

SHORT COMMUNICATION

## Included, excluded and re-included: *Chironius brazili* (Serpentes, Colubridae) in Rio Grande do Sul, southern Brazil

### Inclusão, exclusão e reinclusão: *Chironius brazili* (Serpentes, Colubridae) no Rio Grande do Sul, sul do Brasil

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#### Abstract

Although *Chironius brazili* Hamdan and Fernandes, 2015 was recently described, its occurrence in Rio Grande do Sul, southern Brazil, has been discussed for at least three decades. In this work, we evaluate the occurrence of *C. brazili* in Rio Grande do Sul, presenting three new records, a distribution extension and comments in its available literature records. In the Pampa biome, all records are near areas of Atlantic Forest, in grassy-woody steppes with gallery forest, in western Rio Grande do Sul. Our records suggest that *C. brazili* might occur in the Central Depression of Rio Grande do Sul, Uruguay and adjacent areas to the Western portion of Rio Grande do Sul.

**Keywords:** geographical distribution, gallery forest, Pampa, Southern Brazil.

#### Resumo

Embora *Chironius brazili* Hamdan and Fernandes, 2015 tenha sido recentemente descrita, sua ocorrência no Rio Grande do Sul tem sido discutida há, pelo menos, três décadas. Neste trabalho, avaliamos a ocorrência de *C. brazili* no Rio Grande do Sul, apresentando três novos registros, uma extensão de distribuição e comentários sobre seus registros disponíveis em literatura. No bioma Pampa, todos os registros estão perto de áreas de Mata Atlântica, em estepes gramíneo-lenhosas com mata ciliar, no oeste do Rio Grande do Sul. Nossos registros indicam que *C. brazili* pode ocorrer na Depressão Central do Rio Grande do Sul, Uruguai e áreas adjacentes à porção ocidental do Rio Grande do Sul.

**Palavras-chave:** distribuição geográfica, floresta de galeria, Pampa, Sul do Brasil.

The genus *Chironius* FITZINGER, 1828, represents a monophyletic group of colubrid snakes of terrestrial-arboreal habits (Hollis, 2006; Klaczko *et al.*, 2014), currently composed by 22 species distributed from south of Honduras in Central America to southern Uruguay in South America (Dixon *et al.*, 1993). In the state of Rio Grande do Sul, there are literature records for *Chironius bicarinatus* (WIED, 1820), *Chironius brazili* HAMDAN AND FERNANDES, 2015, *Chironius exoletus* (LINNAEUS, 1758) and *Chironius maculoventris* DIXON, WIEST AND CEI, 1993 (Lema 1994; Abegg and Entiauspe, 2012; Hamdan and Fernandes, 2015; Santos *et al.*, 2015).

Although *Chironius brazili* was recently described, its occurrence in Rio Grande do Sul has been discussed for at least three decades. Hamdan and Fer-

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nandes (2015) revised the taxonomic status of *C. flavolineatus*, and described *C. brazili* based on populations previously recognized as the former species. Lema (1994) published a list of reptile species for Rio Grande do Sul, based both on vouchers and anecdotal records. However, Di-Bernardo *et al.* (2004) proposed the deletion of eight species from the list, based mainly on the lack of evidence argument, since several of the portrayed taxa did not present accordingly evidence for their support as new records for the region.

One of the excluded records was of *C. flavolineatus*, which was recorded by Lema (1994) based on seven eggs discovered in a native forest of Poço do Carvão, municipality of São Leopoldo. His identification was made based on the analysis of two embryos, which were described as in advanced stages of development. Lema (1994) also added a comment attributed to Wiest (1978), that “the southern population (SP (São Paulo), MT (Mato Grosso), MS (Mato Grosso do Sul), PR (Paraná), SC (Santa Catarina), RS (Rio

Grande do Sul) differs clearly from the others and could be a subspecies”. Photographs from the individuals or the voucher material itself were not found in any collections by the authors of this work and it is believed to be discarded by the Museu de Ciências Naturais employee staff (Thales de Lema, pers. comm. 2016).

Hamdan and Fernandes (2015), in the revision of *C. flavolineatus*, provide a geographical distribution for *C. brazili* in the Central and Southeastern Cerrado of Brazil, and comment that “an apparently disjunct population of *C. brazili* occurs in the state of Rio Grande do Sul” with two isolated records in this state, providing no further comments on its biogeographical implications.

Di-Bernardo *et al.* (2004), in its exclusion proposal, argued that *C. flavolineatus* lacked voucher specimens and had not been recorded in the other Southern Brazilian states or neighboring countries. The recorded habitat for *C. flavolineatus* in Dixon *et al.* (1993), which was grass steppes of



**Figure 1.** Specimens of *Chironius brazili* encountered in Rio Grande do Sul, southern Brazil: (A) Santa Cruz do Sul; (B) São Francisco de Assis; (C) Santiago; (D) Rosário do Sul; (E) Highway BR-377 between Santiago and São Francisco de Assis municipalities. Scale bars not available.





**Figure 2.** Habitat occupied by *Chironius brazili* in Rio Grande do Sul, southern Brazil. (A) Woody steppe with gallery forest in Rosário do Sul (IBSP 87.468); (B) Woody steppe with gallery forest in Santiago (IBSP 87.467).

the Marajó island (Pará), in caatinga-agreste-savanna formations of northeastern Brazil, and in Campos Cerrados of Mato Grosso, Bahia, Goiás, Minas Gerais and São Paulo, also contrasted sharply with the one proposed by Lema (1994). Therefore, Di-Bernardo *et al.* (2004) argued that the presented embryos corresponded to another species.

Hamdan *et al.* (2014) designated the lectotype of *C. flavolineatus* (MSNM Re2729), which contains a collection locality tag of “Rio Grande do Sul”. However, the authors

argued that the handwriting was added by a third party, as Jan (1863) presented the type locality of the species only as “Brasile”, therefore, considering “Rio Grande do Sul” as an error. In this work, we evaluate the occurrence of *C. brazili* in Rio Grande do Sul, presenting three new records, a distribution extension and comments in its available literature records. Collection acronyms are: MCP (Museu de Ciências e Tecnologia, Pontifícia Universidade Católica do Rio Grande do Sul) and IBSP (Instituto Butantan).

**Table 1.** Meristic and morphometric data of *Chironius brazili* records for Rio Grande do Sul, southern Brazil. The abbreviations are as follows: CL = caudal length; DSR = dorsal scale row formula; IL = infralabials, right/left; IL (CS) = infralabials in contact with chin shields; KDA, KDM, KDP = rows of keeled dorsal scales at anterior, midbody, and posterior portion of body, respectively; PO = postocular; SC = subcaudals; SL = supralabials, right/left; SO = supralabials contacting orbit; SVL = snout-vent length; TEA = anterior temporals; TEP = posterior temporals; VE = ventrals.

	MCP 18.429	MCP 18.430	IBSP 87.467	IBSP 87.468
SVL	643 mm	849 mm	849 mm	405 mm
CL	371 mm	460 mm	503 mm	197 mm
VE	158	155	160	159
SC	140	142	136	140
SL	9/9	9/9	9/9	9/9
SO	5-6	5-6	5-6	5-6
IL (CS)	10/10 (1-5)	11/10 (1-6/1-5)	9/9 (1-5)	10/10 (1-5,7)
PO	2	2	2	3
TEA	1	1	1	1
TEP	2	2	1	2
CS	divided	divided	divided	divided
DSR	12-12-10	12-12-10	12-12-10	12-12-10
KDA	0	0	0	0
KDM	2	2	2	2
KDP	0	0	2	2

Lema (1994) – Unvouchered and unknown collection date. Seven eggs encountered in a hollow native tree, in the upper portion of the Rio dos Sinos, Poço do Carvão locality, São Leopoldo municipality (S29° 45' 19.62" W51° 9' 1.58"; 7m asl), Rio Grande do Sul. The eggs were collected and transported to the Museu de Ciências Naturais (MCN), Fundação Zoobotânica, where they were incubated. Two eggs were opened, and the examined embryos were identified as *C. flavolineatus*. Based on the reference to Wiest (1978), morphological distinction within southern populations of *C. flavolineatus* and its portrayed states, we can argue that Lema (1994) was referring to the morphotype of *C. brazili*. The eggs were probably discarded by the MCN employee staff (Thales de Lema, pers. comm. 2016).

Hamdan and Fernandes (2015) – MCP 18.429 (Figure 1A). Adult female. The specimen was found in the municipality of Santa Cruz do Sul (S29° 42' 46.0" W52° 25' 48.0", 234m asl), Rio Grande do Sul, Brazil, in 28 December 1994 by Ricardo Ott. This specimen previously was identified as *Chironius bicarinatus*.

Hamdan and Fernandes (2015) – MCP 18.430 (Figure 1B). Adult female. The specimen was found run over in the RS-377 road (S29° 33' 26.0" W55° 4' 1.2", 228 m asl), in the municipality of São Francisco de Assis, Rio Grande do Sul, Brazil, in 22 July 2006 by A. P. Santos-Jr, Fernanda. M. D'Agostini, and Rodrigo Lingnau. Both jaws are broken.

This study – IBSP 87.467 (Figure 1C). Adult female. The specimen was observed crossing an asphalted driveway in Santiago (S29° 11' 30" W054° 52' 02", 426 m asl).

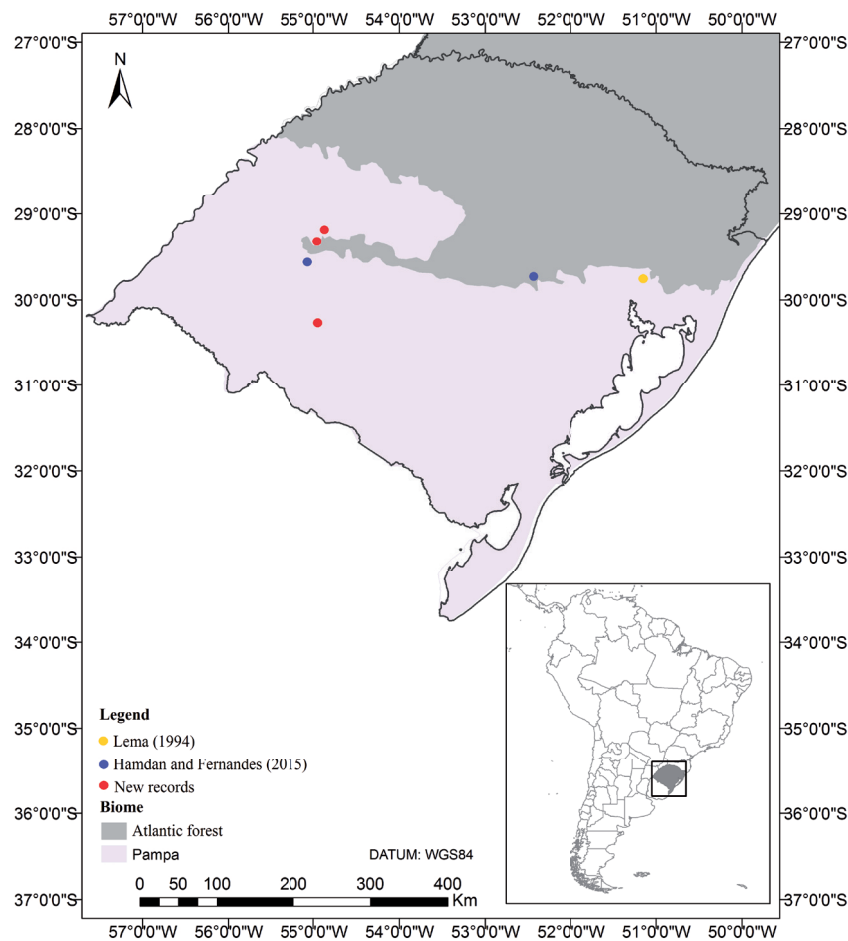
Encountered by Olmiro Bochi Brum, in Avenida Batista Bonoto Sobrinho at 02 August 2015. The area presents grasslands with lotic water and gallery forest (Figure 2A).

This study – IBSP 87.468 (Figure 1D). Adult female. The specimen was collected by the authors (CMR, ADA, LMB) and Juliana Dockhorn (collecting permit SISBio 50666-1), in Serra do Caverá, near the Área de Proteção Ambiental do Ibirapuitã, Rosário do Sul municipality, on 29 October 2015. The specimen was encountered while dislocating in the substrate, inside of a riparian forest (Figure 2B) (S30° 15' 59.1" W054° 56' 38.8", 218 m asl), around 10:00h, in a sunny and hot day.

This study – Uncollected (Figure 1E). Roadkill specimen, without meristic or morphometric data, photographed by Otávio Ribeiro, in 18 November 2013, in the highway RS-377 (S29° 19' 26.1" W54° 57' 08" 413 m asl), between the municipalities of Santiago and São Francisco de Assis. The vicinities of the highway were a rural property with a fragment of native forest.

The meristic and morphometric variables found in specimens of Rio Grande do Sul (Table 1), as well as their respective dorsal and ventral coloration, are in accordance with the described for the species (Hamdan and Fernandes, 2015).

Accordingly to Hamdan and Fernandes (2015), *C. brazili* is distributed in Brazilian Cerrado throughout the states of Goiás, Federal District, Minas Gerais, and São Paulo, from 70 up to 1360m asl (generally 700–900m asl), occurring in sympatry with *C. flavolineatus* in its northern distribution portion, the latter being usually found between 100–400m asl.



**Figure 3.** Distribution map for *Chironius brazili* in Rio Grande do Sul, southern Brazil. New records (red circle). Other colors represent literature records.

Bérnils (2009) commented the occurrence of *C. flavolineatus* in the southern portion of Paraná, in areas above 800m asl. This data was apparently not analyzed by Hamdan and Fernandes (2015), considering their lack of specimens for this state. However, considering that *C. flavolineatus* occurs mainly in lowlands and has a centro-setentrional distribution in Brazil, we speculate that the records in Paraná actually consist with *C. brazili*, being the higher altitudes and the Central Southern distribution consistent with records of the species. Curiously, our new records are from localities from 7 – 426m above sea level, with the most records south at lower altitudes than the north.

As related for *C. flavolineatus* (*lato sensu*) and *C. brazili* in its setentrional distribution portion, this species seems to occur mainly in open areas or in forests next to them, with five records for the Pampa biome. In the Pampa biome, all records are near areas of Atlantic Forest (Seasonal Deciduous Forest), in grassy-woody steppes with gallery forest, in western Rio Grande do Sul. There is a single record for the Atlantic Forest in Santa Cruz

do Sul, near a woody steppe with gallery forest. Lema's record (1994) remains distinct, considering its location in a Seasonal Semideciduous Forest, which differs from our analyzed records in the state. However, the presence of steppes and gallery forests in the area reported by Lema (1994) renders highly likely the occurrence of *C. brazili* in the region, but may represent a geographical distribution limit to the east, considering the gradual scarcity of grasslands beyond this locality.

Except for the record in Santa Cruz do Sul (76 km), all others are relatively distant (approximately 300 km) from the municipality of São Leopoldo (Lema's record), displaying that *C. brazili* might occur in the Central Depression of Rio Grande do Sul (Figure 3). It is also likely that the species occurs in Uruguay and adjacent areas to the Western portion of Rio Grande do Sul. Further assessment of the phylogenetic relationships between *C. flavolineatus* and *C. brazili*, under a biogeographical framework, are needed in order to elucidate dispersal and diversification patterns between these species.



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