

## Description of a new genus for allocation of *Elapomorphus lepidus* and the status of *Elapomorphus wuchereri* (Serpentes: Dipsadidae: Xenodontinae: Elapomorphini)

### Descrição de um novo gênero para alocar *Elapomorphus lepidus* e o status de *Elapomorphus wuchereri* (Serpentes: Dipsadidae: Xenodontinae: Elapomorphini)

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#### Abstract

*Coronelaps g. n.* is presented to allocate the species *Calamaria lepida* Reinhardt, 1861. The new genus is characterized by the presence of a yellow collar on the head, by general back coloration red with three very thin dark stripes that disappear in the development; by skull bones as the basioccipital process strongly developed, transverse suture between supraoccipital and exoccipital, and aspects of teeth, and hemipenis. It differs from others species of *Elapomorphus*, where which is located, by the long body with the same diameter along it; head short; from *Phalotris*, by the presence of paired prefrontals; and from *Apostolepis*, by the presence of paired internasals and prefrontals, and by the absence of the black tail blotch. This species was confounded with *Elapomorphus wuchereri* Günther, 1861, and the later, with *Elapomorphus quinquelineatus* (Raddi, 1820).

**Key words:** *Coronelaps*, *Elapomorphus wuchereri*, *Elapomorphus quinquelineatus*, coloration, skull, teeth, hemipenis.

#### Resumo

Apresenta-se o novo gênero *Coronelaps g.n.* para alocar a espécie *Calamaria lepida* Reinhardt, 1861. O novo gênero caracteriza-se pela presença de um colar amarelo sobre a cabeça, pela cor geral dorsal de fundo vermelha com três linhas pretas longitudinais que desaparecem na idade adulta, por ossos cranianos como processo do basioccipital muito desenvolvido, pela sutura do transverso entre o supraoccipital e exoccipital, além de aspetos dos dentes e hemipênis. Externamente essa espécie difere das demais espécies de *Elapomorphus*, onde estava lotada, pelo longo e isodiamétrico tronco e cauda grossa até a extremidade e cabeça curta; das espécies de *Phalotris*, pela presença de dois prefrontais, principalmente; e das espécies de *Apostolepis*, pela presença de prefrontais e internasais pares, além da ausência da mancha preta extremo-caudal. *Elapomorphus wuchereri* Günther, 1861 esteve confundida com esta espécie e com *Elapomorphus quinquelineatus* (Raddi, 1820).

**Palavras-chave:** *Coronelaps*, *Elapomorphus wuchereri*, *Elapomorphus quinquelineatus*, coloração, crânio, dentes, hemipênis.

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## Introduction

Lema and Hofstadler Deiques (1995) reviewed and analyzed the variation of *Elapomorphus lepidus* (Reinhardt, 1861), with description of the skull and hemipenis. They conclude, among other things, by allocation of this species in another genus, but without indication of a name for them. The same suggestion was made by Ferrarezzi (1993), in a master dissertation, also without naming the pretense new genus.

Hofstadler Deiques and Lema (2005) proposed a phylogeny for Elapomorphinae using skull characters, plus some of the morphology, and comparing the species, *E. lepidus*, *E. quinquelineatus* (Raddi, 1820), *Phalotris* Cope, 1861 (several species), *Apostolepis assimilis* (Reinhardt, 1861), and *Apostolepis dimidiata* (Jan, 1862). The out group were selected from Xenodontinae and Atractaspididae.

The relationships analyzed authorized the revalidation of Elapomorphinae, as subfamily of Colubridae, but the analysis of mitDNA sequence (Zaher *et al.*, 2009), the group is included in Xenodontinae.

For *E. lepidus* were found two autapomorphies: (i) the basioccipital process strongly developed, and (ii) the transverse suture situated between supraoccipital and exoccipital. For *E. quinquelineatus*, derived character is not found. *E. lepidus* is most related to *Phalotris* and *Apostolepis*, than *Elapomorphus*, forming with the two latter, a monophyletic group (Ferrarezzi, 1993; Hofstadler Deiques and Lema, 2005) by the absence of contact between premaxilla and vomer, and position of the foramen maxillary nerve bordering the anterior margin of parietal.

Based on these facts, we proposed the description of a new genus for allocation of *E. lepidus*.

## Material and methods

Data used from Lema (1977, 1984), Savitzky (1979), Hofstadler Deiques (1991), Ferrarezzi (1993), Underwood and Kochva (1993), Lema and

Hofstadler Deiques (1995) and Hofstadler Deiques and Lema (2005). Specimens examined from scientific collections: BMNH, The Natural History Museum, London, U.K.; CEPLAC, Comissão Executiva do Plano da Lavoura Cacaueira, Itabuna, Bahia, Brazil; FMNH, Museum of Natural History of Chicago, Illinois, U.S.A.; FUNED, Fundação Ezequiel Dias, Belo Horizonte, Minas Gerais, Brazil; IBSP, Instituto Butantan, São Paulo, Brazil; MBES, Museu de Biologia Prof. Mello Leitão, Santa Teresa, Espírito Santo, Brazil; MCP, Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, Brazil; MNHN, Muséum National d'Histoire Naturelle, Paris, France; MNRJ, Museu Nacional do Rio de Janeiro, Brazil; MZUC, Museum of Zoology, Universitet Kobenhavn, Danmark; MZUSP, Museu de Zoologia da Universidade de São Paulo, Brazil; MZUT, Museo Zoologico, Università di Torino, Torino, Italy; NMW, Naturhistorisches Museum, Wien, Austria; RMNH, Rijksmuseum van Natuurlijke Historie, Leiden, Holland; SMF, Senckenberg Museum, Frankfurt, Germany; SMNS, Staatliches Naturhistorischen Museum zu Stuttgart, Germany; UFES-CZ, Universidade Federal do Espírito Santo, Coleção Zoológica, Santa Teresa, Espírito Santo, Brazil; UMMZ, Museum of Zoology, University of Michigan, Ann Arbor, Michigan, U.S.A.; USNM, National Museum of Natural History, Washington, U.S.A.; ZBM, Universität Humboldt, Museum für Naturkunde Berlin, Germany; ZMB, Zoologisches Museum, Berlin, Germany; ZSBS, Zoologische Sammlung des Bayerischen Staates, München, Germany; ZSM, Zoologisches des Bayerischen Staates, München, Germany; ZUEC, Universidade Estadual de Campinas, São Paulo, Brazil (See Appendix 1).

*Elapomorphus* (*Elapomorphus*) Lema, 1984 (part): 64.

**Diagnosis.** It differs from *Apostolepis* by presence of the two internasal plates (absent in *Apostolepis*), and by lacking the black tail blotch, that is peculiar to *Apostolepis*. It differs from *Phalotris* presenting two prefrontal plates, instead of one. And, from *Elapomorphus*, by the more elongate body, with one diameter along it; by high snout; tail shorter, with one diameter along it; red dorsal coloration on the body; yellow band on the parietal plates (difference for the remainder Elapomorphinae), and a larger terminal shield. In the skull osteology, it differs from *Elapomorphus* and *Phalotris*, by the presence of some sinapomorphies, as the transverse suture between the exoccipital and supraoccipital, basioccipital strongly developed process, and relatively long palatine teeth. And for all, by the hemipenis divided along, at least, half of the organ, with the safeguard that the hemipenis of several species of Elapomorphini is not known.

**Description.** Body with the same diameter, from head to part of tail; approximately; dorsal scales almost isodiametric, smooth, without apical pits and in 15 rows, without reduction. Head plates with 2 internasals; 2 prefrontals; 6 supralabials, 2<sup>nd</sup> and 3<sup>rd</sup>, entering the orbit; 7 infralabials (varying 5-8); 2 postoculars; temporals present (anterior and posterior); loreal absent. Ventrals 192-231; anal paired; subcaudals paired varying 26-47, being 35-47 in males and 26-33 in females. Hemipenis forked at medium part of the organ, the branches opposite between them like a “Y”, covered with small spines; *sulcus spermaticus* divided in the first half of the organ, with conic lobes (Figure 4). Maxillary teeth 5; palatine teeth long and slender, with sharp point. Skull with anterior diameter similar to posterior; V-like parietal suture with supraoccipital;

## Results

*Coronelaps* n. g.

*Elapomorphus* Wiegmann, 1843 (part): 25.

supraoccipital suture with exoccipital transverse; exoccipital with lateral expansions excavated; paroccipital process present; basioccipital with anterior process extended to posterior extremity; dorsal surface of nasals oval; nasals with their antero-median tip isolated by sharp process, which is forked in the lifted up articulation of premaxilla; parasphenoid process short. Presence of a yellow transversal band on the parietals plates of head (Crowned blackhead snake). Dorsal ground red, ventral surface immaculate.

**Type-species.** *Calamaria lepida* Reinhardt, 1861.

**Composition.** Monotypic.

*Coronelaps lepidus* (Reinhardt, 1861) (n. comb.)

(Cabeça-preta coroadá, crowned black head)

(Figuras 2A, 3, 4)

*Elapomorphus lepidus* Reinhardt, 1861: 239, pl. 4, Fig. 6-9; type-locality: Bicuda, Rio da Casca Municipality, Minas Gerais State, Brazil. – Lema and Hofstadler Deiques, 1995:97, Fig. 1, 4-7, 9-17.

*Elapomorphus wuchereri* Günther, 1861a (part):415, fig.; type-locality: Rio Ilhéus, Ilhéus, Bahia, Brazil (Except the drawing). – Günther, 1861b (part):15, Fig. (2<sup>nd</sup> edition of 1861a).

*Elapomorphus (Elapomorphus) coronatus* Sauvage, 1877:110; type-locality: “Amérique du Sud” -- probably environs of Rio de Janeiro (Brazil).

*Elapomorphus (Elapomorphus) lepidus* – Lema, 1984:59, fig. 2, 16.

**Observations.** During the development it changes of coloration, becoming entirely red, disappearing the dark dorsal stripes.

**Distribution.** Eastern Brazil, from Rio de Janeiro to northeastern Brazil until Ceará and Paraíba; to West in eastern Minas Gerais, by in Atlantic Forest.

## Discussion

The revision of Lema and Hofstadler Deiques (1995) noted that *Elapomorphus accedens* Jan, 1862 was described with one specimen from Bahia, perhaps lost, is synonym. The author senior to try to find this specimen, assisted by the Director of the Staatliches Museum de Stuttgart; the same did Axel Kwet (Tübingen University). The original description has very poor data.

The description of Günther (1861) of *Elapomorphus wuchereri* is, basically, for *Coronella lepida*, species unknown to Günther, and the pretenses types of *E. wuchereri* are only more two specimens of *Coronelaps lepidus*. The Wucherer’s drawing of pretense adult specimen of *E. wuchereri*, is an iconotype of it. The drawing was lost but published by Günther (1861) and, by this, perhaps valid. But, the quality of drawings is very poor, and the author preferred to use a good specimen housed in The Natural History Museum of London, and from the same locality (Ilhéus, southern Bahia) (Lema, submitted).

The *Elapomorphini* genera presented a derivation in order of (*Elapomorphus* Wiegmann, 1843) – [(*Coronelaps* n. – *Phalotris* Cope, 1861) – (*Apostolepis*)] (Hofstadler Deiques

and Lema, 2005). The specimens of these genera can be recognized by the key presented here.

The genus *Elapomorphus* is re-presented now by two species, *E. quinquelineatus* (Figures 2, 5, 6), and *E. wuchereri* new combination (Figures 2, 7-9), three species confounded at the past, but very different as is possible to evaluate by the size, morphology, and skull bone features, according to Lema and Hofstadler Deiques (1995) a paper submitted by the author, revalidating *E. wuchereri*. By the distribution the three species inhabiting the same area of Atlantic Forest, being *E. wuchereri* distributed from southern Bahia to Ceará, *E. quinquelineatus* from southern to southeastern Brazil. The occurrence in Rio Grande do Sul (Lema, 1992) is doubtful, perhaps an error during the housing of the specimen in Butantan Institute collection. Part of the confusion in the determination of specimens of the two species is due to the variation during the development: the young of *E. wuchereri* has three black dorsal stripes (Figure 7), the subadult becomes yellow with very feeble stripes (Figures 8 and 9) which disappear in the adult that becomes entirely yellow; the young of *E. quinquelineatus* is olivaceous with five dark dorsal stripes (Figure 5) becoming yellowish brown with three dark stripes (Figure 6).

## Key for identification of *Elapomorphini* genera

- 1a. Internasal plates present; presence of two postocular; temporal plates, anterior and posterior, present. End of the tail without black blotch. Size varying 60 to 160 cm ..... 2
- 1b. Without internasal; one postocular present; only the posterior temporal present, or none. End of tail with black blotch. Size varying 40 to 90 cm, usually 60 ..... *Apostolepis*
- 2a. Presence of two prefrontals ..... 3
- 2b. Presence of one prefrontal ..... *Phalotris*
- 3a. Head without yellow collar on parietals. Dorsal ground coloration olive-brown, reddish or yellowish. Slender body posterior. Size varying 80 to 160 cm ..... *Elapomorphus*
- 3b. Yellow collar on the parietals. Back ground color pinkish red. Body with equal diameter along the trunk. Size until 60 cm..... *Coronelaps g.n.*

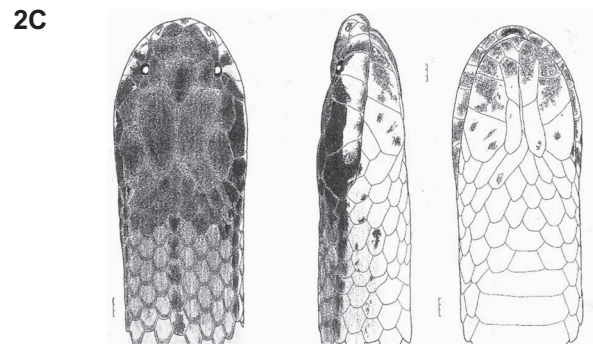
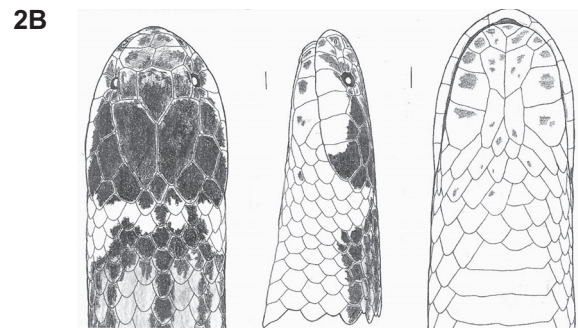
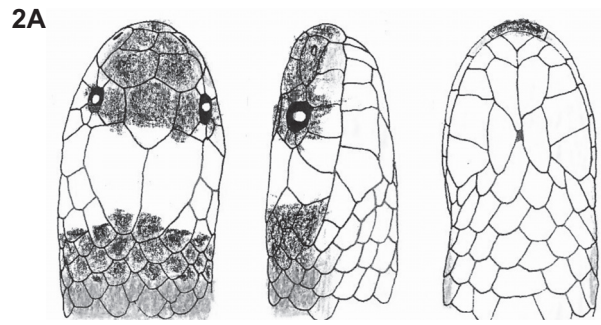




**Figure 1.** Neotype of *E. wuchereri* (BMNH 1946.1.2.96) from Ilhéus, Bahia.



**Figure 3.** *Elapomorphus quinquelineatus*, young, from Minas Gerais (M. Sacramento).



**Figure 2.** Comparison of morphology, pholidosis, and coloration of head of three species of the genus *Elapomorphus*: (2A) *Coronelaps lepidus*, MNRJ 2987 from Campinho, Rio de Janeiro; (2B) *Elapomopomorphus quinquelineatus*, MNRJ 752 from Viçosa, Minas Gerais; and (2C) *Elapomorphus wuchereri*, UESCB 1457 from Mutuípe, Bahia. Trace as 2 mm (1 del. by author, 2 and 3 by Eduardo Mellone Lucchese; color by author).



**Figure 4.** *Elapomorphus quinquelineatus*, adult, from Minas Gerais (M. Sacramento).





Figure 5. *Elapomorphus wuchereri*, very young, Bahia (Freitas and Silva, 2007).



Figure 7. *Elapomorphus wuchereri*, adult (A.J.S. Argolo).



Figure 6. *Elapomorphus wuchereri*, young (A.J.S. Argolo).

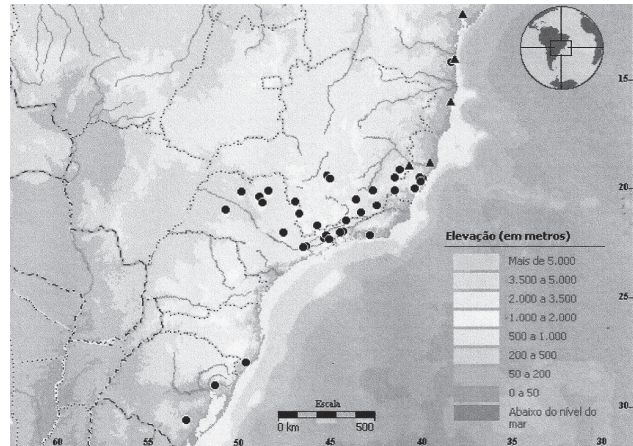


Figure 10. Map of localities where examined specimens: triangles, *Elapomorphus wuchereri*; circles, *Elapomorphus quinquelineatus*. (Microsoft Encarta)

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Lucchese (Porto Alegre, RS), for the drawings.

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## Appendix

### Specimens examined

#### Convention:

w/p: without indication of precedence

w/n: without number

#### *Coronelaps lepidus*

BRAZIL – W/p (NMW 21989, NMW 21995). **Bahia:** Banco do Pedro (MZUSP 9610). Ilhéus: Rio Ilhéus (BMNH 1946.1.2.91, BMNH 1946.1.2.92, syntypes of *Elapomorphus wuchereri* Günther); Ilhéus: Ribeirão da Fortuna (MNRJ 2948). **Ceará:** Crato, Floresta Nacional do Araripe (MNRJ w/n). **Espírito Santo** (ZSBS w/n; UFES-CZ A-105). Araguaia (IBSP 9302, IBSP 10425, IBSP 10534, IBSP 20762); Araguaia: Vila Domingo Martins (IBSP 28891, IBSP 29494); Campinho (MNRJ 2987); Marechal Floriano: Alta Nova Almeida: Sítio Três Marias (MCP 9196); Rio Doce (MZUSP 96); Santa Tereza (MNRJ 741a, MNRJ 741b, MNRJ 2975). **Minas Gerais:** Caratinga (IBSP 324, IBSP 325). Iripui (IBSP 16022). Muzambinho (IBSP 9839), Ouro Preto (IBSP 854, IBSP 12963). Rio da Casca: Arraial do Bicudo: Fazenda Feijão Cru (MZUC 63821, holotype). São Sebastião do Paraíso (IBSP

915). **Paraíba:** Teixeira: Pico do Jabre (MNRJ w/n). **Rio de Janeiro:** Corcovado: 2000 m/h, (MNRJ 2986). Nova Friburgo: Muri (IBSP 21930). Rio de Janeiro (MNHN 5073, holotype of *E. coronatus* Sauvage). Teresópolis (IBSP 740, SMF 774, FMNH 9028, IBSP 48501). **São Paulo:** Serra da Bocaina (ZUEC 1377).

#### *Elapomorphus quinquelineatus*

BRAZIL – W/p (BMNH w/n, holotype of *Elapomorphus teniocephalus* Günther; MZST w/n; MNRJ 744, ZSM 2168/0, ZSM 2169/0, ZBM 2403, ZSM 2421/0, ZSM 2426/0, USNM 6180, USNM 76371, USNM 76372, USNM 207744, BMNH w/n, holotype of *Elapocephalus taeniatus* Günther, IB 5593). **Bahia:** Ilhéus (ZMB 7538). Mucuri: Fazenda Pombal (ZUEC 240). Porto Seguro: Santa Cruz de Cabrália: Reserva Florestal Veracruz (IBSP 55983), Salvador (SMNS W/N, holotype of *Elapomorphus accedens* Jan). São Bento das Lagoas, W of Bahia (ZSM 47/27). Valença (CEPLAC n ?). **Espírito Santo:** w/p (MZUSP 95, MBES 100, UFES-CZ A154, MBES 77). Guandu (IBSP 8825). Jequitibá (ZSM 324/1920). Marechal Floriano: Alta Nova Almeida: Sítio Santa Rita (MCP 9195). Parque Estadual Pedra Azul, Rio Doce (MZUSP 91). Santa

Teresa: Estação Biológica Santa Lúcia (MBES 401). Vitória: Paraíso do Sul: Santa Isabel (ZSM 279/1920a, ZSM 279;1920b). **Minas Gerais:** w/p (MZUSP 90). Parque Nacional do Caparaó (MZUSP 7720). Serra do Cipó: Virginópolis (FUNED 71). **Rio de Janeiro** (MNHN 3673, syntype of *Calamaria blumii* Schlegel). Linhares (MZUSP 9837). Miguel Pereira (MZUSP 8848). Nova Friburgo (ZBM 7449). Rezende: Campo Belo (ex-Itatiaia) (IBSP 25621). Rio de Janeiro (MZUSP 4723, UMMZ 65879). **São Paulo:** w/p (RMNH 124a, RMNH 124b, syntypes of *Calamaria blumii* Schlegel). Boracéia (MZUSP 2196). Monte Alegre (MZUSP 1771). Paranapiacaba (MZUSP 92). São José dos Campos: Barragem do Jaguari (IBSP 48094). Taubaté (MZUSP 93, IBSP 111; IBSP 215, skull).

#### *Elapomorphus wuchereri rev.*

BRAZIL – W/p (IBSP 5593). **Bahia:** Ilhéus (ZMB 7538). Mucuri: Fazenda Pombal (ZUEC 240). Porto Seguro: Santa Cruz de Cabrália: Reserva Florestal Veracruz: Estação Veracruz (IBSP 55983). Salvador (SMNS w/n, holotype of *Elapomorphus accedens* Jan), Valença (CEPLAC w/n). **Espírito Santo:** w/p (MBES 77). Guandu (IBSP 8825). **Rio de Janeiro:** Linhares (MZUSP 9837).