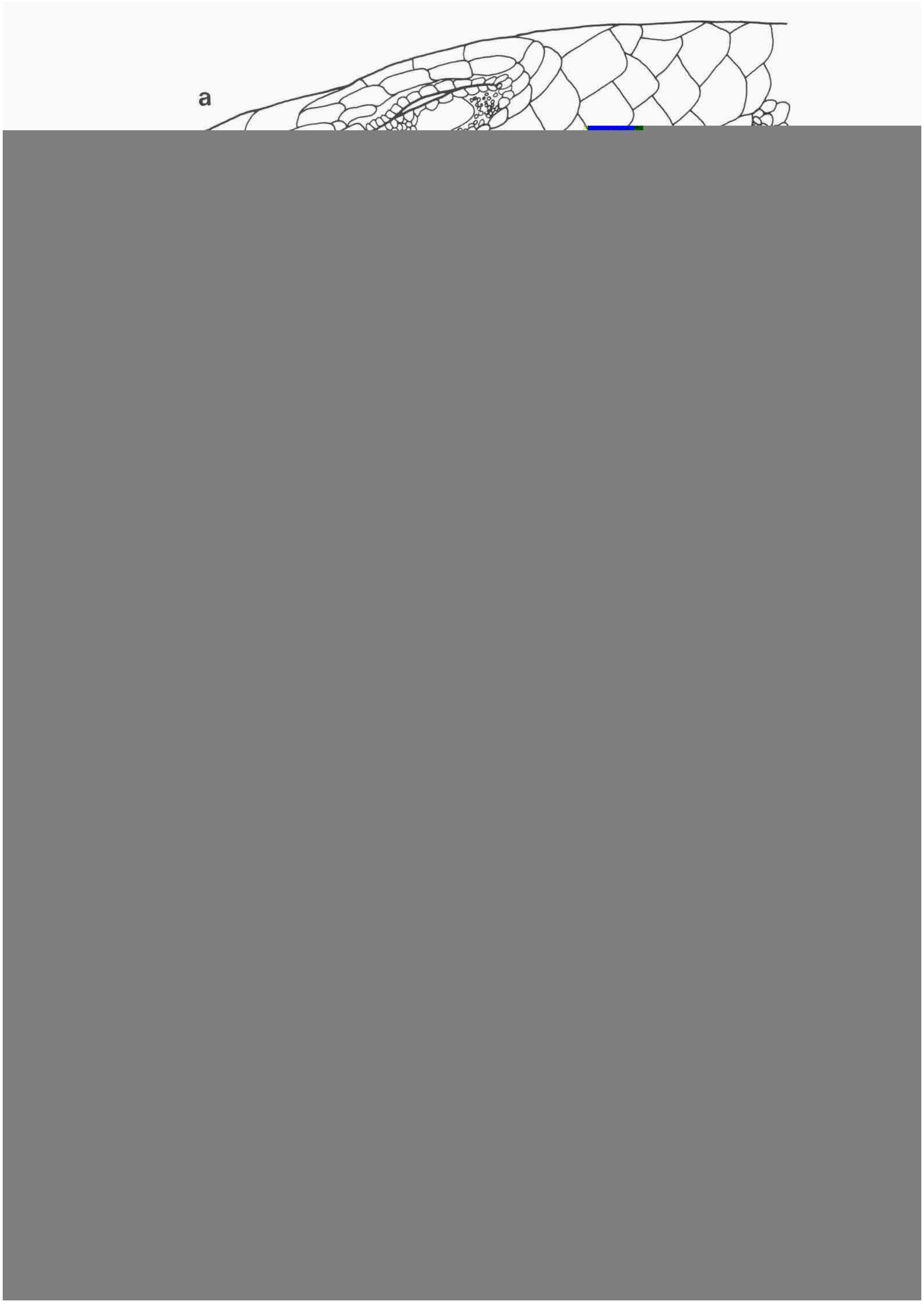


Fig. 201. *Mabuya nigropalmata*, NRM 23258; a, b, c: lateral, dorsal, and ventral views of head; d: ventral view of left foot.

Scales on limbs similar to, but smaller than, dorsals. Palms and soles densely covered by minute but relatively high scales (giving the general impression, under small magnification, of a pilose surface), which extend onto the base of some of the digits. Subdigital lamellae single, smooth, 14-18 (mostly 14-15, 18 on one side of one NRM 2358) under fourth finger, 19-22 (n= 9, 5 specimens) under fourth toe.

Colour in life not known, but colours in preservative suggest that animals in life may have a blue tail. In preservative, general pattern similar in all specimens, but the Brazilian specimen (NRM 23259) has a duller colour than the Bolivian ones (NRM 23258), possibly due to fixation or preservation process. Dorsum either predominantly light olive-green or greyish-blue. On each side, a series of paravertebral, dark greyish-brown spots is present (each series may consist of groups of one to three spots), starting shortly behind level of forelimbs; on tail the two series converge to form one dorsal row, which disappears after a relatively short distance. Flanks mostly covered with a dark greyish-brown band, which starts at the posterior corner of the eye, and continues along body and most of tail. Dorsally the dark band may be partially bordered by a pale light line, while ventrally there is a distinct whitish-blue stripe starting at the corner of the mouth, passing through lower part of ear-opening and above forelimbs, till the insertion of hind limbs (in some specimens less distinct posteriorly). The light line is bordered below by an almost completely dark brown (smaller specimens), or variegated dark brown and whitish-blue (larger specimens), band. Limbs dorsally variegated (dark brown and light olive-green to bluish). Ventral region mostly cream, under tail light blue (especially in smaller specimens) or cream.

Habitat.— Both localities from where the species is known are forest areas, but no information was given on the specific habitat in which the animals were collected.

Distribution (fig. 196).— Only known from the type-localities, on the western border of Amazonia (see remarks).

Remarks.— Burt & Burt (1931) and Dunn (1936) reported *M. nigropalmata* from Venezuela, but later these specimens were described by Horton (1973) as a new, quite distinct species (*M. croizati*). *M. nigropalmata* also has been reported from the state of Pará (Amaral, 1949), from Peru (Burt & Burt, 1933), and "probably" from the Guianas (Cunha, 1961). There are no records of specimens from any of these localities, and it is quite improbable that the species occurs in Pará or the Guianas. However, it could be expected in eastern Peru because both type- localities are close to the border with Peru. Also it may occur in the state of Acre, in southwestern Amazonian Brazil.

Mabuya nigropunctata (Spix, 1825)
(figs. 197, 202, 203, 315)

Scincus nigropunctatus Spix, 1825: 24, pl.xxvi fig. 2 (holotype lost, original type-locality: "Ecgá" [correct original spelling "Ega", at present Tefé], Amazonas, Brazil; MPEG 15248 from Santa Rita, Município de Maraã, left margin of Rio Japurá (Lago Paricá), Amazonas, Brasil, is designated herein as neotype).

Mabuia agilis var. *nigropunctata*; Boulenger, 1887a: 192 (part).

Mabuia aurata; Boulenger, 1887a: 189 (part); Goeldi, 1902: 535; Hagmann, 1910: 491; Procter, 1923: 1066; Cott, 1926: 1160.

Mabuia agilis; Goeldi, 1902: 534 (part).

Mabuya agilis agilis; Amaral, 1937a: 1743 (part).

Mabuya mabouya mabouya; Dunn, 1936: 544 (part); Amaral, 1937b: 203 (part); 1949: 114 (part); Schmidt & Inger, 1951: 455 (part); Cunha, 1961: 96 (part); Peters & Donoso-Barros, 1970: 199 (part); Hoogmoed, 1973: 209.
Mabuya mabouia; Rand & Humphrey, 1968: 8.
Mabuya mabouya; Crump, 1971: 20; Hoogmoed, 1979: 278.
Mabuya bistriata; Williams & Vanzolini, 1980: 99, 100; Rebouças- Spieker, 1981a: 123, 1981b: 162; Vanzolini, 1981b: 196, 1986a: 14; 1986b: 17; Vanzolini & Williams, 1981: 253; Cunha, 1981: 11; Cunha et al., 1985: 30; Nascimento et al., 1988: 35, 1991: 33; O'Shea, 1989: 68; Zimmerman & Rodrigues, 1990: 449; Martins, 1991: 182; Vitt & Blackburn, 1991: 916; Blackburn & Vitt, 1992: 152; Gascon & Pereira, 1993: 181.
Mabuya spec.; Hoogmoed & Gruber, 1983: 397.

Material.— **Brazil.** AMAPA. Serra do Navio: 1 ex., RMNH 25837, Barragem de Agua Limpa do Igarapé Jacaré, 21.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila Pires; 1 ex., MNRJ 3296, ix.1963, leg. H.F. Berla. Igarapé Caneco, 1 km W of Rio Araguari, road Serra do Navio-Araguari: 1 ex., MPEG 15128, 18.xi.1988, leg. M.S. Hoogmoed & T.C.S. Avila-Pires.
AMAZONAS. Barreira do Matupiri, Rio Madeira (05°34'S, 61°07'W): 1 ex., xii.1975, leg. unknown. Rio Uatumã, area of reservoir of hydroeletric dam Balbina, Município de Presidente Figueiredo: 1 ♂, 1 ♀, MPEG 14677-678, 14.xii.1987, leg. D. Peccinini-Seale & rescue team; 1 ex., MPEG 14688, xii.1987, leg. D. Peccinini-Seale & C.F. Rocha; 1 ♂, MPEG 14825, 26.i.1988, leg. F.P. Nascimento & F. Braga; 1 ex., MPEG 14902, 06.ii.1988, leg. rescue team; 1 ex., MPEG 14926, 26.iii.1988, leg. F.P. Nascimento & rescue team; 1 ♀, MPEG 14938, 01.ix.1988, leg. rescue team. Huitanaã, Rio Purus (as 'Hyutanihan'): 1 ex., USNM 28950, leg. J.B. Steere. E of Porto Urucu, S of Tefé: 1 ♂, MPEG 15851, 22.xi.1989, leg. M.S. Hoogmoed & T.C.S. Avila-Pires. Urucu River (Petrobras area), 3 km S of headwaters: 1 ♀, INPA s/n, v.1989, leg. C. Gascon. Santa Rita, Município de Maraã, left margin of Rio Japurá (Lago Paricá): 1 ♂, MPEG 15248, neotype, 16.xi.1988, leg. S. Ramos; 2 ♂♂, 2 ♀♀, 1 ex., MPEG 15224-225, 15242, 15247, 15259, 11-19.xi.1988, leg. S. Ramos. Tapurucuara, Rio Negro: 1 ♂, 1 ♀, MPEG 1748-49, vii.1962, leg. F.M. Oliveira. Cucuí, Rio Negro, 350': 1 ex., USNM 80688, 02.ii.1930, leg. E.G. Holt. Carauari, Rio Juruá: 1 ♀, BM 1979.142, 2.ix.1978, leg. W.H. Timmis, Wallace Exped. to Amazonia. Igarapé Belém, near Rio Solimões, c. 70 km E Leticia: 1 ex., AMNH 114944, 18-28.v.1970, leg. B. Malkin. Santo Antonio, E of Benjamin Constant, Rio Solimões: 1 ♂, MPEG 15901, 08.xii.1989, leg. M.S. Hoogmoed & T.C.S. Avila-Pires. W of Benjamin Constant, Rio Solimões: 3 ♂♂, 5 ♀♀, 1 juv., MPEG 15905, 15923, 15959, 15994, 16000, RMNH 25840-843, 09-19.xii.1989, leg. M.S. Hoogmoed, T.C.S. Avila-Pires. Município de Benjamin Constant, mouth of Rio Javari, right bank of Rio Solimões: 1 ex., MNRJ 3654, v.1942, leg. A. Parko.
MATO GROSSO. Araguaia/Tapirapé: 1 ex., AMNH 87935. Rosario Oeste: 2 ex., KU 97860-861, xi.1963, leg. Alvarenga & Oliveira. Chapada dos Guimarães: 1 ex., 97862, 20.xi.1963, leg. Alvarenga & Werner.
PARA. Ilha de Marajó: 10 ex., BM 1923.11.9.91-100, leg. W. Ehrhardt. Rio Capim: 1 ex., BM 49.11.8.94, purch. S. Stevens. Vigia: 1 ex., USNM 159240, 14.viii.1964, leg. P.S. Humphrey. Km 9 of 'Estrado do Açucareiro' (Pratinha), Benevides: 1 ♀, MPEG 8240, 04.vii.1974, leg. O.R. Cunha & F.P. Nascimento. Belém: 3 ex., BM 1970.688-690, 1967, leg. R. Lainson; 1 ex., USNM 149130, Instituto Agronômico do Norte, 12.iv.1963, leg. P.S. Humphrey; 2 ex., USNM 158070-071, 'Brazilia', resp. 03.viii.1965 & 12.vii.1965, leg. P.S. Humphrey; 6 ex., USNM 159213-218, 'Station A', 08.vii-25.viii.1964; 3 ex., KU 124623-625, Utinga, 18- 19.iv.1967 & 23.ix.1967, leg. J.D. Lynch; 1 ex., KU 127234, IPEAN, leg. L. Hart; 3 ex., KU 127235-237, IPEAN, 13.v- 20.vi.1969, leg. M.L. Crump; 1 ex., KU 128219, IPEAN, 01.iv.1970, leg. W.E. Duellman; 2 ex., KU 128220-221, IPEAN, 03.iv.1970, leg. locals for M.L. Crump; 3 ex., KU 128222-224, IPEAN, 03.iv.1970, leg. W.E. Duellman & P.S. Humphrey; 1 ex., KU 128225, IPEAN, 07.iv.1970, leg. local for M.L. Crump. Cametá, Rio Tocantins: 1 ex., NMW 9553, 1912, 'Mus. Pará'; 1 ex., NMW 9554, 1911, 'Mus. Göldi'. Antonio Lemos (near Breves): 1 ex., BM 1976.343, 23.xi.1925, leg. H.B. Cott. Floresta Nacional de Caxiuanã, Rio Caxiuanã, IBAMA Post (1°47'32.3"S, 51°26'01.5"W): 1 ex., RMNH 26702, 23.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha. Floresta Nacional de Caxiuanã, Rio Curuá, Estação Científica Ferreira Penna (1°44'10.7"S, 51°27'11.3"W): 1 ex., MPEG

16358, 22.x.1992, leg. M.S. Hoogmoed, T.C.S. Avila Pires & R.A.T. Rocha; 1 juv., RMNH 26703, 24.vii.1993, leg. M.S. Hoogmoed, R.J.R. Moraes & R.R. Silva. Cruz Alta, 6 km S of Rio Trombetas, Município de Oriximiná: 1 ♂, 2 ♀♀, 2 ex., RMNH 15838- 839, MPEG 15362-363, 15398, 07-11.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila-Pires & R.A.T. Rocha. Road from Sítio Céu Estrelado to Cruz Alta (approximately midway), between Rio Nhamundá and Rio Trombetas, Município de Faro: 1 ♂, 1 juv., MPEG 15339, 15401, 05 & 12.xii.1988, leg. M.S. Hoogmoed, T.C.S. Avila-Pires & R.A.T. Rocha.
RONDONIA. Guajará-açu Falls, near Guarajá-Mirim, Rio Mamoré: 1 ex., CAS 49772, 1911, leg. Baker & Mann. Rio Jamari, reservoir area of hydroelectric plant Samuel: 2 exs., CEPB 0102-103, 20.xii.1988-31.i.1989, leg. N.J. Silva Jr.
RORAIMA. Ilha de Maracá: 2 ex., MR 553, 15.ii.1988, MR 586, 24.ii.1988, both leg. M. O'Shea.
Mabuya nigropunctata? - 1 juv., MR 587, Ilha de Maracá, 24.ii.1988, leg. M. O'Shea.
In addition to specimens listed above, the MPEG has specimens from the following localities: MARANHAO. Paruá, road BR-316. Nova Vida, road BR-316, 25 km from Rio Gurupi. Forest reserve of Buriticupu/CVRD. PARA. Ilha de Marajó (km 6-10 of road PA-159, Breves-Anajás, Município de Breves; Fazenda Tijucaquara, Município de Chaves). Bela Vista, Viseu. Macapazinho, Castanhal. Fazenda Cacoal, Augusto Correa. Rio Pirajauara, road to Acará. Jacarequara, Acará. Colônia Nova (Gurupi), road BR-316. Km 74 of road BR-316 (Pará-Maranhão). Bom Jesus, Bragança. Road to São Caetano de Odivelas. Santa Luzia, Capitão Poço. Fazenda Morelândia, road to Genipaúba, Benevides. Benevides. Ilha do Mosqueiro. Rio Moju, mouth of Rio Jambuaçu (right bank), on road to Malaifate. Road between Tocantins and Moju rivers, 12 miles from the Tucuruí hydroelectric dam. Reservoir area of hydroeletric dam Tucuruí, Rio Tocantins (Canoal; Chiqueirão; Jacundá; Jacundazinho; Igarapé Saúde; right bank in front of Ilha das Pacas; between rivers Arapari and Cocal). Paragominas. Road PA-70 (Marabá), near Vila Rondon. Road of Cipal, Vila Rondon (road PA-70). Serra Norte, Carajás (in many localities, allover the forested areas). Gorotire, São Felix do Xingu. Santarém (Urumari; road to Maicá). RONDONIA. Fazenda Rio Candeias, km 30 of road BR-364 (Porto Velho-Cuiabá). Ji-Paraná. Ouro Preto d'Oeste.

Diagnosis.— *Mabuya* with paired prefrontals and frontoparietals, one pair of nuchals, dorsals smooth to tricarinate, fore- and hind limbs almost touching each other when adpressed against body. Scales around midbody 27-34, dorsals 48-57, ventrals 33-40. Scales on tail similar to dorsals. Four to six, mostly five, usually subequal supraciliaries. Palms and soles dark, covered by heterogeneously sized, mostly relatively small tubercles. Lamellae under fourth finger 11-16, under fourth toe 15-20. On each side a wide, dark lateral band, bordered or not by dorsal and ventral light stripes, of which the dorsal one, when present, usually ill-defined.

Description.— Skink with maximum SVL in males of 107 mm (MPEG 14688), in females of 113 mm (MPEG 13583). Head 0.17-0.24 (n= 43) times SVL, proportionally shorter in larger specimens; 1.2-1.6 (1.42 ± 0.08, n= 43) times as long as wide; 1.1-1.6 (1.32 ± 0.10, n= 44) times as wide as high. Snout round, sloping gently toward parietal region; canthus rostralis roundish; supraocular region flat or only slightly convex. Neck as wide as head and anterior part of body. Body cylindrical. Limbs well developed, fore- and hind limbs (almost) touch when adpressed against body. Forelimbs 0.24-0.32 (0.28 ± 0.02, n= 44) times SVL, hind limbs 0.32-0.43 (0.37 ± 0.03, n= 43) times. Tail round in cross section, tapering toward tip, 1.2-1.6 (1.38 ± 0.12, n= 20) times SVL.

Rostral well visible from above, twice as wide as high or more, semicircular or band-like with posterior border convex. A pair of internasals, either in contact or separated medially. Frontonasal roughly rhomboid, wider than long, laterally in contact with anterior loreal scale. A pair of prefrontals, quadrilateral, pentagonal, or with an irregular, curved outline; either in contact or separated medially, and in con-

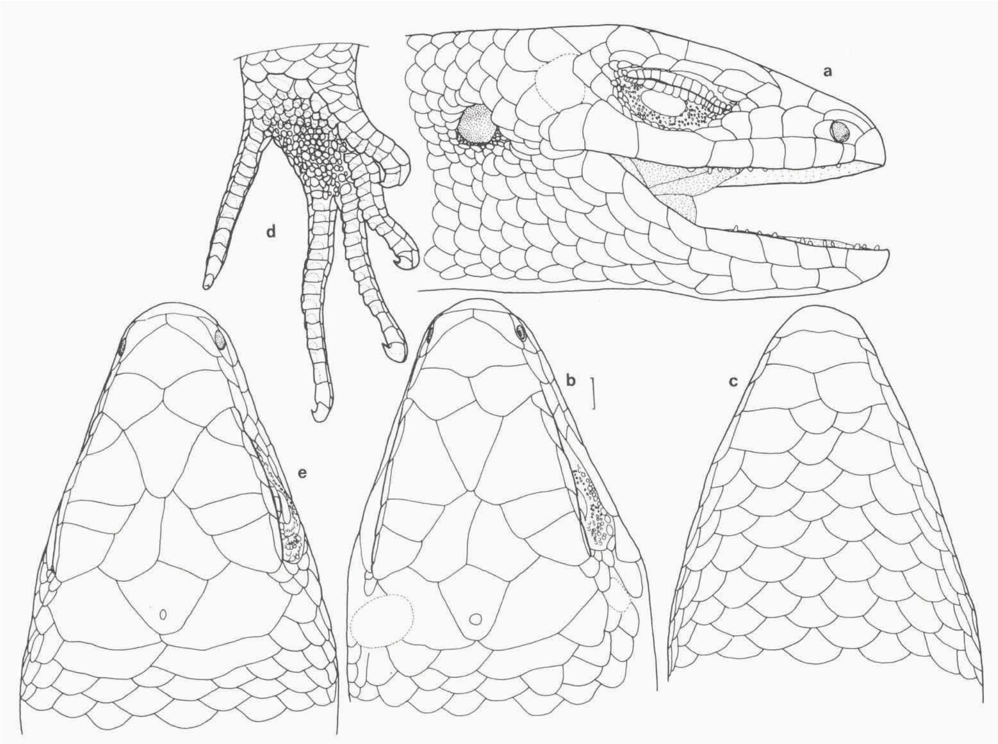


Fig. 202. *Mabuya nigropunctata*; a, b, c: lateral, dorsal, and ventral views of head; d: ventral view of left foot; all of MPEG 15248 (neotype); e: dorsal view of head of MPEG 15398, showing the four supraoculars usual for the species.

tact with frontonasal, both loreals, first supraciliary, first and second supraoculars (in some specimens just touching second supraocular), and frontal. Frontal lanceolate, forming a long suture with second supraocular. A pair of pentagonal or irregular, longer than wide frontoparietals, with a long median suture; each in contact with frontal (mostly), second, third and fourth supraoculars, one parietal, and interparietal. Interparietal rhomboid with blunt angles anteriorly and posteriorly; parietal eye distinct, occupying the posterior corner of the scale. Parietals irregular in shape, wider than interparietal, and either slightly shorter than it, or forming a short suture behind it. Four supraoculars (three in MPEG 15248, where first and second supraoculars obviously are fused), first smallest, second largest; in RMNH 25840 second supraoculars form a short medial suture behind frontal. Supraciliaries 4-6, mostly five; when five, generally subequal or first shortest. Nasal small; nostril in its posterior part, almost as high as the scale itself, directed latero-posteriorly. A small postnasal, roundish posteriorly, and apart from nasal bordered by supranasal, anterior loreal, first, and in some cases second supralabial. An anterior and a posterior loreal, subequal or posterior one larger. A frenocular and one or two pre-suboculars. Supralabials 7-8, respectively fifth or sixth largest and forming lower border of eyelid. Postoculars similar to temporal scales, but smaller. Temporal scales imbricate, smooth, round, not distinctly delimited from scales on nape and sides of neck. Ear-opening relatively small, round, with smooth margin. All dorsal and lateral scales of head smooth, subimbricate (temporal scales distinctly imbricate).

Mental trapezoid with convex anterior margin, or semicircular. Postmental short, approximately trapezoid or hexagonal. Two pairs of chinshields, first in medial contact, second separated medially by one scale; they may be in contact with infralabials or separated from them by a row of elongate scales. Posteriorly, and continuing along gular region, scales round, smooth, imbricate, in longitudinal rows. Infralabials 7-8, rarely 6 or 9, fifth to seventh below centre of eye.

A pair of wide nuchal scales usually borders parietals posteriorly; in some specimens one or both of them divided into more scales. Scales on nape similar to dorsals, but slightly shorter. On sides of neck scales slightly smaller. Dorsals and laterals round, imbricate, smooth to tricarinate, in longitudinal and oblique rows; 48-57 (52.4 ± 1.9, n= 65) middorsal scales in a line between interparietal and posterior margin of hind limbs. Ventrals similar to dorsals, but smooth; 33-40 (36.7 ± 1.7, n= 64) scales along a midventral line between anterior margin of forelimbs and cloacal slit. No distinct boundary between dorsals, laterals and ventrals; 27-34 (30.5 ± 1.5, n= 67) scales around midbody. Preanal plate with scales similar to ventrals.

Scales on tail and limbs similar to those on body, except that they are smaller on limbs. Palmar and plantar regions with relatively small, irregular, tubercular scales; on palms heterogeneous in size, with smaller tubercles interspersed among larger ones, or becoming smaller toward second to fifth fingers; on soles smaller toward third to fifth toes. Both regions delimited by a row of larger and flatter scales continuous with subdigital lamellae of first and fifth digits. Subdigital lamellae smooth, single, 11-16 (13.3 ± 1.2, n= 126, 64 specimens) under fourth finger, 15-20 (16.8 ± 1.2, n= 124, 63 specimens) under fourth toe.

In life, dorsal surface of head and anterior part of body copper- brown (approximately amber, 36), darkening posteriorly into Prout's brown (121A), hair-brown (119A) with a greenish tinge, or a mixture of sepia (219) and olive (30); juveniles may be dorsally golden, also becoming darker posteriorly; black or very dark brown spots may be present along back. Lateral band black, sepia (119) or mars-brown (223A), in some specimens bordered dorsally by a paler stripe, ventrally bordered by a cream- coloured (54) or pale-pinkish-buff (121D) stripe. Lower part of flanks usually variegated, with a mixture of the body colours, or black and cinnamon-drab (219C), or else (in MPEG 15901) predominantly sayal-brown (223C). Ventral region usually greenish-white or opaline-green, in some specimens bluish-white, chamois (123D), or in juveniles pearl-grey (81). Tail usually with same pattern as body. Iris dark (blackish); tongue grey. MPEG 13696, 13700, 13702, 13976 all juveniles from Serra Norte, Carajás, were copper-brown dorsally, with a black lateral band, and ventral to it light copper-brown with black spots; ventral region with a more-or-less vivid light blue colour (paler under head); tail, both dorsally and ventrally, of a bright light blue, proximally with a lateral black stripe. RMNH 26703, from Caxiuanã, also with a bright blue (turquoise-green, 64) tail, which started as two dorsolateral lines between hind limbs; upper part of head and anterior part of back sienna (136), posterior part of back mars brown (223A); belly more or less straw yellow (56); a black band on sides of head, flanks and sides of tail; limbs dorsally sepia (119) (M.S. Hoogmoed field notes).

In preservative dorsal surface of head, back and tail brown (hair-brown, fuscous, cinnamon-brown), either spotless or (back and tail) with blackish spots which may form approximately longitudinal rows, or irregular, transverse rows interrupted medially. A dark greyish-brown or blackish lateral band, two to three scales wide, starts near nostril, passes through eye and upper half of ear-opening, continues above forelimb and hind limb (ventrally just reaching insertion of hind limb), and along most of tail. The band may have nearly straight or quite irregular margins, in some specimens darker than the band itself; dorsally and/or ventrally it may be margined by a whitish stripe. Most commonly the dorsal light stripe is not clearly delimited dorsally, but in some cases it may be bordered by a series of blackish dorsal spots; the stripe is usually most evident near level of forelimbs. Lower part of flanks usually variegated. Limbs dorsally occasionally uniformly dark brown, but most commonly variegated. Ventral region cream or bluish-white. Palms, soles, and underside of digits blackish.

The specimens that had a blue tail when collected (see above), still show a sky blue, or light sky blue, tail, with a middorsal brown area proximally, and a lateral dark brown or blackish stripe.

Habitat.— An inhabitant of relatively open places in and on the borders of terra firme forest, this skink usually is found on branches and trunks of fallen trees in sunny places (e.g. along trails and creeks, in clearings, and in the edge of the forest). Vitt & Blackburn (1991) observed them in heights from 0.1-2.1 m off the ground, on fallen logs or low areas of tree trunks. Hoogmoed & Avila-Pires (1990, 1991) observed the species basking in the canopy, at about 35 m from the ground, on a patch of humus in the heart of a fern on a branch of a *Ficus* tree. These observations indicate that the species also probably inhabits the canopy. *M. nigropunctata* is found both in primary and secondary forests, and in patches of secondary growth (capoeiras). In the city of Belém, most specimens in the collection of MPEG came from areas with patches of forest, although some came from more open areas. Hoogmoed (1973) found the species in the Sipaliwini Savanna, in and among boulders (however, part of the specimens from Sipaliwini were examined, and it suffices to say here that they show some peculiarities in colour pattern, suggesting that they are, or have been, isolated from the forest specimens). Blackburn & Vitt (1992) reported its occurrence in gallery forest in Brazilian cerrado.

Notes on natural history.— The species is heliothermic and frequently is seen basking; Rand & Humphrey (1968) reported that body temperatures in active individuals from Belém, Pará, were distinctly higher than the air temperature. Fitch (1968) reported similar results from Santa Cecília, Ecuador. Vitt & Blackburn (1991) noted that average body temperatures of 11 active animals (32.9 ± 0.98 °C) showed no significant relationship with air or substrate temperatures.

Stomach contents reported by Hoogmoed (1973), Martins (1991), and Vitt & Blackburn (1991) showed that a variety of arthropods are ingested. Data by Vitt & Blackburn (1991) also showed two Gastropoda, one *Prionodactylus*, and the tail of a *Gonatodes*, besides shed skin and placentae.

Hoogmoed (1973) reported a specimen found in the stomach of a small owl, *Glaucidium* sp., and Cunha & Nascimento (1994) another one in the stomach of the snake *Siphlophis cervinus* (Laurenti).

Like other South American *Mabuya*, and documented in the literature (e.g., Beebe, 1925, 1945; Hoogmoed, 1973), the species is viviparous. Vitt & Blackburn (1991) and Blackburn & Vitt (1992) showed that the placentation in this species is highly developed, and that most of nutrients for the embryo come from the mother through a chorioallantoic placenta. Hoogmoed (1973) mentioned a clutch size of four or five embryos. I found females with up to eight embryos (MPEG 13313, 13583, 14120; MPEG 13307 had five embryos and MPEG 14119 six); Vitt & Blackburn (1991) found a brood size of 2-9 (among 94 specimens), with a positive correlation with SVL. The same authors, who studied two separate populations, one from Pará and one from Rondônia, pointed out that ovulation occurred between August and November, followed by a gestation period of 9-12 months, and parturition in the following August-September. These data agree with those of Hoogmoed (1973; based on Beebe's 1925 and 1945 data from Guyana and his own from Suriname), who suggested that the species had only one breeding season, with birth occurring from late August to late September. My observations on specimens from Carajás, southern Pará, agree with the data by Vitt & Blackburn (1991), except that the parturition period seems to be a bit earlier. Two distinctly separated size groups (juveniles and adults) were present among specimens collected from July to November, while specimens of intermediate size were collected between February and May (although in May a juvenile with a SVL of 48 mm was found); the smallest specimen (38 mm SVL) was from July (data taking into account all material collected during a three-year study). According to calculations by Vitt & Blackburn (1991), the species grows 8.4 mm/month during the first three months, and 8.0 mm/month during the following two months, when it attains an approximate SVL of 77 mm; afterwards growth slows to 2.0 mm/month (at least for the next five months).

Distribution (fig. 203).— Throughout Brazilian Amazonia and most probably in the entire Amazon region. Outside Amazonia, it seems to occur in the state of Mato Grosso, possibly spreading along gallery forests (material listed here), and in part of the Atlantic forest (Pernambuco and Alagoas; Vanzolini, 1981b). Blackburn & Vitt (1992) reported the species from the cerrado region (in gallery forest), in Brazil, without specifying localities.

Remarks.— This is the most common skink in Amazonia. As already explained in the generic account and under *M. bistriata*, until recently this taxon was erroneously called *M. bistriata*. A comparison with the lectotype of *M. bistriata* showed that *M. ficta* Rebouças-Spieker was a synonym of *M. bistriata*, and therefore that name could not be used for this species. Spix (1825) described both *M. bistriata* and *M. nigropunctata*. Vanzolini (1981a) remarked that "*Scincus nigropunctatus* cannot be identified with any lizard collected in Brasil so far", and considered it as a "species inquirenda". Although confirming that the holotype of *S. nigropunctatus* Spix was lost, Hoogmoed & Gruber (1983) disagreed with Vanzolini (1981a), identified the species provisionally as *Mabuya* spec., and added that "we feel confident that in due time it will be possible to correctly assign this name on the basis of the original description and illustration, and the additional data provided by Peters (1877)". Spix's (1825) description is quite succinct, and refers mainly to the general colour pattern and the proportions of body and tail, characteristics also depicted in the illustration. The presence of a dark lateral band with no, or ill-defined, light borders and of dark spots on the back agree well with the present species, whereas the short tail, as already observed

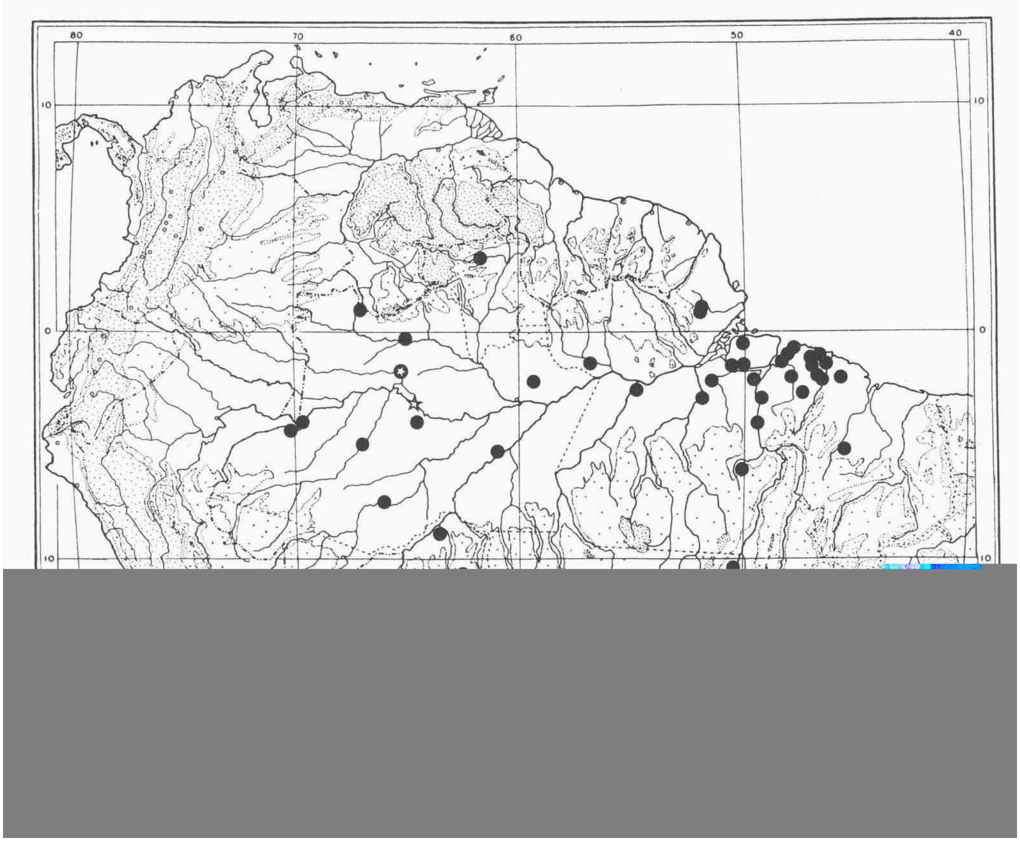


Fig. 203. *Mabuya nigropunctata*, distribution of material studied (circles), and original type-locality (star); circle with star represents neotype locality.

by Hoogmoed & Gruber (1983), may be regenerated. Peters (1877), upon examination of the specimen, reported it to have 30 longitudinal scale rows, three supraoculars, and the eye situated over the fifth supralabial. Among these characteristics, the only one which does not correspond to most specimens of what is called here *M. nigropunctata*, is the number of supraoculars, which is usually four. However, MPEG 15248, which otherwise agrees completely with the other specimens, has three supraoculars on both sides; apparently the first and second supraoculars are fused. Dunn (1936) mentioned some specimens of "*M. mabouya*" with three supraoculars, including the type of *Copeglossum cinctum* Tschudi from eastern Peru, and two specimens from Bolivia, each with three supraoculars (one 3-4, the other 3-?) on at least one side. Thus, although the presence of three supraoculars is not usual among the common Amazonian *Mabuya*, it does occur occasionally. Therefore, I see no differences between *Scincus nigropunctatus* Spix and the species to which I assign the name *Mabuya nigropunctata*. Because of the similarities among many species of *Mabuya* and the resulting nomenclatural confusion, in order to stabilize the taxonomy of the genus I designate MPEG 15248 as the neotype of *Scincus nigropunctatus* Spix, 1825. The specimen agrees quite well with the original description of *S. nigropunctatus*, and that of Peters (1877). It is a male, 61 mm SVL, length of tail 41 mm (original part) + 46 mm (regenerated part); 30 scales around midbody, 53 dorsals, 38 ventrals; seven supralabials on one side, eight on the other, respectively fifth and sixth below the eye; three supraoculars at each side; 12-13 lamellae under fourth finger, 17-17 under fourth toe. The dorsum has many black spots, and the lateral dark band is bordered dorsally by a faint light line (especially anteriorly), and ventrally by a white stripe with irregular borders. Although the specimen is not from Tefé, the original type-locality, it is from a relatively nearby locality, Santa Rita, Município de Maraã, on the left bank of Rio Japurá (Lago Paricá), Amazonas, Brasil; it was collected by Sergio Ramos on 16 November 1988.

Differences in morphology and habitat between *M. bistriata* and *M. nigropunctata* are discussed in the account of the former species.

As in other widespread species, some degree of geographical variability may be expected. Between eastern and western populations, differences exist in the degree of keeling of the dorsals, which are usually more distinctly tricarinate in eastern specimens and smoother in western ones. Also, eight supralabials seem to predominate among eastern specimens and seven among western ones. However, in most characteristics specimens from different localities agree quite well.

Cunha et al. (1985) reported juveniles from Carajás, Pará, with a bright blue tail, but other juveniles of similar size, and adults had the more common brown tail. RMNH 26703, from Caxiuanã, also had a bright blue tail (colour description above). Martins (in lit.) reported that all juveniles (seven in total, three of which collected) he has observed in Urucu, Amazonas, had bright blue tails, whereas the adults had the typical dark tails. Duellman (pers. comm.) noted that juveniles at Cuzco Amazónico, Peru, also had blue tails. It would be interesting to know more about the occurrence of juveniles with a blue tail (e.g., how widespread is this character and how often and in which circumstances it occurs), but observations have to be made in the field or on captive bred individuals.

MR 587, a juvenile (svl= 37 mm) from Ilha de Maracá, Roraima, agrees in most characteristics with *M. nigropunctata*, except that the scales on ventral surface of head and body have a weak median keel.

Family Anguidae Gray, 1825

Classification follows Rieppel (1980) and Stram & Schwartz (1977). Estes et al. (1988) listed diagnostic characteristics for the family.

Content.— Two diploglossine genera in South America — *Diploglossus* and *Ophiodes*. Of these, one species of *Diploglossus* occurs in the southwestern part of Amazonia. *Ophiodes striatus* was mentioned from Pará and Brazilian Amazonia by Amaral (1949) and Cunha (1961) respectively, but no specimen of this taxon is known from the region.

Diploglossus Wiegmann, 1834

Diagnosis.— Body covered by cycloid scales underlain by bony plates (osteoderms); dorsals and ventrals similar; no distinct boundary between gulars and ventrals. Four relatively short limbs present. Dorsal head scales mostly flat and subimbricate; two pairs of internasals; one or three prefrontals. Auricular opening present. Claws usually (almost) completely covered by an ungual sheath (unsheathed in one species).

Distribution.— South and Central America, and the Antilles.

Content.— Twelve species according to Stram & Schwartz (1977), only one of which occurs in Amazonia.

Diploglossus fasciatus (Gray, 1831)
(figs. 204-206)

Tiliqua fasciatus Gray, 1831: 71 (holotype unknown, no type-locality given).
Euprepis fasciatus Reuss, 1834: 51 (holotype SMF 5287, type-locality: Brazil)
Diploglossus Houttuynii Duméril & Bibron, 1839: 597 (3 syntypes, of which the only one still available is MHNP 5208; type-locality: Brazil); Duméril & Duméril, 1851: 154.
Diploglossus resplendens Barbour, 1909: 50 (holotype MCZ 7286, type-locality: junction of the Kaka and Beni Rivers, tropical eastern Bolivia).
Diploglossus fasciatus; Boulenger, 1885b: 287; Goeldi, 1902: 531; Amaral, 1937a: 1738, 1937b: 183; Guibé, 1954: 56; Wermuth, 1969: 8; Peters & Donoso-Barros, 1970: 108; Vanzolini, 1986b: 9; Brygoo, 1987: 8, 9.

Material.— **Brazil.** 1♂, MHNP 5208, syntype of *D. houttuynii*, leg. Langsdorff. 1 ♀, 1 hgr., MPEG 26-27, no further data.
ACRE. Alto Juruá-Mirim: 1 ex., MNRJ 1676. Xapuri, Seringal Sibéria: 1 ♂, MPEG 11029, 21.vi.1978. Vila Bujari (km.27 of the road BR-364, W. of Rio Branco): 1 hgr., UFAC (no number), xi.1989.

Diagnosis.— *Diploglossus* with three prefrontals; nasal may be in contact with rostral; dorsals striate and not keeled; ventrals smooth to slightly striate; claws almost completely covered by an ungual sheath. Scales around midbody 40-45, dorsals 92-105, ventrals 55-67. The animal is completely covered by alternating light and dark transverse bands, which are interrupted on the ventral surface of head and body, but form continuous rings around the tail, except for a central light spot in each dark band ventrally.

Description.— Anguid with maximum SVL of 170 mm (MPEG 26). Head relatively short, wide, depressed; 0.17-0.23 (0.19 ± 0.02, n= 6) times SVL, 1.2-1.4 (1.33 ± 0.07, n= 5) times as long as wide, 1.3-1.5 (n= 3) times as wide as high. Snout round, canthus rostralis rounded. Neck as wide as head and anterior part of body. Body slightly depressed. Limbs short, forelimbs 0.19-0.23 (0.21 ± 0.02, n= 5) times SVL, hind limbs 0.25-0.30 (0.28 ± 0.02, n= 5) times. Tail round in cross section, tapering toward tip; in three specimens with apparently complete original tails, ratios tail/svl are 1.38, 1.24 and 1.16, for svl's of respectively 122 mm, 143 mm, and 105 mm.

Tongue lanceolate, pilose, with a bifid tip. Anterior teeth conical, slightly curved, posterior ones slightly compressed, high, with an obtuse crown.

Rostral rectangular to trapezoid, almost twice as wide as high, just visible from above. Two pairs of internasals, anterior pair shorter; both pairs with curved posterior margin. Three prefrontals, anterior one azygous, roughly rhomboid, anteriorly in contact with posterior pair of internasals and first upper loreal at each side, posteriorly the sutures with the other two prefrontals forming an acute to almost right angle. Posterior prefrontals rhomboid, in contact medially or shortly separated by a

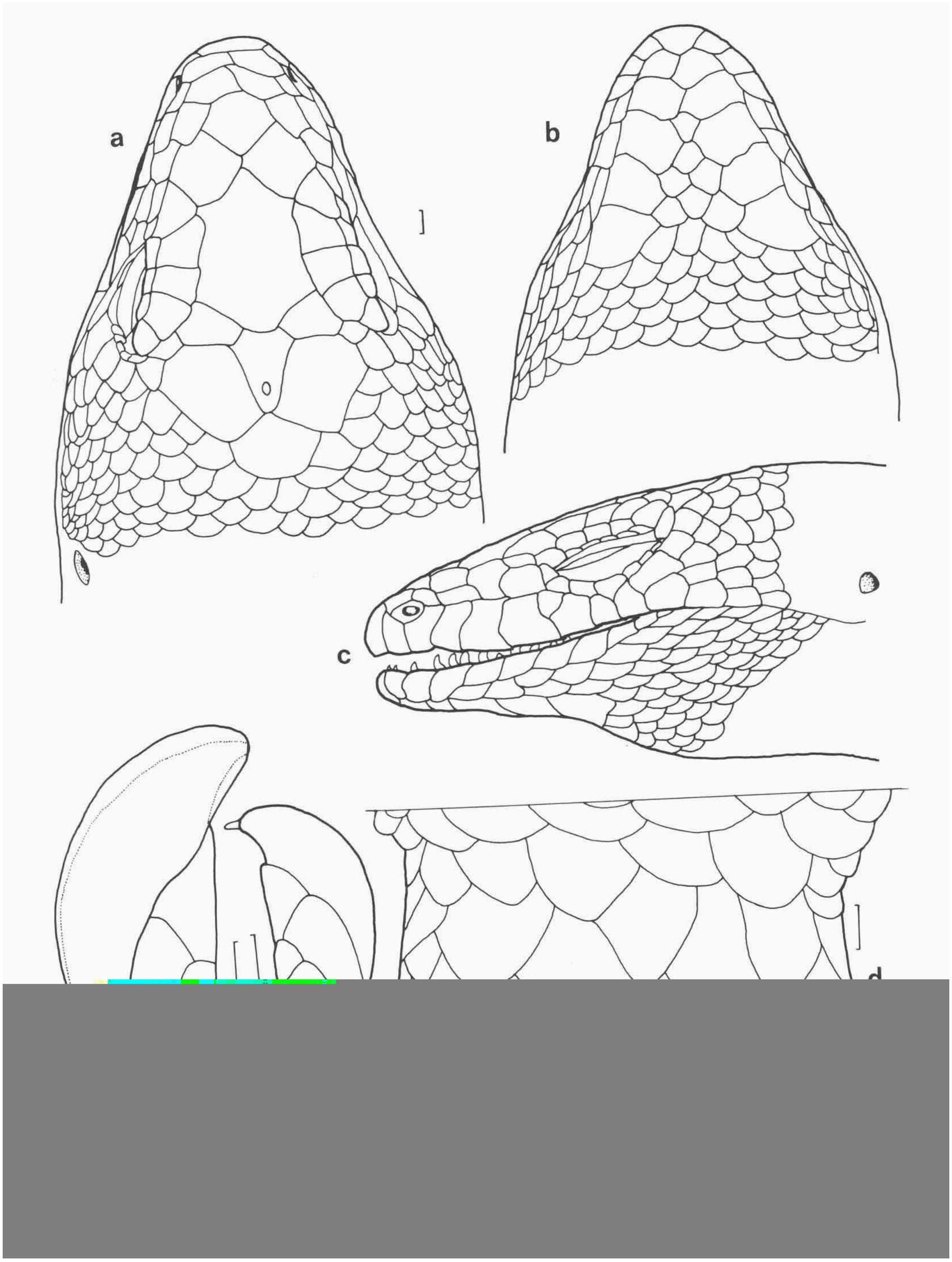


Fig. 204. *Diploglossus fasciatus*; a, b, c: dorsal, ventral, and lateral views of head; d: anal plate; e: ungual sheath of third right toe; all of MPEG 027; f: ungual sheath of third right toe in MPEG 11029, with tip of claw apparent.

suture between anterior prefrontal and frontal. Frontal hexagonal, 1.3-1.5 times as long as its greatest width, in contact laterally with first, second, third, and occasionally fourth, supraoculars. A relatively small pair of frontoparietals, widely separated by a suture between frontal and interparietal. Interparietal narrowing posteriorly into a blunt tip, which contacts the occipital, separating the pair of parietals; a parietal eye is present near its posterior margin. Parietals distinctly wider, and slightly longer than interparietal. Occipital subrhomboid, roundish posteriorly. Five, sometimes six, large medial supraoculars, partially enclosing three smaller lateral supraoculars (in MPEG 11029, the fourth medial supraocular is transversely divided). Supraciliaries 6-7, first much wider than others. Nasal small, hardly higher than nostril, in contact with or separate from rostral, and moreover in contact with anterior internasal, a postnasal, and first and second supralabials; nostril pierced posteriorly. Postnasal relatively small, with round posterior margin, dorsally in contact with posterior internasal. Loreal region usually with three transverse series of scales: two scales anteriorly, of which upper one wider, in contact with postnasal and posterior internasal; medially one or two (upper and lower) scales; and posteriorly two scales, upper one narrower; in MPEG 11029 four scales are present in the lower row, three in the upper row. Posterior upper loreal in contact dorsally with first supraocular, and followed by supraciliary series. One preocular, either small, triangular, only in contact anteriorly with posterior lower loreal, or extending ventrally to reach supralabials. A continuous series of 6-9 (mostly 6-7) suboculars and post-suboculars, the three or four anterior ones usually wider. Lower eyelid completely opaque. Supralabials 9, occasionally 10, followed to commissure by two or three scales; 7-8 to below centre of eye. Some specimens with extra triangular scales between two supralabials. Temporal scales roundish, smooth, imbricate. Ear-opening relatively small, oval, with smooth margin; tympanum moderately recessed.

Mental relatively small, slightly larger than adjacent infralabials. A pair of postmentals, subequal or one distinctly larger than the other. Four pairs of large chinshields; first pair with a medial suture, and in contact with infralabials; remaining chinshields separated from infralabials by one or two elongate scales, and medially by rhomboid to posteriorly round scales. Infralabials 7-10, mostly 8-9; 6-8 to below centre of eye. All scales of head smooth, (sub)imbricate, with very minute tubercles (scale organs) widespread on their surface.

Scales on nape similar to dorsals, on sides of neck slightly smaller. Gulars smooth, similar to and continuous with ventrals. Dorsals cycloid, imbricate, striate (about 15-22 longitudinal striae per scale); in longitudinal and slightly oblique, transverse rows; 92-105 (97.6 ± 5.1, n= 5) transverse rows of scales between occipital and posterior level of hind limbs. Scales on flanks similar to dorsals. Ventrals also similar, but smooth to slightly striate; 55-67 (61.2 ± 4,6, n= 5) rows of ventrals between anterior margin of forelimbs and preanal plate. Scales around midbody 40-45 (42.8 ± 2.1, n= 4). Preanal plate with hexagonal or irregularly polygonal, imbricate scales, larger than ventrals, forming approximately three transverse rows; those bordering cloacal slit longer than anterior ones. Behind cloacal slit, at each side, a single or partially divided tubercle is found in adult specimens.

Scales on dorsal surface of tail similar to dorsals, on ventral surface similar to ventrals, but in both cases slightly larger.

Scales on limbs similar to dorsals, but slightly smaller. Fingers and toes well

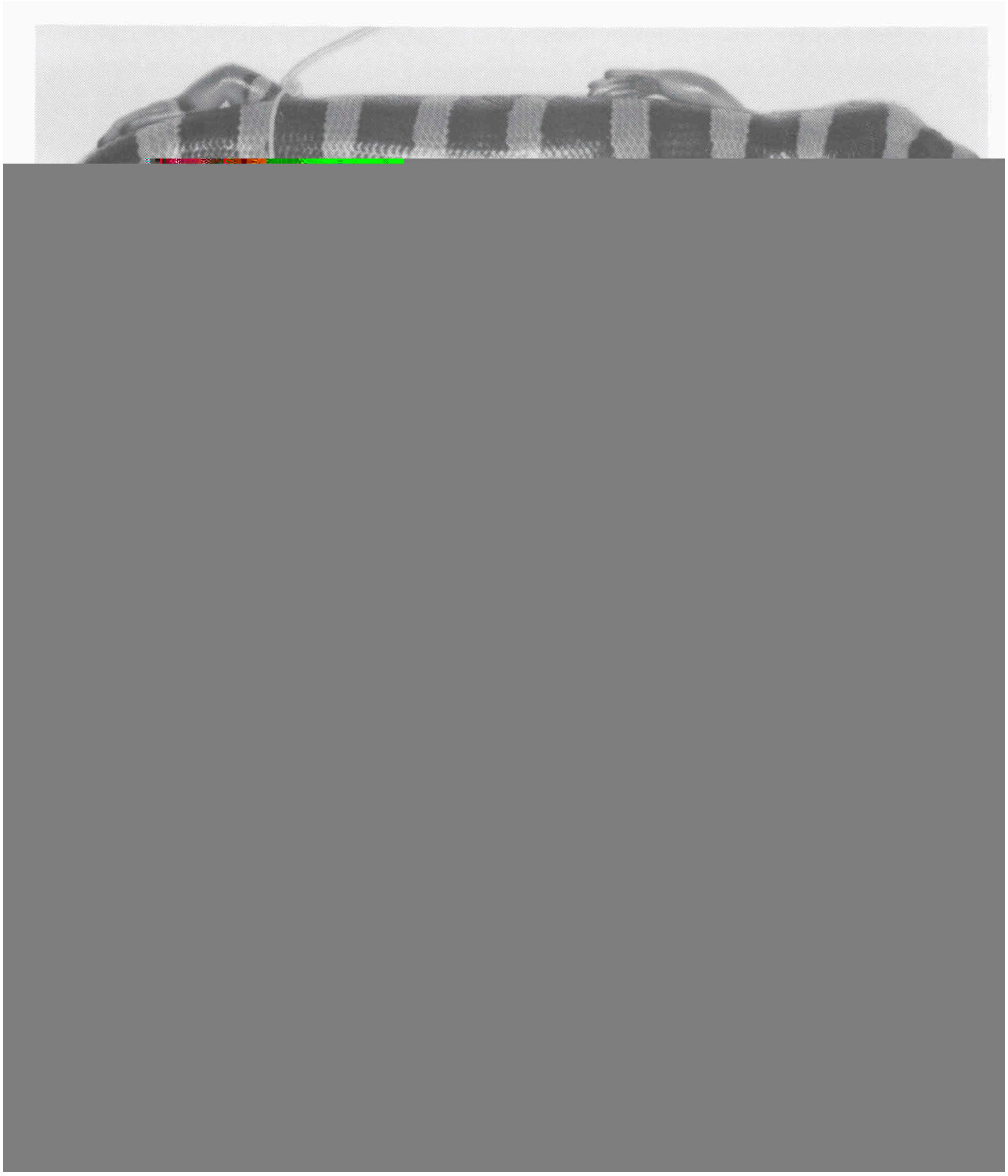


Fig. 205. *Diploglossus fasciatus*, ♂, MPEG 11029, Seringal Sibéria, Xapuri, AC, Brazil: upper figure dorsal view, middle figure ventral view, lower figure lateral view of head (T.C.S. Avila-Pires).

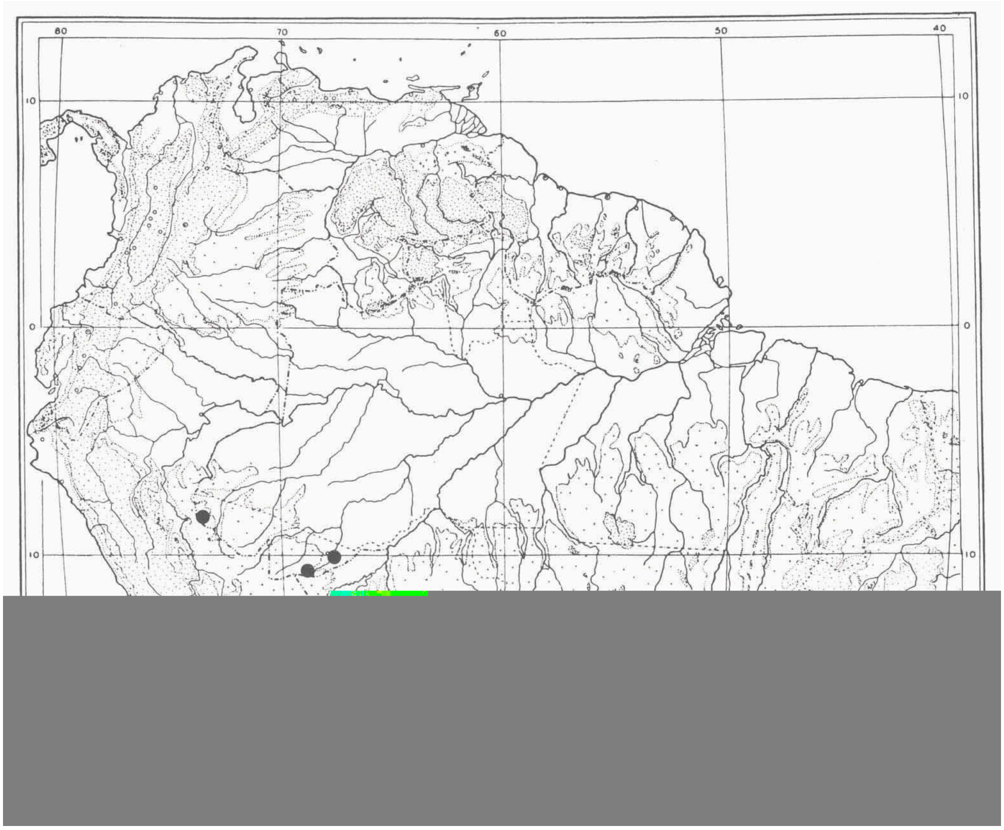


Fig. 206. Partial distribution of *Diploglossus fasciatus*. Closed circles = material studied; open circles = data from literature (Fugler, 1989; Rodriguez & Cadle, 1990); half-closed circle: BM 1982.8 from Villa Tunari, Rio Chapare, Bolivia (specimen not seen). For localities in eastern Brazil, see text.

across tail. Ventral surface light, except for some dark transverse lines latero-ventrally, especially under head, which are continuous with the borders of the dark dorsal bands; under tail, the borders of the dark bands form a continuous ring, but the central part of the area of the band is light. Among the material seen, two have a better preserved pattern. In MPEG 11029 (svl= 143 mm) the dark bands are brown, the light ones cream on head and tail, and greyish-white on body; forelimbs completely cream, hind limbs with a prolongation of the banded pattern; ventral surface cream, with brown areas as described above, and one brown spot on each of the scales bordering the cloacal slit, plus one at each of the postcloacal tubercles, the group forming a transverse dotted line. UFAC specimen (105 mm SVL) with black and white bands all over the animal, except for tip of tail, which is pinkish-white; both limbs grey; ventral surface with a light pinkish tinge; two small black spots on border of cloacal slit; tail with complete white bands, and black bands with a pink central area ventrally.

Barbour (1909) described and illustrated the colour pattern of a specimen from Bolivia (holotype of *D. resplendens*).

Habitat.— Few data on *D. fasciatus* exist. Rodriguez & Cadle (1990) reported the species to occur in primary alluvial forest, and to be terrestrial and diurnal. In Acre, the area where it occurs was mostly covered originally by a relatively low forest. Nowadays, in the eastern part of the state, including the area around Vila Bujari, where UFAC specimen was collected, the forest has been reduced considerably, and large areas have been converted into pasture. *D. fasciatus* is not commonly found, indicating either seclusive habits, low density, or maybe a combination of both factors.

Distribution (fig. 206).— The species has a disjunct distribution; it occurs in eastern Brazil and in southwestern Amazonia and surrounding areas. In the latter region it is known from the state of Acre, Brazil, from western Bolivia (Fugler, 1989; BM 1982.8 [not seen], from Departamento Cochabamba) and southeastern Peru (Vanzolini, 1986b; Rodriguez & Cadle, 1990). Boulenger (1885b) reported specimens from Bahia, Pernambuco, in eastern Brazil, and from 'Tijuco River' (a larger river with this name exists in western Minas Gerais, a smaller river exists in Bahia); Peters & Donoso-Barros (1970) referred to "southeastern coastal Brazil"; and Vanzolini (1988) stated: "Atlantic forest between ca. 14°40' and 25°30'S". BM 1924.9.20.11 (not seen) is from Ilhéus, Bahia.

Remarks.— The information available about this species is quite poor and consists solely of descriptions and few illustrations of some specimens.

The key presented by Peters & Donoso-Barros (1970) on *Diploglossus* is inverted in item 1. The "frontal in contact anteriorly with one scale" should lead to item 4, and "frontal in contact anteriorly with two or more scales" to item 2.

Brygoo (1987) referred to two syntypes of '*Diploglossus Houttuynii* var. A', and two of 'var. B', following the reference to specimens given by Duméril & Duméril (1851). Nevertheless, Duméril & Bibron (1839: 600-601) stated explicitly that they had only one specimen of var. A, and two of var. B. The former was stated to have been collected by Langsdorff, which agrees with MHNP 5208.

Summary of the Systematic Part

The lizards of Brazilian Amazonia, actually considered to belong to 87 species and two species complexes, are dealt with in this paper. The records of two of these species, viz. *Anolis bombiceps* and *Alopoglossus buckleyi*, still need confirmation. *Anolis philopunctatus* is of doubtful status. *Hemidactylus mabouia* is an introduced species. The species complexes (*Gymnophthalmus underwoodi* complex and *Cnemidophorus lemniscatus* complex) include at least three species. Thus, in total 89 species of lizards are here reported from Brazilian Amazonia. This number is expected to increase in the future, with the description of new species and with new records for the area.

Six species are considered polytypic: *Anolis nitens* (five subspecies, one of which mainly extra-Amazonian), *Plica umbra* (two subspecies), *Uracentron azureum* (three subspecies), *Cercosaura ocellata* (three subspecies, one extra-Amazonian), *Iphisa elegans* (two subspecies, one outside Brazil) and *Pantodactylus schreibersii* (three subspecies, only one in Amazonia). Therefore, at specific and subspecific levels, 97 taxa of lizards are presently recognised in Brazilian Amazonia.

Taking into account the habitat, the main division observed relates to forest versus open vegetation. Only four species occur in both environments, of which *Anolis*

Table 13. Distribution of species according to habitat.

SPECIES WHICH OCCUR BOTH IN FOREST AND OPEN VEGETATION:
Iguana iguana
Ameiva ameiva
Colobosaura modesta
Anolis nitens (according to subspecies; indicated with asterisks)

SPECIES RESTRICTED TO OPEN VEGETATION:
(a) In southern Amazonia.
Hoplocercus spinosus
Polychrus acutirostris
Tropidurus insulanus
Tropidurus oreadicus
Tupinambis merianae
Micrablepharus maximiliani
Mabuya guaporicola
**Anolis nitens brasiliensis*

(b) In northern Amazonia and Amazon banks.
Anolis auratus
Kentropyx striata
Cnemidophorus lemniscatus complex (mostly)
Gymnophthalmus underwoodi complex

(c) Both south and north of the Amazon.
Tropidurus hispidus

HABITAT UNKNOWN:
Tretioscincus oriximinensis **spec. nov.**
Tupinambis longilineus **spec. nov.**

FOREST:
All remaining species
**Anolis nitens* other than *A. n. brasiliensis.*

nitens is predominantly a forest species, except for one subspecies (*A. n. brasiliensis*). Sixteen species are restricted to open vegetation, and 67 species are restricted to forest (habitat of two species unknown) (table 13). Among forest species, *Crocodilurus lacertinus*, *Dracaena guianensis*, *Mabuya bistriata*, and the eastern populations of *Kentropyx altamazonica* seem to be restricted to the immediate neighbourhood of large rivers. A few other species (e.g., *Hemidactylus palaichthus* and *Coleodactylus septentrionalis*) may prefer drier or more open types of forest, whereas *Neusticurus racenisi* is found in montane environments.

Zoogeography

The aim of this section is: (a) to unravel biogeographical patterns within the Amazonian region, based on the distribution of lizards; (b) to compare these patterns with those found in other animal taxa; (c) to contribute to our knowledge concerning the historical biogeography of Amazonia.

Infrasubspecific variability, which could reflect more recent events in Amazonian history, was not considered. The phylogenetic relationships between the taxa are still not known well enough to be used to gain new insights about area relationships.

Except for a general overview of the occurrence of Amazonian species outside the region, the analyses will focus on zoogeographical patterns within Amazonia.

Species whose distribution extends beyond Amazonia

Of the 89 species which occur in Brazilian Amazonia, at least 26 (29%) occur outside Amazonia as well. These include (a) some species widely distributed in South America (which may also reach Central America), like *Iguana iguana*, *Ameiva ameiva*, *Colobosaura modesta* and *Pantodactylus schreibersii*; (b) species that occur in Amazonia and in the Atlantic forest, but not in the intermediate zone of open formations (*Anolis fuscoauratus*, *A. ortonii*, *A. punctatus*, *Polychrus marmoratus*, *Cercosaura o. ocellata*, *Kentropyx calcarata* and *Mabuya nigropunctata*); (c) some species that occur in all or most of northern South America plus parts of Central America (*Anolis auratus*, *Thecadactylus rapicauda*); (d) all but one of the species found in enclaves of open vegetation in southern Amazonia, *Tropidurus hispidus* included, which are forms of the diagonal belt of open formations of South America, especially of the cerrados (the exception is *Tropidurus insulanus*, which is endemic to Serra do Cachimbo); (e) a few species (e.g., *Gonatodes humeralis*, apparently *Tupinambis teguixin* and *Kentropyx calcarata*, and perhaps *K. altamazonica*) which extend much further south than other Amazonian forms, along gallery forests; (f) other species, such as *Diploglossus fasciatus*, with a disjunct distribution in SW Amazonia and E Brazil, *Anolis nitens* of which the subspecies *A. n. brasiliensis* spreads into Central Brazil, *Stenocercus roseiventris* which reaches northern Argentina, and *Bachia dorbignyi* which reaches northern Paraguay.

General patterns of lizard distribution in Amazonia

After analysis of the distribution data, seven main patterns were found, plus a number of unique distributions (table 14).

1. Ten species (three of which polytypic) are widespread in the entire region.

2. Nine species, plus one subspecies, occur in almost the entire region, but are apparently absent in some areas in the west (fig. 207). Two of these (*Polychrus marmoratus* and *Iphisa e. elegans*) have close relatives (most probably sister taxa: *P. liogaster* and *I. e. soinii* respectively) in the areas where they are absent. *Anolis punctatus*, *A. ortonii*, and *Alopoglossus angulatus* are apparently missing in the extreme western areas of the Guianas, *Arthrosaura reticulata* in the same areas and in southern Peru, *Uranoscodon superciliosus* and *Coleodactylus amazonicus* in the extreme western areas in Amazonia. Besides, *Bachia flavescens* and *Leposoma percarinatum* are not known from both the western and the southern limits of Amazonia.

3. Among eastern Amazonian taxa (fig. 208), three species occupy the entire area (with a presumed western limit along the Rio Negro and the Rio Madeira), four other species occupy smaller areas (lacking especially in places south of the Amazon).

4. Northern Amazonian taxa (figs. 209, 210) may be subdivided in (1) taxa which are restricted to, and occupy the entire Guianas (Guianan Region of Hoogmoed, 1979) [*Plica u. umbra*, *Gonatodes annularis*, and *Neusticurus rudis*]; (2) taxa of open veg-

Table 14. General patterns of distribution.

1. WIDESPREAD (polytypic species preceded by an asterisk):
Iguana iguana
Anolis fuscoauratus
Thecadactylus rapicauda
Gonatodes humeralis
Ameiva ameiva
Tupinambis teguixin
Mabuya nigropunctata
**Plica umbra*
**Uracentron azureum*
**Iphisa elegans*

2. WIDESPREAD, EXCEPT FOR SOME WESTERN AREAS (areas where the species is lacking between parenthesis) (fig. 207):
Anolis punctatus (part of W GUI)
Anolis ortonii (part of W GUI)
Alopoglossus angulatus (part of W GUI)
Arthrosaura reticulata (NW & SW)
Uranoscodon superciliosus (all W borders)
Coleodactylus amazonicus (all W borders)
Bachia flavescens (SW and maybe also southern borders?)
Leposoma percarinatum (W borders and parts of southern borders?)
Polychrus marmoratus (SW)
Iphisa elegans elegans (SW)

3. EASTERN AMAZONIA (fig. 208):
Neusticurus bicarinatus
Kentropyx calcarata
Cercosaura ocellata ocellata
Uracentron azureum azureum
Arthrosaura kockii
Leposoma guianense
Tretioscincus agilis

4. NORTHERN AMAZONIA (figs. 209-210):
Anolis auratus
Gymnophthalmus underwoodi complex
Kentropyx striata
Plica umbra umbra (GUI)
Gonatodes annularis (GUI)
Neusticurus rudis (GUI)
Anolis nitens chrysolepis (E GUI)
Anolis nitens nitens (W GUI)
Hemidactylus palaichthus (W GUI)
Coleodactylus septentrionalis (W GUI)
Neusticurus racenisi (W GUI)
Tretioscincus oriximinensis (S GUI?)
Mabuya carvalhoi (RR)
Uracentron azureum werneri (NW)

5. WESTERN AMAZONIA (fig. 211):
Enyalioides laticeps

Anolis bombiceps
Anolis nitens scypheus
Anolis nitens tandai+
Anolis transversalis
Uracentron azureum guentheri+
Uracentron flaviceps
Alopoglossus atriventris+
Alopoglossus buckleyi
Cercosaura ocellata bassleri+
Leposoma parietale
Leposoma snethlageae+
Kentropyx pelviceps
+ (only south of the Amazon in Amazonas state, Brazil).

6. SOUTHWESTERN AMAZONIA (fig. 212):
Enyalioides palpebralis
Polychrus liogaster
Stenocercus fimbriatus
Stenocercus roseiventris
Gonatodes hasemani
Bachia dorbignyi
Bachia peruana
Iphisa elegans soini
Leposoma osvaldoi
Pantodactylus schreibersii parkeri
Prionodactylus eigenmanni
Mabuya nigropalmata
Diploglossus fasciatus

7. PERIPHERAL IN SOUTHEASTERN AMAZONIA (open vegetation forms, with distributional area mainly outside Amazonia):
Hoplocercus spinosus
Anolis nitens brasiliensis
Polychrus acutirostris
Tropidurus insulanus (endemic in Serra do Cachimbo)
Tropidurus oreadicus
Colobosaura modesta (open and forest)
Micrablepharus maximiliani
Tupinambis merianae
Mabuya guaporicola

8. OTHERS
(a) Mostly widespread, but absent from some areas:
Plica plica (absent E of Rio Tocantins)
Plica umbra ochrocollaris (absent in GUI)
Pseudogonatodes guianensis (N + extreme West)
**Anolis nitens* (absent in SE forests)

(b) Following main river courses:
Crocodilurus lacertinus
Dracaena guianensis
Mabuya bistriata

(c) Mainly in the West, but with an eastern extension:
Anolis trachyderma
Neusticurus ecpleopus
Kentropyx altamazonica

(d) unique distributions:
Enyalius leechii (SE, in forest)
Stenocercus dumerilii (only in E PA)
Tropidurus hispidus (disjunctive populations N & S Amazon, open areas)
Lepidoblepharis heyerorum (mainly S, with NE extension [or lack of collecting?])
Cnemidophorus lemniscatus complex (N + SE: possibly a northern distribution with a more recent spreading into SE of parthenogenetic populations)
Ptychoglossus brevifrontalis (SUR + COL/EC/PERU) [lack of collecting?]

(e) Only known from one or few localities and specimens:
Anolis phyllorhinus
Gonatodes eladioi
Gonatodes tapajonicus
Lepidoblepharis hoogmoedi
Amapasaurus tetradactylus
Bachia panoplia
Tupinambis longilineus

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etation which occur in the Guianas and along both margins of the Amazon [*Anolis auratus, Gymnophthalmus underwoodi* species complex, and *Kentropyx striata*]; (3) taxa with restricted ranges within the Guianas — eastern Guianas [*Anolis n. chrysolepis*], western Guianas [*A. n. nitens, Hemidactylus palaichthus, Coleodactylus septentrionalis, Neusticurus racenisi, ?Mabuya carvalhoi*], ?southern part of Guianas [*Tretioscincus oriximinensis*]; (4) taxa with a northwestern distribution [*Uracentron azureum werneri*]. Among the western Guianan taxa, *H. palaichthus* and *C. septentrionalis* seem to occupy a more open and/or dry type of forest, and *Neusticurus racenisi* seems to be linked to montane environments (which are poorly studied, especially within the Brazilian borders). *H. palaichthus* may have crossed the Amazon, reaching the Rio Purus and Rio Madeira. Also from northern Amazonia, but poorly known, are *Amapasaurus tetradactylus* and *Bachia panoplia*.

5. Thirteen taxa are restricted to western Amazonia (fig. 211), mostly on both sides of the Amazon. Some of these (marked with a plus-sign in table 14) are known in Brazil (Amazonas state) only from localities south of the Amazon. In two cases, *Anolis nitens* and *Uracentron azureum*, the river may act as a barrier between the ranges of two subspecies (*A. n. tandai* versus *A. n. scypheus*, and *U. a. guentheri* versus *U. a. werneri*). Most probably also a 'western species' is *Lepidoblepharis hoogmoedi*, here described from Benjamin Constant, Amazonas.

6. Thirteen other taxa are restricted to southwestern Amazonia (fig. 212). *Leposoma osvaldoi*, from Rondônia, and *Mabuya nigropalmata*, only known from NW Bolivia and Amazonas state (Brazil), south of Rio Javari, are tentatively included in this group.

7. In southeastern Amazonia a discernible pattern concerns species from enclaves of open vegetation in the Amazonian periphery. Except for *Tropidurus insulanus*,

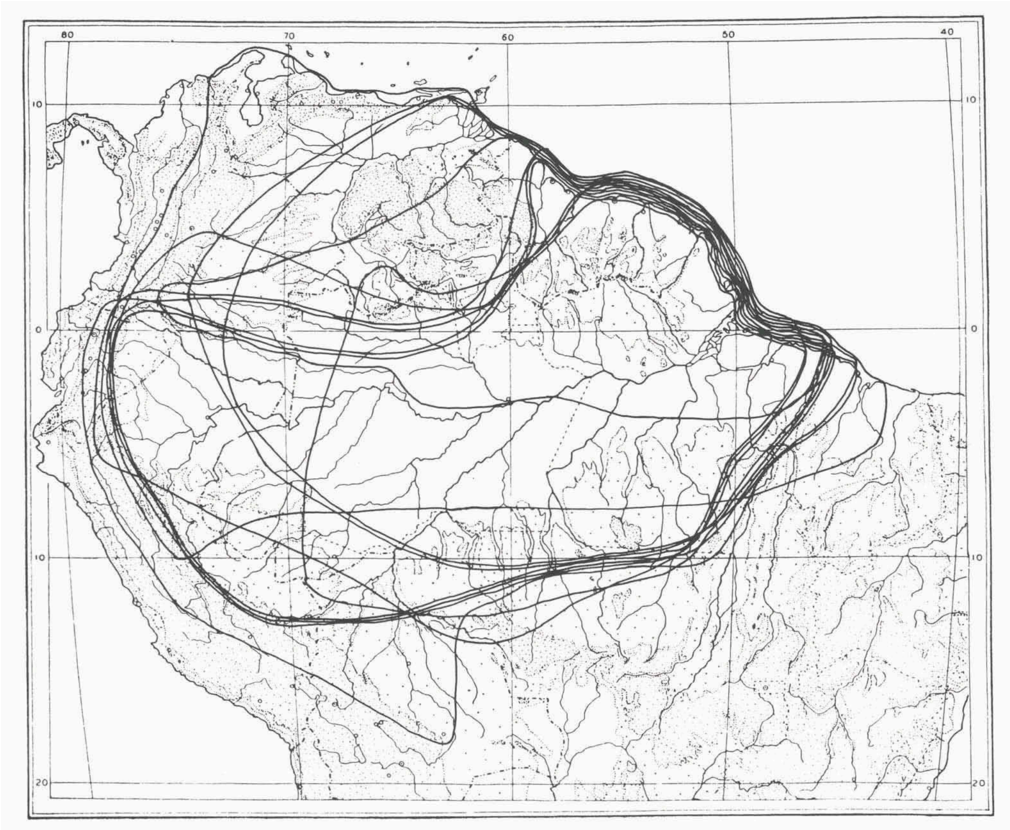


Fig. 207. Brazilian Amazonian lizards with widespread distribution, except for some western areas.

which is restricted to Serra do Cachimbo, all other species have their main area of distribution in the open formations outside (south of) Amazonia. *Colobosaura modesta* occurs both in forest and non-forest habitats. In southeastern Amazonian forests, on the contrary, no pattern of congruent distributions was found. This area harbours some species not known elsewhere, but these are mostly poorly known, and their distributional ranges do not coincide. *Enyalius leechii* is the only species widely distributed, occurring from Maranhão to Rondônia. *Stenocercus dumerilii* is restricted to eastern Pará (where it is known from several localities). Three other species are known from only one or two localities: *Gonatodes eladioi, G. tapajonicus* and *Anolis phyllorhinus*.

8. Besides the patterns mentioned above, other types of distribution are observed.

(a) *Plica plica* is widespread, except that it seems to be absent from east of Rio Tocantins. *Plica umbra ochrocollaris* is absent only from the Guianas, where it is substituted by *P. u. umbra*. *Pseudogonatodes guianensis* occurs north of the Amazon and in western Amazonia down to southern Peru, but it is not known from southeastern Amazonia. *Anolis nitens* is not known from forested areas in southern Pará, the southeastern subspecies (*A. n. brasiliensis*) occurring in Amazonia only in enclaves of

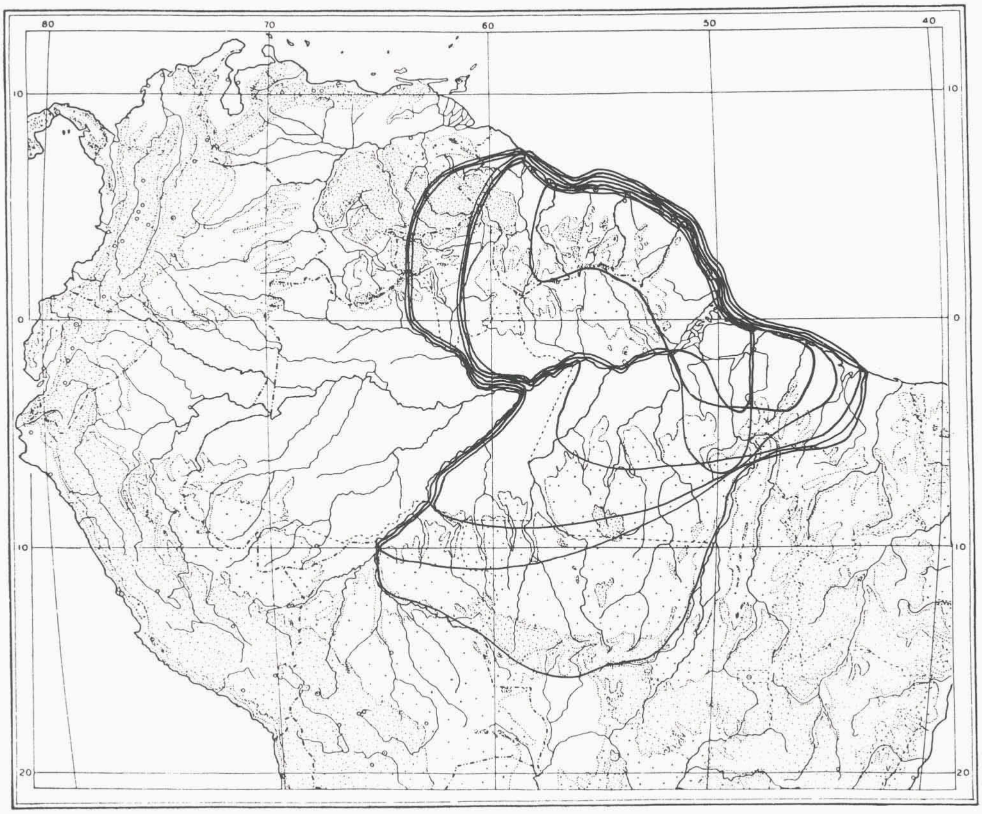


Fig. 208. Brazilian Amazonian lizards with distribution restricted to Eastern Amazonia.

open formations, and in dry forests in the cerrados of Central Brazil.

(b) *Crocodilurus lacertinus, Dracaena guianensis,* and *Mabuya bistriata* are ecologically restricted to the courses of the main rivers of the Amazon basin.

(c) *Anolis trachyderma, Neusticurus ecpleopus,* and *Kentropyx altamazonica* are known mainly from western Amazonia, but some records indicate that they extend much further eastward, mainly south of the Amazon. *Kentropyx altamazonica* is restricted in this eastward extension to seasonally flooded forests, a habitat displacement possibly due to competition with *K. calcarata*. The other two species show a gap in the distributional record between the eastern and western localities.

(d) The unique distributions of *Enyalius leechi* and *Stenocercus dumerilii* were already mentioned above (see item 7). *Tropidurus hispidus,* from open formations, reaches the Amazonian region along its eastern border (Maranhão and Pará), and besides it is known from open vegetation areas north of the Amazon. *Cnemidophorus lemniscatus* species complex, also from open formations, occurs north of the Amazon and is rather widespread in Pará, south of the Amazon. Its original distribution might have been similar to that of the northern Amazonian forms grouped above under (2), but in this case with a more recent southeastern spreading of the parthenogenetic form. *Lepidoblepharis heyerorum* is present in a large part of Amazonia south of the

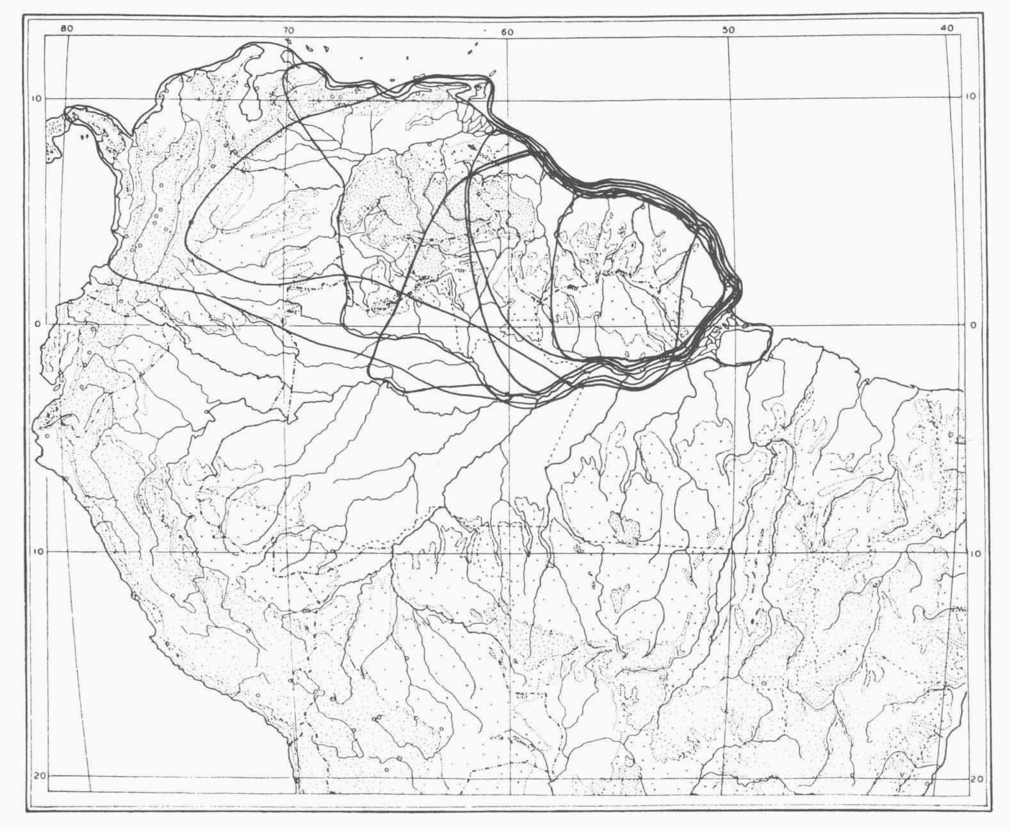


Fig. 209. Brazilian Amazonian lizards with distribution restricted to Northern Amazonia: map 1.

Amazon, and in the eastern Guianas. *Ptychoglossus brevifrontalis* apparently shows an Amazonian peripheral distribution, in the Guianas, western and southwestern Amazonia.

Area Relationships: Parsimony Analysis of Endemicity

Based on the general patterns of distribution obtained, the Amazonian Region was divided into five areas (eastern Guianas [E.GUI], western Guianas [W.GUI], western Amazonia [W], southwestern Amazonia [SW], and southeastern Amazonia [SE]) which were used as terminal units in a Parsimony Analysis of Endemicity (PAE) (see Methodology). Additionally, a new analysis was made including Rondônia [RO] as a sixth area. The data matrix used for the analysis (including Rondônia) is presented in Appendix 1. The most parsimonious trees which resulted from each analysis are shown in fig. 213. The three most parsimonious trees obtained in fig. 213-A differ mainly in the position of RO. When these are compared with the tree in fig. 213-B, it becomes clear that RO is in fact a composite area, with faunas which have different affinities. The trees show a closer relationship between the Guianas and southeastern Amazonia, than between any of these three areas and western localities. Thus they indicate a main east-west division, instead of a north-south division. Southwestern

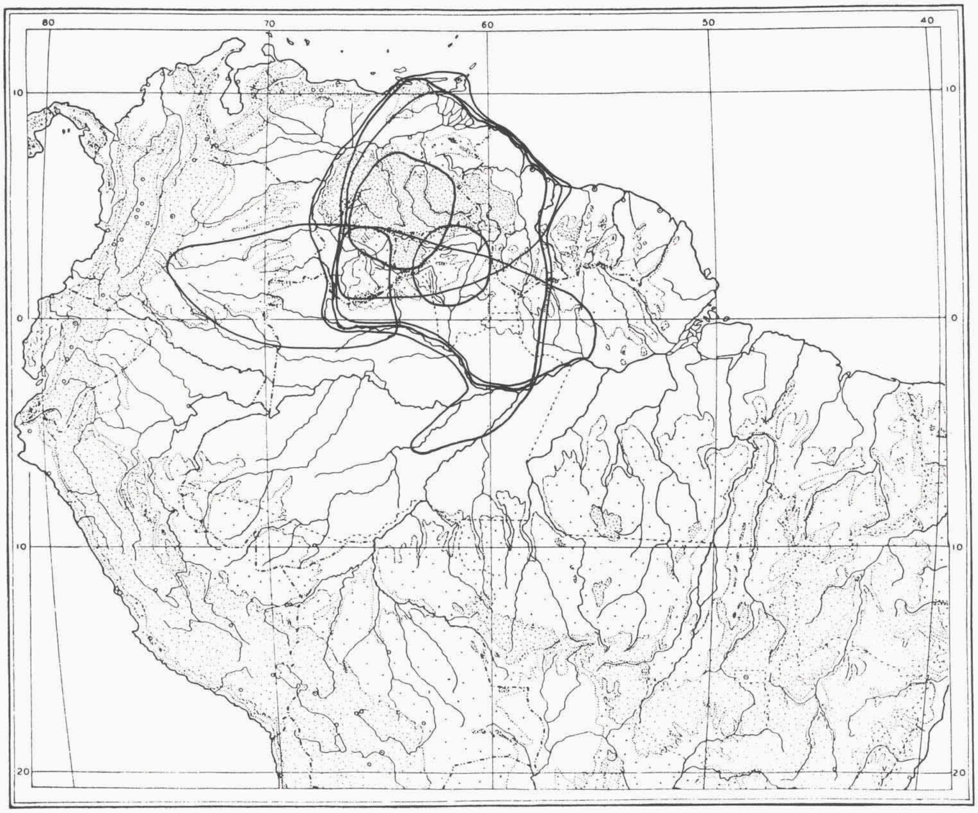


Fig. 210. Brazilian Amazonian lizards with distribution restricted to Northern Amazonia: map 2.

Amazonia was the sister area of all other Amazonian areas.

Considering that the PAE was used originally to compare separate, well delimited localities, another PAE analysis was made, using eleven selected areas from where the lizard fauna was relatively well known (fig. 214). These areas differ in size and possibly in diversity of environments, but all have some degree of heterogeneity, which should at least in part avoid that the results reflect different habitats, instead of different geographical sites. The data matrix used for this analysis is presented in Appendix 2. The unique most parsimonious tree obtained (fig. 215) shows again a clear distinction between western and eastern localities. Within the eastern localities, those in the 'Guianan region' (SR, AP, MN) do form a unity, which is most closely related to 'eastern Pará' (EP). Within the western localities, the most northern ones (SC, IQ, BC) also cluster together, followed subsequently by the progressively more southern localities (MP, SP).

Results of the three analyses are consistent with (1) a main distinction between the lizard faunas of eastern and western Amazonia; (2) the recognition of a Guianan subset within the eastern group; (3) the existence of a composite fauna in Rondônia, with different affinities.

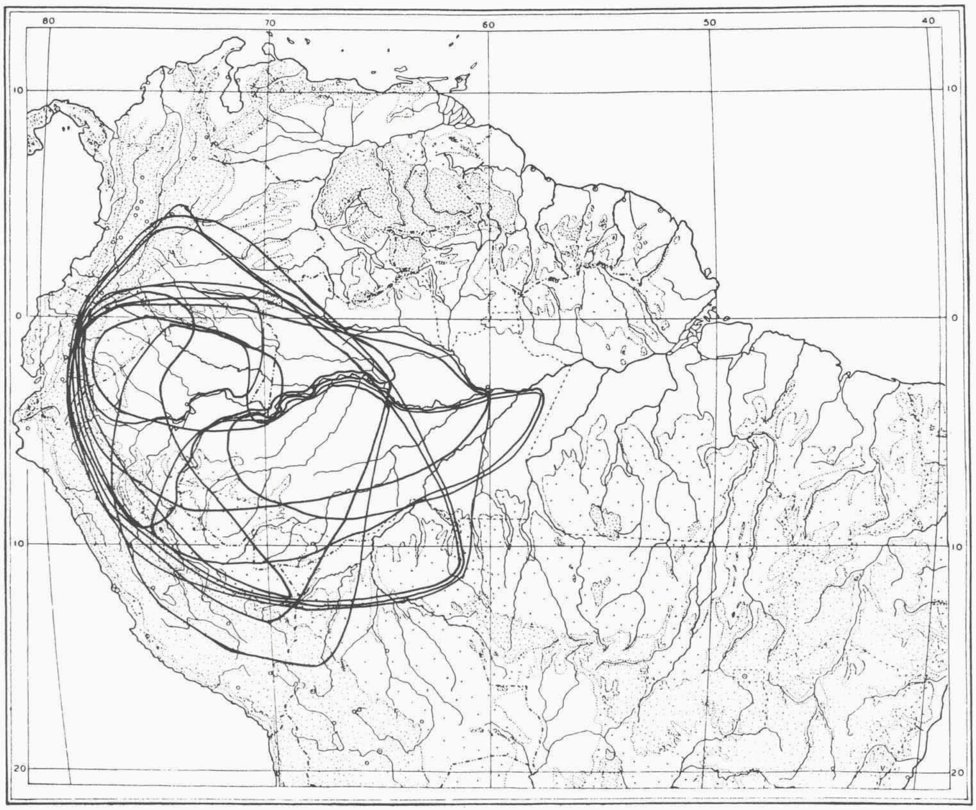


Fig. 211. Brazilian Amazonian lizards with distribution restricted to Western Amazonia.

Comparison with data from other Amazonian organisms

The data concerning lizards indicate that some general distributional patterns within Amazonia do exist. The coincidence of these patterns with those obtained by studying different organisms might reflect common causes. However, one difficulty in comparing patterns of distribution concerns the adequacy of the data set used. Heyer (1988) showed that for frogs the patterns found by Lynch (1979) and Duellman (1982) changed significantly with the addition of distributional data not considered by these authors. In reptiles, Dixon (1979) estimated the number of silvicolous lizards in Amazonia to be 44, about half the number known at present. Several species of frogs and reptiles stated to be restricted to the Guianas (Hoogmoed, 1979) were later shown to have a wider distribution. Moreover, there are relatively few zoogeographical studies which focus on Amazonia as a whole, and these are usually based on slightly different approaches, which can make the resulting patterns not completely comparable.

The distributional patterns of Amazonian lizards enable the distinction of an eastern and a western fauna. A similar situation was shown to occur in birds (Haffer, 1987) and in acridids (Orthoptera: Amédégnato & Descamps, 1982). Data given by Prance (1990) also indicate differences between the western and the eastern Amazo-

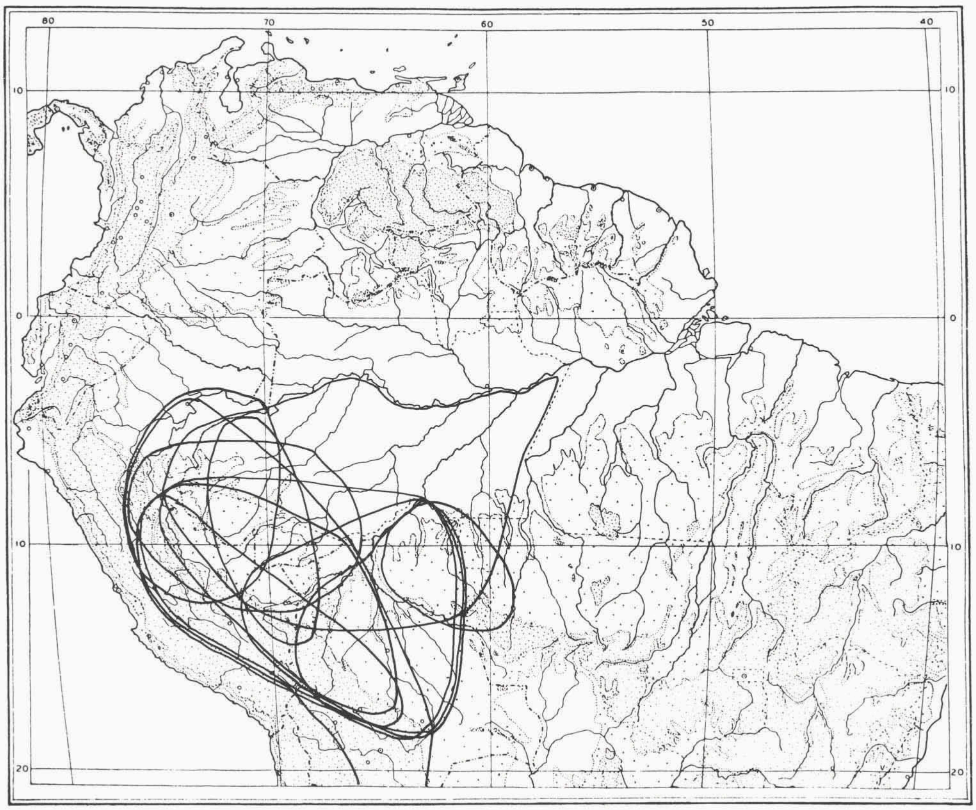


Fig. 212. Brazilian Amazonian lizards with distribution restricted to Southwestern Amazonia.

nian floristic composition (especially in relation to trees), but his data do not permit to evaluate whether this is a primary division for Amazonian plants in general. An apparent difference between the distribution of plants and that of lizards is that there is a larger number of plant species from Manaus in common with western and northwestern Amazonia, than is shared with the Guianas. The lizard fauna of Manaus is very similar to that of the Guianas.

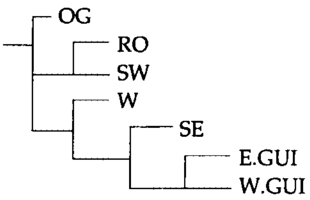
The distinction between a western and a southwestern area, as seen in lizards, is also reported by Haffer (1987) and Prance (1987b), who recognise respectively the Napo and Inambari, and the Napo and east Peru-Acre centres of endemism. Amédégnato & Descamps's (1982) Ucayali centre includes the area immediately south of the Amazon in western Amazonia. However, the authors also observed the presence of several distinct species in the occidental part of this centre, which correlates with the area here named southwest.

In eastern Amazonia there is more variation, among different studies, in the amount of recognised centres of endemism and their limits. In part such variation is a consequence of areas not or poorly represented in some of the studies (including data on lizards). However, this might as well reflect, at least in part, historical factors. When data on lizards alone are analysed, it is observed that species that occur in

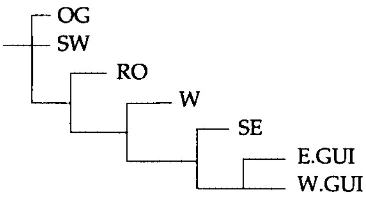
Fig. 213. Most parsimonious trees resulting from comparison between areas (OG = outgroup; RO = Rondônia; SW = Southwestern Amazonia; W = Western Amazonia; SE = Southeastern Amazonia; E.GUI = Eastern Guianas; W.GUI = Western Guianas).

A. Including Rondônia as a distinct area (three most parsimonious trees, length = 78, consistency index = 61, retention index = 55):

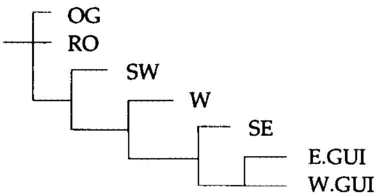
tree 1



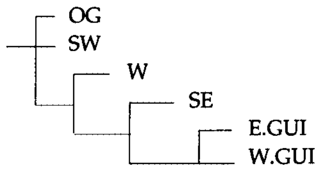
tree 2



tree 3



B. Rondônia not included (one most parsimonious tree, length = 62, consistency index = 77, retention index = 72):



western and southwestern Amazonia each form one cluster, while species from northern Amazonia can be divided into several subgroups. If the scanty distribution data on the species restricted to southeastern Amazonia are also considered, a similar situation of non-congruent distributions appears (*Anolis phyllorhinus* and *Gonatodes tapajonicus* could be considered part of the Madeira centre of Amédégnato & Descamps (1982) and the Rondônia centre of Haffer (1987), and *Stenocercus dumerilii* as part of the Belém centre of Haffer (1987), but even if this is so, these centres would be characterised by distinctly fewer species than the western centres). This may indicate that isolation of areas within northern and southeastern Amazonia was less effective (temporally, spatially, or both) than that which was responsible for the development of the western and southwestern faunas.

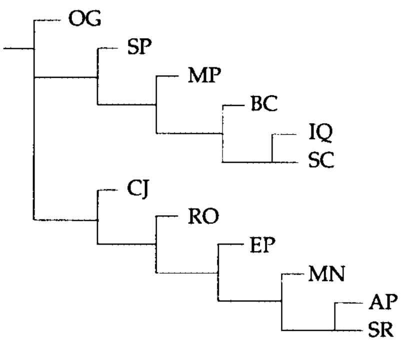
Even though not internally homogeneous and characterised by less species than the western areas, a Guianan fauna is usually recognised (Müller, 1973; Descamps et al., 1978; Hoogmoed, 1979; Amédégnato & Descamps, 1982; Prance, 1987b, 1990; Haffer, 1987). Among lizards, besides those already referred to as Guianan, some species with an eastern Amazonia distribution could be interpreted as Guianan

Fig. 214. Amazonian localities selected for comparison through the Parsimony Analysis of Endemicity (an explanation about each area is given in 'Methodology').

forms which later expanded southeastward. In a study on primates, Ayres & Clutton-Brock (1992) demonstrated that the similarity of faunas on different banks along the Amazon decreased with increasing distance from its headwaters up to a certain point, but closer to the mouth of the Amazon it increased again. Such an increase in similarity was associated with a decrease in water speed and the presence of numerous islands, facilitating dispersal between banks, as well as to historical instability of its course. These factors might also have favoured the dispersal of lizards. An alternative explanation would be to consider the eastern Amazonian species common to both sides of the Amazon as remanescent from the time when the Amazon ran westward, before the uplift of the Andes. However, if these species were isolated since the Amazon opened its way toward the Atlantic, one would expect to find some degree of differentiation between the populations at each side of the river, which is apparently not the case.

Although limited, these data show that the main characteristics observed in the distribution of lizards find parallels in the distribution of other organisms. They probably reflect historical factors which caused isolation of faunas presently in contact in Amazonia, as well as, in some cases, dispersal of species from their original

Fig. 215. Most parsimonious tree resulting from comparison between selected localities (see text for explanation and fig. 214 for localities). Length of tree = 108, consistency index = 57, retention index = 65.



ranges into new areas. Which were these historical factors is still very controversial; this will be discussed below.

The Historical biogeography of Amazonia

Several attempts have been made to explain the biogeographic patterns in Amazonia. The "refuge model" gained much support (e.g., several papers in Prance, 1982, and Whitmore & Prance, 1987) after its initial proposition (Haffer, 1969; Vanzolini & Williams, 1970). However, critical notes to this model and alternative hypotheses have since appeared in the literature (e.g., Campbell & Frailey, 1984; Beven et al., 1984; Salo, 1987; Cracraft & Prum, 1988; Lynch, 1990; Campbell, 1991; Ayres & Clutton-Brock, 1992). Originally, the refuge model postulated that during the Quaternary, due to climatic fluctuations that characterize this period, the Amazonian forest was repeatedly subdivided into smaller areas (refuges) separated by open, non- forest vegetation. The forest fauna and flora became isolated during the periods of forest contraction because of the patchiness of the area, resulting in speciation events.

In the more recent literature (e.g., Prance, 1987a; Haffer, 1990a) forest refuges were postulated to have been separated by a complex of vegetation types, including drier and more open forest types. In some of his most recent papers, Haffer (1990b, 1992) amplified the concept of the refuge theory into a model of speciation due to climatic-ecologic fluctuations during the Tertiary and Quaternary (in contrast to speciation due to tectonic-paleogeographic changes). Such changes in the model have implications. A barrier formed by a dry, open forest will probably be less effective than one formed by non-forest vegetation. Although climatic-vegetational fluctuations may also have occurred during the Tertiary, the conclusions based on the refuge model as originally stated cannot be automatically expanded to previous times. The postulated refuge areas were delimited mainly according to climatic conditions supposed to exist during the Quaternary (e.g. Haffer, 1969; Brown, 1982, 1987). They probably would not be the same for most of the Tertiary, when there were important orogenic changes. Therefore, the statement by Haffer (1992: 23) that "the refuge theory refers to a postulated origin of species in ecological refuges independent of the period" (my translation from the Portuguese original) is not correct.

It is well established that there have been climatic fluctuations during the Quaternary, and that such fluctuations caused changes in the vegetation, at least in the Amazonian periphery (Van der Hammen, 1974, 1986; Absy & Van der Hammen, 1976; Absy et al, 1991). Whether there was only a shrinkage of the forest (and to which extent), or a subdivision into smaller forested areas, is not yet possible to say. The geomorphological data are still subject to quite distinct interpretations by different authors. The existence of two groups of lizards in the Amazonian enclaves of open formations (one occurring in the southern enclaves and in the open formations south of Amazonia, the other from northern Amazonia and the banks of the Amazon) does not support the hypothesis of a (relatively recent) spread of savannas throughout the region. Probably the present southern enclaves have been connected to the main South American area of open vegetation. In northern Amazonia, the history of open vegetation forms (and possibly of the open vegetation enclaves) is more complex, since it includes two species complexes. Only *Tropidurus hispidus* occurs north and south of the Amazon, but judging from its present distribution, the previous connection between the two groups might have been along the Atlantic coast. Based on pollen studies, Van der Hammen (1986) concluded that "the available data all point to the erstwhile dominance of real savanna vegetation in the present coastal area of Guyana and Suriname during glacial time" (when sea level was lower than at present). As already suggested by Novaes & Lima (1992), the same might have happened along the coast of Para, which may have permitted the spreading of *Tropidurus hispidus* northward (supposedly at this time it would have been easier as well to cross the Amazon, due to low water levels).

Alternative views to the refuge model are those of Frailey et al. (1988) and Campbell (1990,1991) on a "Lake Amazonas" (with different points of view by each author on the causes that led to the lake formation), and the studies by Rasanen (1991, and papers therein) on the dynamics of fluvial depositional systems. The latter studies, however, may explain in part the maintenance of a high biodiversity, due to the heterogeneity of the environment, but do not offer an explanation for its origin.

As already mentioned above, besides the idea of climatic-vegetational changes causing speciation, the refuge model also postulated speciation events (at least in part) to be Quaternary (usually Pleistocene, sometimes Holocene — e.g., Vanzolini, 1970b; Vanzolini & Williams, 1970) in age. One of the consequences of this view was the increase of studies on the Quaternary of South America, ent heterogeneity in the area, data on pollen by Absy & Hammen (1976) demonstrated that areas presently covered with forest have been previously covered by savanna. Moreover, Costa et al. (1993) showed that a seismogenic zone is present in Rondônia, which approximately coincides with paleosutures between two crustal blocks. These data denote that the area has been directly under the influence of tectonic events in the past, related to the release of intraplate tension. Although these data are not sufficient to clarify the history of the local fauna, they show that a complex history is involved.

This paper does not aim at completely covering the recent literature which deals with evolutionary models in Amazonia, basic data related to paleoenvironments and present distributional patterns. Recent data on mammal fossils (Rancy, 1993a,b) as well as studies on sediments (Kronberg et al., 1991; Kronberg & Benchimol, 1993a,b), both from Acre, also added interesting information and questions, as did several other papers presented during the International Symposium on the Quaternary of Amazonia (Franzinelli & Latrubesse, 1993). Much more studies, however, are still necessary, both in geosciences and biosciences, before we can better understand the evolution of the present Amazonian biota.

Conclusions

It is not yet possible to reconstruct the evolutionary history of the Amazonian lizards, or even to decide which model would best fit the present data. All sets of data, both related to the knowledge of the present lizard fauna and to historical factors, show many gaps and are frequently subject to conflicting interpretations. However, some points may help to guide future discussions.

(1) There are a well defined western and a southwestern fauna, which differ in species composition from the fauna of eastern Amazonia. This is not only seen in lizards but also in several other organisms. These data point to a major historical division in Amazonia between east and west. It also suggests that (part of) the southwestern fauna had an origin separate from that of the western fauna.

(2) Patterns in eastern Amazonia are not so clear. Probably isolation within this area was less effective (temporally, spatially, or both). Even though, localities north of the Amazon, based on lizard fauna, are more similar to each other than they are to localities south of it, indicating some degree of (past or present) isolation. The recognition by several authors of a Guianan fauna, or a Guiana centre corroborates such an idea.

(3) Rondônia is an area of complex interaction of faunas, which is possibly related to a complex geological and environmental history.

(4) The existence of two groups of lizard species of open formations in Amazonia, one occurring in the southern enclaves and in the open formations south of Amazonia, the other from northern Amazonia and the banks of the Amazon, do not corroborate the hypothesis that savannas spread throughout the Amazonian region in recent times. It supports the idea that the present southern enclaves have been connected to the main South American area of open formations.

(5) *Tropidurus hispidus* is postulated to have dispersed north of the Amazon through coastal savannas which formed during low sea level, in glacial times.

Much is still needed for a better understanding of Amazonian history and the causes of its high biodiversity. Within the biological sciences, I think three sets of information should be especially looked for, in order to increase our knowledge in this subject:

- Faunal surveys, in order to firmly delimit geographic ranges of taxa; such surveys should also gather ecological data, especially on habitat, which may influence the distribution of the animal.
- Phylogenetic studies, which could provide a clearer understanding of area relationships, and would permit to test the correlation between distribution patterns obtained from different animal groups more accurately.
- Studies on the age of present taxa (e.g., using serological and DNA techniques), in order to estimate a time span which can be correlated with possible causes of the cladogenetic events under study.

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Appendices

Appendix 1. Data matrix used in comparison between areas (species with widespread distribution or occurring in only one area not included):

Areas:

OG = outgroup; E.GUI = Eastern Guianas; W.GUI = Western Guianas; SE = Southeastern Amazonia; W = Western Amazonia; RO = Rondônia state (Brazil); SW = Southwestern Amazonia.

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       0                 1                   4                   3                   4
       1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8

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W.GUI  1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 0 1 0 1 0 1 0
SE     1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 0
W      1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 0 0 0 0 1 0 0 0 1 1 1 1 1 1 1 1 0 0 1 0 1
RO     1 1 1 0 0 ? 1 1 1 ? 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 ? 0 1 1 1 1 0 1 1 1 1 0 0 0 1 0 0 0 1 0 0 0 1
SW     0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 0 0 0 1 1 0 1 ? 0 1 1 0 0 0 0 1
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Species (according to numbers in the data matrix above):

1.*Arthrosaura reticulata*; 2.*Uranoscodon superciliosus*; 3.*Coleodactylus amazonicus*; 4.*Bachia flavescens*; 5.*Leposoma percarinatum*; 6.*Polychrus marmoratus*; 7.*Iphisa elegans elegans*; 8.*Neusticurus bicarinatus*; 9.*Kentropyx calcarata*; 10.*Cercosaura ocellata ocellata*; 11.*Uracentron azureum azureum*; 12.*Arthrosaura kockii*; 13.*Leposoma guianense*; 14.*Tretioscincus agilis*; 15.*Anolis auratus*; 16.*Gymnophthalmus underwoodi* species complex; 17.*Kentropyx striata*; 18.*Plica umbra umbra*; 19.*Gonatodes annularis*; 20.*Neusticurus rudis*; 21.*Tretioscincus oriximinensis*; 22.*Enyalioides laticeps*; 23.*Anolis transversalis*; 24.*Uracentron flaviceps*; 25.*Alopoglossus buckleyi*; 26.*Cercosaura ocellata bassleri*; 27.*Kentropyx pelviceps*; 28.*Polychrus liogaster*; 29.*Gonatodes hasemani*; 30.*Pantodactylus schreibersii parkeri*; 31.*Prionodactylus eigenmanni*; 32.*Mabuya nigropalmata*; 33.*Hoplocercus spinosus*; 34.*Tropidurus oreadicus*; 35.*Micrablepharus maximiliani*; 36.*Plica umbra ochrocollaris*; 37.*Pseudogonatodes guianensis*; 38.*Crocodilurus lacertinus*; 39.*Dracaena guianensis*; 40.*Mabuya bistriata*; 41.*Anolis trachyderma*; 42.*Neusticurus ecpleopus*; 43.*Kentropyx altamazonica*; 44.*Enyalius leechii*; 45.*Tropidurus hispidus*; 46.*Lepidoblepharis heyerorum*; 47.*Cnemidophorus lemniscatus* species complex; 48.*Ptychoglossus brevifrontalis*.

Appendix 2. Data matrix used in comparison between selected localities (species with widespread distribution or occurring in only one area not included):

Areas:
OG = outgroup; AP = Amapá; SR = Suriname; MN = Manaus; EP = eastern Pará; RO = Rondônia; CJ = Carajás; IQ = Iquitos; SC = Santa Cecília; BC = Benjamin Constant; MP = meso-Peru; SP = southern Peru.

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     0                   1                   2                   3                   4                   5                   6
     1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2

OG   0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
AP   1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 0 0 0 0 0 0 0 0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
SR   1 1 1 1 1 0 1 1 1 1 0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 1 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
MN   1 1 1 1 1 0 1 1 1 1 0 1 1 1 1 1 0 1 1 1 0 1 0 0 0 0 1 1 1 0 0 0 0 0 1 1 0 0 0 0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EP   1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 1 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1
RO   1 1 1 1 1 0 1 1 1 1 1 0 0 1 0 0 1 ? 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 10 ? 0 1 1 0 0 0 1 1 1 0 0 0 0 0 0 0 1 1 0
CJ   0 1 1 0 1 1 1 0 0 1 1 0 0 0 0 0 1 1 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1
IQ   1 1 1 1 1 1 1 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 1 1 1 11 1 0 1 1 1 1 1 0 0 0 0 1 1 1 1 1 0 0 0 0
SC   1 0 0 1 1 1 1 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 1 1 1 11 0 1 1 1 1 1 1 0 0 0 0 0 0 1 1 1 1 0 0 0
BC   1 ? 1 1 1 1 1 1 1 1 0 0 0 0 0 ? 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 1 1 0 11 1 0 1 1 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0
MP   1 1 1 1 1 1 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 1 0 0 11 1 0 0 1 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0
SP   1 0 1 1 1 0 1 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 1 1 0 1 11 1 1 0 0 0 0 0 1 1 1 1 1 0 0 0 1 1 0 0 0
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Species (according to numbers above data matrix):
1.*Tupinambis teguixin*; 2.*Iguana iguana*; 3.*Plica plica*; 4.*Alopoglossus angulatus*; 5.*Anolis punctatus*; 6.*Polychrus marmoratus*; 7.*Plica umbra ochrocollaris*; 8.*Iphisa elegans elegans*; 9.*Arthrosaura reticulata*; 10.*Uranoscodon superciliosus*; 11.*Coleodactylus amazonicus*; 12.*Lepidoblepharis heyerorum*; 13.*Bachia flavescens*; 14.*Leposoma percarinatum*; 15.*Dracaena guianensis*; 16.*Crocodilurus lacertinus*; 17.*Neusticurus bicarinatus*; 18.*Cercosaura ocellata ocellata*; 19.*Kentropyx calcarata*; 20.*Tretioscincus agilis*; 21.*Leposoma guianense*; 22.*Arthrosaura kockii*; 23.*Uracentron azureum azureum*; 24.*Anolis auratus*; 25.*Kentropyx striata*; 26.*Tropidurus hispidus*; 27.*Cnemidophorus lemniscatus* species complex; 28.*Pseudogonatodes guianensis*; 29.*Gonatodes annularis*; 30.*Plica umbra umbra*; 31.*Neusticurus rudis*; 32.*Anolis nitens chrysolepis*; 33.*Hemidactylus palaichthus*; 34.*Coleodactylus septentrionalis*; 35.*Gymnophthalmus underwoodi* species complex; 36.*Anolis nitens nitens*; 37.*Kentropyx altamazonica*; 38.*Neusticurus ecpleopus*; 39.*Anolis trachyderma*; 40.*Ptychoglossus brevifrontalis*; 41.*Uracentron flaviceps*; 42.*Kentropyx pelviceps*; 43.*Cercosaura ocellata bassleri*; 44.*Alopoglossus buckleyi*; 45.*Anolis transversalis*; 46.*Enyalioides laticeps*; 47.*Alopoglossus atriventris*; 48.*Leposoma parietale*; 49.*Anolis nitens scypheus*; 50.*Prionodactylus eigenmanni*; 51.*Gonatodes hasemani*; 52.*Polychrus liogaster*; 53.*Iphisa elegans soini*; 54.*Stenocercus roseiventris*; 55.*Stenocercus fimbriatus*; 56.*Enyalioides cofanorum*; 57.*Gonatodes concinnatus*; 58.*Bachia trisanale*; 59.*Prionodactylus manicatus*; 60.*Enyalius leechii*; 61.*Tropidurus oreadicus*; 62.*Colobosaura modesta*.

Taxonomic Index

The index includes all names of genera and species referred to in the study. Page numbers in italics refer to maps, in bold to other figures; italic and bold indicate the main entry of the taxon; page numbers followed by an asterisk refer to tables.

Fig. 216. *Enyalioides laticeps* (Guichenot), ♂, KU 183500, Limoncocha, Napo, Ecuador (W.E. Duellman).

Fig. 217. *Enyalioides palpebralis* (Boulenger), ♂, NMW 32459, Panguana, Huanuco, Peru (M.J. Henzl).

Fig. 218. *Hoplocercus spinosus* Fitzinger, Sto. Antônio do Leverger, Rio Cuiabá, MT, Brazil (I. Sazima).

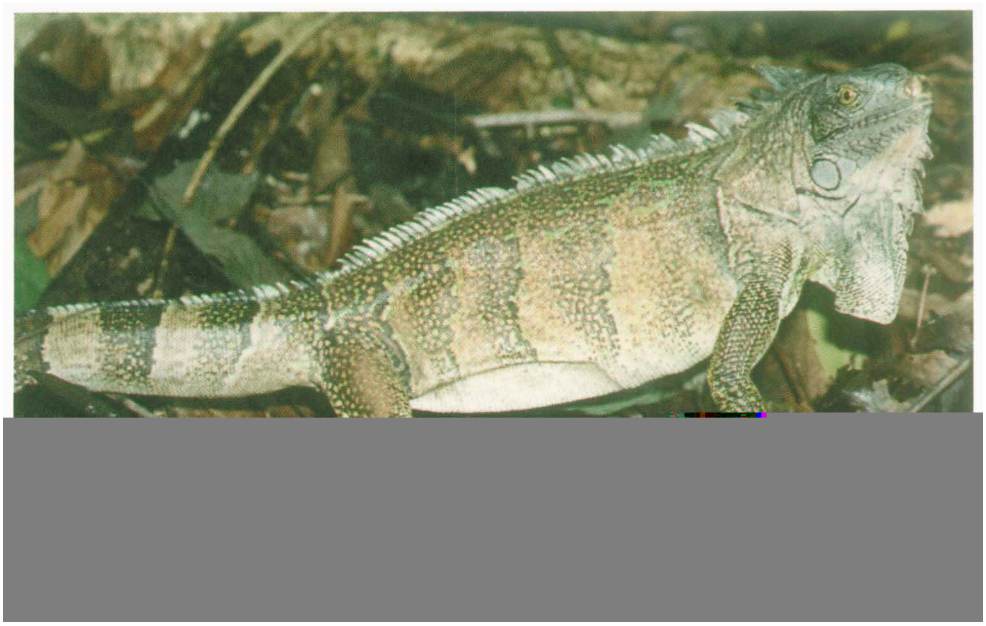

Fig. 219. *Iguana iguana* (Linnaeus), Balbina, AM, Brazil (M.R.C. Martins).

Fig. 220. *Anolis auratus* Daudin, ♀, RMNH 26811, Paramaribo, Suriname (M.S. Hoogmoed).

Fig. 221. *Anolis n. nitens* (Wagler), ♀, RMNH 24656. Reserva Ducke, near Manaus, AM, Brazil (M.S. Hoogmoed).

Fig. 222. *Anolis fuscoauratus* Duméril & Bibron, ♂, MPEG 15866, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 223. *Anolis fuscoauratus* Duméril & Bibron, ♂, dewlap, MPEG 15876, Tabatinga, AM, Brazil (T.C.S. Avila-Pires).

Fig. 224. *Anolis nitens chrysolepis* Duméril & Bibron, ♂, MPEG 15052, Serra do Navio, AP, Brazil (M.S. Hoogmoed).

Fig. 225. *Anolis nitens chrysolepis* Duméril & Bibron, ♀, RMNH 24676, Serra do Navio, AP, Brazil (M.S. Hoogmoed).

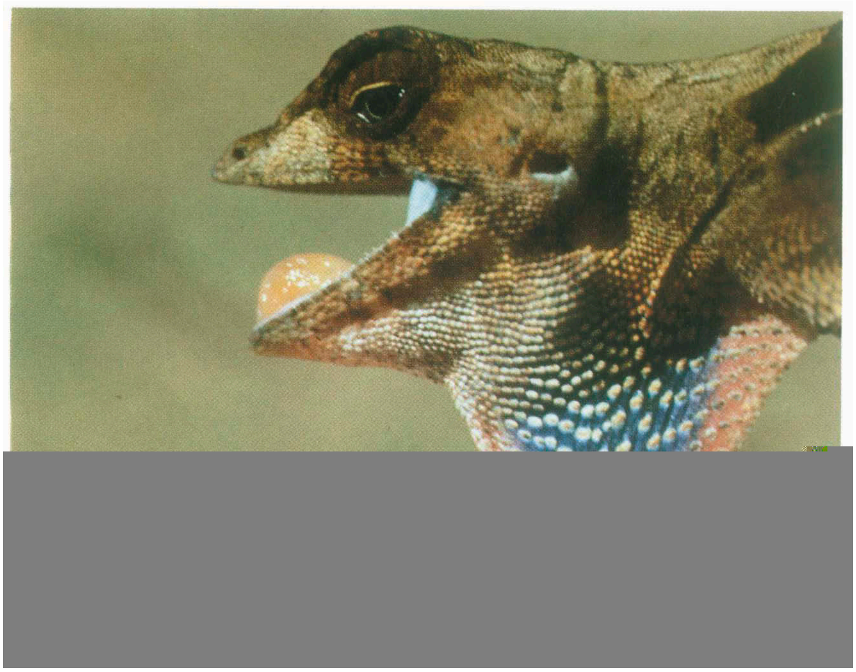

Fig. 226. *Anolis nitens scypheus* Cope, ♀, dewlap, RMNH 24653, Pozo Balsaura, near Montalvo, Ecuador (M.S. Hoogmoed).

Fig. 227. *Anolis nitens scypheus* Cope, ♀, RMNH 24653, Pozo Balsaura, near Montalvo, Ecuador (M.S. Hoogmoed).

Fig. 228. *Anolis nitens tandai* subspec. nov., ♂, RMNH 24666, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

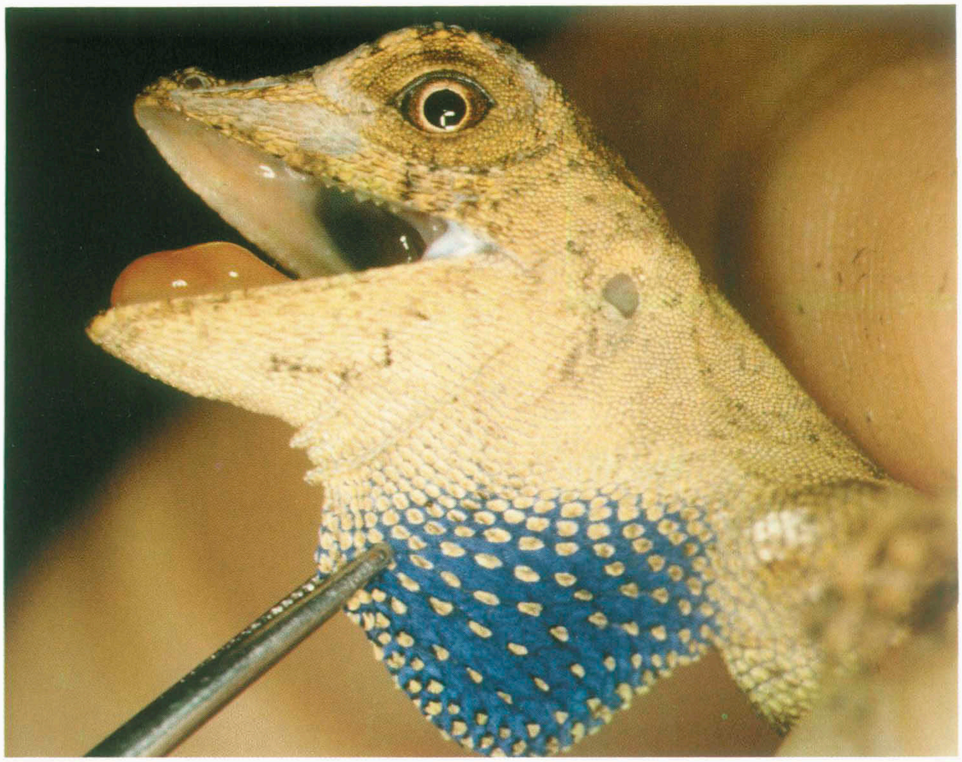

Fig. 229. *Anolis nitens tandai* subspec. nov., ♂, dewlap, RMNH 24666, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 230. *Anolis nitens tandai* subspec. nov., ♀, MPEG 15850, Urucu, AM, Brazil (T.C.S. Avila-Pires).

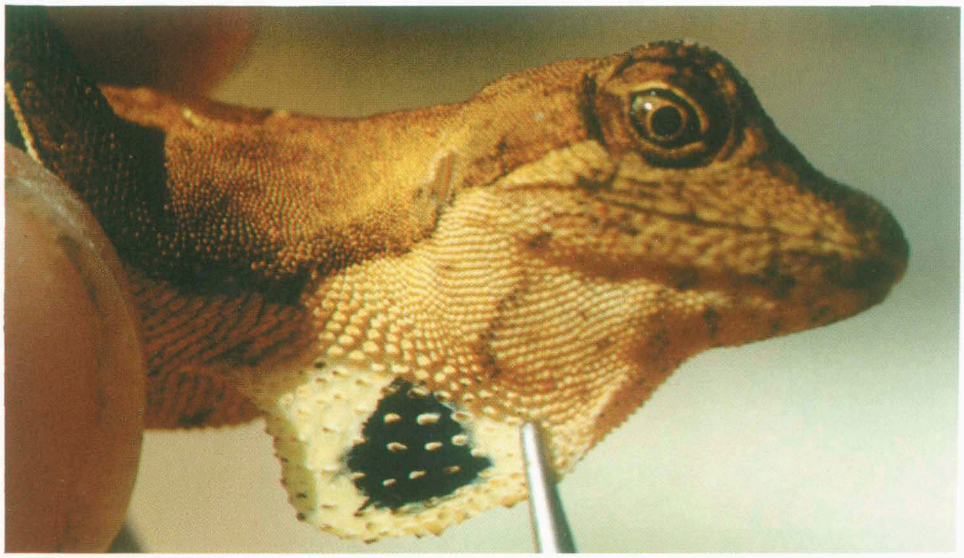

Fig. 231. *Anolis nitens tandai* subspec. nov., ♀, dewlap, MPEG 15850, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 232. *Anolis ortonii* Cope, ♀, MPEG 15117, Cupixi, AP, Brazil (M.S. Hoogmoed).

Fig. 233. *Anolis ortonii* Cope, ♂, MPEG 16471, Caxiuanã, PA, Brazil (M.S. Hoogmoed).

Fig. 234. *Anolis punctatus* Daudin, young ♀, RMNH 26809, Kabalebo, km 80.5, Suriname (M.S. Hoogmoed).

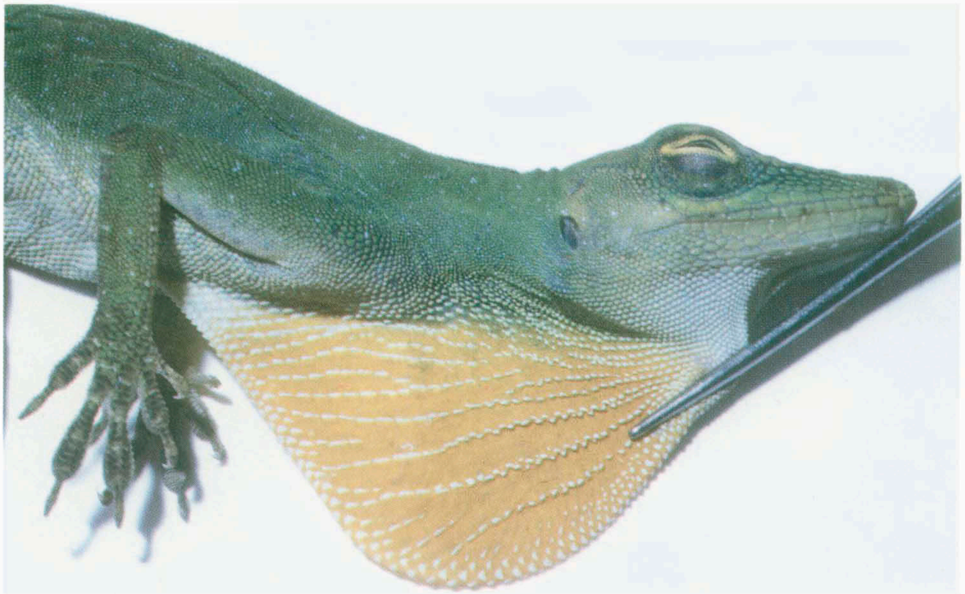

Fig. 235. *Anolis punctatus* Daudin, ♂, dewlap, MPEG 16011, Humaitá, north of Rio Branco, AC, Brazil (M.S. Hoogmoed).

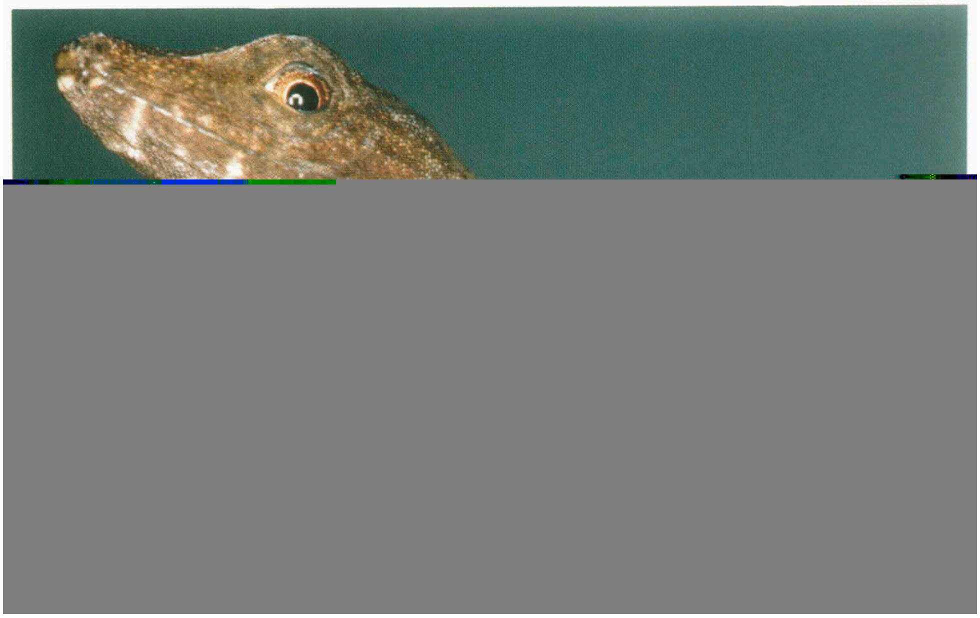

Fig. 236. *Anolis trachyderma* Cope, ♀, MPEG 15974-6/RMNH 25902-4, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 237. *Enyalius leechii* (Boulenger), LJV 1635, Rio Xingu, PA, Brazil (L.J. Vitt).

Fig. 238. *Anolis transversalis* Duméril, ♀, MPEG 15877, Tabatinga, AM, Brazil (M.S. Hoogmoed).

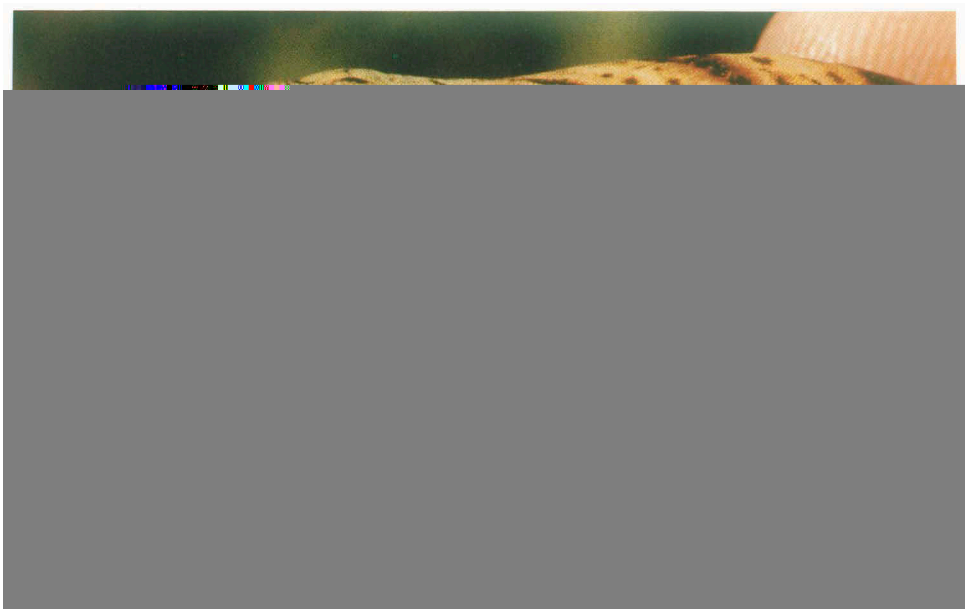

Fig. 239. *Anolis transversalis* Duméril, ♀, dewlap, MPEG 15877, Tabatinga, AM, Brazil (M.S. Hoogmoed).

Fig. 240. *Anolis transversalis* Duméril, ♂, Coari, Rio Urucu, AM, Brazil (M.R.C. Martins).

Fig. 241. *Anolis transversalis* Duméril, ♂, dewlap, Coari, Rio Urucu, AM, Brazil (M.R.C. Martins).

Fig. 242. *Polychrus marmoratus* (Linnaeus), ♀, RMNH 26810, Albina, Suriname (M.S. Hoogmoed).

Fig. 243. *Stenocercus dumerilii* (Steindachner), ♀, MPEG 16401, Patauateua, PA, Brazil (T.C.S. Avila-Pires).

Fig. 244. *Stenocercus fimbriatus* spec. nov., young ♂, MPEG 15915, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 245. *Plica plica* (Linnaeus), RMNH 26283, Caxiuanã, PA, Brazil (T.C.S. Avila-Pires).

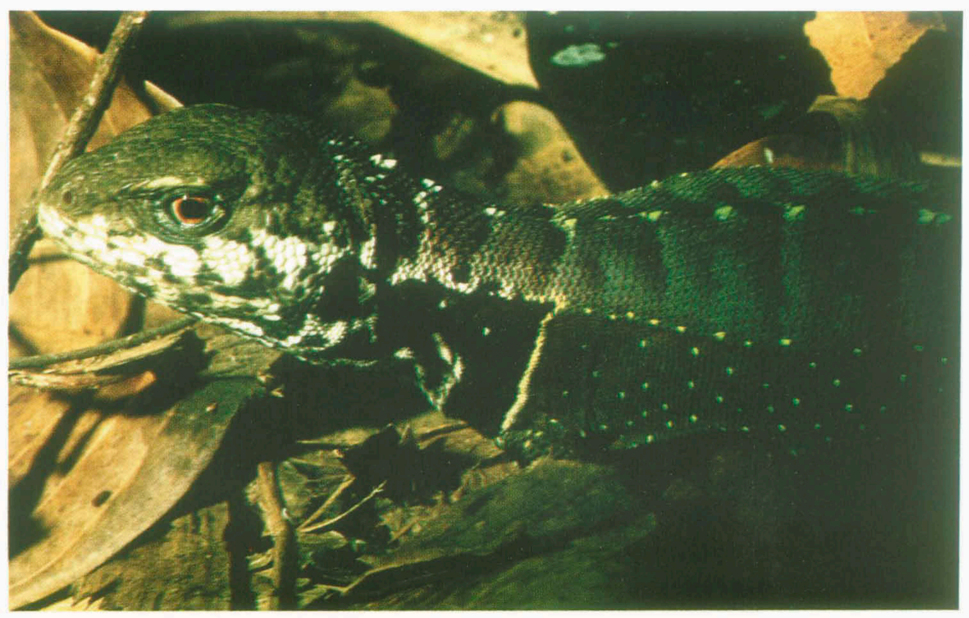

Fig. 246. *Stenocercus roseiventris* Duméril & Bibron, ♂, RMNH 25697, Panguana, Huanuco, Peru (M.S. Hoogmoed).

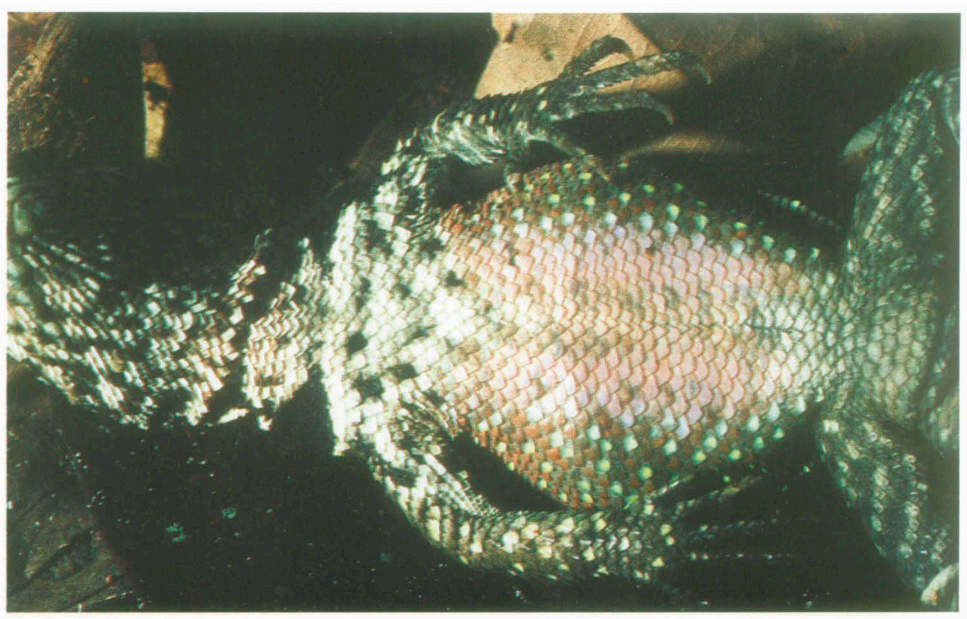

Fig. 247. *Stenocercus roseiventris* Duméril & Bibron, ♂, belly, RMNH 25697, Panguana, Huanuco, Peru (M.S. Hoogmoed).

Fig. 248. *Plica umbra umbra* (Linnaeus), ♂, RMNH 26239, Tafelberg, Suriname (M.S. Hoogmoed).

Fig. 249. *Tropidurus hispidus* (Spix), Puerto Ordaz, Bolivar, Venezuela (M.S. Hoogmoed).

Fig. 250. *Plica umbra ochrocollaris* (Spix), ♀, MPEG 15937, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 251. *Uracentron azureum guentheri* Boulenger, Coari, Rio Urucu, AM, Brazil (M.R.C. Martins).

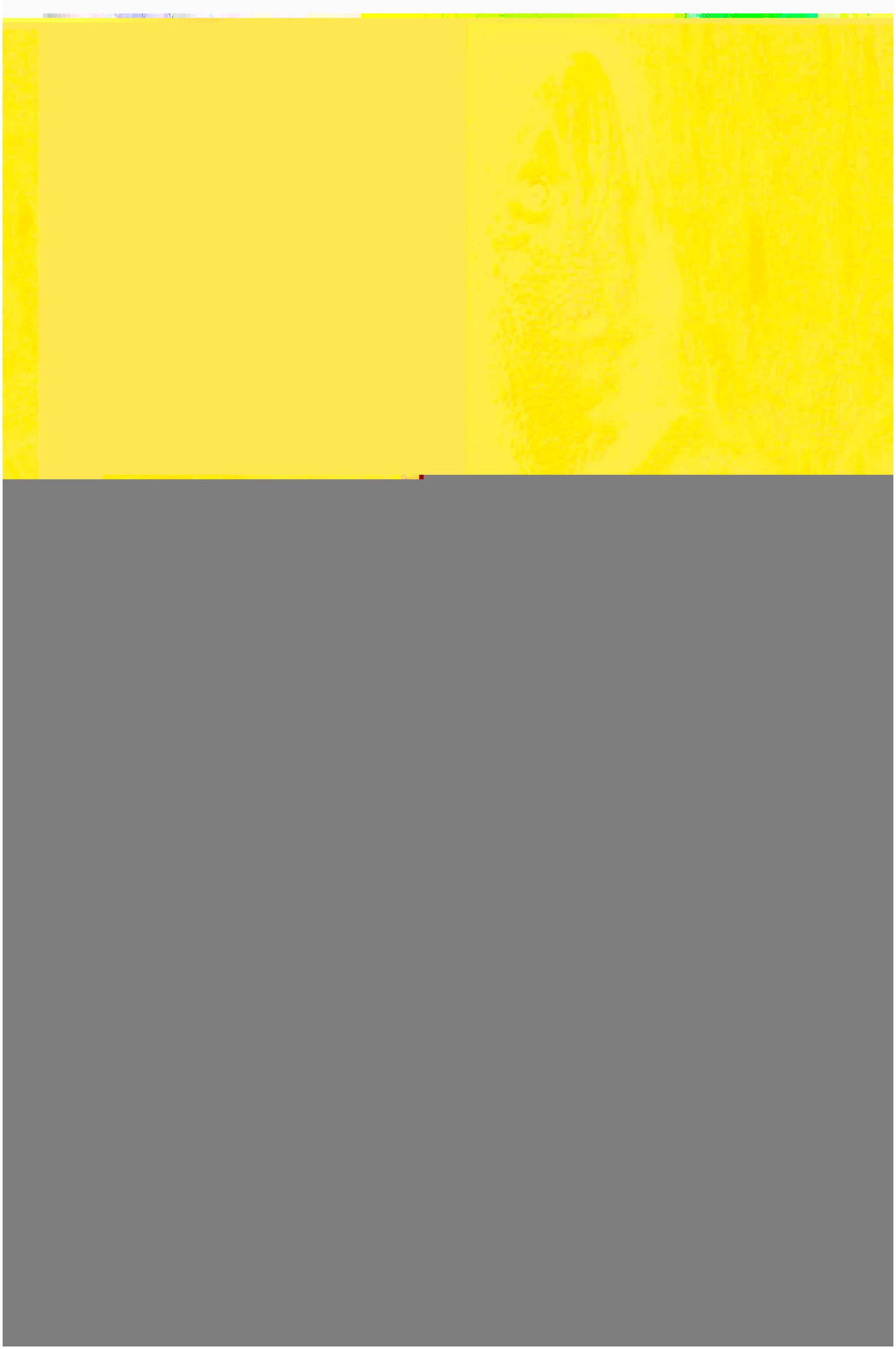

Fig. 254. *Uracentron azureum werneri* Mertens, juvenile, Rio Mavaca, Mrakapiwei, Venezuela (H. Mägdefrau).

Fig. 255. *Uracentron flaviceps* (Guichenot), ♀, MPEG 15988, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 256. *Uranoscodon superciliosus* (Linnaeus), ♂, RMNH 26273, Cruz Alta, Mun. Oriximiná, PA, Brazil (T.C.S. Avila-Pires)

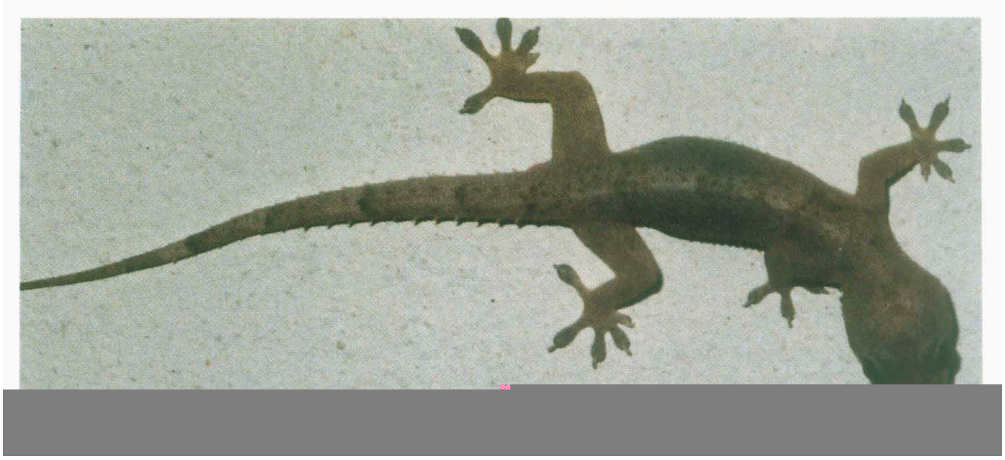

Fig. 258. *Hemidactylus mabouia* (Moreaeu de Jonnès), Paramaribo, Suriname (H. Huijbregts).

Fig. 259. *Hemidactylus palaichthus* Kluge, ♀, RMNH 22079, Puerto Ayacucho, Venezuela (M.S. Hoogmoed).

Fig. 260. *Thecadactylus rapicauda* (Houttuyn), ♀, RMNH 26476, Porto Velho, RO, Brazil (M.S. Hoogmoed).

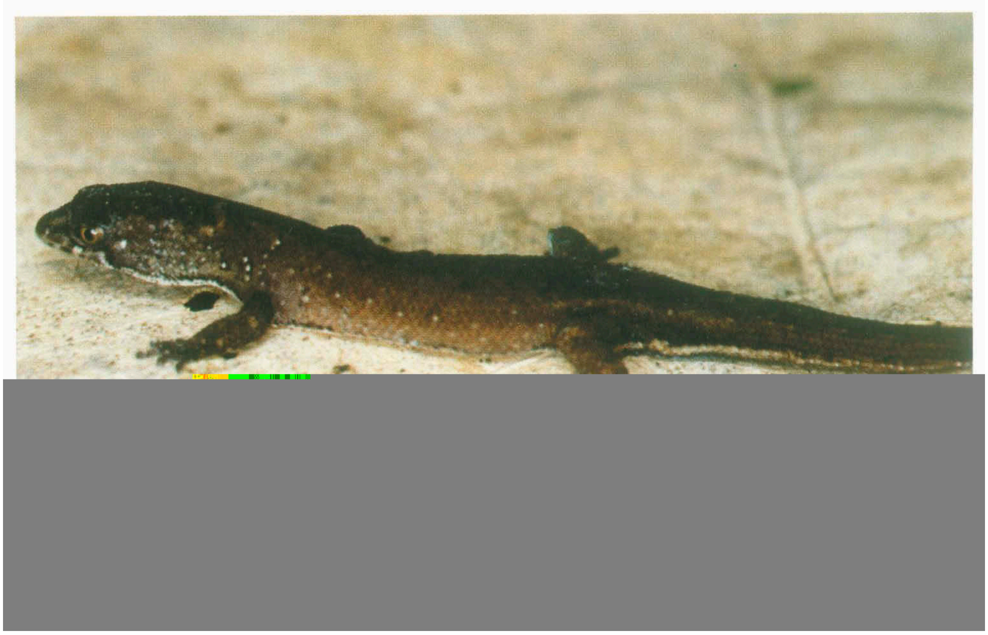

Fig. 261. *Coleodactylus amazonicus* (Andersson), ♂, RMNH 25164, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 262. *Coleodactylus septentrionalis* Vanzolini, Ilha de Maracá, RR, Brazil (M. O'Shea).

Fig. 263. *Gonatodes annularis* Boulenger, ♂, MPEG 15396, Cruz Alta, Mun. Oriximiná, PA, Brazil (T.C.S. Avila-Pires).

Fig. 264. *Gonatodes annularis* Boulenger, ♀, RMNH 26393, Cruz Alta, Mun. Oriximiná, PA, Brazil (T.C.S. Avila-Pires).

Fig. 265. *Gonatodes hasemani* Griffin, ♂, MPEG 15857, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 266. *Gonatodes tapajonicus* Rodrigues, ♂, Urma, PA, Brazil (M.T. Rodrigues).

Fig. 267. *Gonatodes humeralis* (Guichenot), ♂, RMNH 26418-21, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 268. *Gonatodes humeralis* (Guichenot), ♂, MPEG 15913, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 269. *Lepidoblepharis heyerorum* Vanzolini, ♂, MPEG 15856, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 270. *Lepidoblepharis heyerorum* Vanzolini, ♂, RMNH 26468, Serra do Navio, AP, Brazil (T.C.S. Avila-Pires).

Fig. 271. *Lepidoblepharis hoogmoedi* spec. nov., ♂, holotype, MPEG 15984, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

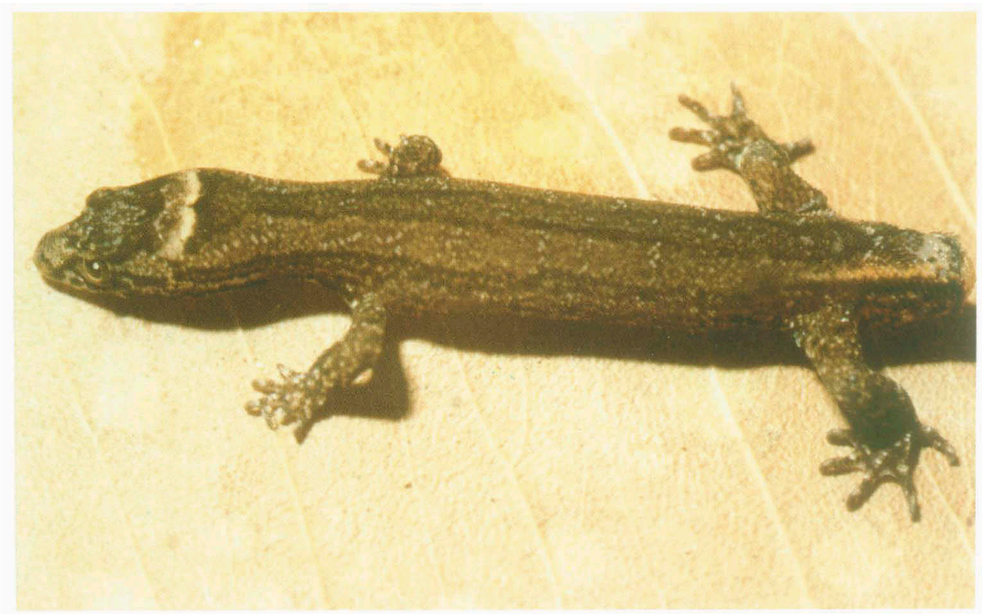

Fig. 272. *Pseudogonatodes guianensis* Parker, ♂, RMNH 25878, Rio Nhamundá, PA, Brazil (M.S. Hoogmoed).

Fig. 273. *Alopoglossus angulatus* (Linnaeus), ♂, RMNH 25324, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 274. *Alopoglossus atriventris* Duellman, ♂, RMNH 25323, Urucu, AM, Brazil (T.C.S. Avila-Pires).

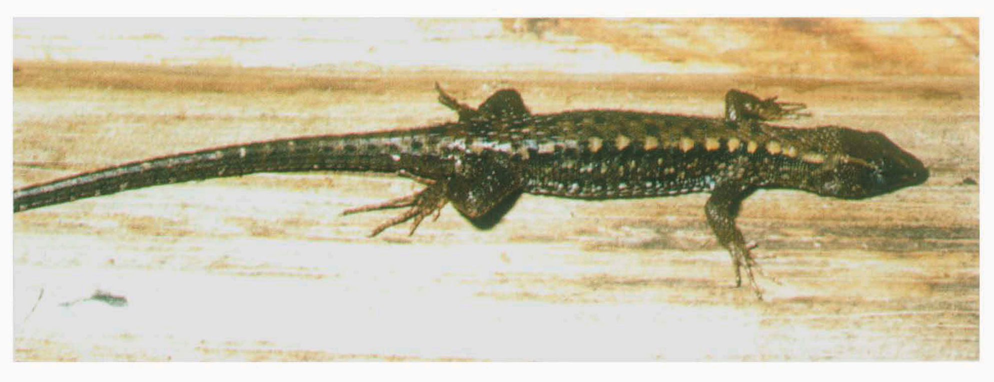

Fig. 275. *Alopoglossus buckleyi* (O'Shaughnessy), RWM 11236, Vic. Huampami, Rio Cenepa, Amazonas, Peru (R.W. McDiarmid).

Fig. 276. *Bachia flavescens* (Bonnaterre), ♂, MPEG 16511, Caxiuanã, PA, Brazil (T.C.S. Avila-Pires).

Fig. 277. *Arthrosaura kockii* (Van Lidth de Jeude), RMNH 25278, Petit Saut, Sinnamary River, French Guiana (T.C.S. Avila-Pires).

Fig. 278. *Arthrosaura reticulata* (O'Shaughnessy), ♂, MPEG 15354, Cruz Alta, Mun. Oriximiná, PA, Brazil (T.C.S. Avila-Pires).

Fig. 279. *Cercosaura ocellata bassleri* Ruibal, ♂, MPEG 15854, Urucu, AM, Brazil (T.C.S. Avila-Pires).

Fig. 280. *Bachia panoplia* Thomas, Manaus, AM, Brazil (M.R.C. Martins).

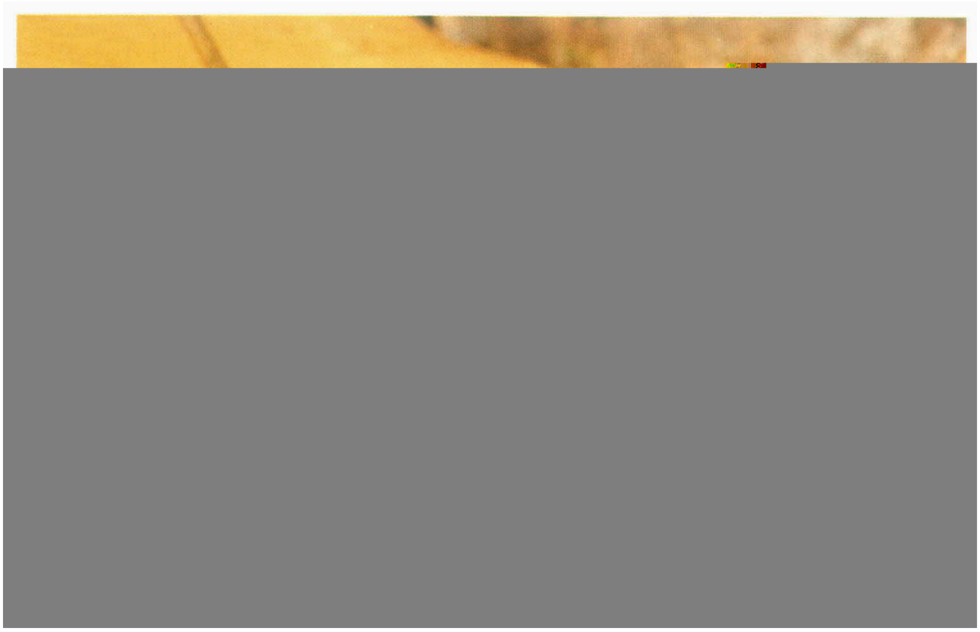

Fig. 281. *Cercosaura ocellata ocellata* Wagler, ♀, MPEG 15115, Cupixi, AP, Brazil (M.S. Hoogmoed).

Fig. 282. *Cercosaura ocellata ocellata* Wagler, ♀, RMNH 26560, Caxiuanã, PA, Brazil (T.C.S. Avila-Pires).

Fig. 283. *Gymnophthalmus underwoodi*?, ♀, Ilha de Maracá, RR, Brazil (M.R.C. Martins).

Fig. 284. *Iphisa e. elegans* Gray, ♂, RMNH 25363, Tabatinga, AM, Brazil (M.S. Hoogmoed).

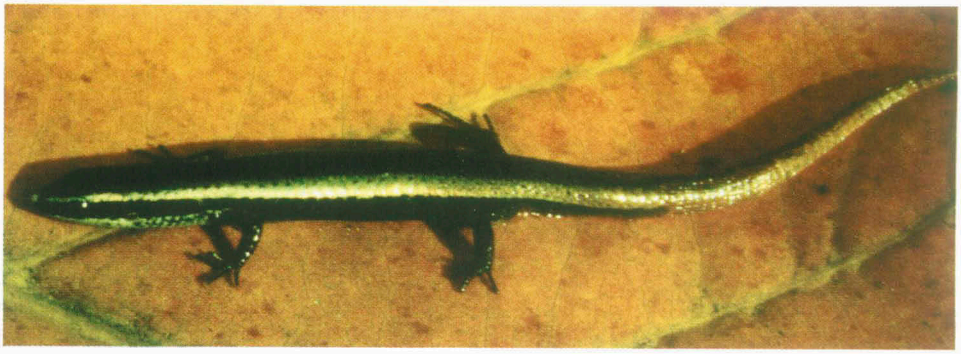

Fig. 285. *Gymnophthalmus leucomystax* Vanzolini & Carvalho, Boa Vista, RR, Brazil (L.J. Vitt).

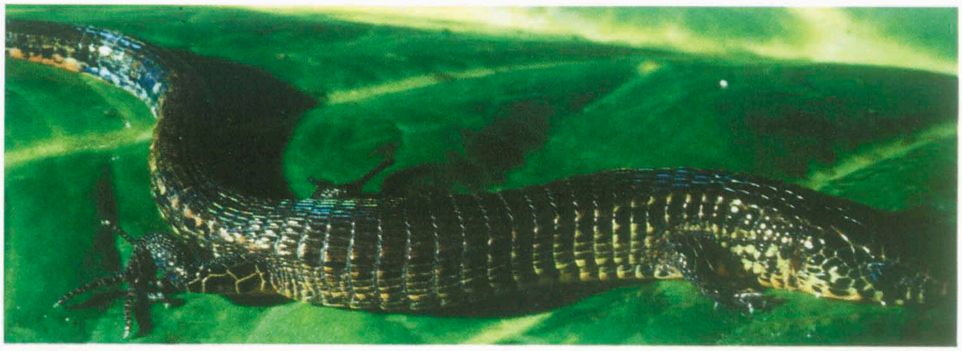

Fig. 286. *Ptychoglossus brevifrontalis* Boulenger, ♀, RMNH 26390, Reventador, Ecuador (M.S. Hoogmoed).

Fig. 287. *Ptychoglossus brevifrontalis* Boulenger, ♀, ventral view, RMNH 26390, Reventador, Ecuador (M.S. Hoogmoed).

Fig. 288. *Leposoma guianense* Ruibal, ♂, MPEG 15088, Serra do Navio, AP, Brazil (T.C.S. Avila-Pires).

Fig. 289. *Leposoma percarinatum* (Müller), Ilha de Maracá, RR, Brazil (M. O'Shea).

Fig. 290. *Leposoma snethlageae* spec. nov., Coari, Rio Urucu, AM, Brazil (M. R.C. Martins).

Fig. 291. *Leposoma parietale* (Cope), ♂, RMNH 26808, Rio Napo, Ecuador (M.S. Hoogmoed).

Fig. 292. *Micrablepharus maximiliani* (Reinhardt & Lütken), MPEG 16757-58, Barão de Tromaí, MA, Brazil (T.C.S. Avila-Pires).

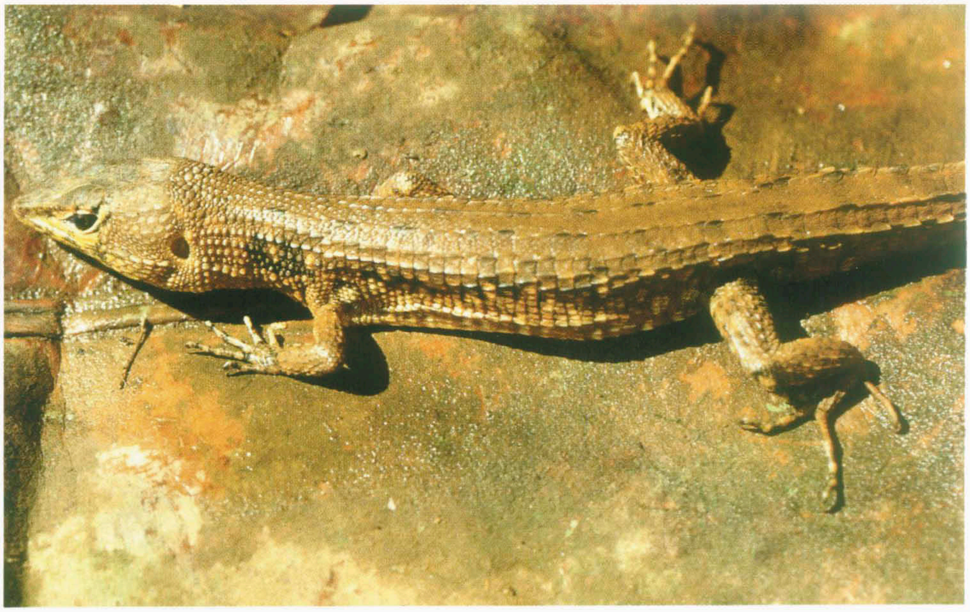

Fig. 293. *Neusticurus bicarinatus* (Linnaeus), ♂, MPEG 15176, Serra do Navio, AP, Brazil (T.C.S. Avila-Pires).

Fig. 294. *Neusticurus ecpleopus* Cope, ♀, RMNH 24611, Tabatinga, AM, Brazil (T.C.S. Avila-Pires).

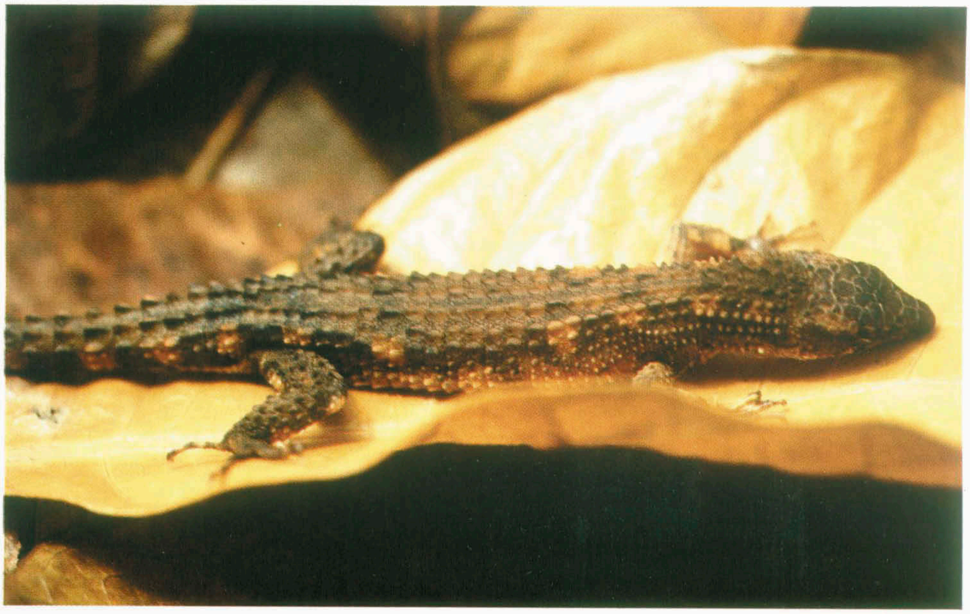

Fig. 295. *Neusticurus rudis* Boulenger, juvenile, MPEG 15049, Serra do Navio, AP, Brazil (T.C.S. Avila-Pires).

Fig. 296. *Prionodactylus eigenmanni* Griffin, ♀, RMNH 26550, Perseverancia, Bolivia (M.S. Hoogmoed).

Fig. 297. *Prionodactylus oshaughnessyi* Boulenger, ♂, RMNH 26565, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 298. *Tretioscincus agilis* (Ruthven), ♂, MPEG 16384, Caxiuanã, PA, Brazil (T.C.S. Avila-Pires).

Fig. 299. *Tretioscincus oriximinensis* spec. nov., AMNH 137205-219, Mavaca Mission, T.F. Amazonas, Venezuela (J. Cole).

Fig. 300. *Ameiva ameiva* (Linnaeus), juvenile, Pitinga, Presidente Figueiredo, AM, Brazil (M.R.C. Martins).

Fig. 301. *Cnemidophorus ?gramivagus* (cytotype E), ♂, Manacapuru, AM, Brasil (W.E. Magnusson).

Fig. 302. *Cnemidophorus ?gramivagus* (cytotype E), ♀, Manacapuru, AM, Brasil (W.E. Magnusson).

Fig. 303. *Cnemidophorus lemniscatus* (Linnaeus), ♂, Alter-do-Chão, PA, Brazil (W.E. Magnusson).

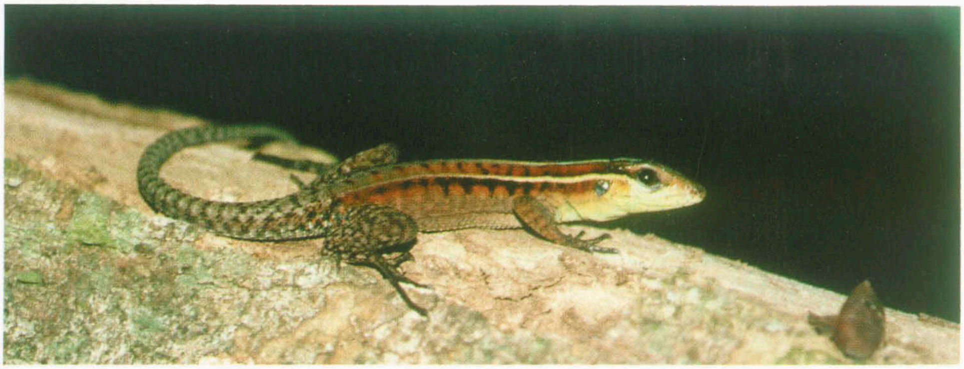

Fig. 304. *Kentropyx calcarata* Spix, juvenile, Caxiuanã, PA, Brazil (T.C.S. Avila-Pires).

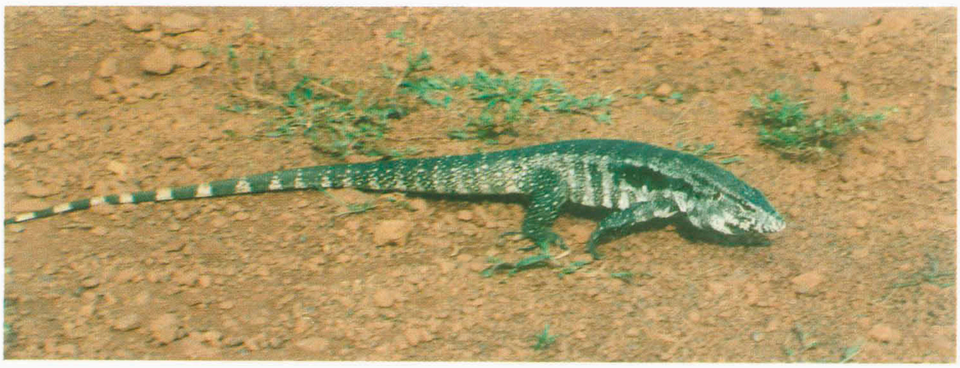

Fig. 305. *Tupinambis merianae* (Duméril & Bibron), Carajás, PA, Brasil (T.C.S. Avila-Pires).

Fig. 306. *Cnemidophorus lemniscatus* (Linnaeus), ♀, Curuá-Una, PA, Brazil (W.E. Magnusson).

Fig. 307. *Kentropyx altamazonica* Cope, ♂, MPEG 15902, Benjamin Constant, AM, Brazil (T.C.S. Avila-Pires).

Fig. 308. *Kentropyx pelviceps* Cope, young ♀, RMNH 25400, Benjamin Constant, AM, Brazil (M.S. Hoogmoed).

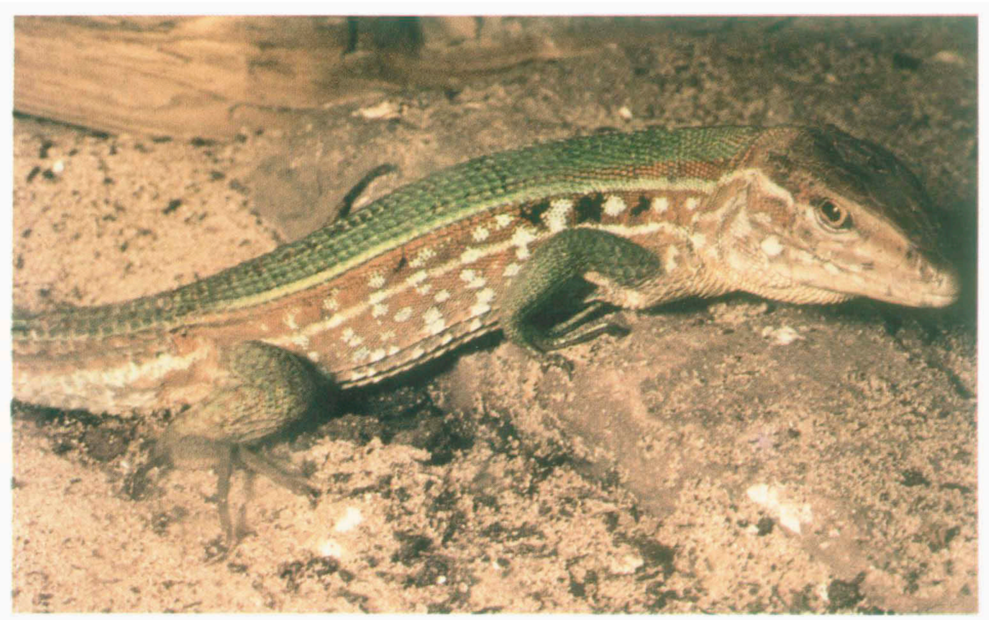

Fig. 309. *Kentropyx striata* (Daudin), ♂, RMNH 16415 A, Airstrip Kaiser Mountains, Suriname (M.S. Hoogmoed).

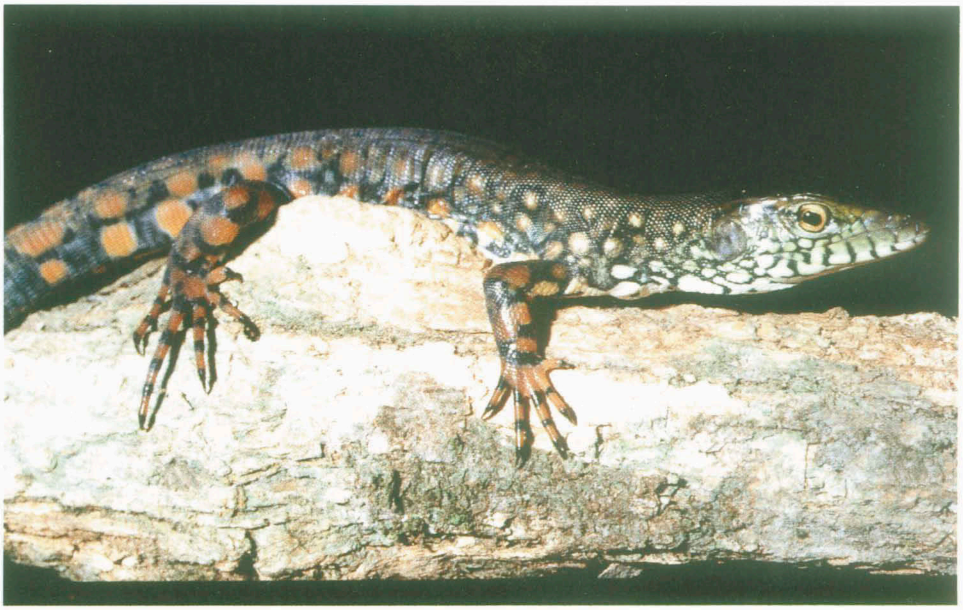

Fig. 310. *Crocodilurus lacertinus* (Daudin), juvenile, MPEG 16506, Caxiuanã, PA, Brazil (M.S. Hoogmoed).

Fig. 311. *Dracaena guianensis* Daudin, São Sebastião da Boa Vista, Marajó, PA, Brazil (M.S. Hoogmoed).

Fig. 312. *Tupinambis teguixin* (Linnaeus), Ilha de Maracá, RR, Brazil (M. O'Shea).

Fig. 313. *Mabuya bistriata* (Spix), ♀, pregnant, MPEG 16219, Breves, Marajó, PA, Brazil (T.C.S. Avila-Pires).

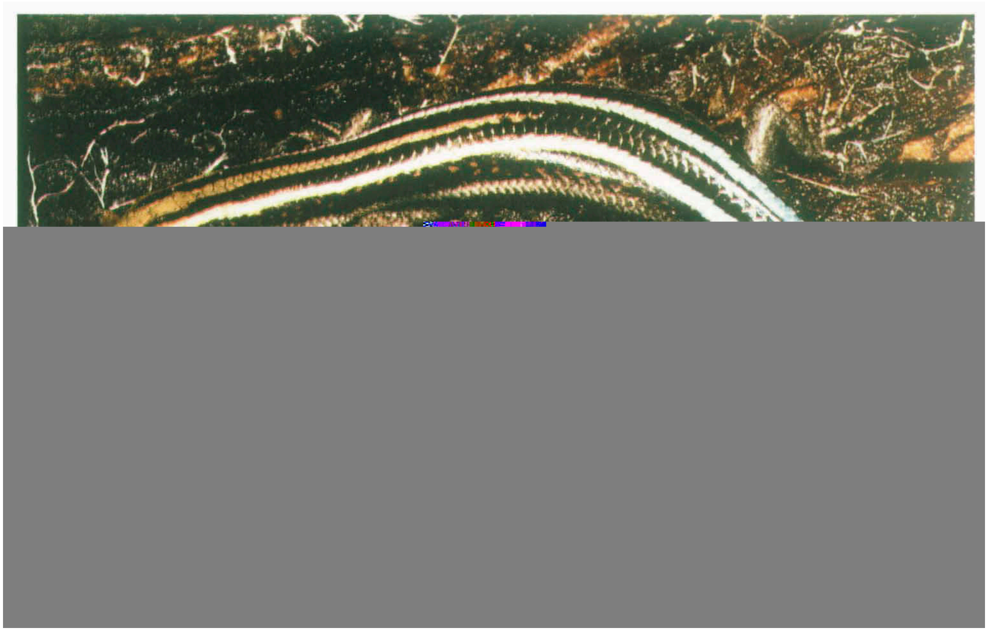

Fig. 314. *Mabuya carvalhoi* Rebouças-Spieker & Vanzolini, Ilha de Maracá, RR, Brazil (M. O'Shea).

Fig. 315. *Mabuya nigropunctata* (Spix), ♂, MPEG 15851, Urucu, AM, Brazil (T.C.S. Avila-Pires).