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## FOSSORIAL SNAKE GENUS *APOSTOLEPIS* FROM SOUTH AMERICA (SERPENTES: COLUBRIDAE: ELAPOMORPHINAE)

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**ABSTRACT.** An update commented list of the snake genus *Apostolepis* from South America, with keys for identification of the species. They are fossorial snakes that present different coloration according their distribution: (a) 7 to 3 dark stripes coloration, without light nuchal collar (if present, vestigial), with snout not projected beyond jaws - in Amazonian and enclaves within Caatinga domain; (b) 5 dark striped dorsal pattern, snout projected, usually without white nuchal collars - from region of contact between Cerrado and Chaco domains; (c) dorsal pattern coloration uniformly red, with nucho-cervical collars, snout usually projected - in Cerrado with dispersion to Chaco and Caatinga; (d) 2 or none dark stripes dorsally, venter immaculate or with black blotches, snout projecting; (e) an aberrant pattern with oblique black dorsal stripes, without collars, head black and snout projecting - one species in an enclave within Caatinga, with 17 rows of scales instead of 15.

### INTRODUCTION

The genus *Apostolepis* Cope 1861 is represented by several species inhabiting cisandine South America. Ferrarezzi (1993) presented a phylogenetic analysis of the genus, and a distribution of species in groups. The genus is incompletely known because the majority of species is bad known, and there are new species to be described. The goal of this paper is to update and to comment the species, and, by other hand, to help the curators of collections. The source of data are mainly from Strauch (1885), Boulenger (1896), Lema (1978), Savitzky (1979), Deiques (1991), Ferrarezzi (1993), Lema and Renner (1998), Harvey (1999), and Zaher (1999).

#### Characterization of *Apostolepis*

**Morphology:** The body is subcylindrical, its diameter is similar from head to tail, and the trunk is very elongate. Head sometimes narrower than neck, and can be broad to elongated, high to depressed. Snout round or sharp, broad or slender,

blunt or projected. Eyes are re-entering, small to minute, their diameter always smaller than the distance from it to oral border; pupil circular or a few sub elyptical. Nostril open internally. Tail usually shorter in females; terminal shield blunt, conical or compressed.

**Pholidosis:** Head plates tend to fusions, without internasals; frontal usually hexagonal; nasal entire, usually triangular; loreal absent; preocular one, usually contacting nasal, if not, prefrontal contacts second supralabial plate varying at random (without diagnostic value); postoculars usually one; usually 6 supralabials (sometimes 7 or 5), second to third entering the eye, usually; the two first very small, and the last very larger than others; temporals usually absent, if present only the posterior; usually one pair of large occipitals, sometimes confounded by some authors, with temporals; cycloid dorsal scales in the nuchal region; mental isolated from mentonean plates by first pair of infralabials; usually 7 infralabials (rarely 6 or 5); two pairs of mentonean

plates; gulars usually in 6 rows on each side; preentrals usually more than 4, sometimes 10; dorsal scales in 15 rows, smooth, without apical pits, without reduction (one species has 17 as regression); supracaudal scales in 8 usually reducing to 6 rows being cycloid and broad; ventral scales in large number, usually more than 230, varying 190 to 260; subcaudal scales usually in few number varying 26 to 60.

**Coloration:** Background color varying from reddish brown to brilliant red, and dorsal pattern varying lineate to alineate, stripes varying 7 to one (vertebral, paravertebrals, laterals); in some species, reducing the number with age (5 to 3); tail with a black blotch on the tip, with or without small white blotch on the tip. Head color with a black or blackish brown head cap, usually not covering the snout that is yellow usually, scarcely red; the light snout blotch and the supralabial light blotches varying during the development and in different species; the young presents, usually, these blotches larger than adult; black nuchal collar extending or not to gular region, and sometimes to the mental region. Some species present white or cream nuchal collar followed by black cervical collar (post-nuchal), both varying in length. Ventral coloration yellow or yellowish white immaculate usually; few species have black blotches on the belly; rarely occur black dots on lower side of the tail, in the median line or widespread by subcaudal scales.

**Dentition:** Maxillary of opisthoglyphous type, diacrantherian; very few and small prediastemal teeth in a short maxillary bone; two very enlarged fangs under the eyes, with anterior to lateral groove; palatine teeth few, small, and thick teeth.

**Hemipenis:** Long and slender, single, with or without small apical lobes; usually covered with small spines, totally or partially, with some largest proximally; capitate and/or with fringed area, without spinules; *sulcus spermaticus* bifurcated half of the organ or in the apex.

**Skull:** Not elongated anteriorly; parietal bone long and tubular; latero dorsal crest of the parietal is low; posterior junction of the dorso-lateral crests of the parietals; side bulbous area of the parietal median to

posteriorly; parietal suture with the supraoccipital transverse V-like; supraoccipital suture with exoccipital V-like; anterior process of the basioccipital absent; paroccipital process absent; parietal not sutured with the supratemporal; lateral process of the nasals present; nasal dorsal surface rectangular; antero-median area of the nasals V-like isolating the bones; premaxilla suture with the nasal V-like; lateral process of the quadrate absent; parasphenoid process widening; antero-lateral wing of the frontal absent; sphenoid complex without crest; palatal process of the pre-maxilla short or long; premaxilla does not articulate with the vomer; anterior border of the premaxilla lifting.

**Biology.** Fossorial, cryptozoic, with nocturnal habits. Usually ophiophagous feeding amphisbaenians, small colubrids and, perhaps, blindsnakes (Scolophoridae). Sometimes eat invertebrates and larvae found into the soil, as earthworms. The eggs are very long, stuck among them, as the coral-snakes eggs (*Micrurus* Wagler). They are put within ant nests, under the fungi cultures. There are few records of the biology of elapomorphines (Lema, 1990; Lema *et al.*, 1983). Perhaps they are prey of coral-snakes (*Micrurus*) so both are living in the same haunt. Some species present display with the raising of the tail as *A. ambiniger* (e.g.).

**Distribution of the species.** *A. niceforoi*, *A. nigrolineata*, *A. nigroterminata*, and *A. quinquelineata* are Amazonian species; *A. goiasensis*, *A. nigroterminata*, and *A. tenuis* occur in the southern Amazonia contact area with Cerrado; *A. cearensis* are from caatinga; *A. arenaria*, *A. gaboi*, *A. longicaudata*, and *A. polylepis* are from caatinga enclaves of forests or sandy areas; *A. assimilis*, *A. dimidiata*, *A. flavotorquata*, and *A. sanctaeritae* are own from cerrado; *A. dimidiata* has dispersed to chaco; *A. multicineta*, *A. intermedia*, *A. lineata*, and *A. vittata* are from cerrado-chaco contact area; *A. ambiniger*, *A. breviceps*, *A. dorbignyi*, and *A. multicineta* are from chaco (Table 1).

SPECIES	DISTRIBUTION	COLOR PATTERN	MODEL
<i>A. ambinger</i>	CH (BO-PA)	A -- R - Bl - VW	DIM
<i>A. assimilis</i>	CE (BR:CE,-BOL-PA-AR)	A -- R - W - VW	ASS
<i>A. arenaria</i>	CA:RE (BR:NE)	L (5) -- Br -- W -- VW	TEM
<i>A. breviceps</i>	CH (BOL)	A - R - Bl - VW	DIM
<i>A. cearensis</i>	CA (BR:NE)	A -- R - W - VW	ASS
<i>A. dimidiata</i>	CE (BR CE-SW, BO, PA, AR)	L (2/3) -- R - S - VB - VM	DIM
<i>A. dorbignyi</i>	CE (BO-BR SW?)	A -- R - W - VW	FLA
<i>A. flavotorquata</i>	CE (BR:CE,-BO)	A (L=1) -- R - W -- VW	FLA
<i>A. gaboi</i>	CA: RE (BR:NE)	L (5) -- Br -- W -- VW	TEN
<i>A. goiasensis</i>	AS (BR:CE)	L (3) -- Br -- Y -- VW	TEN
<i>A. intermedia</i>	CE (BR:SW)	L (5) -- Br - S -- VW	LIN
<i>A. lineata</i>	CE (BR SW)	L (5) - Br - S -- VW	LIN
<i>A. longicaudata</i>	CA:RE (BR:NE)	L (5) - BR -- S -- VW	QUI
<i>A. multicineta</i>	CE/CH (BO)	A -- R - W - VW	ASS
<i>A. niceforoi</i>	AW (CO, VE)	L (5/7) -- Br -- S -- VW	QUI
<i>A. nigrolineata</i>	AE (BR:N)	L(5/3) -- Br-- S(Y) -- VW	QUI
<i>A. nigroterminata</i>	AW-AS (PE - BO)	L (5/3) -- Br - S/Y -- VW	QUI
<i>A. phillipsi</i>	CE (BO)	L(5) - Br - W (Y) -- VW	LIN
<i>A. polylepis</i>	CA:RE (BR:NE)	L (4) -- Br? -- S -- VW	POL
<i>A. quinquelineata</i>	AW (GU,-BR:N)	L (5) - Br -- S (Y) -- VW	QUI
<i>A. quirogai</i>	LP (AR:NE)	L (2) -- R - W -- VB	DIM
<i>A. sanctaeritae</i>	CE (BR:CE)	A - R -- W - VW	ASS
<i>A. tenuis</i>	AS (BO)	L (3) -- Br - S -- VW	TEN
<i>A. vittata</i>	CE (BR:SW)	L (5) -- Br - S -- VW	LIN

**Table 1.** Comparison of main aspects of *Apostolepis* species. Key — *Distribution*: (*morpho-climatic domain*) AE, eastern Amazonia. AS, southern Amazonia. AW, western Amazonia. CA, Caatinga. CE, Cerrado. CE/CH, border CE with CH. CH, Chaco. LP, low Parana. RE, refugia (endemic enclaves); (*political division*) AR, Argentina. BO, Bolivia. BR, Brazil. CE, central. CO, Colombia. GU, Guyana. NE, northeastern. NO, northern. PA, Paraguay. PE, Peru. SO, southern. SU, Suriname. SW, southwestern. VE, Venezuela. N, S, E, W, cardinal points. *Color pattern*: A, unlined. Bl, black neck. Br, reddish brown dorsally. L, lineate. R, red dorsally. S, striped neck. VB, black blotched belly. VW, white belly. Y, yellow nuchal blotches. W, white nuchal collar. O, 1, 2, 3, 4, 5, 7, number of dark stripes. *Model of species*: ASS, assimilis; DIM, dimidiata; FLA, flavotorquata; LIN, lineata; POL, polylepis; QUI, quinquelineata; TEN, tenuis.

## SYSTEMATIC LIST

### *Apostolepis* Cope, 1861 (Blacktail blackheads)

*Elapomorphus* Duméril, Bibron and Duméril, 1854  
(Part): 832.

*Apostolepis* Cope, 1861 (Part): 302; 524; type-species *Elapomorphus flavo-torquatus* Duméril, Bibron and Duméril - designated by Amaral (1929).

*Elapomojus* Jan, 1862: 42; type-species: *Elapomorphus (Elapomojus) dimidiatus* Jan.

*Rhynchonyx* Peters, 1869: 47; type-species *Rhynch-*

*conyx ambiniger* Peters 1869.

*Elapomoius* Senna, 1886 (Error pro *Elapomojus*): 503.

*Elaphomoeus* Berg, 1898 (Correction for *Elapomojus*): 28.

*Parapostolepis* Amaral, 1930: 51; type-species *Apostolepis polylepis* Amaral 1921

**Distribution.** Cisandine South America, from Guyanas to northern Argentina (by western), and from northeastern Brazil to southwestern Brazil.

**Comments.** Ferrarezzi (1993) synonymized *Parapostolepis* with *Apostolepis*.

### KEY FOR THE SPECIES

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|----|--|-----|--|
| 1a | Head usually short, snout not or few projecting beyond lower jaws. Light nuchal collar usually absent. Back ground color pinkish brown with seven or five dark stripes that can be reduced to three with age. Black tail blotch usually dorsal. Belly yellowish white immaculate ..... 2 | 6b  | With 15 dorsal scale rows. Stripes always parallel among them ..... 7  |
| 1b | Not as anterior combination. Head variable, snout variable. Nuchal light collar present or absent. Dorsal coloration pinkish brown or red, with or without stripes. Black tail blotch usually on dorsal and ventral sides. Belly immaculate or with blotches ..... 14                    | 7a  | Dorsal pattern alineate with a red ground color. Light nuchal collar followed by a black cervical collar ..... 8   |
| 2a | Head a few slender. Black cap of head with extension as sideburns. Lateral stripes narrow running on the fourth scales row. Without nuchal light collar ..... <i>A. longicaudata</i>   | 7b  | Dorsal pattern lineate or alineate, red or pinkish red ground color. Light nuchal collar present or absent ..... 9   |
| 2b | Head wide and short. Head black cap doesn't forms sideburns. Lateral stripes variable running allays on the fourth dorsal scales row. Nuchal light collar usually absent (or present as vestigial blotches) ..... 3  | 8a  | Head wide, short, depressed; snout not projected. Black cervical collar narrow and shadowed posteriorly ..... 10   |
| 3a | Paravertebral stripes black conspicuously. Light supralabial blotch as small blotches in the adult ..... 4   | 8b  | Head a few elongate, snout usually projected. Black cervical collar long, never shadowed posteriorly ..... 11  |
| 3b | Paravertebral stripes darkish brown becoming feeble or disappearing with age. Light supralabial blotch single, smaller in the adult... 5   | 10a | Head very short, wide and depressed. Light labial blotch large divided by vertical stripes from head black cape. Black cervical collar very narrow and spotted posteriorly ..... <i>A. flavotorquata</i> |
| 4a | With a paraventral stripe ..... <i>A. niceforoi</i>  | 10b | Head elongate, not depressed. Light labial blotch small. Black cervical collar long, not spotted posteriorly ..... <i>A. dorbignyi</i>   |
| 4b | Without paraventral stripe, which zone is light ..... <i>A. quinquelineata</i>   | 11a | Snout very projected, and red. Cervical black collar with a vertebral prolongation anteriorly. Light supralabial blotch very small and yellow..... <i>A. cearensis</i>                                   |
| 5a | Five stripes in young becoming three in adult. Paraventral zone darkish, sometimes forming a stripe. A pair of yellow round small blotches on the nuchal region ..... <i>A. nigrolineata</i>   | 11b | Snout not very projected, and yellow. Cervical black collar without anterior prolongation. Light supralabial blotch variable ..... 12  |
| 5b | Five stripes, with paravertebral lineal and feeble, perhaps disappearing with age. Paraventral zone light. A narrow yellow nuchal collar ..... <i>A. nigroterminata</i>  | 12a | Light supralabial blotch long, trapezoid like... ..... <i>A. assimilis</i>   |
| 6a | With 17 dorsal scale rows. With projected and curved snout. Dorsal pattern with two black  | 12b | Light supralabial blotch short ..... 13  |
|    |  | 13a | Supralabial light blotch irregular. End of tail entirely black ..... <i>A. sanctaeritae</i>  |
|    |  | 13b | Supralabial light blotch triangle like. End of tail white in the point and ventrally..... <i>A. multicincta</i>  |
|    |  | 14a | Head slender to wide; snout not or a few projected. Dorsal coloration pinkish brown with dark stripes (five to three or seven). Light nuchal collar usually present ..... 15                             |
|    |  | 14b | Head elongated; snout projected. Dorsal coloration pinkish brown striped or red uniformly. Light nuchal collar present or absent.. ..... 18  |
|    |  | 15a | Three dorsal stripes ..... 16  |
|    |  | 15b | Five (seven) dorsal stripes very thin ..... 17   |
|    |  | 16a | Light supralabial blotch long and low, from the rostral to the last supralabial plate. Paravertebral stripes thin. Light nuchal collar as a yellow pair of blotches ..... <i>A. goiasensis</i>           |
|    |  | 16b | Light supralabial blotch small under the eye. Paravertebral stripes wide. Light nuchal collar narrow ..... <i>A. tenuis</i>  |
|    |  | 17a | Less than 200 ventral plates. Lower sides spotted as a vestigial stripe ..... <i>A. arenaria</i>   |
|    |  | 17b | More than 200 ventrals. Paravertebral stripe cracked posteriorly. Lower sides light ..... <i>A. gaboi</i>  |
|    |  | 18a | Five to three dark stripes, usually lineal, on a   |

- ground pinkish red color. Usually without light nuchal collar. Belly yellowish white immaculate ..... 19
- 18b Two (or three) stripes to none, on a brick red ground dorsal color. Nuchal light collar present or absent. Belly black blotched or immaculate ..... 22
- 19a With a white nuchal collar followed by a black collar. Light supralabial blotch long, from the rostral to the last supralabial. Lateral stripes wide ..... *A. phillipsi*
- 19b Without nuchal and cervical collars ..... 20
- 20a Snout projected. Black stripes narrow (lineal). Paravertebral stripes disappear in adult ..... 21
- 20b Snout strongly projected. Vertebral stripe lineal, paravertebral stripes spotted anterior- and posteriorly ..... *A. vittata*
- 21a Light supralabial blotch long, from rostral to last labial. Snout slender ..... *A. lineata*
- 21b Light supralabial blotch smaller (second to fifth labials). Snout curved ..... *A. intermedia*
- 22 a With black blotches on the belly ..... 23
- 22b Belly immaculate ..... 24
- 23a With light nuchal collar. Lateral dark stripes wide. Light supralabial blotch small, irregular ..... *A. quirogai*
- 23b Without light nuchal collar. Lateral dark stripes variable. Light supralabial blotch long, from the rostral to the last labial plate.....  
..... *A. dimidiata*
- 24a Two black narrow dorsal stripes. Light supralabial blotch long. Nuchal black collar narrow ..... *A. dimidiata* morph *barrioi*
- 24b Without stripes. Light supralabial blotch very small. Nuchal black collar long attaining the neck ..... 25
- 25a Snout slender and few projected. Five supra and infralabials ..... *A. breviceps*
- 25b Snout sharp and too projected. Six supralabials and seven infralabials ..... *A. ambiniger*

### 1. *Apostolepis ambiniger* (Peters, 1869) (Paraguayan blackhead)

*Rhynchonyx ambiniger* Peters, 1869: 438, pl. (fig. 2); type-locality: "Paraguay".

*Elapomorphus erythronotus* Peracca, 1895 (Error): 20.

*Apostolepis ambinigra* Boulenger, 1896 (Part; correction of *R. ambiniger* Peters): 237.

*Apostolepis ambiniger* Peters and Orejas-Miranda, 1970 (Correction of *A. ambinigra* Boulenger): 22.

**Distribution.** From Paraguay and adjacent Brazil and Bolivia, perhaps Argentina, by Chaco morphoclimatic domain.

**Comments.** Very common species, but very few specimens in collections. The snout

is very projecting beyond the jaws that motivated the genus *Rhynchonyx*. Similar snout occurs in *A. intermedia*, *A. polylepis*, *A. vittata*, probably for excavation of hard soil. This is a typical species from Chaco, with the coloration typical from the Cerrado species, but without nuchal-cervical collars. The head is black and the long black nuchal collar presents vestiges of back black longitudinal stripes, perhaps derived from an ancestral with lineate pattern and missing in the speciation. The black head and beginning neck are paradoxical because the species lives in very sunny savannahs, very wet, and high temperatures (respectively 90%, and 40° C, approximately).

### 2. *Apostolepis arenaria* Rodrigues, 1992 (Sand dunes blackhead)

*Apostolepis arenarius* Rodrigues, 1992: 54, fig. 1-2; type-locality: Alagoado, Queimadas, Bahia, Brazil.

**Distribution.** Northeastern Brazil, in dunes along side of medium São Francisco river, Bahia. Caatinga area, but in an special sandy microhabitat.

**Comments.** Very interesting lined species, probably derived from the Amazonian lineage of *Apostolepis*, and probable endemic of type-locality. The stripes are very thin, and back ground coloration cryptic with the habitat. It has low number of ventrals (less 200) in relation to remainder species (more than 200).

### 3. *Apostolepis assimilis* (Reinhardt, 1861) (Common red blackhead)

*Elapomorphus assimilis* Reinhardt, 1861: 235, pl. 4 (fig. 1-5); type-locality: Capão dos Porcos Farm, west of Serra do Espinhaço, Minas Gerais State, Brazil.

*Elapomorphus affinis*, Cope, 1861 (Error pro *A. assimilis*): 302; 524.

*Apostolepis assimilis* Boulenger, 1896: 234.

**Distribution.** Central Brazil to Paraguay, through Bolivia and Paraguay. In Brasil,

occurs from Bahia to Paraná States. Its occurrence in Argentina is doubtful. Cerrado with dispersion to border of Chaco.

**Comments.** The occurrence in Argentina seems to be doubtful for Giraucho and Scrocchi (1998) because there is one specimen from this country. Usually is a small species, sometimes occur larger specimens. It is the most frequent specie of the genus occurring in urban areas of São Paulo city (S. Paulo State, Brazil). In the Uberaba city (Minas Gerais, Brazil), I found many specimens, all very small.

**4. *Apostolepis breviceps*  
Harvey, González-A.  
and Scrocchi, 2001**  
(Chacoan black head)

*Apostolepis breviceps* Harvey *et al.*, 2001: 502, fig. 1;  
type-locality: Cerro Cortado, Cordillera Province, Santa Cruz, Bolivia.

**Distribution.** Four specimens from the Bolivian Chaco at Santa Cruz Department, Province Cordillera.

**Comments.** Snout pointed and few projecting. Head black extended to black nuchal collar attaining 6 - 7,5 vertebral dorsal scales. Light labial blotch short and narrow; 5 supralabials (third entering the eye), and 5 infralabials (3 contact the chinshields); only one pair of chinshields — the most reduced head squamation of any Elapomorphae. Black blotch of tail 6 - 10 subcaudals long, and the terminal shield is entirely yellow. Back ground color brick red. Harvey *et al.* (2001) compared with other species, but the projecting snout is shared with several species of *Apostolepis*, but *A. vittata* differs to much of *A. breviceps*. The reduction of plates in the head denotes the general tendency in Elapomorphae increasing their adaptation to the burrowing environment. I suggest that this species is more related to the species from *A. dimidiata* group.

**5. *Apostolepis cearensis*  
Gomes, 1915**  
(Caatinga blackhead)

*Apostolepis cearensis* Gomes, 1915: 122, pl. 3, fig. 4-8; type-locality: Ceará State, Brazil (No locality given).

*Apostolepis amarali* Werner, 1925: 62; type-locality: 'South America' probably Bahia State, Brazil  
*Apostolepis dorbignyi* Amaral, 1930 (Error): 16.

**Distribution.** Widely distributed by the Caatinga reaching all the northeastern Brazilian States, except Pernambuco perhaps due by lacking collect of specimens (Zamprogno *et al.*, 1998).

**Comments.** Species very common in caatingas, inclusive in urban areas as the city of Fortaleza (Ceará State). The snout is strongly projected and red; the red snout is a peculiarity among *Apostolepis*. Some specimens from northern Bahia State differ from the remainder (another species?).

**6. *Apostolepis dimidiata*  
(Jan, 1862)**

(Common bilineate blackhead)

*Elapomorphus (Elapomojus) dimidiatus* Jan, 1862: 47, pl. (fig.); type-locality: "Brasile" (The holotype was discarded)

*Elapomorphus erythronotus* Peters, 1880: 222; type-locality: São Paulo, Brazil – Not detailed (The holotype is lost)

*Apostolepis erythronota* Boulenger, 1896: 236.

*Elapomoius dimidiatus* Boulenger, 1896 (Correction for *Elapomojus dimidiatus* Jan): 238.

*Apostolepis nigriceps* Werner, 1897: 207, fig. ; type-locality: São Paulo, Brazil (Not detailed)

*Apostolepis ventrimaculatus* Lema, 1978: 34, 36, fig. 7-14; type-locality: Miranda, Mato Grosso do Sul State, Brazil – Lema (1993).

*Apostolepis barrioi* Lema, 1978: 30, fig. 1-4; type-locality: Rio Ypané, Cororo, Concepción Province, Paraguay – completed by Lema (1993).

*A. villaricae* Lema, 1978: 32, fig. 5-6; type-locality: Villa Rica, Concepción Province, Paraguay – completed by Lema (1993).

*A. dimidiata*, Lema, 1984: 76, fig. 1-3.

**Distribution.** Central Brazil to northern Argentina by Bolivia and eastern Paraguay. Cerrado region with dispersion to Chaco.

**Comments.** A polymorphic species (Lema, 1993), with light, dark, and melanistic morphs, but decreasing the melanin tax in a sense of eastern to western distribution. The morph bilineate with immaculate ventral and subcaudal surfaces (*A. barrioi*, *A. villaricae*), are from western district of the area. In the region of central Brazil (cerrado) all the specimens have the venter with black blotches, and the distribution of the morphs has the aspect of mosaic. For to north, the species is substituted by another, that we are describing. Another variation is the elongatement of the head with the age (Lema, 1993). This species is very abundant in the region of the Brazilian State São Paulo. The holotypes of *E. dimidiatus* and *E. erythronotus* are lost (deterioration, according the curators), and a new type must be erected. The name available in a chronological sequence, is *A. nigriceps*, but the holotype is anomalous (Lema, 1993).

**7. *Apostolepis dorbignyi***  
(Schlegel, 1837)  
(Dorbigny's blackhead)

*Calamaria d'Orbigny* Schlegel, 1837, 1: 130, 2: 30; type-locality: "Chili" (= Chile, error) – probably from Bolivia.

*Calamaria d'Orbignyii* Guichenot, 1855: 73 (Correction for *C. d'Orbigny*).

*Elapomorphus Orbigny* Duméril, Bibron and Duméril, 1854 (Error of *Elapomorphus d'Orbigny*): 834

*Apostolepis orbigny* Cope, 1861: 302; 524.

*Elapomorphus D'Orbigny* Jan, 1862: 43.

*Apostolepis dorbignyi*, Boulenger, 1896 (Correction pro *A. orbigny* Cope): 236.

**Distribution.** Bolivia, in Chaco, according specimen from Torino's Museum from Aguayrenda, Tarija Department (Harvey, 1999).

**Comments.** Perhaps endemic from Bolivian chaco. Confounded with *A. assimilis* by the authors. Harvey (1999) described another specimen explaining that Amaral (1930) confounded this species with *A. assimilis* and *A. cearensis*. *A. dorbignyi* differs from *A. assimilis* mainly by the high head, and snout not projected (*A. assimilis* has head depressed and snout projected), by the

small yellow blotch on the supralabials (*A. assimilis* has larger yellow blotch), and lower surface of the head cream immaculate (*A. assimilis* has this area blackish blotched with cream).

**8. *Apostolepis flavotorquata***  
(Duméril, Bibron and Duméril, 1854)  
(Cerrado blackhead)

*Elapomorphus flavo-torquatus* Duméril, Bibron and Duméril, 1854: 836; type-locality: "Amérique du Sud" – Goiás State, Brazil (Strauch, 1885).

*Apostolepis flavotorquatus* Cope, 1861: 302; 524.

*Apostolepis flavitorquata*, Boulenger, 1896 (Correction for *Elapomorphus flavotorquatus* Duméril, Bibron and Duméril): 234.

*Apostolepis flavotorquata* Amaral, 1930 (Part; correction of *A. flavitorquata* Boulenger): 50.

**Distribution.** Central Brazilian Plateau at States Tocantins, Goiás, Bahia, Mato Grosso through of Cerrado.

**Comments.** This is a large species from cerrado with short, broad and depressed head. This species was confounded with others by several authors, as Amaral (1930), that synonymized it with very others species with different pattern (lineate pattern). Usually, with the back coloration uniformly red (as the cerrado pattern coloration of the genus) but, sometimes, can appears a vertebral line, complete or vestigial; or only a shadowed band of minute black dots. I am examining a lot of specimens for the analysis of variation. They presents some characters similar to that of *A. quinquelineata*, and others similar of *assimilis* group. I found a giant specimen in the Zoological Park of Brasilia (D.F.) with more than 50cm of length.

**9. *Apostolepis gaboi***  
**Rodrigues, 1992**  
(Sand-dunes blackhead)

*Apostolepis gaboi* Rodrigues, 1992: 54 (2): 56, fig. 3; type-locality: Queimadas, Bahia State, Brazil.

**Distribution.** Northeastern Brazil, at São Francisco river basin, at sand dune (Bahia); region of caatinga.

**Comments.** Another interesting and, perhaps, endemic species from region of São Francisco river sandy dunes. It presents similarities with the Amazonian group (quinquelineata).

**10. *Apostolepis goiasensis*  
Prado, 1942**  
(Prado's blackhead)

*Apostolepis goiasensis* Prado, 1942: : 7, pl. 1; type-locality: Rio Verde, Goiás state, Brazil.

*Apostolepis flavotorquata* Amaral, 1944 (Part; error): 23.

*Apostolepis quinquelineata* Cunha and Nascimento, 1978 (Part): 57.

**Distribution.** Central Brazil at Goiás State. Intermediary region of Amazonia — Cerrado.

**Comments.** Known only by the holotype. The low sides are blackish, as *A. tenuis*, very different from *A. flavotorquata* (dorsal pattern uniformly red) and from *A. quinquelineata* (dorsal pattern striped with the paraventral zones cream).

**11. *Apostolepis intermedia*  
Koslowsky, 1898**  
(Koslowsky's blackhead)

*Apostolepis intermedia* Koslowsky, 1898: 30, pl. 1, fig. 4-7; type-locality: Miranda, Mato Grosso do Sul State, Brazil (Lema, 1993).

**Distribution.** Southwestern Brazil at Pantanal in Mato Grosso do Sul, Cerrado-Chaco contact area.

**Comments.** Known only from the holotype, which is lost. It was in the Museo de La Plata, near Buenos Aires city (Argentina), and the last curator was Pablo Gaggero (dead) wih collection were in deterioration; I and students from the Universidad de La Plata, tryed to rescue the most specimens that was possible, but many them must be discharded, perhaps the holotype of *A. intermedia* together. I have another specimen from the same area, but with head too injured difficulting the identification.

**12. *Apostolepis lineata*  
Cope, 1887**  
(Hognose lineate blackhead)

*Apostolepis erythronotus lineatus* Cope, 1887: 56; type-locality: "Chupada, Brazil" (Error) — Chapada dos Guimarães, Mato Grosso State, Brazil (Lema, 1984).

*Apostolepis erythronota*, Boulenger, 1896 (Part): 236.

*Apostolepis lineata* Peters and Orejas-Miranda, 1972: 588.

**Distribution.** Western Brazil at Mato Grosso, Brazil. Cerrado region.

**Comments.** Known only by two specimens (syntypes), adult and young, the later is lost. The adult is from Chapada dos Guimarães, near Cuiabá city. The description of Cope (1887) is very brief, because he considered as a variation of *A. dimidiata*. The head and the cream supralabial blotch are equal to *A. dimidiata*, but the dorsal pattern is very different. I examined the ANSP 11211 (the ANSP 11212 was discharded), and I believe that is a good species although Harvey (1999) believed that is not valid. The spcimen is in bad condition (dehydrated). By Cope (1887), the stripes of the young is stronger than the adult and I believe that is a species that is 5-striped only in the first stage of life becoming 3-striped in adult.

**13. *Apostolepis longicaudata*  
Gomes, 1921**  
(Piauí blackhead)

*Apostolepis longicaudata* Gomes, 1921a: 159, pl. A (fig. 4-7); type-localiity: Engenheiro Dodt, Santa Filomena Municipality, Piauí State, Brazil.

**Distribution.** Endemic in a enclave of Amazonian Forest inside the caatinga, at southern Piauí State, northeastern Brazil.

**Comments.** Known only by the holotype. The alleged high number of subcaudals is equal to *A. quinquelineata* and *A. nigrolineata* (Lema and Renner, 1998), but Gomes pehaps did not know the two later species. The occurrence within the Caatinga at



northeastern Brazil, is an indicator that the area is a remnant of the old Amazonian forest. *A. longicaudata* is very closed with *A. quinquelineata*.

**14. *Apostolepis multincincta*  
Harvey, 1999**  
(Harvey's blackhead)

*Apostolepis multincincta* Harvey, 1999: 396, fig. 2,3,5,9; type-locality: Vicinity of Pampa Grande, Florida, Santa Cruz Department, Bolivia.

**Distribution.** Bolivia, in highlands of Santa Cruz Department. Chaco region.

**Comments.** Known only from the holotype. It is closed with *A. assimilis*, but the lower side of the head is cream immaculate, and there is a white blotch on the tip of the tail.

**15. *Apostolepis niceforoi*  
Amaral, 1935**  
(Colombian blackhead)

*Apostolepis niceforoi* Amaral, 1935: 221, fig. "5" (Error, for fig. 2); type-locality La Pedrera, Bajo Caquetá, Amazonas State, Colombia

**Distribution.** Amazonian Colombia to Ecuador, by eastern district into the tropical rain forest. Perhaps occurs also in adjacent Brazil.

**Comments.** The presence of a paraventral stripe is not a news, several others species pentalineate have dots and darkish blotches on the paraventral zone as a stripe, or, sometimes striped; perhaps this increases with the development. The species is very poor known and presents many similarities with *A. quinquelineata*, probably derivate from the later in his dispersion to the highlands of the High Amazonas.

**16. *Apostolepis nigrolineata*  
(Peters, 1869)**  
(Pará blackhead)

*Elapomorphus nigrolineatus* Peters, 1869: 439; type-locality: "Guinea" (Error pro Guyana ?)  
*Apostolepis nigrolineata* Boulenger, 1896: 235. Lema, 1997: 198.  
*Apostolepis pyimi* Boulenger, 1903: 353; type-locality: Brazil – Probably Pará State, Brazil. Lema and Renner, 1998: 105, fig. 2,4,5.  
*Apostolepis flavotorquata* Amaral, 1930 (Part; error): 49. Lema, 1978 (Part): 29.  
*Apostolepis coronata*, Amaral, 1930 (part): 50.  
*Apostolepis quinquelineata*. Hoge, 1958 (Part): 73. Cunha and Nascimento, 1978 (Part): 39. Nascimento and Lima-Verde, 1989: 96.

**Distribution.** Eastern Brazilian Amazonia in Pará, Maranhão, Amazonas, Rondônia States. One enclave in Ceará State, northeastern Brazil (Nascimento and Lima-Verde, 1989). Tropical rainforest, and refugia inside the caatinga region.

**Comments.** See *A. quinquelineata* about confusion with this species and the synonymizations made by Amaral (1930) confounding with other species as *A. flavotorquata* (from the cerrado), and with species from another genus as *Elapomorphus lepidus* (Lema and Deiques, 1995). Hoge (1958), and Cunha and Nascimento (1978) fall in mistake as Amaral (1930) probably because they didn't see specimens of the true *A. quinquelineata*. *A. nigrolineata* is thick, robust species, with broad and high head, five brown blackish stripes in the young, desaparearing the paravertebrals in the adult. The population from caatinga (Nascimento and Lima-Verde, 1978) were examined by Lema and Renner (1998) that noted differences due by the isolation. The species is very frequent in Pará State; Cunha and Nascimento (1978) obtained hundreds of specimens sending by the people along highways of Para. The dominant back color is the brown, and the black blotch of tail is complete and long, diferent of *A. quinquelineata* that has the dominant back color pinkish brown (cinnamon bark color) and the black blotch of tail only dorsal and short. Both species have the young with yellow blotches on the nugal region, and only *A. nigrolineata* has vestigial yellow blotch (a pair) in the nape.

**17. *Apostolepis nigroterminata*  
Boulenger, 1896  
(Peru blackhead)**

*Apostolepis nigroterminata* Boulenger 1896: 235, pl. 10 (fig. 2); type-locality: "Cayaria, Peru" — Callaria, Ucayali, northeastern Peru (Harvey, 1999). — Peters and Orejas-Miranda, 1970: 23 (Included *A. borellii*).

*Apostolepis borellii* Peracca 1904: 9; type-locality: Urucum, Mato Grosso State, Brazil.

*Apostolepis quinquelineata* Amaral, 1930 (Part; error): 48.

**Distribution.** Eastern Peru (Ucayali) to adjacent Bolivia and Brazil (Mato Grosso). The holotype of *A. borellii* is from cerrado, at SW Brazil. Tropical rain forests of high Amazonas to Cerrado with forests ("Cerradão").

**Comments.** Redescribed recently by Harvey (1999), with other specimen from Bolivia. Paraventral zones darkish brown. It is very similar to *A. quinquelineata* differing, basically, by the presence of a white nuchal collar in *A. nigroterminata*, by several minute cream spots on the parietals, and the paravertebral stripes feeble, on the fifth and sixth dorsal scale rows, perhaps disappearing in the adult. The occurrence in Brazil is known only on the holotype of *A. borellii* found in Mato Grosso, and the dorsal pattern of this holotype is different of the *A. nigroterminata*, but Peters and Orejas-Miranda (1970) followed by Harvey (1999) consider the same species. Ferrarezzi (1993) believed that *A. borellii* is a valid species, but I examined the holotype and I am convinced that is equal to *A. nigroterminata*.

**18. *Apostolepis phillipsi*  
Harvey, 1999  
(Phillips's blackhead)**

*Apostolepis phillipsi* Harvey, 1999: 402, fig. 11; type-locality: Estancia El Refugio, Velasco, Santa Cruz Department, Bolivia.

**Distribution.** Bolivia, at intermediary region between the Cerrado and Chaco. The holotype was caught in a bank of the river Paragua on plain savanna and forest seasonally inundated.

**Comments.** Known from only one specimen. The projecting snout, elongated head, and large cream supralabial blotch are very similar to *A. dimidiata*. It has some aspects of the *A. lineata*, another species that remember *A. dimidiata* (Cope, 1887).

**19. *Apostolepis polylepis*  
Amaral, 1921  
(Hawbeak blackhead)**

*Apostolepis polylepis* Amaral, 1921b: 13, 57, pl. 1 (fig. 5-8); type-locality: Engenheiro Dodt, Santa Filomena, Piauí, Brazil.

**Distribution.** Northeastern Brazil, in a enclave of Amazonian forest into the Caatinga contact Cerrado, at southern Piauí State.

**Comments.** Species with several peculiarities (regressions, autapomorphies) used by Amaral (1930) to create the genus *Parapostolepis* that was considered the same *Apostolepis* by Ferrarezzi (1993) which 17 rows of dorsal scales would be an autapomorphy. But, the dorsal pattern is very different of the others species, with a lateral pair of stripes oblique and incomplete, becoming spotted and disappearing to rear. Another noteworthy aspect is curve snout as a eagle beak remembering the snout of *A. intermedia* from the *lineata* group. By these aspects, we considered the species as a isolate group with peculiarities resulting of isolation within semiarid region (Caatinga enclave).

**20. *Apostolepis quinquelineata*  
Boulenger, 1896  
(Western Amazonian blackhead)**

*Apostolepis quinquelineata* Boulenger, 1896: 235, pl. 10 (fig. 1-3); type-locality: "Demerara, British Guyana" — atual Georgetown, Guyana . — Cunha and Nascimento, 1978 (Part): 57, pl. 7, fig. 1. — Lema and Renner, 1998: 102, fig. 1,3,5.

*Apostolepis Rondoni* Amaral, 1925: 25, pl. (fig. 4-6); type-locality: Rondon, Rondonia, Brazil.

*Apostolepis coronata*, Amaral, 1930 (Part; error): 50, 109, 225.

**Distribution.** Western Amazonia, from Guyanas to Rondonia and Mato Grosso

States, Brazil, by tropical rainforest, including Roraima, western Pará, and Amazonas States, Brazil; perhaps Acre State at extreme western Brazil.

**Comments.** Confounded many time with *A. nigrolineata* (Lema and Renner, 1998) that is the closest species. It differs from *A. nigrolineata* by absence of yellow nuchal blotches (present in *A. nigrolineata*), five black dorsal stripes allways present (five to three stripes during development in *A. nigrolineata*), yellow blotches in the rostral and supralabials (one ovoid yellow blotch in *A. nigrolineata*), and black blotch on the tail only supracaudal (in *A. nigrolineata* attains some subcaudals).

**21. *Apostolepis quirogai*  
Giraud and Scrocchi, 1998**  
(Misiones blackhead)

*Apostolepis quirogai* Giraud and Scrocchi, 1998: 470, fig.; type-locality: Posadas, Misiones Province, Argentina. Lema and Cappellari, 2001: 121 (Rio Grande do Sul, Brazil).

**Distribution.** Northeastern Argentina, at Misiones and Entre Ríos, and adjacent Brazil (Santo Ângelo, Rio Grande do Sul). Area of influence of the Paraná basin, with subtropical rainforests and savannahs due by the deforestation.

**Comments.** Described from two specimens, one very damaged (from dead on road). A third specimen is from Santo Ângelo, northeastern Rio Grande do Sul (Brazil) (Capellari and Lema, 2001). The coloration is similar to *A. dimidiata* [melanistic morph, Lema (1993)], but the head shape is similar to *A. assimilis*, depressed and elongated, with round snout. Another difference is the presence of white and black nucho-cervical collars that are absent in *A. dimidiata*.

**22. *Apostolepis sanctaeritae*  
Werner, 1924**  
(Santa Rita blackhead)

*Apostolepis sanctae-ritae* Werner, 1924: 43; type-locality: Santa Rita, Ibipectuba, Bahia State, Bra-

zil (Lema and Fernandes, 1997). —Lema and Fernandes, 1997: 51, fig.  
*Apostolepis flavotorquata*, Amaral, 1930 (Part): 109, 225

**Distribution.** W Bahia, Brazil. Cerrado.

**Comments.** Known only by the holotype. Similar to *A. assimilis*, but not with *A. cearensis* (according some authors), nor *A. flavotorquata* from which it differs strongly. *A. cearensis* has the snout red instead *A. sanctaeritae* has it blackish with yellow. The white nuchal collar has a black vertebral stripe insted *A. sanctaeritae* doesn't it. *A. sanctaeritae* is very similar to *A. assimilis*.

**23. *Apostolepis tenuis*  
Ruthven, 1927**  
(Bolivian blackhead)

*Apostolepis tenuis* Ruthven, 1927: 1; type-locality: Buena Vista, Santa Cruz, Bolivia. —Peters and Orejas-Miranda, 1972: 590.

*Apostolepis ambinigra* Amaral, 1930 (Part): 108, 224

*Apostolepis ambiniger* Peters and Orejas-Miranda, 1970 (Part; correction of *A. ambinigra* Boulenger, 1896): 22.

**Distribution.** Bolivian Andes by eastern district.

**Comments.** Known only by two specimens, redescribed by Harvey (1999). Apparently endemic of highlands of Bolivian Andes. This species is characterized by the black paraventral zones. This is a species from southern Amazonia were occurs the contatc of Amazonian forests with the Cerrado forests (Cerradão).

**24. *Apostolepis vittata*  
Cope, 1887**  
(Beaked blackhead)

*Rhynchonyx ambiniger vittatus* Cope, 1887: 56; type-locality: Chapada dos Guimarães, Mato Grosso, Brazil (Lema, 1993)

*Apostolepis ambinigra*, Boulenger, 1896 (Part; Correction of *Rhynchonyx ambiniger* Cope): 237. Peters and Orejas-Miranda, 1972: 588.

*Apostolepis vittata* Peters and Orejas-Miranda, 1972: 588.

**Distribution.** Western Brazil at Mato Grosso, Cerrado.

**Comments.** Only the holotype is known. Recent redescription of Harvey (1999) using two others specimens which I believe that aren't of this species. The snout is strongly projected similarly to the *A. ambiniger*, and by this, Cope used the name *Rhynchonyx* for both species. As *A. lineata*, Cope (1887) described with few data because he believed to be a variety of *A. ambiniger*.

### ZOOGEOGRAPHICAL CONSIDERATIONS

The *Apostolepis* species inhabiting forested areas are polylineate (7 to 3 stripes), and the species from open areas (cerrado, chaco) are alineate or bilineate. The species from forested areas have the back ground color yellowish or reddish brown, and the open areas have the back ground color brick or brilliant red. The northern species have snout not projecting, and the central to southwestern species have the snout projecting. The relationships among the species were establish by use of models: each species was compared with a most related species (Table 1). The models are (from the alineate to lineate pattern, and the projection of the snout): Assimilis = alineate; snout few to very projected; species: *A. assimilis*; Flavotorquata = alineate usually, sometimes a vertebral stripe, conspicuous or vestigial; snout not projected; species: *A. flavotorquata*; Dimidiata = alineate to bilineate, sometimes a vestigial vertebral stripe; snout too projected; species: *A. dimidiata*; Tenuis = five to tree-striped; snout not projected; species: *A. tenuis*; Lineata = five to tree-striped; snout too projected; species: *A. lineata*; Quinquelineata = seven to tree-striped; snout not projected; species: *A. quinquelineata*.

I believe that the models presented here can be considered groups of species. If this will be true, the species groups presented by Ferrarezzi (1993) is no good, at least in part, because that author used variable characters in his phylogeny, as the contact or not, of the prefrontal with suprabil.

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