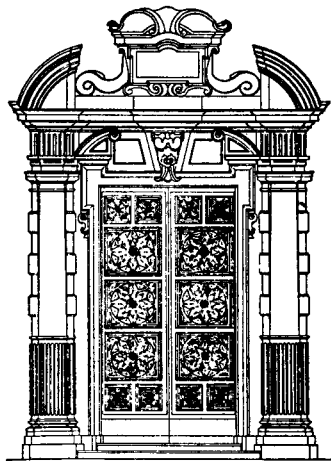


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A new genus and species of
Pseudoboine Snake, with a revision
of the genus *Clelia*
(Serpentes, Xenodontinae)

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ESTRATTO

dal Bollettino del Museo Regionale di Scienze Naturali - Torino
Volume 14 - N. 2 - 1996

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ABSTRACT

Boiruna, a new pseudoboine genus, is erected to accommodate two species in South American xenodontine snakes: *Oxyrhopus maculatus* Boulenger, 1896 (type species), and a new species from the xeric open formations in lowlands of northeastern Brazil. This genus differs from all other pseudoboine genera by its plesiomorphic hemipenial morphology and a venter almost completely black posteriorly. The externally similar species of the genus *Clelia* are revised according to the new findings.

INTRODUCTION

As presently conceived, the genus *Clelia* is distributed throughout most of Latin America, from Mexico to Argentina on the mainland and occurring on Trinidad and the Lesser Antillean islands of Grenada and St. Lucia. This genus has a complex nomenclatural history owing to attempts by systematists to clarify the generic limits between the species belonging to it and those placed within the closely related genera *Oxyrhopus* and *Pseudoboa*. Since Duméril, Bibron and Duméril (1854), each genus has been synonymized with the other at least once (see Boulenger, 1896; Berg, 1898; Stejneger, 1901; Gomes, 1918; Amaral, 1926). Bailey's (1970) opinion, recognizing the three genera as distinct, is the last tentative to resolve this matter and has been extensively followed until the present.

More recent taxonomic proposals have modified the composition of the genus

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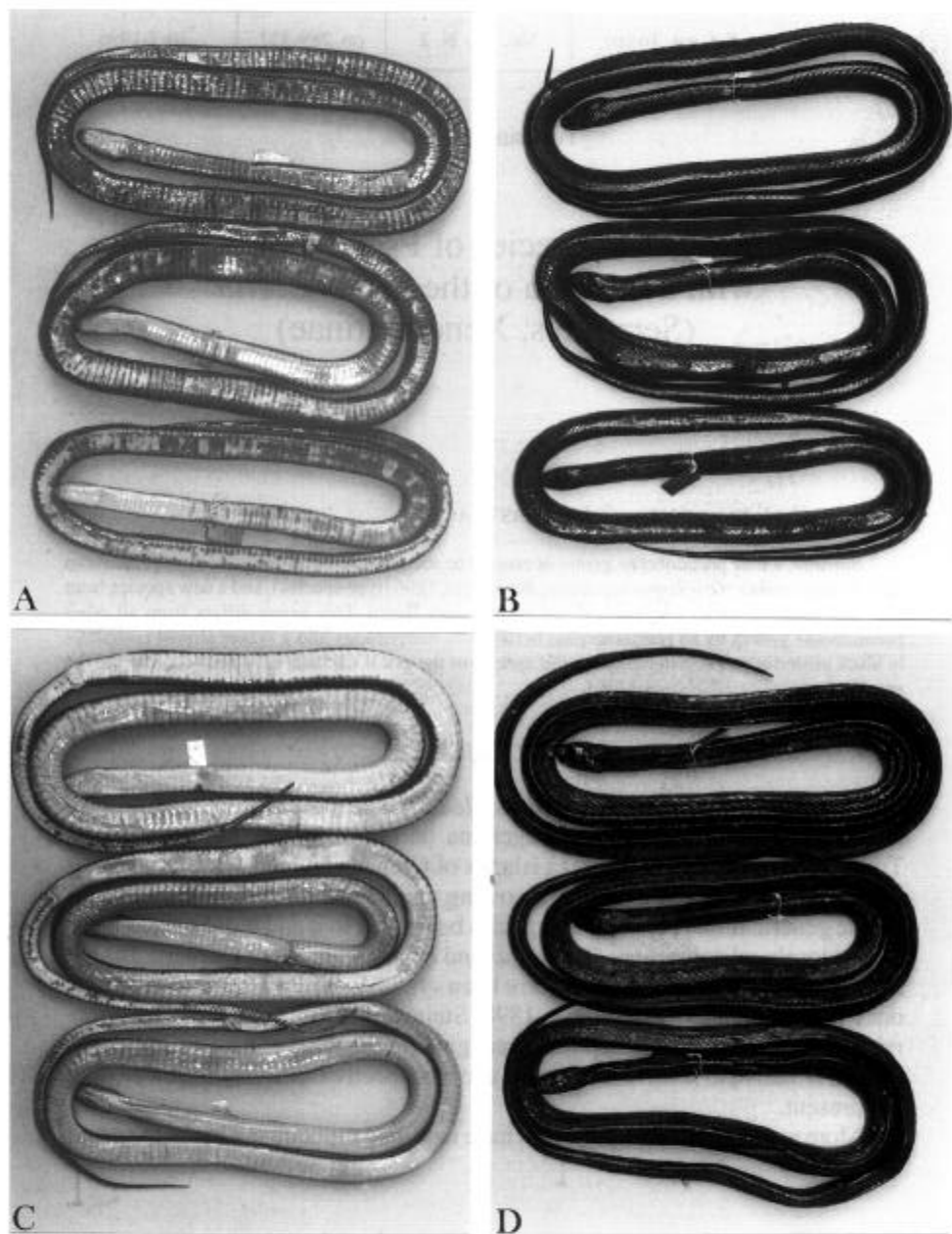


Figure 1- A, B: *Boiruna maculata* (IB 30413, 33036, 30414). C, D: *Clelia plumbea* (IB 24885, 33912, 44232). Ventral and dorsal views of adults.

Clelia, now composed of eight species. Underwood (1993) described *C. errabunda* from St Lucie, Lesser West Indies. Lema (1994), based on the spineless condition of the hemipenis, rightfully elevated *Clelia plumbea* to the specific level. Previously, two other subspecies of *Clelia clelia* - *C. clelia groomei* and *C. clelia immaculata* - were placed in the synonymy of *C. clelia clelia* by Bailey (1970) and Dixon *et al.* (1962), respectively. No subspecies are presently recognized in the genus *Clelia*.

The validity of *Clelia occipitolutea* was questioned by Scrocchi and Viñas (1990), who placed it in the synonymy of *Clelia clelia*. However, I disagree with their conclusions for reasons to be developed below. Also, the name synonymized by these authors, although widely accepted, seems to have been used inadequately until the present date. Indeed, it is commonly accepted that the nominal species *Brachyruton occipitoluteum* Duméril, Bibron and Duméril, 1854, represents a valid species placed in the genus *Clelia*, the nominal species *Oxyrhopus maculatus* Boulenger, 1896, corresponding to the same concept as the former species. However, *B. occipitoluteum*, as well as *Brachyruton nuchaluteum* Duméril, 1853, represent two distinct new names of *Pseudoboa coronata* Schneider, 1801, which is implicit by their listing in the synonymy given by Duméril (1853) and Duméril, Bibron and Duméril (1854), as shown by their reference to the *Scytale coronata* of Wagler, 1830, a new combination for *Pseudoboa coronata* Schneider, 1801. For this reason, the valid name for the southernmost South American population commonly designated as "*Clelia occipitolutea*" is *Oxyrhopus maculatus* Boulenger, 1896.

Recently, I furnished a phylogenetic hypothesis for the species of pseudoboine snakes where the genus *Clelia* resulted in a polyphyletic assemblage, *Clelia maculata* appearing unequivocally as the sister taxon of all other Pseudoboini due to its plesiomorphic hemipenial morphology (Zaher, 1994a, 1996; see discussion below). In addition, populations from the xeric open formations of northeastern Brazil, generally considered conspecific of *C. maculata*, actually represent a new species to be described below. Together, these two species represent the sister-group of the remaining Pseudoboini, justifying the erection of a new genus to accommodate them.

RESULTS

Boiruna, New Genus

Type species: *Oxyrhopus maculatus* Boulenger, 1896.

E t y m o l o g y : from the Tupi-Guarani 'Mbói+r+ú (=which eats snake)+una (=black), in allusion to the ophiophagous habits of these black snakes.

C o n t e n t : *Boiruna maculata* (Boulenger, 1896); *Boiruna sertaneja*, n. sp.

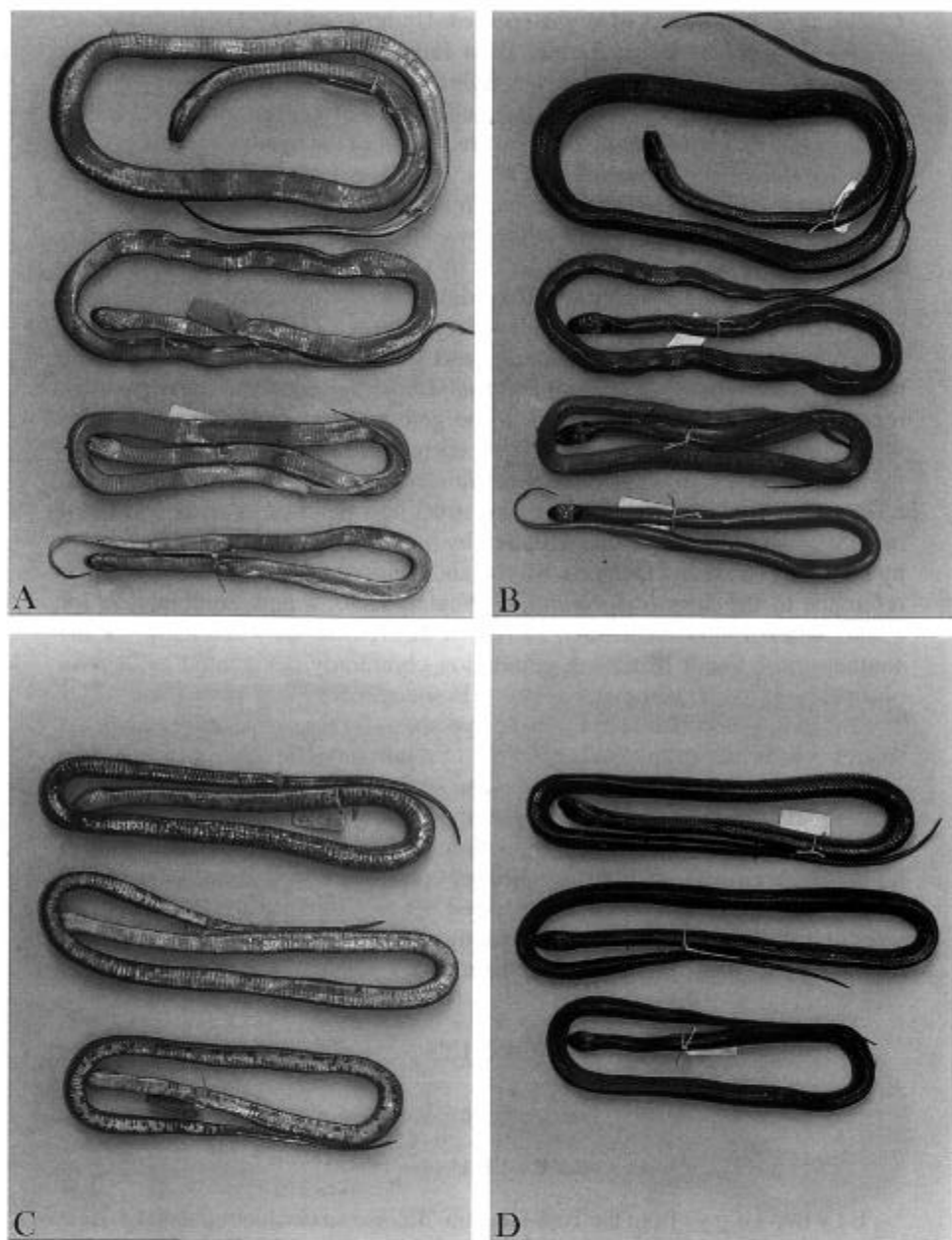


Figure 2- A, B: *Clelia plumbea* (IB 33992, 25357, 25333, 17008). C; D: *Boirana maculata* (IB 42623, 32175, 22545). Ventral ad dorsal views of juveniles.

D i a g n o s i s : A member of the tribe Pseudoboini. The following combination of traits distinguishes *Boiruna* from all other taxa of the tribe: (1) adults with subcaudal and ventral scales almost completely black except for the anterior region of the body; (2) juveniles with a black longitudinal stripe in the vertebral and paravertebral region; (3) presence of two parallel rows of well developed and large shallow calyces throughout the asulcate surface of the lobes; (4) a pair of weakly developed naked pockets in the lobular crotch; (5) absence of intrasulcar enlarged spines.

The first feature is interpreted as a synapomorphy of *Boiruna*. However, some specimens of *B. maculata* from southern Brazil, Paraguay, and northern Argentina, show light cream venters. The taxonomic status of these southern populations remain to be analyzed. The second feature is present homoplastically in juveniles and subadults of other pseudoboine taxa as *Clelia bicolor*, *Pseudoboa haasi*, and *Rhachidelus brazili* (Zaher, 1994a). The last three features are plesiomorphic states for the Pseudoboini (Zaher, 1994a).

***Boiruna maculata* (Boulenger, 1896)**

new combination

Oxyrhopus maculatus Boulenger, 1896, Catalogue of the snakes in the British Museum (Natural History), vol. 3: 110.

H o l o t y p e : Natural Museum, London (BMNH) no. 1946.1.9.33, a female from Uruguay.

D i a g n o s i s : Differs from *Boiruna sertaneja* sp. n. by the presence of spines in the hemipenis, a lower number of subcaudal scales (60-73 subcaudals in males and 50-63 in females, whereas *B. sertaneja* presents 68-79 and 60-75, respectively), young specimens retaining the juvenile color pattern (red dorsum with a black longitudinal stripe) to a larger size (to 1500 mm in *B. maculata*, not documented after 500 mm in *B. sertaneja*), the presence of a well developed bodenaponeurosis of the adductor muscles in juveniles and subadults (see Zaher, 1994b: fig. 8C), and a semicapitate condition of the hemipenis (bicapitate in *B. sertaneja*).

D e s c r i p t i o n : [176 specimens examined]. Proportions and scutellation: Largest specimen a female 1680mm total length, 230mm tail length; largest male 1640 mm total, 300 mm tail. Tail longer in males [16-19% (\bar{X} = 18%) of total length] than in females [13-15% (\bar{X} = 14%)]. Ventrals higher in females [213-234; \bar{X} = 224.24 \pm 4.45; N= 46] than in males [199-228; \bar{X} = 213.32 \pm 4.47; N= 92]. Subcaudals usually divided throughout the tail, higher in males [60-73; \bar{X} =66.54 \pm 2.92; n= 92] than in females [50-63; \bar{X} = 57.21 \pm 2.77; N= 46]. The first ten subcaudals just after the cloaca tend to the single condition (31% of specimens with one or more single anterior subcaudals). Dorsal scales in 19-19-17 with two apical pits and vertebral row undifferentiated. Lore-

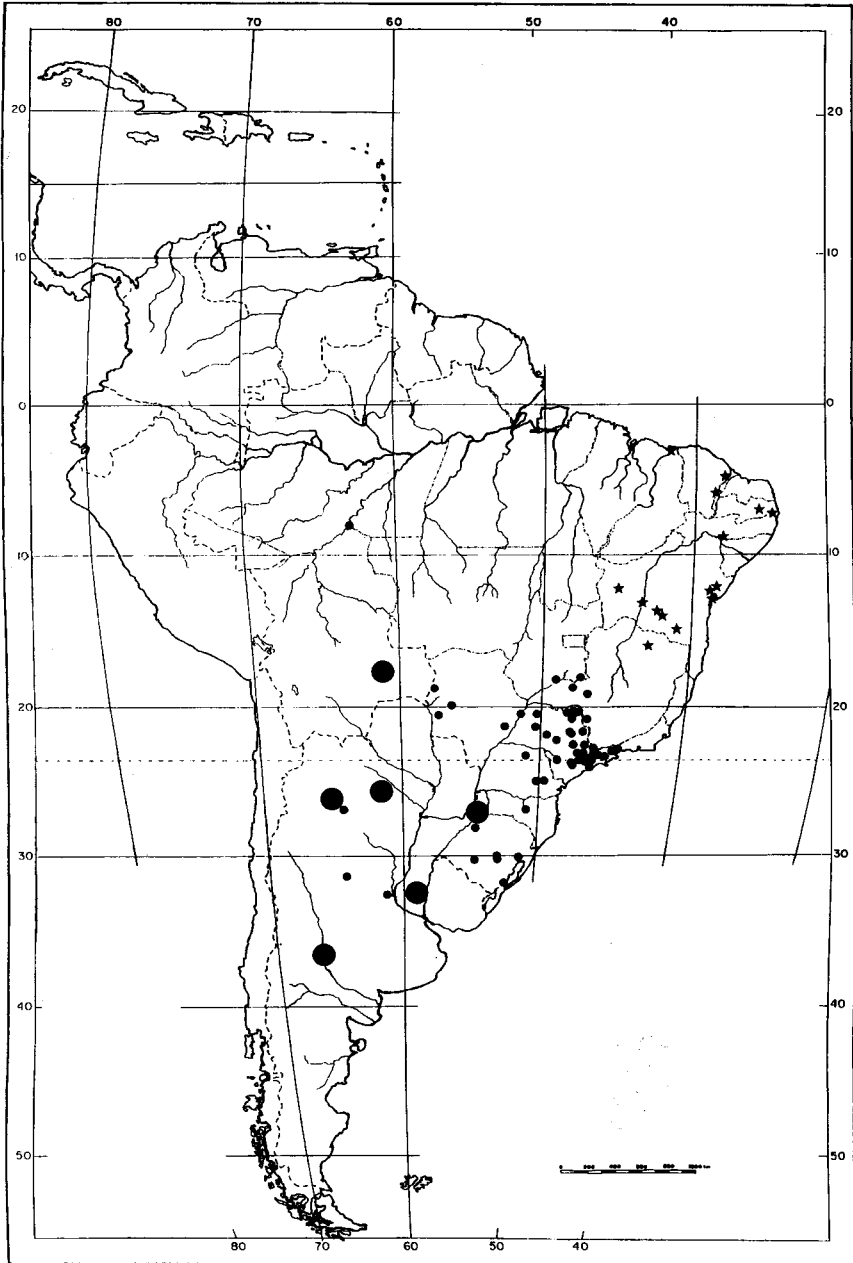


Figure 3- Localities for specimens examined of *Boiruna maculata* (circle) and *Boiruna sertaneja* (star). large circles correspond to a known record for a state or province without precise locality data.

al present (absent in 2% of specimens); one preocular; two postoculars; 2+2 or 2+3 temporals (40% and 57%, respectively; rarely 1+2 or 1+3); 7 supralabials (3-4 in contact with orbit); 8 infralabials (rarely 9).

C o l o r p a t t e r n (Figures 1 A,B and 2 C,D): Juvenile specimens show a different color pattern from that of adults due to ontogenetic change. Juveniles below 1000 mm show a black head from the tip of the snout to the middle or posterior edge of the parietal scales dorsally and fifth supralabials laterally, followed by a light collar ending at the level of the 4th/5th vertebral scale, followed by a large black vertebral stripe ending at the tip of the tail. The flanks are yellowish (reddish in life). Infralabial scales and throat are always light cream. Some specimens show a thinner light collar, resulting from the extension of the black color pattern of the temporal region. The venter varies from light cream to spotted or almost completely black. All specimens show nearly complete black subcaudal scales. Light parts of the venter of juveniles seem to be reddish/pinkish in life as shown by some specimens which retained their color in preservative. The black vertebral stripe invades progressively the flanks in an ontogenetic sequence which ends when specimens show an uniformly black dorsum. Above the length of 1000mm until 1500mm, specimens may retain the bicolored pattern of the dorsum with a black dorsal stripe still visible, whereas the light collar is absent or, when present, shows a brownish coloration. Above 1500mm almost all specimens show an uniform black dorsum. When the dorsum is not uniformly black, the dorsal scales have black apical tips and darker edges.

The ventral surface of the body shows important variation of pigmentation. The anterior 1/4 of the venter is generally light cream throughout the individual's life. Thus, except for the anterior region of the venter, juvenile and adult specimens show venters ranging from the uniform light cream to the almost completely black pattern, a completely black venter being present only on adult specimens. Three different ventral conditions were observed: (1) a light cream venter; (2) ventral scales light cream in the middle with black lateral edges; (3) ventral scales almost completely black with only light cream spots throughout the middle of the venter. Pattern (1) is present only in few individuals from São Paulo, Argentina, Mato Grosso do Sul, Mato Grosso and a specimen from Humaitá (State of Amazonas, Brazil). Pattern (2) is the most common among juveniles, also being present in various adults. However, the tendency in adults is to show pattern (3) with an nearly uniform black venter, except for the anterior portion of the body and the middle of each ventral scale. This pattern leads, in adult specimens, to a black venter with a more or less well defined median longitudinal light cream stripe. Only a few adult specimens presented light cream ventrals with black lateral edges, a condition which may lead to confusion since it is very similar to the ventral pattern of adult specimens of *Clelia plumbea* and *C. clelia*. Conditions (2) and (3) represent two distinct phases of a progressive

ontogenetic darkening of the venter. Ontogenetic phases, or progressive darkening, involving the venter and dorsum seem to develop independently in each region.

Hemipenis (Plate 1): [based on 11 everted organs]. Hemipenis deeply bilobed, semicapitate or weakly bicapitate, with long lobes (2.0 longer than wide) ornamented by spinulate calyces in their sulcate and lateral surfaces. Each capitulum shows well developed overhanging edges and is only weakly direct-

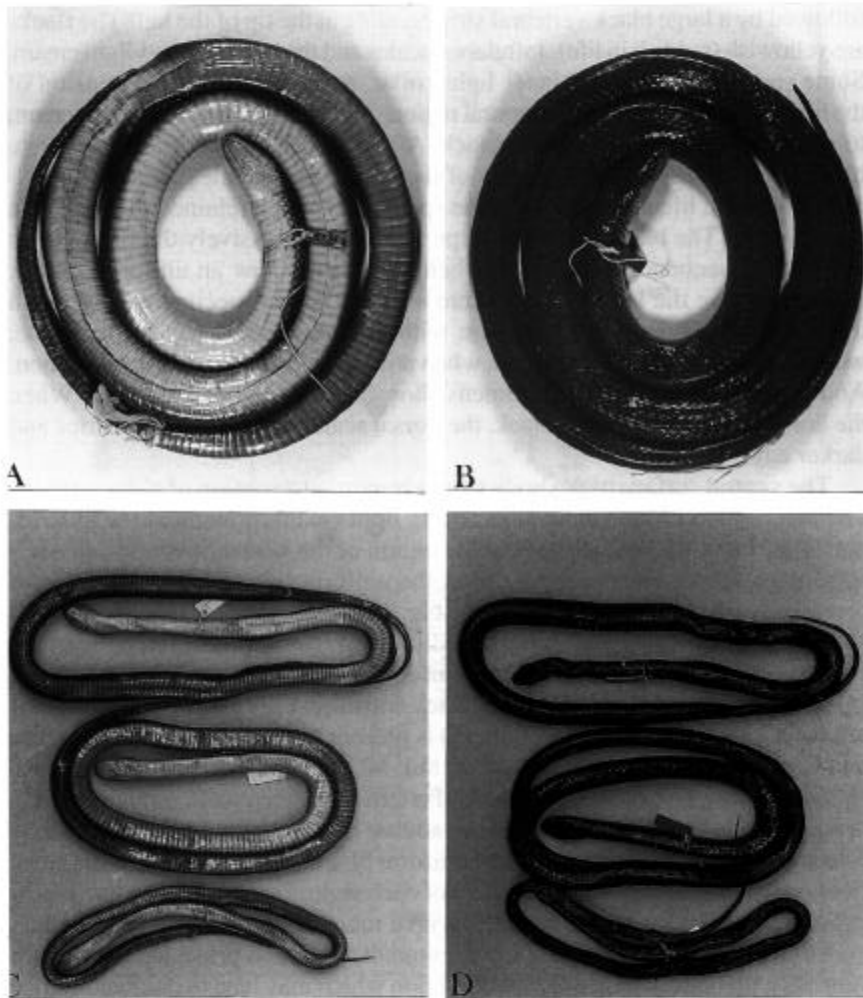


Figure 4- A, B: *Boiruna sertaneja*, new species, holotype (MNRJ 2384). C, D: *Boiruna sertaneja* (IB 54258, 21097, 49388). Ventral and dorsal views.

ed externally, taking a more or less lateral position on the lobe only in the distal region. The asulcate surface of the lobes is ornamented distally by two rows of 3 to 4 large shallow papillate calyces, and proximally by an inflated crest that is confluent with the lateral enlarged spines basally, and with the medial vertical walls of the large calyces, distally. The crest present in each lobe derived from the medial vertical walls of the large papillate calyces that inflated greatly. The horizontal walls of the same calyces are also present in the vestigial form of thin flounces. The sulcus spermaticus divides in the proximal region of the hemipenial body, each branch extending centrolaterally until the middle of the lobes where they take a centrifugal position. There are 13 to 17 lateral enlarged spines on each side of the hemipenial body, grouped in 3 to 4 rows. The basal region of the hemipenial body is ornamented by minute spinules. The basal crotch shows a pair of weakly defined naked pockets. The intrasulcar spines are absent.

Distribution (Figure 3): From southern Bolivia, western Mato Grosso do Sul and southern Goiás, Brazil, southward through southeastern and southern Brazil to northern and western Argentina, present in Uruguay (Achaval, 1973) and Paraguay (Norman, 1994: fig. 26). One isolated specimen from Humaitá, state of Amazonas, northern Brazil.

***Boiruna sertaneja*, new species**

Holotype: Museu Nacional do Rio de Janeiro (MNRI) no. 2384, an adult male from Barreiras, Bahia, Brazil.

Paratypes: Museu Nacional do Rio de Janeiro (MNRI) no. 2382, an adult female from Barreiras, Bahia, Brazil, and Instituto Butantan (IB) no. 49434, 51263, two adult females from Parnaíba, Piauí.

Etymology: The specific name, a noun in apposition, refers to the occurrence of this taxon as an inhabitant of the “sertão”, the xeric open formations in lowlands of northeastern Brazil.

Diagnosis: Differs from *Boiruna maculata* by a completely spineless and bicapitate hemipenis (semicapitate in *B. maculata*), a higher number of subcaudal scales (68-79 in males and 60-75 in females of *B. sertaneja*; 60-73 and 50-63 in *B. maculata*), the absence of bodenaponeurosis in the adductor muscles, and young specimens losing very soon their juvenile color pattern (not documented after 500mm in *B. sertaneja*, until 1500mm in *B. maculata*).

Description of holotype (Figure 4 A,B): The specimen is an adult male with 1320mm total length, 220mm tail length (a section of the end of the tail lacking); tail length about 17 percent of total length. Head distinct from neck; body slightly wider than high. Dorsal scales smooth in 19-19-17, with two apical pits; scale row reduction occurring, from 19 to 18 rows by fusion

of rows 3+4 at level of ventrals 180-181 and then to 17 rows by fusion of rows 3+4 at ventrals 185-186. Three preventrals, 231 ventrals, an undivided anal plate, 68+ subcaudals, all paired, except second to sixth which are single.

Rostral plate 1.8 times wider than high, visible from above. Paired internasals wider than long. Paired prefrontals wider than long, in contact with its mate and with frontal, supraocular, preocular, loreal, nasal, and internasal (left prefrontal in contact with both internasals). Frontal pentagonal, nearly as long as wide, 1.3 times longer than its greatest width. Supraoculars longer than wide, 70 percent of frontal length, wider posteriorly. Parietals 1.5 times longer than broad.

Nasal plate in contact with supralabials 1-2, divided above and below naris. Loreal plate nearly as wider than long. Single preocular wider than long, in contact with supraocular, prefrontal, loreal, and third supralabial. Two small postoculars of same size. Two large anterior temporals + three smaller posterior temporals. Supralabials 7, with 3-4 bordering the orbit, the first three touching loreal in the right side whereas only second supralabial touches loreal on the left side. Infralabials 8 on the right side, 7 on the left side (3 and 4 fused), first pair in broad contact behind mental, 1-5 (in right side) touching an anterior genial. Anterior genials longer and wider than posterior genials.

The preserved specimen shows a uniform brown dorsum (black in life), being darker in the paravertebral and vertebral regions and lighter in the flanks, each dorsal scale with black apical tip and darker edges. Venter brown (black in life), except for the anterior 1/4 which retain a uniform yellowish color (light cream in life). Anterior ventral scales light cream with brown edges, the subcaudals and last 50 ventrals being completely brown (black in life). Supralabials 1 to 7 show upper half black, whereas their lower half, all the infralabials and the throat are uniform yellowish (light cream in life).

Both hemipenes are fully everted but not inflated, difficulting direct observation of fine structure. However, they are mostly identical to the prepared hemipenes used in the general description presented below, being bilobed, bicapitated, completely spineless, with a distinct capitulum in the sulcate side of the lobes and two rows of large shallow weakly papillate calyces in the asulcate side.

General description: [61 specimens examined]. Proportions and scutellation: Largest specimen a female 2240mm total length, 300mm tail length; largest male 1690mm total, 290mm tail. Tail longer in males [16-19% (\bar{X} = 18%) of total length] than in females [14-16% (\bar{X} = 15%)]. Ventrals higher in females [227-244; \bar{X} = 235.62 \pm 4.16; N= 21] than in males [215-230; \bar{X} = 222.31 \pm 4.30; N= 16]. Subcaudals usually divided throughout the tail, higher in males [68-79; \bar{X} = 74.18 \pm 3.20; N= 16] than in females [60-75; \bar{X} = 66.38 \pm 4.20; N= 21], the first eight subcaudals just after the cloaca tend to the single condition (44% of specimens show one or more subcaudals single). Dor-

sal scales in 19-19-17 with two apical pits and vertebral row undifferentiated. Loreal always present; one preocular (rarely two); two postoculars; 2+3 temporals (rarely 2+2); 7 supralabials (rarely 8; 3-4 in contact with orbit); 8 infralabials (rarely 9).

C o l o r p a t t e r n (Figure 4 C,D): New born and very young specimens, from about 260mm to 400mm, retain a black vertebral stripe in the dorsum with reddish/pinkish flanks as well as a light cream collar (grey in life; see also: Vanzolini et al., 1980: plate 3; Queiroz and Silva, 1992; Nunes 1992). The light collar vanishes rapidly, with young specimens above 400mm having an adult color pattern with an uniform black dorsum (only with lighter flanks). Specimens in that phase also show a distinctly black venter, except for the anterior 1/4 of the body that remains yellowish (light cream in life). There are two distinct color patterns of the ventral scales: 1) all ventrals black, except for the anterior 1/4 of the body and for a little portion at the middle of each scale, which form a thin light cream stripe in the midline of the venter until the cloaca; 2) all ventrals yellowish (light cream in life) with posterior and lateral edges black, except for the anterior 1/4 of the body. The latter juvenile color pattern confers a reticulate condition to the venter. Young specimens show light cream subcaudals edged with black, whereas adults have completely black subcaudals. In all specimens, supralabials 1 to 4-5 show upper half black, whereas their lower half, the remaining supralabials, all the infralabials, and the throat are uniform light cream. All adult individuals show an uniform black dorsum. All specimens show dorsal scales with a black apical tip and darker edges, when the dorsum is not uniformly black. When compared to *Boiruna maculata*, juvenile specimens of *B. sertaneja* show a very early darkening of the dorsum during ontogenesis.

H e m i p e n i s (Plate 2): [based on three everted organs]. Hemipenis deeply bilobed, bicapitate, with long lobes (2.0 longer than wide), each one ornamented by diminute spinulate calyces in the sulcate surface. The capitulum is directed externally, in a lateral position, whereas the asulcate surface of each lobe retains an internal position. Each capitulum shows well developed overhanging edges. The asulcate surface is ornamented by two rows of large shallow papillate calyces, each one made up by 6 to 7 calyces. The basal region of each lobe retains a vestigial crest. The forked sulcus divides approximately in the middle of the hemipenial body, each branch extending centrolinearly until the base of the lobes where they take a centrifugal position. The hemipenial body is smooth, lacking spinules, lateral enlarged spines, and intrasulcar enlarged spines. The basal crotch lacks a pair of naked pockets.

D i s t r i b u t i o n (Figure 3): Xeric open formations in lowlands of north-eastern Brazil, in the states of Piauí, Ceará, Paraíba, Pernambuco, Alagoas, Bahia, and Minas Gerais.

SYSTEMATIC ACCOUNTS

The present section furnishes a detailed description of the species maintained in the genus *Clelia*, and a dichotomous key for the species of *Clelia* and *Boiruna*. According to my own results on the phylogenetic relationship of the pseudoboines, the genus *Clelia*, as presented in this section, remains polyphyletic and still needs to be partitioned (Zaher, 1994a). However, I opted to present the arguments for further partition of the genus along with the cladistic analysis of the tribe in a separate contribution. Moreover, I prefer to wait for the publication by Franco et al. (in press) of two new species assigned to the genus *Clelia*, already included in my analysis, in order to have their names available for use.

***Clelia bicolor* (Peracca, 1904)**

Oxyrhopus bicolor Peracca, 1904, Rev. Suisse Zool., 12:667.

H o l o t y p e: Muséum d'Histoire Naturelle de Genève (MHNG) no. 677.47, a male from north of Santa Fé, Buenos Aires, Argentina.

D i a g n o s i s: differs from *Clelia clelia*, *C. plumbea*, *C. equatoriana*, *C. scytalina*, and *C. errabunda* by the presence of a left lung, lower number of ventrals (less than 180 in males and 195 in females of *C. bicolor*; more than 190 in males and 200 in females of the remaining species), and dorsally concave Duvernoy's glands. Further distinguished from the first four species by a short trachea extending no more than five ventral scale units beyond the tip of the ventricle, and from the last three species by 19 dorsal scale-rows at mid-body. Differs from *C. rustica* by 8 supralabials and 9 infralabials, the presence of a white stripe through the supralabial scales, and a lower number of ventral scales (165-176 in males and 227-244 in females of *C. bicolor*; 190-208 and 213-231 in *C. rustica*).

D e s c r i p t i o n: [28 specimens examined]. Proportions and scutellation: Largest specimen a female 860mm total length, 170mm tail length; largest male 710mm total, 160mm tail. Tail longer in males [21-23% (\bar{X} =22%) of total length] than in females [16-19% (\bar{X} = 18%)]. Ventrals higher in females [170-193; \bar{X} = 178.13 \pm 5.64; N= 16] than in males [165-176; \bar{X} = 169.40 \pm 3.59; n= 10]. Subcaudals always divided throughout the tail, higher in males [64-73; \bar{X} = 68.60 \pm 2.63; N= 10] than in females [53-62; \bar{X} = 56.56 \pm 2.50; N= 16]. Dorsal scales 19-19-17 with two apical pits and vertebral row undifferentiated. Loreal always present; one preocular; two postoculars; 2+3 temporals (rarely 1+2); 8 supralabials (4-5 in contact with orbit); 9 infralabials.

C o l o r p a t t e r n: Juvenile and adult specimens retain a similar basic bicolored pattern of the dorsum, with a brownish to black vertebral stripe of

10 to 12 scale rows width, and light yellowish flanks (reddish in life). All specimens show a dark-brown head cap from the tip of the snout to the posterior edge of the parietal scales, followed by a light cream nuchal collar ending at the level of the 5th-8th vertebral scale, followed by the vertebral stripe. Dorsal scales always show a black apical tip. Specimens below 400mm retain a clearly differentiated nuchal collar that is completely absent in specimens above 550mm. The dorsal vertebral stripe vanishes in adult specimens above 700mm, usually due to darkening of the flanks. Supralabials, infralabials, throat, and venter are almost completely light cream in all specimens, except for a very slight invasion of brownish coloration on the lateral edges of ventral scales and between subcaudal scales.

Hemipenis (Plate 3): [based on one everted organ]. Hemipenis deeply bilobed, bicapitate, with relatively short lobes (1.5 longer than wide), each one ornamented by spinulate calyces in the sulcate surface. The capitulum is directed externally, in a lateral position, whereas the asulcate surface of each lobe retains an internal position. Each capitulum shows well developed overhanging edges. The asulcate surface is almost completely nude except for the presence of a thin papillate crest in the asulcate surface which extends from the distal region of the hemipenial body (just above the rows of lateral enlarged spines) to the distal tip of the lobes. The sulcus spermaticus divides in the middle of the hemipenial body, each branch extending centrolinarily until the base of the lobes where they take a centrifugal position. There is one row of two intrasulcar enlarged spines and 3 rows of 13 lateral enlarged spines on each side of the hemipenial body. Except for the pair of enlarged spines, the intrasulcar region is smooth. The basal region of the hemipenial body is covered by spinules. The basal crotch lacks a pair of naked pockets.

Distribution (Figure 5): Southern Mato Grosso, Brazil, south to Paraguay and northern Argentina.

Clelia clelia (Daudin, 1803)

Coluber clelia Daudin, 1803, Histoire naturelle, générale et particulière des Reptiles, tom. 6: 447.

Clelia daudini Fitzinger, 1826, Neue Classification der Reptilien: 55 (substitute name for *Coluber clelia* Daudin).

Clelia clelia immaculata Smith, 1942, Proc. U.S. Natl. Mus., 92: 394 (in part). Holotype: National Museum of Natural History, Smithsonian Institution (USNM) no. 24966. Type locality: Guadaluajara, Jalisco, Mexico.

Clelia clelia groomei Greer, 1965, Breviora, 223: 1. Holotype: Museum of Comparative Zoology (MCZ) no. 79767. Type locality: Beausejour, St. George Parish, Grenada Island, Lesser Antilles.

Holotype: Presumably lost.

Diagnosis: A species distinguished from *C. plumbea* by the presence

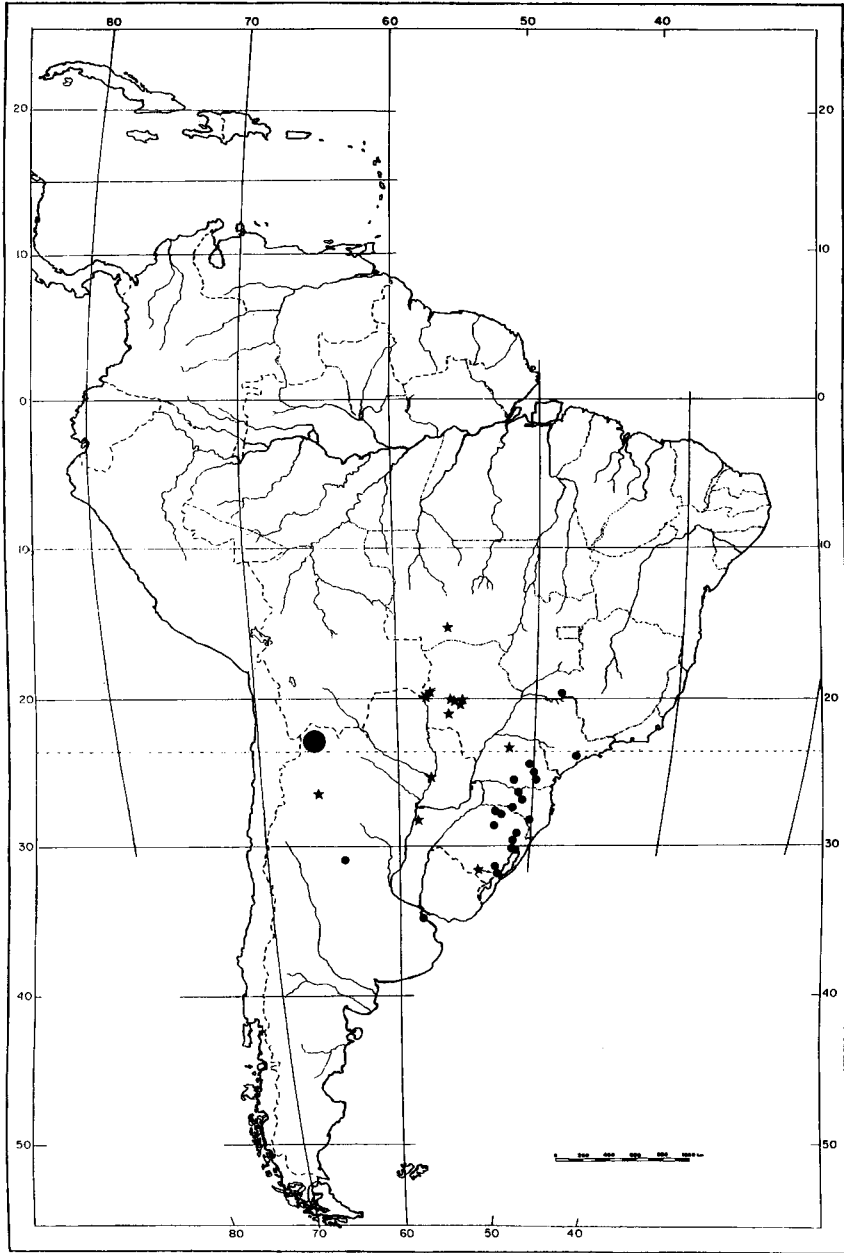


Figure 5 - Localities for specimens examined of *Clelia bicolor* (star) and *Clelia rustica* (circle). The large circle corresponds to a known record for the province of Jujuy without precise locality data.

of spines in the hemipenes. Differs from *C. equatoriana*, *C. errabunda* and *C. scyralina* by the presence of 19 dorsal scale rows at mid-body instead of 17 rows, and from *C. bicolor* and *C. rustica* by the lack of a left lung and dorsally convex Duvernoy's glands. Further distinguished from *C. errabunda* by the presence of a long trachea extending through the ventral surface of the right lung until the level of the terminal air sac (trachea extending no more than five ventral scales beyond the tip of the ventricle in *C. errabunda*).

Description: [147 specimens examined]. Proportions and scutellation: Largest specimen a female 2250mm total length, 360mm tail length; largest male 1840mm total, 400mm tail. Tail longer in males [18-23% (\bar{X} = 21%) of total length] than in females [16-20% (\bar{X} = 18%)]. Ventrals higher in females [218-244; \bar{X} = 232.15 \pm 5.40; N= 46] than in males [201-230; \bar{X} = 215.86 \pm 5.77; N= 51]. Subcaudals always divided throughout the tail, higher in males [81-98; \bar{X} = 89.52 \pm 3.97; N= 51] than in females [70-91; \bar{X} = 80.19 \pm 4.20; N= 46]. Dorsal scales in 19-19-17 or 17/19/17 (30%) of specimens with the latter condition; rarely 18/19/17) with two distinct or vestigial (rarely absent) apical pits. Loreal present (absent in two specimens); one preocular (rarely two); two postoculars; 2+3 temporals (rarely 1+3 or 2+2); 7 supralabials (3-4 in contact with orbit); 8 infralabials (rarely 9).

Color pattern: Juvenile specimens with a different color pattern from that of adults due to ontogenetic change. All specimens below the length of 900 mm show the juvenile coloration, whereas above this length specimens varies until 1500mm when all of them present the adult uniform black dorsum. All specimens show dorsal scales with black apical tip and darker edges when the dorsum is not uniformly black.

The posterior 1/4 of the tail almost always shows black edged or completely black subcaudal scales in very young and juvenile specimens. The black edged pattern extends to the anterior subcaudal scales in subadults and adults, showing various degrees of invasion of the light cream subcaudals of youngest specimens. Three distinct patterns of invasion of the subcaudals by black pigmentation were observed: 1) on the lateral and anterior edges of each scale, leaving the posterior and medial regions of each scale light cream; 2) on the medial, lateral, anterior, and posterior edges of each subcaudal, leaving only the middle of the scale with a light cream coloration; 3) on the medial edge of each scale, following the region of contact of the subcaudal scales on the middle of the tail, leaving almost all the surface of each scale with a light cream color.

Hemipenis (Plate 4): [based on six everted organs]. Hemipenis deeply bilobed, bicapitate, with long lobes (2.0 longer than wide), each one ornamented by spinulate calyces in the sulcate surface and by a lobular crest with large horizontal flounces in the asulcate surface. The lobular crest extends from the distal region of the asulcate side of the hemipenial body (just above the rows of

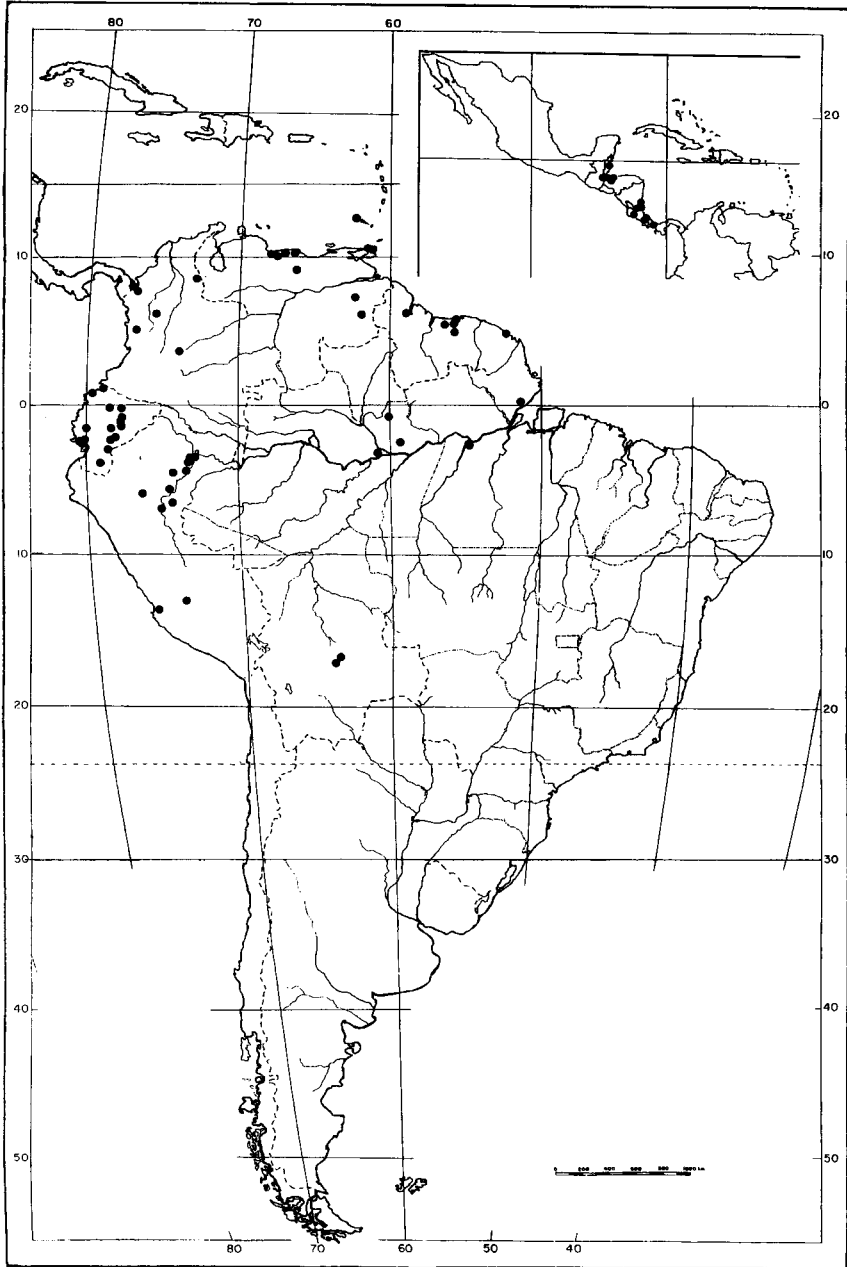


Figure 6- Localities for specimens examined of *Clelia cletia*.

lateral enlarged spines) to the distal tip of each lobe. The flounces are few in number (no more than 7) and positioned laterally and medially to the crest, connecting the latter with the edge of the capitulum. Except for the flounces, the areas on each side of the crest are totally naked. The capitulum, formed by spinulate calyces, is directed externally in a lateral position, whereas the asulcate surface retains an internal position in each lobe. Each capitulum shows well developed overhanging edges. The forked sulcus spermaticus divides in the proximal region of the hemipenial body, each branch extending centrolinearly until the base of the base of the lobes where they take a centrifugal position. One or two lateral enlarged spines are found on each side of the hemipenial body on the easternmost South American specimens (Trinidad, Guyana, Surinam and French Guyana), whereas there are 3 to 6 (generally 5 or 6) lateral enlarged spines on the western South American and Central American populations. Both conditions are found in Venezuela and Peru. There is always one pair of intrasulcar enlarged spines. The basal crotch is ornamented by a pair of large and shallow naked pockets. The hemipenial body is smooth, lacking spinules.

Distribution (Figure 6): From the tropical lowlands of southern Mexico to southwestern Peru, west of Andes, and central Bolivia, east of Andes. Widespread in the coastal regions and Amazonian basin of Colombia, Venezuela, the Guyanas, and in the Amazonian basin of Brazil. Not found south to the Amazon river in the Brazilian states of Amazonas and Pará, except for a specimen caught in Santarém (Pará) (probably in error). Trinidad and Grenada in the Carribean sea.

Remarks: A surprisingly high number of specimens of *Clelia clelia* presented dorsal scale rows in 17-19-17 instead of 19-19-17. All specimens are restricted to northwestern South America, from localities in Venezuela, Ecuador, Peru, and Bolivia. Most specimens with the 17-19-17 pattern also show poorly developed apical pits (specimen AMNH 110582 lacks apical pits). Underwood (1993: 6) already pointed out the existence of specimens from that region with 17 dorsal scales rows, observing that "these are indistinguishable from typical *Clelia* in respect of the other characters considered..."

It follows Underwood (1993) in accounting the 17-19-17 pattern to intraspecific variation since anterior dorsal scale rows seem to be highly variable as exemplified by the occurrence also in *Clelia clelia* of intermediate patterns such as 18-19-17 (3 specimens from Peru) and 21-19-17.

The existence of a broad area of hybridization between *Clelia clelia* and *Clelia scytalina* or *C. equatoriana*, to account for the 17-19-17 pattern and poorly developed apical pits, is discarded since none of the latter two species occur in Bolivia and Peru.

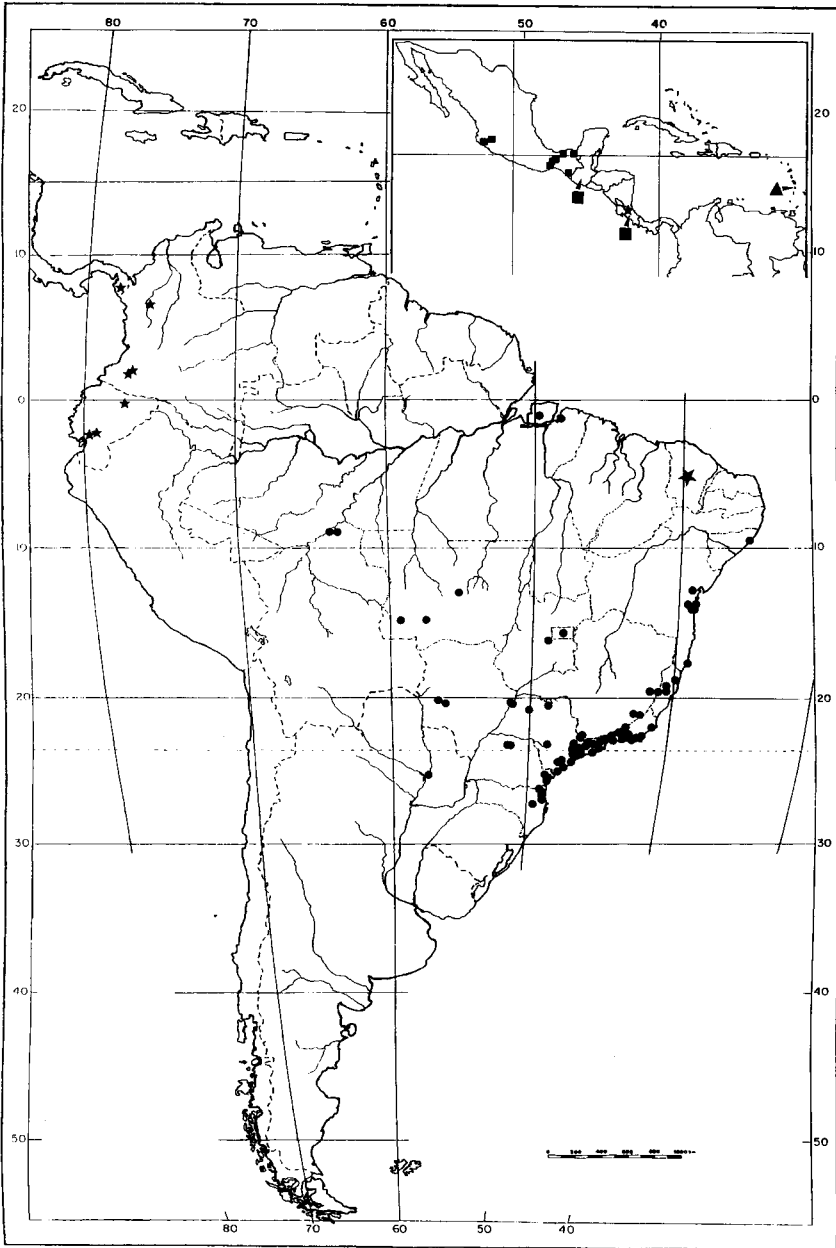


Figure 7- Localities for specimens examined of *Clelia equatoriana* (star), *Clelia errabunda* (Triangle), *Clelia plumbea* (circle), and *Clelia scytalina* (squares). A large square corresponds to a known record for the country without precise locality data.

***Clelia equatoriana* (Amaral, 1924)**

Barbourina equatoriana Amaral, 1924, J. Washington Acad. Sci., 14: 201.

H o l o t y p e : National Museum of Natural History, Smithsonian Institution (USNM) no. 62790, a male from Guayaquil, Ecuador, collected by F. W. Goding in April, 1920.

D i a g n o s i s : A species distinct from all other species of the genus by the complete lack of apical pits in all dorsal scales. Further distinguished from *Clelia clelia* and *C. plumbea* by 17 dorsal scale rows at mid-body, and from *C. errabunda* by a long trachea extending back nearly to the level of the air sac. It differs further from *C. rustica* and *C. bicolor* by the absence of a left lung and dorsally convex Duvernoy's glands.

D e s c r i p t i o n : [16 specimens examined]. Proportions and scutellation: Largest specimen a female 1575mm total length, 175mm tail length; largest male 435mm total, 85mm tail. Tail longer in males [19-21% (\bar{X} = 20%) of total length] than in females [17-19% (\bar{X} = 18%)]. Ventrals higher in females [200-217; \bar{X} = 209.17 \pm 7.19; N= 6] than in males [202-207; \bar{X} = 205.40 \pm 1.94; N= 5]. Subcaudals always divided throughout the tail, higher in males [75-80; \bar{X} = 76.40 \pm 2.07; N= 5] than in females [54-64; \bar{X} = 59.83 \pm 3.97; N= 6]. Dorsal scales in 17-17-17 without apical pits. Loreal present (absent in one specimen); one preocular; two postoculars; 2+3 temporals; 7 supralabials (3-4 in contact with orbit); 8 infralabials.

C o l o r p a t t e r n : Juvenile specimens with a different color pattern from that of adults due to ontogenetic change. All juveniles have a black snout and head with a yellowish-white collar on the neck and posterior part of the head, followed by a black nuchal band ending at the level of the 6th-14th vertebral scale, a red dorsum and an uniformly light cream venter with subcaudals edged with black or completely black. Juveniles frequently present dorsal scales with almost all the distal region pigmented with black instead of only their edges. Adult specimens show subcaudals almost completely black, or heavily pigmented on their edges, leaving only the central region of each scale with a light cream coloration. All specimens below the length of 900 mm retain the juvenile color pattern. Specimens above 900mm varies until 1400mm where all of them show the adult uniform black dorsum; their white nuchal collar and red dorsum are progressively replaced by brown and brownish black until the entire dorsum and head become black. The brownish black dorsal color appears first in the vertebral scale rows and extends ventrally to the flanks and edges of the ventrals. In adults above 1400mm the entire dorsum is black, the infralabial scales, throat, and venter are light cream with frequently more than 30% of the total length of each ventral edged with black, subcaudals frequently completely black.

H e m i p e n i s (Plate 5 B): [based on four everted organs]. Hemipenis deeply bilobed, bicapitate, with long lobes (2.0 longer than wide), each one orna-

mented by spinulate calyces in the sulcate surface and by a lobular crest in the asulcate surface. The lobular crest extends from the distal region of the asulcate side of the hemipenial body (just above the rows of lateral enlarged spines) to the distal tip of each lobe. The areas on each side of the crest are completely naked, except for one flounce in the distal tip of the lobes (present in 2 hemipenes). The capitulum, formed by spinulate calyces, is directed externally in a lateral position, whereas the asulcate surface retains an internal position. Each capitulum shows well developed overhanging edges. The forked sulcus spermaticus divides in the proximal region of the hemipenial body, each branch extending centrolinearly until the base of the lobes where they take a centrifugal position. There are 11 to 13 lateral enlarged spines disposed on 3 rows on each side of the hemipenial body. There is always one intrasulcar enlarged spine on each side of the intrasulcar surface. The basal crotch is ornamented by a pair of large naked pockets. The hemipenial body is smooth, lacking spinules.

Distribution (Figure 7): From northern Costa Rica through Panama and Colombia to Amazonian Ecuador.

***Clelia errabunda* (Underwood, 1993)**

Brachyruton cloelia Duméril, Bibron, and Duméril, 1854, *Erpétologie générale ou histoire naturelle complète des Reptiles*, tom. 7 (2): 1007 (in part).

Oxyrhopus cloelia Boulenger, 1896, *Catalogue of the snakes in the British Museum (Natural History)*, vol. 3: 108 (in part).

Clelia errabunda Underwood, 1993, *Bull. Nat. Hist. Mus.*, 59 (1): 3.

Holotype: Natural History Museum, London (BMNH) no. 89.8.14.25, a male from St. Lucia, West Indies, collected by G. A. Ramage.

Paratype: Museum national d'Histoire naturelle de Paris (MNHN) no. 7598, a male from St. Lucia, West Indies.

Diagnosis: A species distinguished from *C. clelia*, *C. equatoriana*, *C. scytalina*, and *C. plumbea* by the short trachea extending no more than five ventral scale units beyond the tip of the ventricle. Differs from *C. rustica* and *C. bicolor* by the absence of a left lung and dorsally convex Duvernoy's glands. Further distinguished from *C. rustica*, *C. bicolor*, *C. clelia* and *C. plumbea* by 17 dorsal scale-rows at midbody.

Description: [3 specimens examined]. Proportions and scutellation: Largest specimen a female 1640mm total length, 270mm tail length (amputated); largest male 1450mm total, 290mm tail (amputated). Ventrals higher in females [230-234; \bar{X} = 232 \pm 2.82; N= 2] than in males [224]. Subcaudals always divided throughout the tail, higher in males [84¹] than in females [71].

¹ Subcaudal scale count taken from Underwood (1993: 8); the only male specimen available in this study have a broken tail with only 75 subcaudal scales.

Dorsal scales in 17-17-17 with two apical pits. Loreal always present; one preocular; two postoculars; 2+3 temporals; 7 supralabials (3-4 in contact with orbit); 8 infralabials.

Color pattern: Juvenile color pattern unknown but most probably similar to the one described for *C. scytalina* and *C. equatoriana*. Adult specimens show subcaudals almost completely black, or heavily pigmented on their edges, leaving only the central region of each scale with a light cream coloration. The entire dorsum is black, the infralabial scales, throat, and venter are light cream with no more than 30% of the total length of each ventral edged with black.

Hemipenis (Plate 5 A): [based on one everted organ]. Hemipenis deeply bilobed, bicipitate, with long lobes (2.0 longer than wide), each one ornamented by spinulate calyces in the sulcate surface and by a lobular crest in the asulcate surface. The lobular crest extends from the distal region of the asulcate side of the hemipenial body, just above the rows of lateral enlarged spines, to the distal tip of each lobe. Only the distal 1/3 is not inflated. The areas on each side of the crest are nearly naked, except for one frounce in the distal region of one of the lobes. The capitulum, formed by spinulate calyces, is directed externally in a lateral position, whereas the asulcate surface retains an internal position in each lobe. Each capitulum shows well developed overhanging edges. The forked sulcus spermaticus divides in the proximal region of the hemipenial body, each branch extending centrolinearly until the base of the lobes where they take a centrifugal position. There are 27-28 lateral enlarged spines disposed on 5 rows on each side of the hemipenial body. One intrasulcar enlarged spine is present on the right side of the intrasulcar surface, whereas the other side bears two spines. The basal crotch is ornamented by a pair of large naked pockets. The hemipenial body is smooth, lacking spinules.

Distribution (Figure 7): restricted to St Lucia, Lesser West Indies.

Remarks: Underwood (1993) considered the short trachea of *C. errabunda* as a "primitive feature found in hundreds of other species of snakes, suggesting that this species is primitive in regard to the other species of the genus. However, if one consider the possession of 17 midbody dorsal scale rows as a synapomorphy of *C. scytalina*, *C. equatoriana*, and *C. errabunda*, it appears more parsimonious to interpret the short trachea of the latter as a reversal since the former two species as well as *Clelia clelia*, *C. plumbea* and the genus *Boiruna* retain an extended trachea. In addition, the midbody rows appear to be a stable character in all specimens examined, contrary to the highly variable anterior dorsal scale rows. For these reasons, the presence of a short trachea in *C. errabunda* is considered an autapomorphy instead of a plesiomorphy.

Underwood (1993) also interpreted the absence of a left lung as a synapomorphy shared by *C. clelia*, *C. equatoriana*, *C. scytalina* and *C. errabunda*. Underwood may be right in interpreting the left lung and short trachea as inde-

pendent characters since various south American taxa show a short trachea but lack a left lung (e.g., *Liophis*, *Erythrolamprus*, *Tropidodryas*, *Drepanoides*, *Hydrops*). However, all taxa presenting a long trachea also lack the left lung, suggesting that the extension of the trachea leads invariably to the loss of this lung. In this context, the short trachea of *C. errabunda* represents a reversal.

In addition to the pseudoboine taxa referred above, the genera *Hydrodynastes*, *Waglerophis*, and some species of *Xenodon* also show an extended trachea and lack the left lung, suggesting that these two dependent conditions may well represent a synapomorphy of a more inclusive group within the South American xenodontines. An expanded phylogenetic analysis including all South American clades is needed to address this question.

Clelia plumbea (Wied, 1820)

Coluber plumbeus Wied, 1820, Reise nach Brasilien in den Jahren 1815 bis 1817, vol. 1: 95.

Holotype: American Museum of Natural History (AMNH) no. 3481, an adult male from São João, north of Cabo Frio, Rio de Janeiro, Brasil.

Diagnosis: A species distinguished from all other species of the genus by a completely spineless hemipenis. It differs from *C. errabunda*, *C. scytalina* and *C. equatoriana* by the presence of 19 dorsal scale rows at midbody, and from *C. bicolor* and *C. rustica* by the lack of a left lung and dorsally convex Duvernoy's glands. Further distinguished from *C. errabunda* by a trachea extending through the ventral surface of the right lung to the level of the terminal air sac.

Description: [188 specimens examined]. proportions and scutellation: Largest specimen a female 2585mm total length, 420mm tail length (amputated); largest male 1810mm total, 350mm tail (amputated). Tail longer in males [20-22% (\bar{X} = 21%) of total length] than in females [16-19% (\bar{X} = 17%)]. Ventrals higher in females [226-243; \bar{X} = 233.90 \pm 3.29; N= 60] than in males [198-230; \bar{X} = 218.68 \pm 5.03; N= 63]. Subcaudals always divided throughout the tail, higher in males [77-97; \bar{X} = 85.95 \pm 3.97; N= 63] than in females [70-84; \bar{X} = 76.83 \pm 3.35; N= 60]. Dorsal scales in 19-19-17 with two apical pits. Loreal usually present (absent in 27% of specimens); one preocular (rarely two); two postoculars; 2+3 temporals (rarely 1+3 or 2+2); 7 supralabials (3-4 in contact with orbit); 8 infralabials (rarely 9).

Color pattern (Figures 1 C,D and 2 A,B): Juvenile specimens with a different dorsal color pattern from that of adult individuals due to ontogenetic change. All juvenile specimens are uniformly light cream ventrally, with only some specimens showing subcaudals edged with black medially or being completely black. All specimens below the length of 900 mm show a red dorsum typical of the juvenile coloration, whereas above this length specimens

show an uniformly brownish to black dorsum but retain a more or less visible collar in the neck. Above the length of 1400mm, all specimens examined show an uniform black dorsum characteristic of the adult pattern. All specimens show dorsal scales with black apical tip and darker edges when the dorsum is not uniformly black.

Juvenile below 650mm show a black head from the tip of the snout to the posterior edge of the frontal and postorbital scales dorsally, fifth supralabial and fourth infralabial laterally, followed by a light collar ending at the level of the 3rd/4th vertebral scale, followed by a black nuchal band ending at the level of the 7th/14th vertebral scale. All specimens, except three, present a yellowish (reddish in life) dorsum. The three specimens with unusual dorsal pattern are young individuals with less than 500mm: the first specimen (IB 48820) shows a normal color pattern and scutellation (except for the lack of loreal scales) differing by the presence of a thin black dorsal stripe passing through the middle of the vertebral scales across all the body; the second one (IB 55606) presents more pigmented vertebral and paravertebral scales with two more or less visible black stripes in each side of the dorsum at the level of the 2nd/3rd paravertebral scales, forming a visible but weakly defined large dorsal stripe; the third specimen shows a clearly defined black dorsal stripe as the one present in young individuals of the genus *Boiruna*, the stripe being of 3 to 4 scales width are confluent with the black nuchal collar. However, these specimens clearly belong to *C. plumbea* since they present typical ventral and subcaudal counts. Specimens from 700mm to 1400mm show an uniform brownish color pattern of the dorsum and the light collar is absent (turned to a brownish color) or, when present, is confined to the first 3 to 4 rows of dorsal scales (the parietal and temporal scales showing a brownish color pattern). Specimens larger than 1400mm show an uniform black dorsum typical of the adult color pattern. The black color of the dorsum invades the lateral edge of the ventral scales in all adult specimens, not exceeding 35% of the total length of each ventral scale. Contrary to the juvenile pattern, the subcaudal scales are generally edged with black or completely black in the posterior half of the tail, being rarely totally light cream.

H e m i p e n i s (Plate 6): [based on six everted organs]. Hemipenis deeply bilobed, bicapitate, with long lobes (2.0 longer than wide), each one ornamented by spinulate calyces in the sulcate surface and by a lobular crest with horizontal flounces in the asulcate surface. The lobular crest extends from the distal region of the asulcate side to the distal tip of each lobe. The flounces are in very few number (no more than 3), vestigial, and positioned laterally and medially to the crest. Some flounces connect the crest with the edge of the capitulum. Except for the vestigial flounces, the areas on each side of the crest are totally naked. The capitulum formed by the spinulate calyces is directed externally, in a lateral position, whereas the asulcate surface shows an internal posi-

tion. Each capitulum shows well developed overhanging edges. The forked sulcus spermaticus divides in the proximal region of the hemipenial body, each branch extending centrolinearly, and almost parallel to each other, until the base of the lobes where they take a centrifugal position through the distal tip of the lobes. The hemipenial body is smooth, lacking spinules, lateral enlarged spines and intrasulcar enlarged spines. The basal crotch is ornamented by a pair of large and shallow naked pockets.

Distribution (Figure 7): From south of the Amazon river, Brazilian Amazonian basin, through open formations (Cerrados) of central Brazil and São Paulo, to Mato Grosso do Sul and Paraguay and the Atlantic rainforest of northeastern, southeastern and southern Brazil.

Remarks: The holotype is a male with spineless hemipenes which conform with the description given above.

Clelia plumbea and *Boiruna maculata*, which are sympatric in almost all their range, have shown to be difficult to characterize by color pattern since adult specimens are very similar externally. However, two important differences separate these species promptly: (1) an almost totally black venter from the tip of the tail to at least the anterior 1/4 of the body in adult specimens of *B. maculata* (an almost completely light cream venter in *C. plumbea*); (2) a lower number of subcaudal scales in *B. maculata* (60-73 in males and 50-63 in females of *B. maculata*; 81-97 in males and 70-84 in females of *C. plumbea*). Differences of coloration are subject to variation within each species and may remain a source of confusion during determination. However, added to the color pattern, the number of subcaudal scales proved to be decisive in the determination of the specimens analyzed (the only limitation being that the tail of the specimen must be intact). The presence of a black vertebral stripe in juveniles of *B. maculata* differentiates them promptly from young specimens of *C. plumbea* which are almost completely reddish dorsally.

***Clelia rustica* (Cope, 1878)**

Oxyrrhopus rusticus Cope, 1878, Proc. Am. Philos. Soc., 17: 92.

Holotype: Academy of natural Sciences, Philadelphia (ANSP) no. 11326, type locality unknown, supposedly the Argentine Confederation.

Diagnosis: Differs from *Clelia clelia*, *C. plumbea*, *C. equatoriana*, *C. scytalina*, and *C. errabunda* by the presence of a left lung and dorsally concave Duvernoy's glands. Further distinguished from the first four species by a short trachea extending no more than five ventral scale units beyond the tip of the ventricle, and from the last three species by 19 dorsal scale-rows at mid-body. Differs from *C. bicolor* by 7 supralabial and 8 infralabial scales and the absence of a white stripe through the supralabial scales.

Description: [31 specimens examined]. Proportions and scutellation: Largest specimen a female 1310mm total length, 185mm tail length; largest male 1200mm total, 225mm tail (amputated). Tail longer in males [17-20% (\bar{X} = 18%) of total length] than in females [13-15% (\bar{X} = 14%)]. Ventrals higher in females [213-231; \bar{X} = 220.30 \pm 5.42; N= 8] than in males [190-208; \bar{X} = 205.00 \pm 5.06; N= 12]. Subcaudals divided throughout the tail, higher in males [54-64; \bar{X} = 60.58 \pm 2.53; N= 12] than in females [49-56; \bar{X} = 51.50 \pm 2.50; N= 8]. Dorsal scales in 19-19-17 with two apical pits and vertebral scale row undifferentiated. Loreal always present; one preocular; two postoculars; 2+3 temporals (rarely 1+2); 7 supralabials (3-4 in contact with orbit); 8 infralabials.

Color pattern: Juvenile and adult specimens retain the same brownish color pattern, the former differing only by lighter flanks and the presence of a light brown nuchal collar according to Halloy and Laurent (1984) (however, see figure 1 of these authors where the nuchal collar shows a reddish color pattern). The light collar disappears very early and specimens above 500mm usually have lost it. Young specimens lack a clearly differentiated black vertebral stripe. All specimens present a brownish pattern from the tip of the snout to the tip of the tail dorsally. The supralabials are always more or less invaded dorsally by brown coloration. All specimens show the basal region of dorsal scales edged by black pigment from the temporal region to tip of the tail, being more or less pigmented according to their degree of melanism. A specimen with a heavily pigmented dorsum generally also shows a heavily pigmented venter. The infralabials, throat, and the anterior 1/4 of the venter are light brown. Young specimens below 500mm usually show a light cream or slightly pigmented venter. In adult specimens, ventral accentuation of the brownish/black pigmentation shows great variation, represented by individuals with an almost completely light cream venter to individuals with almost completely pigmented ventral and subcaudal scales except on their distal edge. Contrary to the pattern shown by *Boiruna* and *Clelia* where the black pigmentation invades the lateral edges of each ventral scale, in *C. rustica* invasion is always from the anterior edge of each ventral scale to the posterior edge, the latter remaining light cream even in the most melanistic specimens. Such pattern of pigmentation is also present in subcaudals, lighter specimens showing only slightly more pigmented subcaudals than ventrals. Dorsal scales also show the same pattern of pigmentation with their anterior region darker than their posterior region. In addition, vertebral and paravertebral scale rows are always lighter than lateral scale rows.

Hemipenis (Plate 7): [based on two everted organs]. Hemipenis deeply bilobed, bicapitate, with long lobes (2.0 longer than wide), each one ornamented by spinulate calyces in the sulcate surface and by a lobular crest with large horizontal flounces in the asulcate surface. The lobular crest extends from the distal region of the asulcate side of the hemipenial body, just above

the rows of lateral enlarged spines, to the distal tip of each lobe. The flounces are few in number (no more than 6) and disposed laterally and medially to the crest, connecting the latter with the edge of the capitulum. Except for the flounces, the areas on each side of the crest are totally naked. The capitulum, formed by spinulate calyces, is directed externally in a lateral position. The asulcate surface of the lobes retains an internal position. Each capitulum shows well developed overhanging edges. The forked sulcus spermaticus divides in the middle of the hemipenial body, each branch extending centrolinearly until the base of the lobes where they take a centrifugal position. There are 16 to 17 lateral enlarged spines on each side of the hemipenial body disposed on 3 or 4 rows. There are always 2 enlarged spines on each side of the intrasulcar region of the body. The basal crotch is ornamented by a pair of large and shallow naked pockets. The hemipenial body is covered by spinules.

D i s t r i b u t i o n (Figure 5): From southern Minas Gerais, Brazil, south through southeastern and southern Brazil to Uruguay and Southern Argentina (Achaval, 1973; Cei, 1993).

Clelia scytalina (Cope, 1867)

Scolecophis scytalinus Cope, 1867, Proc. Acad. Nat. Sci. Philadelphia, [1866]: 320.

Oxyrhopus proximus Bocourt, 1897, Mission scientifique au Mexique et dans l'Amérique Centrale, livr. 15: 856. Syntypes: Muséum national d'Histoire naturelle de Paris (MNHN) no. 7871, 1899.54, 1899.55 (three individuals); Instituto Butantan (IB) no. 17743. Type locality: Western slope of Volcán Atitlan, Guatemala.

Clelia clelia immaculata Smith, 1942, Proc. U.S. Natl. Mus., 92: 394 (in part). Holotype: National Museum of Natural History, Smithsonian Institution (USNM) no. 24966. Type locality: guadalajara, Jalisco, Mexico.

H o l o t y p e: National Museum of Natural History, Smithsonian Institution (USNM) no. 6581, from Tabasco, Mexico.

D i a g n o s i s: Differs from *Clelia plumbea*, *C. clelia*, *C. bicolor*, and *C. rustica* by 17 dorsal scale rows at midbody, and from *C. errabunda*, *C. bicolor*, and *C. rustica* by the presence of a long trachea extending back nearly to the level of the air sac. Further distinguished from *C. bicolor* and *C. rustica* by the absence of a left lung and dorsally convex Duvernoy's glands. It differs from *C. equatoriana* by the presence of well developed apical pits in the dorsal scales.

D e s c r i p t i o n: [22 specimens examined]. Proportions and scutellation: Largest specimen a male 1540mm total length, 350mm tail length; largest female 1415mm total, 225mm tail. Tail longer in males [20-22% (\bar{X} = 21%) of total length] than in females [15-19% (\bar{X} = 17%)]. ventrals higher in females [218-221; \bar{X} = 219.33 \pm 1.52; N= 3] than in males [203-216; \bar{X} = 206.78 \pm 3.89; N= 9]. Subcaudals always divided throughout the tail, higher in males [78-90; \bar{X} = 84.44 \pm 3.94; N= 9] than in females [75-80; \bar{X} = 77.00 \pm 2.64; N= 3] Dorsal scales in 17-17-17 with two apical pits (rarely 19-17-17). Loreal always pre-

sent; one preocular; two postoculars; 2+3 temporals; 7 supralabials (3-4 in contact with orbit); 8 infralabials.

C o l o r p a t t e r n : Juvenile specimens with a different color pattern from that of adults due to ontogenetic change. Juveniles show a black snout and head with a yellowish collar (probably light cream in life) on the neck and posterior part of the head, followed by a black nuchal band ending at the level of the 6th-11th vertebral scale, a red dorsum and an uniformly light cream venter, dorsal scales with the posterior tip and edges pigmented with black. Subcaudal pigmentation in adult specimens similar to that of *C. clelia*, almost light cream with black edges. All specimens below the length of 900 mm retain the juvenile color pattern. Specimens above 900mm varies until 1300mm where all specimens show an adult uniform black dorsum. No intermediate specimens have been examined. However, progressive replacement of the white nuchal collar and red dorsum by brown and brownish black coloration certainly occurs in subadult specimens. In adults above 1300mm the entire dorsum is black, the infralabial scales, throat, and venter are light cream with no more than 30% of the total length of each ventral edged with black. Subcaudals frequently edged with black.

H e m i p e n i s (Plate 8): [based on two everted organs]. Hemipenis deeply bilobed, bicapitate, with long lobes (2.0 longer than wide), each one ornamented by spinulate calyces in the sulcate surface and by a lobular crest in the asulcate surface. The lobular crest extends from the distal region of the asulcate side of the hemipenial body, just above the rows of lateral enlarged spines, to the distal tip of each lobe. The areas on each side of the crest are completely naked, except for one flounce in the distal tip of the lobes of one hemipenis. The capitulum, formed by spinulate calyces, is directed externally in a lateral position. The asulcate surface retains an internal position in each lobe. Each capitulum shows well developed overhanging edges. The forked sulcus spermaticus divides in the proximal region of the hemipenial body, each branch extending centrolinearly until the base of the lobes where they take a centrifugal position. There are 8 to 11 lateral enlarged spines disposed on 2 rows on each side of the hemipenial body. There is always one intrasulcar enlarged spine on each side of the intrasulcar surface. The basal crotch is ornamented by a pair of large naked pockets. The hemipenial body is smooth, lacking spinules.

D i s t r i b u t i o n (Figure 7): From Jalisco on Pacific slopes and Veracruz on Atlantic slopes, Mexico, southward to Costa Rica and Panama (Auth, 1994). In South America, present in Colombia and Ecuador (Pérez-Santos and Moreno, 1986, 1991).

R e m a r k s : Cope (1867) described this species based on a specimen caught "near Tabasco" by Dr. Berendt. Two localities are known in Mexico with this name: the state of Tabasco and the city of Tabasco in the state of Zacatecas.

The extension of the species' range to the state of Jalisco (two specimens: KU 67646, 95766) validates the possibility of Cope's specimen being from near the city of Tabasco instead of the state of Tabasco [Casas-Andreu (1982) and Smith and Perez-Higareda (1989) commented earlier upon the specimen KU 67646]. However, this locality is here viewed to be in the state of Yucatán, near the border of the state of Tabasco, since another specimen collected by Dr. Berendt and described by Cope came from that region [*Coluber flavirufus*, described from Yucatán but "found also at Tabasco by Dr. Berendt" (Cope, 1867: 319)]. Dixon et al. (1962) identified the specimen KU 67646 as a *Clelia clelia clelia*, whereas it is a typical *C. scytalina* since only the neck shows 19 dorsal scale rows, almost all the body presenting 17 scale rows. With this specimen properly identified, no more Mexican record exists for *Clelia clelia* north of the Yucatán Peninsula (see also Flores-Villela, 1993). The northward extension of the range of *C. scytalina* as far as Jalisco on Pacific slope is here confirmed (Casas-Andreu, 1982; Smith and Perez-Higareda, 1989).

KEY TO SPECIES OF *BOIRUNA* AND *CLELIA*

Even though the species of *Clelia* and *Boiruna* are easily distinguished by their hemipenial morphology, writing a dichotomous key for both sexes of these species based only on external has proven difficult because of their great similarity. For this reason, internal features are added to the key in order to complement the external character data. The internal characters used are easy to visualize and need only slight dissection. For example, to determine the shape of the dorsal surface of the Duvernoy's glands, only a small incision between the posterior supralabial scales and the gland is needed to separate the former from the latter. This character can be determine very easily without any incision in juveniles since the glands are visible under their thin scales.

The distinct color pattern shown in juvenile and adult specimens of *Clelia* and *Boiruna* represents an additional difficulty to the preparation of a key. For this reason dichotomous keys are presented separately for juveniles and adults.

***Dichotomous key for juvenile specimens presenting a reddish or bicolored dorsum and a white nuchal collar*²**

1. Specimens with a black longitudinal vertebral stripe and reddish flanks, or with an uniform brown dorsum.....2
 - Specimens with an almost completely red dorsum (yellowish in preservative)5
2. Dorsal surface of Duvernoy's glands convex; left lung absent; males with hemipenes

² *Clelia rustica* represents an exception since young individuals retain the adult's brown coloration of dorsum. However, they retain a vestigial light nuchal collar. Halloy and Laurent (1984) furnish a color photograph which illustrates with accuracy the juvenile color pattern.

- showing large shallow calyces on the asulcate surface of the lobes3
 Dorsal surface of Duvernoy's glands concave; left lung present; males with hemipenes showing vestiges of calyces on the asulcate surface of the lobes, a pair of large naked pockets in the basal crotch, and intrasulcar spines (yet not calcified)4
3. Hemipenis bicapitate and spineless; 68-79 subcaudal scales in males and 60-75 in females; bodenaponeurosis absent*Boiruna sertaneja*
 Hemipenis semicapitate and spiny; 60-73 subcaudal scales in males and 50-63 in females; bodenaponeurosis present*Boiruna maculata*
4. Head uniform brown except for the supralabial scales which are almost completely white; dorsum bicolored with a black longitudinal vertebral stripe and light reddish flanks (yellowish in preservative), almost identical to the adult; eight supralabial scales*Clelia bicolor*
 Head and supralabial scales uniform brown; dorsum uniform brown, almost identical to the adult, except for the presence of a vestigial nuchal collar; seven supralabial scales*Clelia rustica*
5. Hemipenis spineless*Clelia plumbea*
 Hemipenis spiny6
6. 19 dorsal scale rows at midbody*Clelia clelia*
 17 dorsal scale rows at midbody7
7. A short trachea, extending no more than five ventral scale units beyond the ventricle (left lung absent)*Clelia errabunda*
 A long trachea, extending very far beyond the ventricle, throughout all the ventral surface of the right lung, until the air sac (left lung also absent)8
8. Apical pits present*Clelia scytalina*
 Apical pits absent*Clelia equatoriana*

Dichotomous key for subadult and adult specimens presenting an uniform black dorsum

1. Specimens with at least the posterior half of the venter (including the tail) almost completely black; males with hemipenes showing large shallow calyces in the asulcate surface of the lobes2
 Specimens with a light cream venter or heavily mottled with brown pigmentation; males with hemipenes showing vestiges of calyces or a papillate crest in the asulcate surface of the lobes, a pair of large naked pockets in the basal crotch, and intrasulcar spines3
2. Hemipenis bicapitate and spineless; 68-79 subcaudal scales in males and 60-75 in females; bodenaponeurosis absent*Boiruna sertaneja*
 Hemipenis semicapitate and spiny; 60-73 subcaudal scales in males and 50-63 in females; bodenaponeurosis present*Boiruna maculata*³
3. Dorsal shape of Duvernoy's glands concave; left lung present4
 Dorsal surface of Duvernoy's glands convex; left lung absent5

³ Southern population may present a light cream venter (see description of the species).

- 4 Venter mottled with brown pigmentation; dorsum uniform brown; seven supralabial scales *Clelia rustica*
 Venter light cream; dorsum bicolored with a black longitudinal vertebral stripe and light reddish flanks (yellowish in preservative); eight supralabial scales *Clelia bicolor*
5. Hemipenis spineless *Clelia plumbea*
 Hemipenis spiny 6
6. 19 dorsal scale rows at midbody *Clelia clelia*
 17 dorsal scale rows at midbody 7
7. A short trachea, extending no more than five ventral scale units beyond the ventricle left lung absent) *Clelia errabunda*
 A long trachea, extending very far beyond the ventricle, throughout all the ventral surface of the right lung, until the air sac (left lung also absent) 8
8. Apical pits present *Clelia scyotalina*
 Apical pits absent *Clelia equatoriana*

DISCUSSION AND CONCLUSION

Scrocchi and Vinãs (1990) analyzed the correlation between the number of subcaudal scales and the latitude for specimens of *Clelia clelia* and “*C. occipitolutea*” from Argentina, and concluded that differences in scale counts among these two species are due to clinal variation where subcaudal numbers increase while the latitude decreases. Based on these results, they synonymized “*C. occipitolutea*” with *C. clelia clelia*. This conclusion is rejected on the basis of new evidences described in the present paper, where *B. maculata* (*C. occipitolutea* of Scrocchi and Vinãs) is clearly distinguished from *C. plumbea* and *C. clelia* by (1) a semicapitate hemipenis, (2) the presence of well developed and shallow calyces on the asulcate surface of the lobes, (3) a pair of weakly defined pockets on the lobular crotch, (4) no enlarged intrasulcar spines, (5) the presence of a well developed bodenaponeurosis of the adductor muscles, and (6) a lower number of subcaudal scales (60-73 in males, 50-63 in females of *B. maculata*; 77-97 in males, 70-84 in females of *Clelia plumbea*; 81-98 in males, 70-91 in females of *Clelia clelia*) (Figure 8).

However, Scrocchi and Vinãs (1990) were right at some extent when pointing to a possible latitudinal cline involving scale counts. Ventral and subcaudal counts were analyzed in different geographic samples totalizing 92 specimens of *Boiruna maculata* and 128 specimens of *Clelia plumbea*. The results corroborated the existence of latitudinal clinal variation for ventrals in the former species and for subcaudals in the latter (Figure 9 and Table 1). Unfortunately, only two close localities were available for females of *B. maculata* with complete subcaudal scale counts which resulted in the exclusion of these specimens from the analysis.

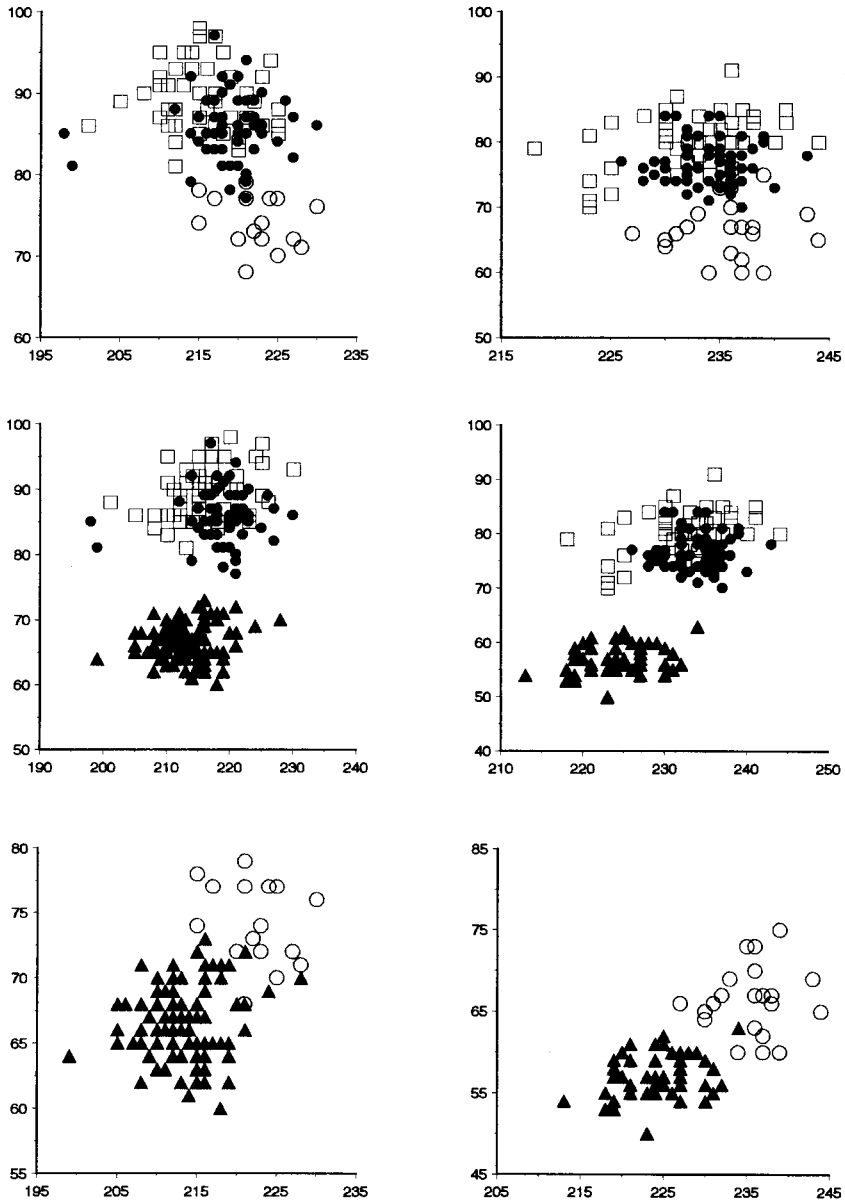


Figure 8- Distribution of the number of ventral scales (horizontal axis) by the number of subcaudal scales (vertical axis) in males and females of: *Boiruna maculata* (solid triangle), *Boiruna sertaneja* (open circle), *Clelia clelia* (open square), and *Clelia plumbea* (solid circle). Left column = males; right column = females.

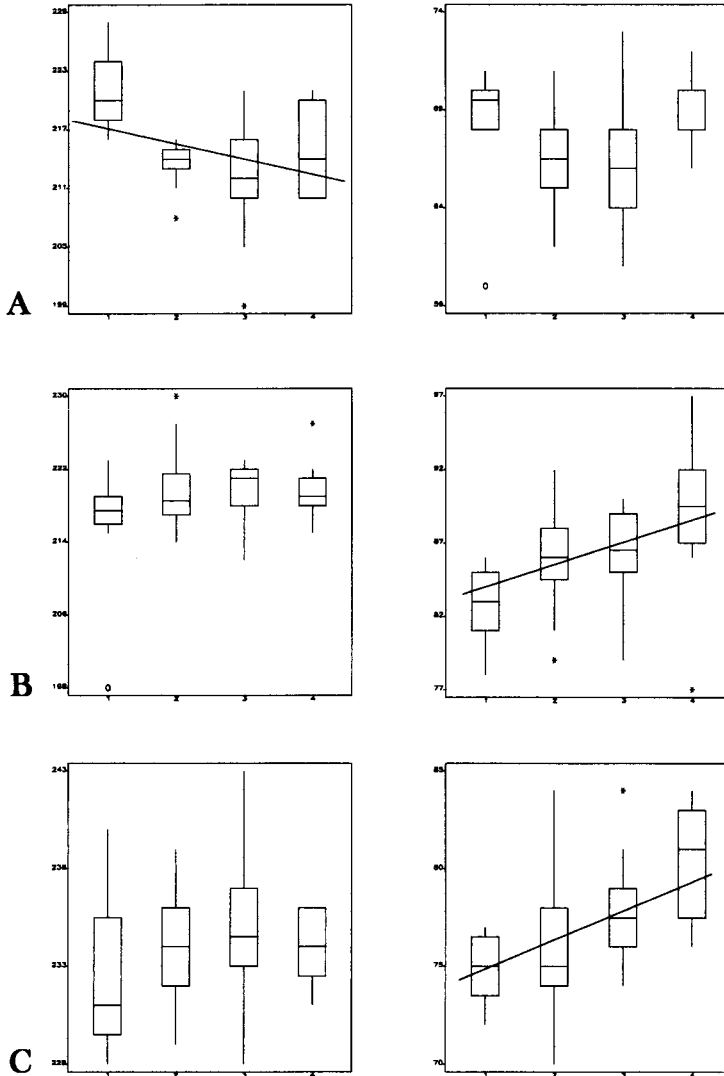


Figure 9- Distribution of the number of ventral and subcaudal scales (vertical axis) by geographic regions (horizontal axis) in: (A) males of *Boiruna maculata* (ventrals: $R_s = -0.21$; subcaudals: $R_s = -0.00$; $n=92$), (B) males of *Clelia plumbea* (ventrals: $R_s = 0.21$; subcaudals: $R_s = 0.52$; $n=71$), and (C) females of *Clelia plumbea* (ventrals: $R_s = 0.16$; subcaudals: $R_s = 0.44$; $n=57$). Left column = ventrals; right column = subcaudals. Specimens were grouped according to regions of similar latitude: 1 = Argentina; 2 = Rio Grande do Sul, Paraná, Misiones; 3 = São Paulo, Mato Grosso do Sul; 4 = Minas Gerais, Goiás. Range, median, and standard deviation are indicated for each sample. R_s = Spearman rank correlation coefficient. The three figured regressions demonstrated statistical significance at the level of 0.01.

	Homogeneous groups	Species	N	Mean	Analysis of variance
A	*	<i>C. bicolor</i>	16	178.12	F = 316.30 P < 0.001
	*	<i>C. equatoriana</i>	6	209.16	
	*	<i>C. scytalina</i>	3	219.33	
	*	<i>C. rustica</i>	8	220.37	
	*	<i>B. maculata</i>	46	224.23	
	*	<i>C. clelia</i>	46	232.15	
	*	<i>B. sertaneja</i>	21	235.61	
B	*	<i>C. rustica</i>	8	51.50	F = 255.69 P < 0.001
	*	<i>C. bicolor</i>	16	56.56	
	*	<i>B. maculata</i>	46	57.21	
	*	<i>C. equatoriana</i>	6	59.83	
	*	<i>B. sertaneja</i>	1	66.38	
	*	<i>C. plumbea</i>	60	76.83	
	*	<i>C. scytalina</i>	3	77.00	
	*	<i>C. clelia</i>	46	80.19	
C	*	<i>C. bicolor</i>	10	169.40	F = 147.44 P < 0.001
	*	<i>C. rustica</i>	12	205.00	
	*	<i>C. equatoriana</i>	5	205.40	
	*	<i>C. scytalina</i>	9	206.77	
	*	<i>B. maculata</i>	92	213.31	
	*	<i>C. clelia</i>	51	215.86	
	*	<i>B. sertaneja</i>	16	222.31	
D	*	<i>C. rustica</i>	12	60.58	F = 332.22 P < 0.001
	*	<i>B. maculata</i>	92	66.54	
	*	<i>C. bicolor</i>	10	68.60	
	*	<i>B. sertaneja</i>	16	74.18	
	*	<i>C. equatoriana</i>	5	76.40	
	*	<i>C. scytalina</i>	9	84.44	
	*	<i>C. plumbea</i>	63	85.95	
		<i>C. clelia</i>	51	89.52	

Table 1- Multiple range analysis, by the 95 percent Duncan test, for ventrals and subcaudals in males and females of the species belonging to *Boiruna* and *Clelia*. A) ventrals in females; B) subcaudals in females; C) ventrals in males; D) subcaudals in males.

In a preliminary phylogenetic analysis of the interrelationships of the species belonging to the eight genera of Pseudoboini, the genus *Boiruna* appeared unequivocally as the sister group of the remaining Pseudoboini (Zaher, 1994a). Synapomorphies supporting the monophyly of all other parts of the clade Pseudoboini at the exclusion of *Boiruna* are (1) the presence of enlarged intrasulcar spines, (2) the reduction of the large shallow calyces to few longitudinal flounces, and (3) the presence of a pair of large shallow pockets in the lobular crotch.

Enlarged intrasulcar spines are found only in the pseudoboines, in *Tropidodryas*, *laltris*, and in some Antillean species of the genus *Alsophis*. *Boiruna*, and all remaining Neotropical genera investigated lack these spines (Zaher, 1994a). The large shallow calyces present in *Boiruna* are reduced and almost vestigial in the remaining pseudoboine genera. Large calyces are present in most South American xenodontines (sensu Zaher, 1995), showing various different conditions of reduction, and always markedly distinct from that shown by the pseudoboines. Large calyces are completely absent in the Xenodontini, Hydropsini, various species of *Arrhyton* and *Alsophis* in *Psomophis*, and *Conophis* (Zaher, 1994a). A pair of large shallow and naked pockets in the basal crotch is unique to the pseudoboines, at the exclusion of *Boiruna*. A similar, but not homologous, structure is present in *Saphenophis tristriatus* (pers. obs.). A "lobular crest" is present in species of the genera *Alsophis*, *Uromacer*, *Arrhyton*, *Antillophis*, and in *Darlingtonia* and *Hydrodynastes*. The structures present in those genera, except for the latter, are clearly distinct from the one present in the pseudoboines (Zaher, 1994a). The pattern shown by *Hydrodynastes* resembles closely to the one present in *B. maculata*, with a distinct lobular crest inflated only basally. The very similar hemipenial morphology of the basal crotch and asulcate surface of the lobes of *Boiruna* and *Hydrodynastes* may provide evidences that the latter is the sister-group of the Pseudoboini. *Boiruna sertaneja* shows an almost totally straight lobular crest which is only weakly inflated on its proximal region.

Although *Boiruna* has no unambiguous apomorphies, the black posterior region of the venter in most populations of the two species is likely to be apomorphic and diagnostic of the genus.

ACKNOWLEDGMENTS

I am indebted to Alain Dubois, Ulisses Caramaschi, José Cei, and Marcelo Napoli for their constant support during the elaboration of this work. I am grateful to Alain Dubois (MNHN), Jean Pierre Gasc (AC), Giuseppe Puerto (IB), Paulo Emilio Vanzolini, Ana Maria M. Pamos-Costa (MZUSP), Anibal Melgareja (IVB), Antônio J. S. Argolo (CEPEC), George Zug, Kevin de Queiroz, Roy McDiarmid (USNM), Chuck Myers, Darrel Frost (AMNH), William Duellman, Linda Trueb (KU), John Cadle (MCZ), and Colin McCarthy (BMNH) for providing working facilities during my visits to their institutions. For lending comparative specimens in their care, I thank Diva M. Borges (UFC), Gustavo Scrocchi (FML), Douglas Rossman (LSUMZ), Gustavo Carrizo (MACN),

Elena Gavetti (MRSN and MZUT). Tania Brazil Nunes provided additional information concerning literature and Roger Bour advised on matters of nomenclatural order. Paulo Emilio Vanzolini and Giuseppe Puorto provided precious help in finding difficult localities. Marcelo Napoli gave advices on the elaboration of the statistical tests.

RIASSUNTO

Viene creato un nuovo genere di pseudoboio, *Boiruna*, al fine di includere due specie sudamericane di serpenti xenodontini: *Oxyrhopus maculatus* Boulenger, 1896 (specie tipo) ed una nuova specie proveniente dalle formazioni xerixhe aperte delle pianure del Brasile nordorientale. Questo genere differisce da tutti gli altri generi di pseudoboio per la sua morfologia emipenica plesiomorfica e per la colorazione del ventre, totalmente nero posteriormente. Le specie del genere *Clelia* superficialmente simili a quelle del nuovo genere sono conseguentemente riviste criticamente.

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SPECIMENS EXAMINED

The followed abbreviations of collections are used in the text and in the list of specimens given below: AC, Laboratoire d'Anatomie Comparée, Museum national d'Histoire naturelle de Paris; AMNH, American Museum of Natural History, New York; BMNH, Natural History Museum, London; CEPEC, Centro de Pesquisas do Cacau, Itabuna; FML, Fundación Miguel Lillo, Tucumán; IB, Instituto Butantan, São Paulo; IVB, Instituto Vital Brazil, Niteroi; KU, Museum of Natural History, the University of Kansas, Lawrence; LSUMZ, Museum of Natural Science, Louisiana State University, Baton Rouge; MACN, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge; MNHN, Laboratoire des Reptiles et Amphibiens, Muséum national d'Histoire naturelle de Paris; MNRJ, Museu Nacional do Rio de Janeiro; MRSN, Museo Regionale di Scienze Naturali di Torino; MZUSP, Museu de Zoologia, Universidade de São Paulo; MZUT, Museo Zoologico dell'Università di Torino (now incorporated as part of the Museo Regionale di Scienze Naturali di Torino); UFC, Universidade Federal do Ceará, Fortaleza; USNM, National Museum of Natural History, Smithsonian Institution, Washington D.C.

Boiruna maculata

ARGENTINA: No specific locality (MNHN 1893.3). *Chaco:* No specific locality (MACN 4381). *Cordoba:* Cordoba (MRSN R119). *Entre Rios:* No specific locality (MACN 3667). *La Pampa:* No specific locality (MACN 33035). *Misiones:* No specific locality (MACN 12691). *Santa Fé:* San Lorenzo (MRSN R1797 [2 specimens]). *Santiago del Estero:* Santiago del Estero (MACN 7269). *Tucumán:* No specific locality (BMNH 1902.7.29.68); Carbon Pozo (FML 694).

BOLIVIA: *Santa Cruz:* Lara province (BMNH 1904.10.29.56).

BRAZIL: No specific locality (IB 23742). *Amazonas:* Humaitá (IB 40884). *Goiás:* Ouvidor (IB 45618); Santa Rita do Parnaíba (IB 7962). *Mato Grosso do Sul:* Corumbá (IB 7894); Ilha Solteira (IB 36373, 36587); Miranda (IB 6328); Xavantina (IB 24547). *Minas Gerais:* Araguari (IB 7845); São Sebastião do Paraíso (IB 31061); Serra do Salitre (IB 55255). *Paraná:* Guaraji (IB 15652); João Eugênio (IB 24709); Londrina (IB 49824, 24825); Nova Restinga (IB 16846). *Rio Grande do Sul:* No specific locality (BMNH 86.10.4.12); Cachoeira do Sul (IB 2343, 23425, 23738, 24247, 30461); Porto Alegre (IB 22376); Juruá (IB 9486); Pelotas (IB 1642, 1831); Rosário do Sul (IB 6081); Saicã (IB 7751). *Santa Catarina:* Rio Caçador (IB 2038). São Paulo: No specific locality (IB 1312, 2089, 2170, 34092, 47341, 6677). Agudos (IB 21303); Araraquara (IB 53526); Atibaia (IB 29995, 30672, 43623, 49283, 50026, 53290, 53393); Barueri (IB 22227, 33223); Boituva (IB 30160, 30672, 53618, 55384); Bragança Paulista (IB 37459, 6536); Brigadeiro Tobias (IB 20379); Butantan, São Paulo (IB 154, 1049, 2039, 2567, 2923); Cabreúva (IB 33196); Campo Lindo (IB 1343); Capivari (IB 7161); Carapicuíba (IB 30809, 42183); Chapadão (IB 15167); Conde do Pinhal (IB 4835); Corredeira (IB 7089); Cotia (IB 9503, 21406, 23563, 41197); Cruzeiro (IB 19691); Engenheiro Marçilac (IB 25824); Fernandópolis (IB 41819, 42121); Franca (IB 9788); Franco da Rocha (IB 24490); Guarulhos (IB 8881); Ibaté (IB 9676); Itaguá (IB 15979); Itapetininga (IB 27569); Itapevi (IB 9300); Itatiba (IB 52449); Itobi (IB 9436); Itu (IB 33208, 52175, 54348, 54809); Itupeva (IB 30414, 30416, 55280); Ituverava (IB 23891); Jundiá (IB 28997, 31927, 32156); Jarínú (IB 33036); Jataí (IB 5610); Louveira (IB 54396); Mairinque (IB 49668); Mogi Mirim (IB 6070); Morro Agudo (IB 53294); Osasco (IB 21665, 23590, 32150, 40397, 55661); Patrocínio Paulista (IB 30560); Penápolis (IB 10246); Piedade (IB 29713, 54810); Pirapitingui (IB

5861); Pirapora (IB 5272, 11862); Pirassununga (IB 28681); Poá (IB 2064); Porto Feliz (IB 17403); Quiririm (IB 4868); Ribeirão Preto (IB 29660, 29708, 49080); Rio das Pedras (IB 49428); Roseira (IB 8245); São Bernardo do Campo (IB 1325); São João Novo (IB 53035); São Joaquim (IB 7862); São José dos Campos (IB 5544, 22545, 23128, 24055, 24336, 28251, 28408, 55333); Salto (IB 1534); São Paulo (IB 438, 7322, 8290, 8375, 8999, 9388, 15666, 16845, 20494, 20495, 21536, 21559, 23723, 25651, 25652, 26044, 29117, 29256, 30413, 40395, 42685, 45926, 50227); São Roque (IB 20960, 50047); Sarapuí (IB 32175); Sorocaba (IB 7493, 55415); Várzea (IB 17182); Vinhedo (IB 54304, 55426).

Boiruna sertaneja

BRAZIL: *Piauí:* Parnaíba (IB 49434, 51263); Valença (MZUSP 5793, 5794). *Ceará:* No specific locality (IB 4612, 4658, 4659, 4660, 4691); Icó (IB 13077); Município de Limoeiro do Norte (UFC 491, 496); Sítio Ilha, Município de Limoeiro do Norte (UFC 106). *Paratba:* Campina Grande (IB 9060). *Pernambuco:* No specific locality (MNHN 1967.155, 1971.245); Carnaubeira (MZUSP 4994); Exu (MZUSP 6524, 6526, 6553, 6554, 6555, 6556, 6557, 6631, 6632, 6633, 6634, 6635, 6636, 7031, 7032, 7033, 7034, 7035, 7036); Fazenda Batente, Exu (MZUSP 6924); Município de Timbaúba (MNRJ 3934); Petrolândia (IB 54258). *Alagoas:* Xingo (MZUSP 10841, 10842). *Bahia:* Baixa Grande (MZUSP 7803); Barreiras (MNRJ 2381, 2382, 2384, 2385); Bom Jesus da Lapa (MNRJ 2383, 2386); Brumado (IB 33068, 42651, 49388); Caetitê (MNRJ 4494); Conquista (IB 20456); Itaparica (MNRJ 3898; IB 52106); Muritiba (IB 49262, 49304); Vitória da Conquista (IB 21097). *Minas Gerais:* Mocambinho, Município de Manga (MNRJ 4001, 4004; IB 42717).

Clelia bicolor

ARGENTINA: *Tucumán:* Dique Escaba, Marapa river, Dept. Juan B. Alberti (FML 00819). *Corrientes:* San Lorenzo (MRSN R1797 [3 specimens]).

BRAZIL: *Mato Grosso:* No specific locality (IB 4316, 7716); Cuiabá (IB 32206). *Mato Grosso do Sul:* Aquidauana (IB 4859, 15513, 18574); Forte Coimbra (IB 10440); Guia Lopes (IB 14272); Nabileque (IB 37361); Miranda (IB 6147, 9080, 9084, 14201, 54798); Porto Esperança (IB 25960); Salobra (IB 16847); Taunai (IB 4553, 6333, 12731). *Paraná:* Rolândia (IB 10079), *Rio Grande do Sul:* Pelotas (IB 1818).

PARAGUAY: Assunción (BMNH 1930.11.27.224, 1930.11.27.225, 1930.11.27.226).

Clelia clelia

No specific locality (MNHN172; AMNH 6768; USNM 319945).

BELIZE: *Stann Creek:* 23.9 miles west of Stann Creek (KU 157550).

BOLIVIA: *Santa Cruz:* Buena Vista (AMNH 35994); 112 kilometers north of Santa Cruz de la Sierra, 1200ft (AMNH 119923, 119924).

BRAZIL: No specific locality (MNHN 3783). *Amapá:* Macapá (IB 24793, 25402). *Amazonas:* Manacapuru, Solimões river (BMNH 1926.4.30.14); Presidente Figueiredo (IB 52197, 54460). *Pará:* Santarém (MCZ 2788; IB 42681).

COLOMBIA: No specific locality (AMNH 17466). *Antioquia:* Chigorodó (USNM 154019). *Chocó:* Andagoya, near Condoto (BMNH 1915.10.21.23; MCZ 32725); Isthmus of Darien (USNM 24507). *Meta:* Medellín (IB 7234; USNM 195909). *Norte de Santander:* Rosario, near Cúcuta (BMNH 89.8.23.13).

COSTA RICA: *Limon:* Sixaola (BMNH 1933.6.22.9). *Puntarenas:* 10 miles south of Buenos Aires (USNM 148050).

ECUADOR: No specific locality (AMNH 28812; MCZ 154055). *Chimborazo:* Chamala, Normandia, Riobamba (AMNH 35919). *Esmeraldas:* Esmeraldas (AMNH 210846); San Lorenzo (USNM 210845). *Guayas:* Balzar (USNM 210847); Guayaquil (USNM 12349); Santo Domingo (AMNH 27145, 27146). *Loja:* east of Loja (BMNH 1933.6.24.108). *Morona Santiago:* Macas region

(AMNH 28861); Macas and vicinity (AMNH 35834); Macuma (USNM 210848); Santiago River (USNM 20622). *Napo*: Alto río Napo, Distrito de Suno (USNM 210850); 1 kilometer northeast of Chaco, 5000ft (USNM 210849, 210856); Río Oyacachi at Quito-Lago Agrio Road, about 20 kilometers north-northeast of Balza, 1550m (AMNH 110582). *Pastaza*: Region of Alto río Curaray (USNM 210852); Lliguino river, tributary of Villano river, Alto río Curaray (USNM 210851, 210853, 210854).

FRENCH GUYANA: No specific locality (AC 1978.77; MNHN 1983.661, 1988.174). Cayenne (MNHN 5529, 826; IB 13958).

GUATEMALA: *Izabal*: Izabal, 5.1 kilometers west-southwest of Santo Thomas (KU 187257).

GRENADA: No specific locality (MCZ 4507) [paratype of *Clelia clelia groomei*]. Beausejour, St George Parish (MCZ 1798ç). Du Quesne, Du Quesne River Valley, St Marks (MCZ 79766) [Paratype of *Clelia clelia groomei*]. Happy Hill Village (MCZ 101237).

GUYANA: Kartabo (AMNH 14258, 65573, 65574).

HONDURAS: *Atlantida*: Lancetilla, 60-100ft. (AMNH 70234); Tela (IB 2853; MCZ 25229, 32015, 32016); Ulna river, Tela (MCZ 19933). *Cortes*: Agua Azul Reserve Station, 2120ft. (AMNH 70259); Agua Azul Reserve Station (AMNH 70262); San Pedro Sula (MCZ 33338).

NICARAGUA: San Juan del Norte, río San Juan (USNM 24700). Río San Juan (USNM 19563); Cukra, Wholesome Creek (AMNH 12691, 12692).

PANAMÁ: *Chiriquí*: Gorgona, middle of the Isthmus of Panamá (MNHN 1891.148).

PERU: No specific locality (USNM 60747). *Ayacucho-Cuzco*: Huadquiña (USNM 49543). *Ica*: Chanchamayo, 1500m (AMNH 52147). *Loreto*: Fundo Sinchono (USNM 119015); Iquitos (AMNH 52052, 52227, 52413, 52499, 25203, 53293, 53531, 55776); Lupana Isla, Iquitos (AMNH 56090); Monte Carmelo, requila (AMNH 55606); Orellana (AMNK 54608); Pampa Hermosa, Cushabatay river (AMNH 52982, 55406); Parinari, Lower Manañon (AMNH 55681); Puritania, Amazonas river (AMNH 52122); Itaya river, Iquitos (AMNH 53601, 53603, 53661, 53779, 53804, 53972, 53976, 54163, 54281, 54304, 54481, 54523, 54540, 54675, 54805, 55096, 55230, 55236, 55323, 55324). *San Martín*: Moyobamba (BMNH 74.8.4.21, 74.8.54.56).

SURINAM: No specific locality (AMNH 130544, 130545.; BMNH 44.2.22.11). *Brokopondo*: Mazaroni Top, Brownsberg Natural Reserve, 500m (AMNH 133335). *Saramacca*: Coppename river (MCZ 152212). *Surinam*: Botanical Garden, Paramaribo (AMNH 130499); DOR Paramaribo, Albina road (MCZ 152210); La Poule (AMNH 130496); Paramaribo (AMNH 8684, 130498).

TRINIDAD: No specific locality (USNM 166682; AMNH 64475). 7.5 miles north of Arima (USNM 252676). Guanapo river (BMNH 1964.1998). Maracas Valley (AMNH 81430, 81431). Maqueripe (AMNH 64533 [2 specimens]).

VENEZUELA: No specific locality (IUSNM 217181, 319945). *Aragua*: Rancho Grande, near Maracay (AMNH 98232). *Bolívar*: Camarata (BMNH 1976.244); 56 kilometers southeast of El Manteco (USNM 162818). *Carabobo*: 0-19 kilometers northwest of Urama (USNM 162835, 162837). *Distrito Federal*: Caracas (USNM 32218). *Guarico*: Chaguaramas, U.S. Navy Base (AMNH 81446). *Miranda*: Power Plant, Curupao (AMNH 59429).

Clelia equatoriana

No specific locality (USNM 35794).

COSTA RICA: Near head of Sucio river, Isla Nuevo, Atlantic side (AMNH 17318).

ECUADOR: No specific locality (BMNH 60.6.16.47, 60.6.16.48). *Guayas*: Bucay (AMNH 22091); Guayaquil (USNM 62790 [holotype of *Barbourina equatoriana*]). *Napo*: immediate environs of Borja, 5600ft. (USNM 210855). *Pichincha*: Tandapi, 1460m (KU 112254); Santo Domingo de los Colorados (MCZ 166567).

COLOMBIA: No specific locality (AMNH 17465, 17467). *Antioquia*: Medellín (AMNH 35606). *Cauca*: Popayán (KU 140401); 6 kilometers south-southwest of Timbio (KU 169958).

PANAMA: No specific locality (USNM 50098). *Darién*: no specific locality (USNM 151090).

Clelia errabunda

St LUCIE: (MCZ 6119, 6121; MNHN 7598A [paratype od *Clelia errabunda*]).

Clelia plumbea

BRAZIL: No specific locality (MNRJ 3896; IB 33138). *Alagoas:* Maceió (IB 48538). *Bahia:* Buerarema (CEPEC 386); Caravelas (IB 45319); Ilhéus (CEPEC 002, 036, 137, 146, 161, 235, 423, 576, 1228); Itabuna (CEPEC 687); Itacaré (CEPEC 22227); Itajibá (IB 32469); Santa Terezinha (IB 33912); Uruçucá (CEPEC 1504). *Ceará:* No specific locality (IB 20004, 20057, 20068). *Distrito Federal:* Brasília (IB 54547). *Espírito Santo:* No specific locality (IB 45896); Baixo Guandu (IB 8513); Colatina (IB 26005, 37582); São Domingos (IB 25333, 25357); São Mateus (IB 52866). *Goiás:* Km 86, Rodovia Belém-Brasília (IB 20677). *Mato Grosso:* No specific locality (IB 53708); Barracão Queimado (IB 22775); Barra do Bugres (IB 44232); Pontes e Lacerda (IB 49905). *Mato Grosso do Sul:* No specific locality (IB 53708); Agachi (IB 15392); Jupiá (IB 22037); Passo do Lontra (IB 53707); Três Lagoas (IB 21969). *Minas Gerais:* Cataguazes (IB 152, 1328); Coronel Fabriciano (IB 22981); Guaxupé (IB 1530); Penha Longa (IB 6295); Sereno (IB 19673). *Pará:* No specific locality (MCZ 2634, 22447); Belém (IB 14792, 15052, 17690, 21131); Ilha de Marajó (IB 14949). *Paraná:* Antonina (IB 28021, 40082); Cornélio Procópio (IB 17008); Curitiba (IB 8367); Londrina (IB 9322); Morretes (IB 5654); Paranaguá (IB 22024, 24244); Rolândia (IB 9938). *Rio de Janeiro:* No specific locality (MNHN 3204); Angra dos Reis (IB 55606; IVB 1633); Arrozal (IB 8533); Barro Branco (MNRJ 416); Caxias (MNRJ 417, 2673, 3730, 2757); Friburgo (IVB 236); Itaipu, Niterói (MNRJ 3897); Joaquim Leite (IB 8022); Maricá (IVB 151); Pentagna (IB 18480); Petrópolis (IVB 149); Quinta da Boa Vista, Rio de Janeiro (MNRJ 418); Rocha Miranda (MNRJ 2681); São João, north of Cabo Frio (AMNH 3481 [Holotype of *Cotuber plumbeus*]); Sapucaia (IB 23594); Teresópolis (IVB 150); Tijuca, Rio de Janeiro (IB 8512). *Rondônia:* Porto Velho (IB 53190); UHE cachoeira de Samuel, Porto Velho (UFC 1488). *Santa Catarina:* No specific locality (IB 8029, 7590; BMNH 95.11.1.1); Blumenau (IB 3178, 2181, 46147); Corupá (IB 28884, 9418); Humboldt river (MNRJ 413, 414, 415); Jaraguá do Sul (IB 5876, 6559, 9432, 9530); Joinville (IB 27887, 32619; MNRJ 412); Rio do Sul (IB 9508); São Francisco do Sul (IB 22219). *São Paulo:* No specific locality (IB 46521); Aparecida (IB 19027); Bertoga (IB 29672, 29962, 33270); Bragança Paulista (USNM 100734); Caçapava (IB 32322); Cachoeira Paulista (IB 44434); Cananéia (IB 24521, 30297, 30319, 31473, 55349); Caraguatatuba (MNRJ 4498; IB 13026); Cipó (IB 30312); Cubatão (IB 3182, 4648, 13566, 19683, 22730, 36183, 27921, 29170, 42672); Engenheiro Ferraz (IB 24885); Engenheiro Marçilac (IB 24136, 32183); Guaratinguetá (IB 11581); Iguapé (IB 32430, 32431, 33897, 46525); Ilhabela (IB 21696); Itapeçerica da Serra (IB 28738); Itanhaém (IB 21466, 21862, 23593); Itariri (IB 8857); Itatinga (IB 40498); Jacaré (IB 10346); Juquiá (IB 22312, 33947); Juquitiba (IB 44629, 49305); Lavrinhas (IB 153); Mogi das Cruzes (IB 34089); Mongaguá (IB 19929, 39319); Monte Azul (IB 4379); Pedro Barros (IB 17609); Pereira Barreto (IB 53993); Peruibe (IB 4470, 33992, 54437); Pindamonhangaba (IB 24399, 42143); Piquete (IB 1826); Pirapitingui (IB 6471); Poá (IB 2063); Praia do Pulso, Ubatuba (IB 37510); Prainha (IB 8007); Quiririm (IB 7598); Rocinha (IB 2062); Roseiras (IB 16168); São Bernardo do Campo (IB 48820); Santos (IB 21996, 29582); São Lourenço da Serra (IB 49251); São Paulo (IB 27285, 29013, 30023); São Sebastião (IB 20420, 26877, 43981, 53453); São Vicente (IB 22497); Taubaté (IB 13993); Ubatuba (IB 9712, 24968, 27757, 50973);

PARAGUAY: Assunción (IB 10100).

Clelia rustica

ARGENTINA: Buenos Aires (IB 45879). Córdoba: Córdoba (IB 347); Jujuy: No specific locality (IB 8812).

BRAZIL: *Minas Gerais:* Uberaba (IB 10462). *Paraná:* Guarapuava (IB 25135, 47326); João Eugênio (IB 12791); Ponta Grossa (IB 23722); Telemaco Borba (IB 49772). *Rio Grande do Sul:* Alfredo Chaves (IB 10088); Canguçu (IB 51848); Erechim (IB 27026); Espumoso (IB 19584); Pelotas (IB

1787, 1788, 1789, 1790, 1791, 1812, 1819); Porto Alere (IB 2546); Itatiba do Sul (IB 34315, 3439); Salvador do Sul (IB 49046, 49047, 19378). *Santa Catarina*: Adolfo Conder (IB 14979); Capinzal (IB 40351); Lages (IB 47110); Porto União (IB 30440). *São Paulo*: Campo Largo (IB 32622).

Clelia scytalina

No specific locality (USNM 111267).

MEXICO: No specific locality (MNHN 162). *Chiapas*: No specific locality (KU 43560); Cruz de Piedra (USNM 111262, 111264, 111265); Lake near Acacoyahua (USNM 111263); Rancho Las Gradadas (USNM 111266). *Jalisco* 46 kilometers southwest of Autlán de Navarro (KU 95766); 15 miles northeast La Resolana, 900ft (KU 67646). *Oaxaca*: Tehuantepec (IUSNM 32272). *Tabasco*: 1.5 miles northeast Macultepec (KU 157551). *Veracruz*: Hacienda La Oaxaqueña, 30 kilometers of Jesus Carranza (AMNH 62282); 60 kilometers southwest of Jesus Carranza (KU 23855). *Yucatan*: Near Tabasco (USNM 6581) [Holotype of *Scolecophis scytalinus*].

GUATEMALA: No specific locality (MNHN 1899.54, 1899.55 [3 specimens]). Western Slope of Volcán Atitlán, Southern Guatemala (MNHN 7871 [2 specimens, syntypes of *Oxyrhopus Proximus*]).

COSTA RICA: No specific locality (MNHN 1897.376).

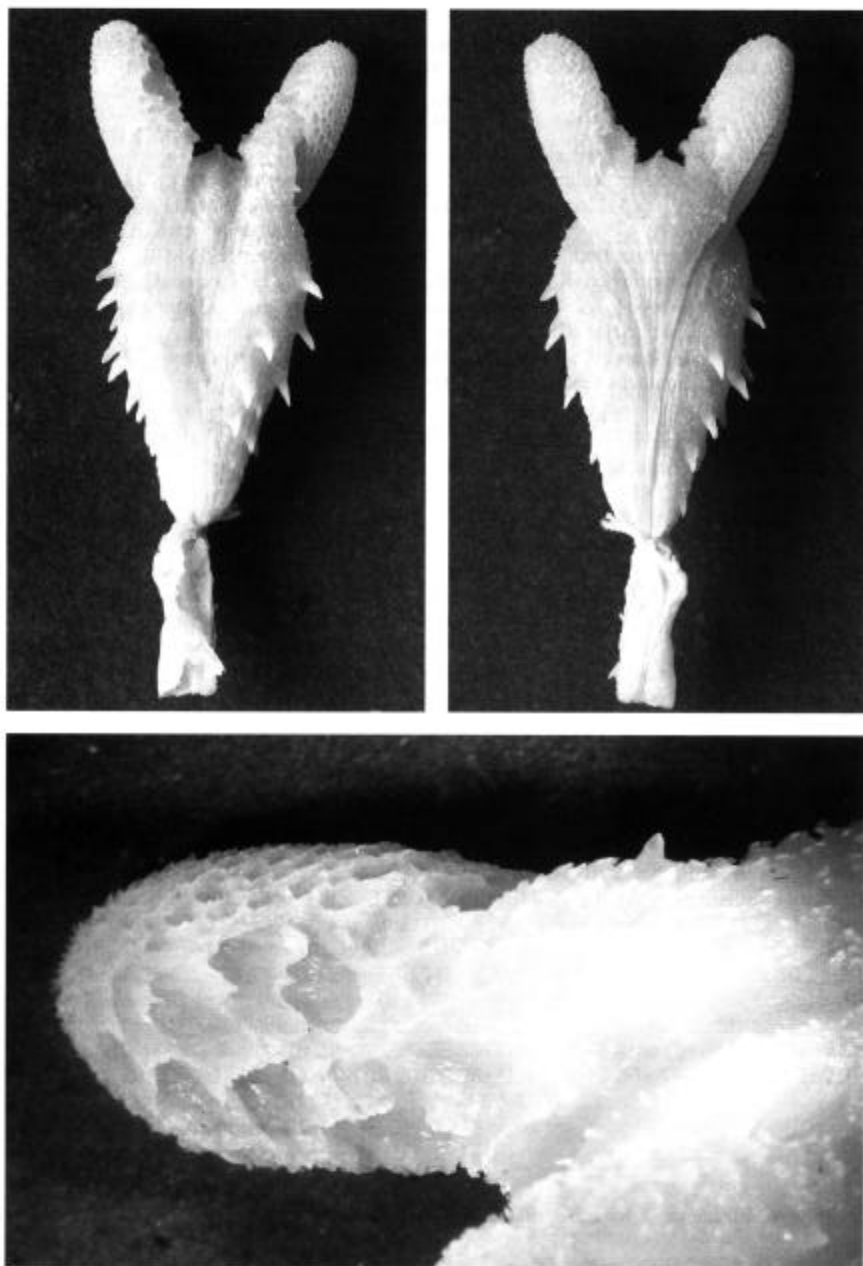


Plate 1 - Hemipenis of *Boiruna maculata*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the right lobe (bottom).

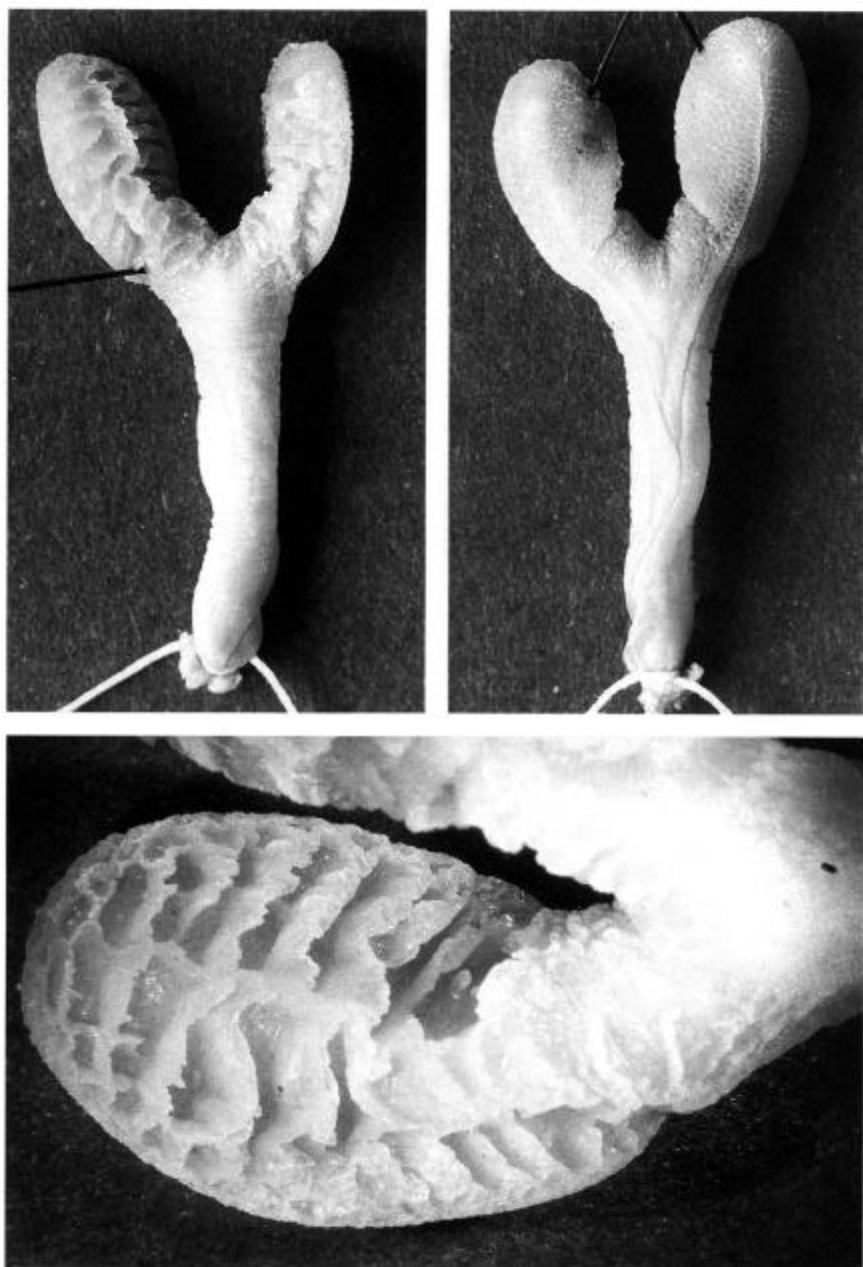


Plate 2 - Hemipenis of *Boiruna sertaneja*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the left lobe (bottom).

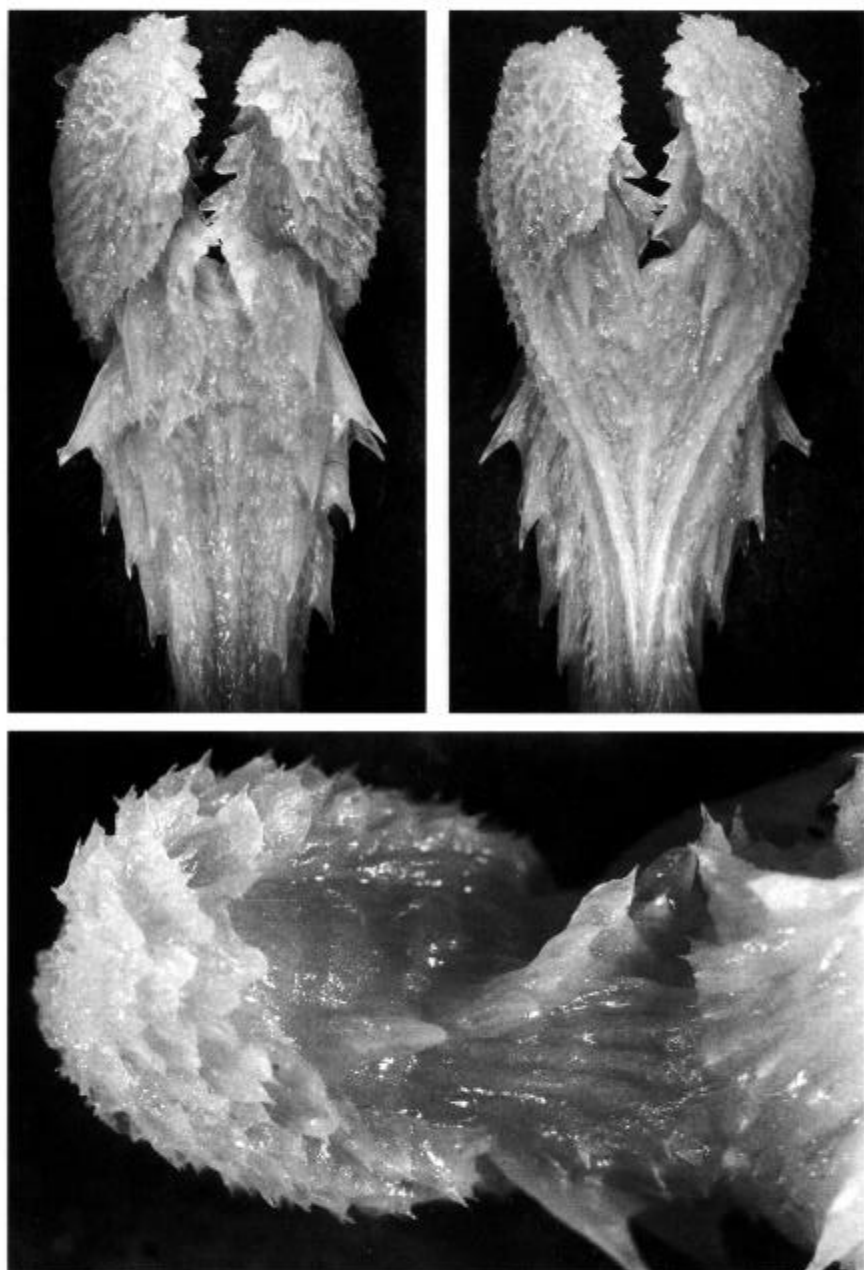


Plate 3 - Hemipenis of *Clelia bicolor*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the right lobe (bottom).

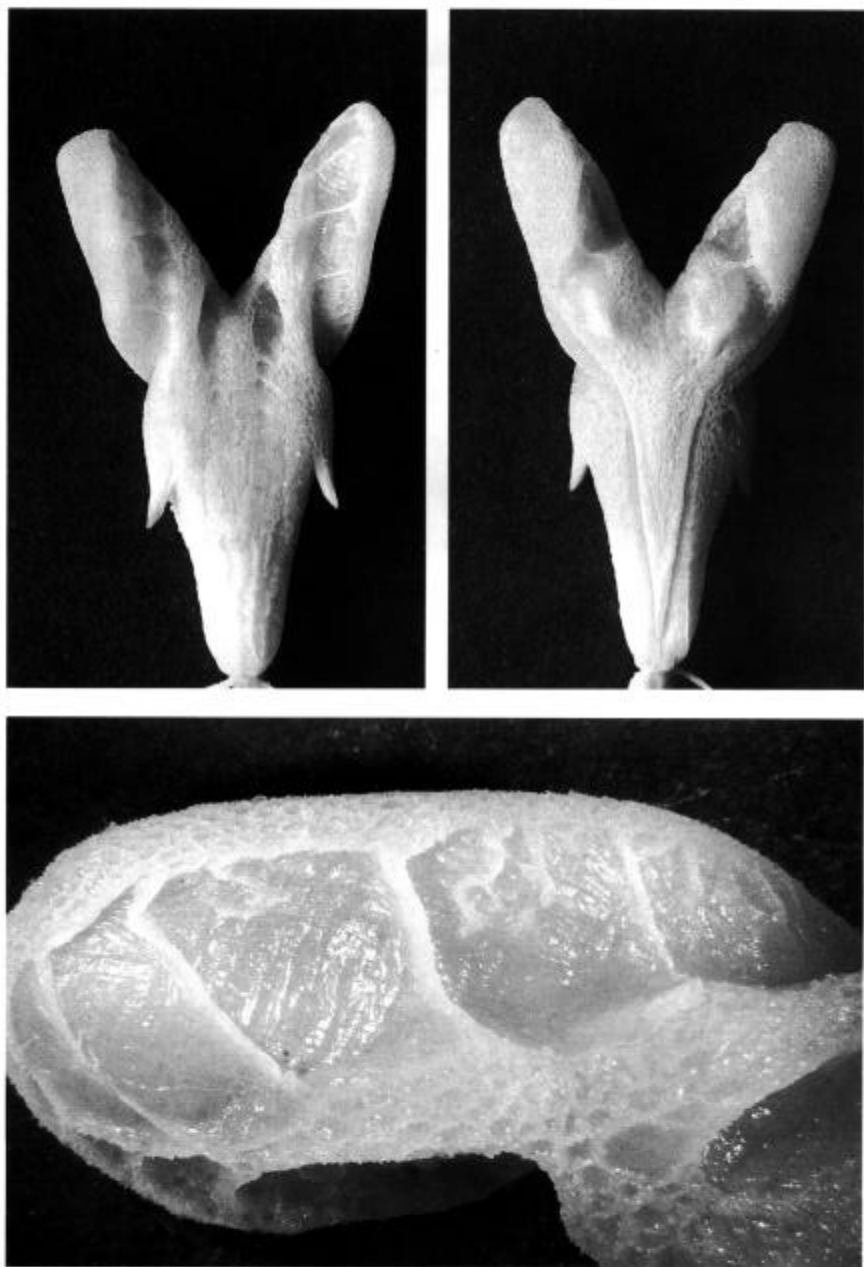


Plate 4 - Hemipenis of *Clelia clelia*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the right lobe (bottom). Hemipenis of AC 1978.77, from French Guyana.

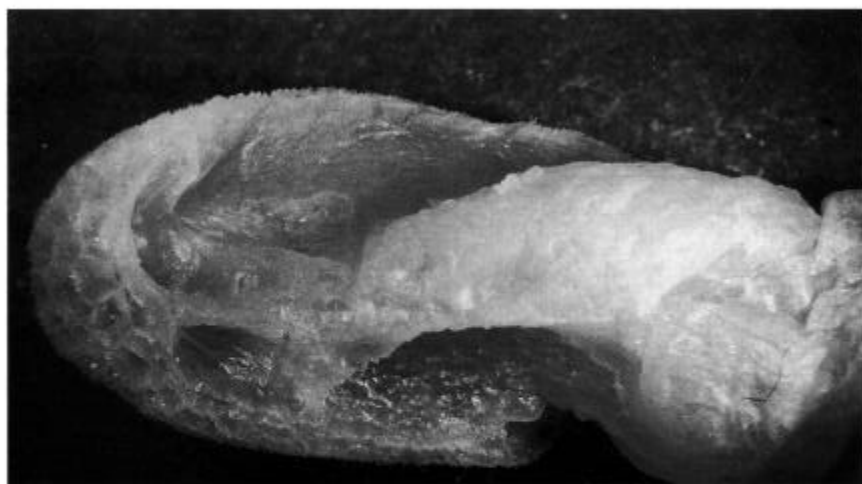
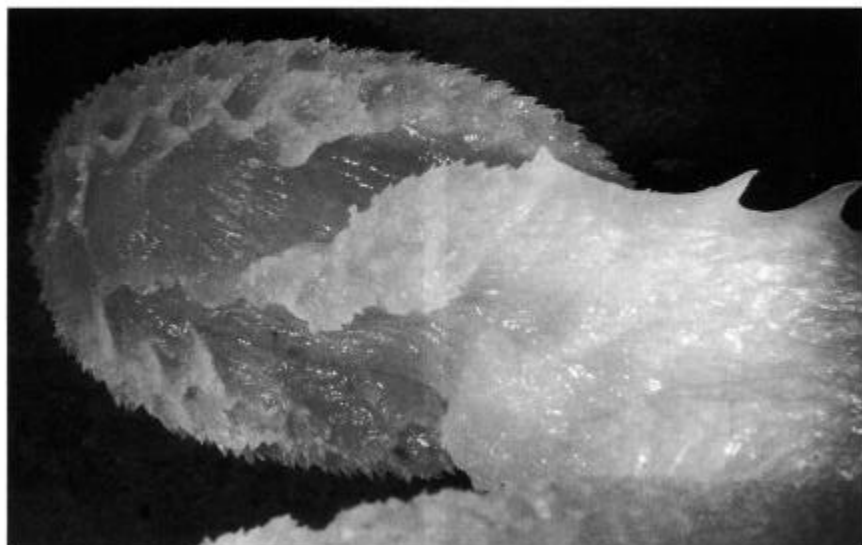


Plate 5 - Asulcate surface of the right hemipenial lobe of *Clelia errabunda* (top) and *Clelia equatoriana* (bottom).

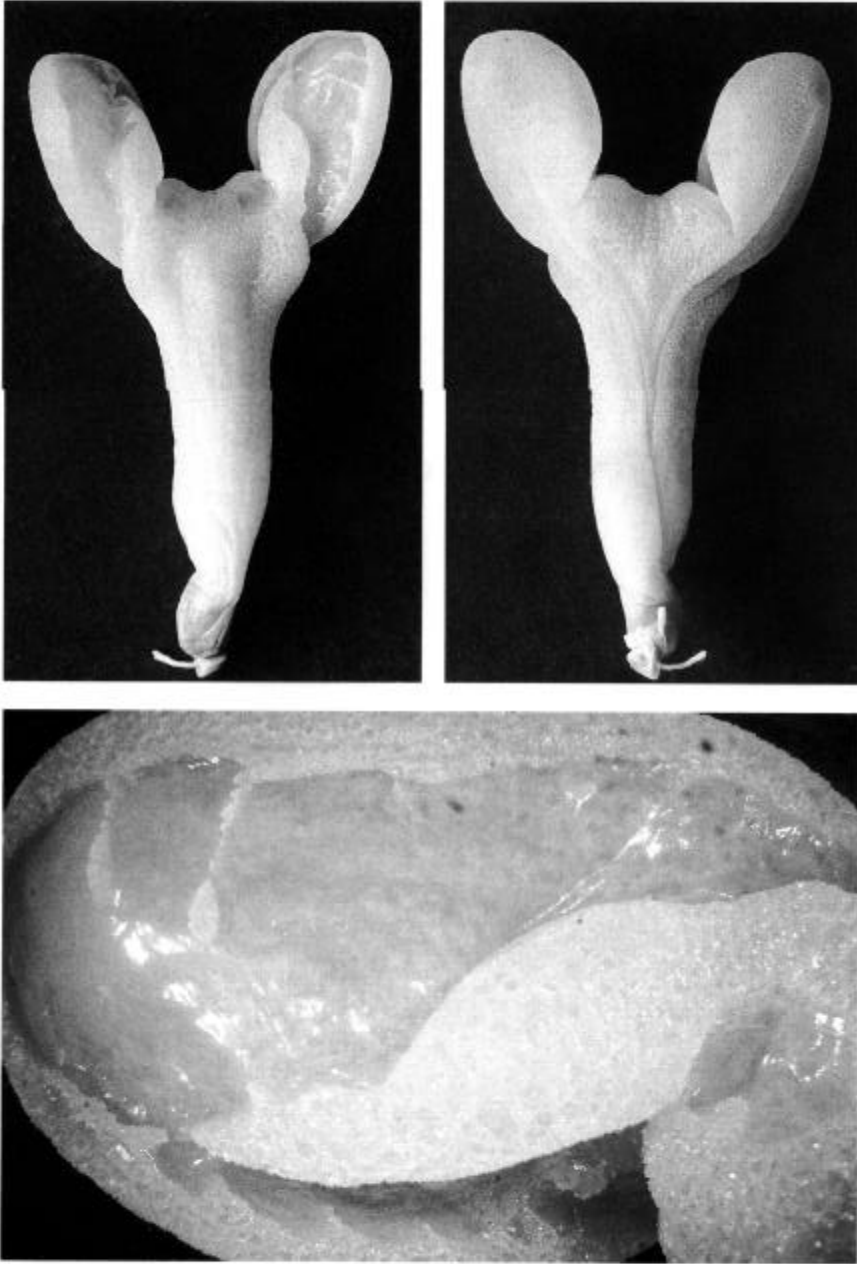


Plate 6 - Hemipenis of *Clelia plumbea*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the right lobe (bottom).

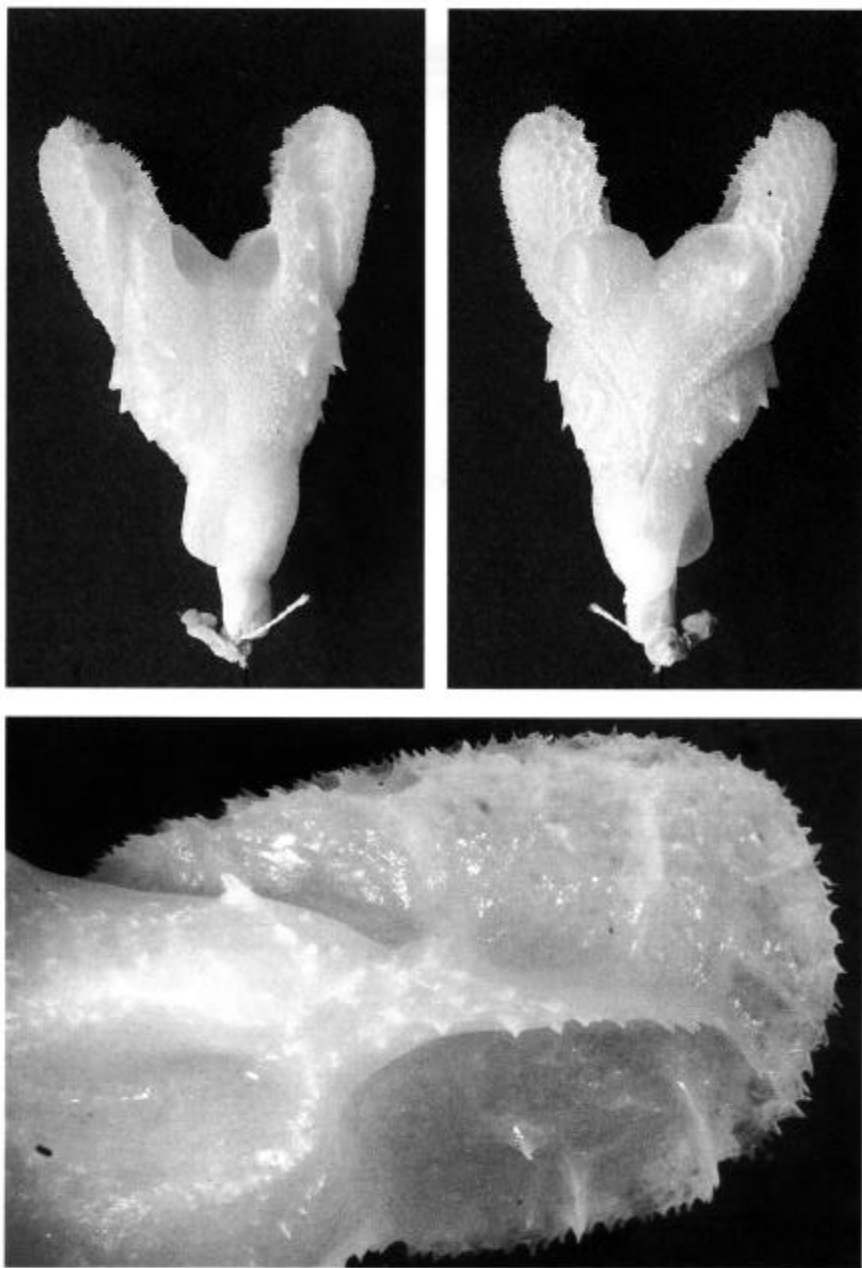


Plate 7 - Hemipenis of *Clelia rustica*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the right lobe (bottom).

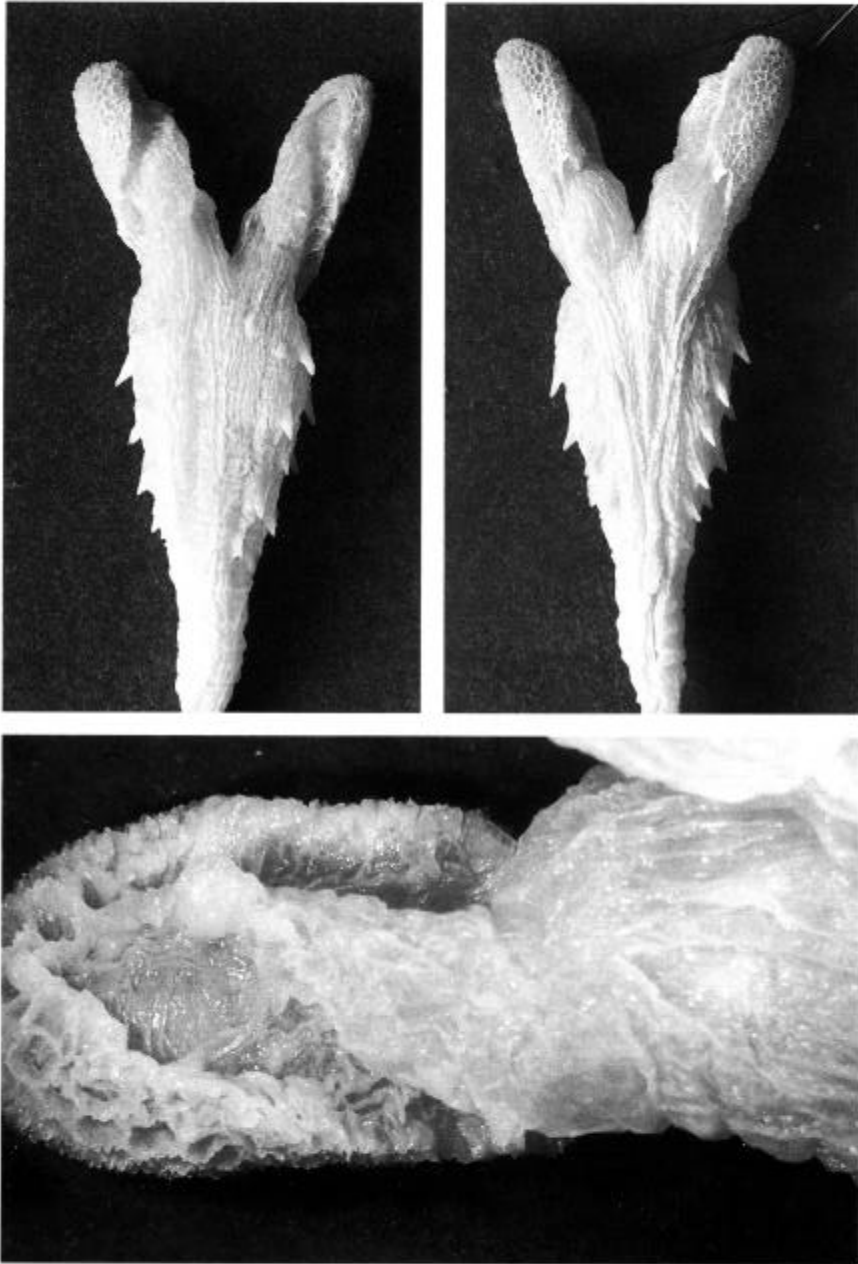


Plate 8 - Hemipenis of *Clelia scytalina*. Sulcate (top right) and asulcate views (top left). Asulcate surface of the right lobe (bottom).

