

New records and geographic distribution of *Corythomantis greeningi* Boulenger, 1896 (Amphibia: Hylidae)

Leandro Braga Godinho^{1*}, Mario Ribeiro Moura^{2,3} and Renato Neves Feio¹

1 Universidade Federal de Viçosa, Departamento de Biologia Animal, Museu de Zoologia João Moojen. Vila Gianetti, casa nº 32, Campus UFV. CEP 36570-000. Viçosa, MG, Brazil.

2 Universidade Federal de Minas Gerais, Instituto de Ciências Biológicas, Departamento de Zoologia, Laboratório de Herpetologia. Avenida Antônio Carlos, 6627, Pampulha. CEP 31270-901. Belo Horizonte, MG, Brazil.

3 Ecos Biota Consultoria Ambiental. Rua Pratinha 37/302BL01. CEP 30750-250. Belo Horizonte, MG, Brazil.

* Corresponding author. E-mail: bragamol@yahoo.com.br

ABSTRACT: We provide new records of *Corythomantis greeningi* from southeastern Brazil, extending its southernmost distribution. The new records of *C. greeningi* are from an area of the Cerrado biome, in the State of Minas Gerais.

Corythomantis greeningi Boulenger, 1896 is a medium to large-sized casque-headed frog widely distributed in the xeric and subhumid regions of northeastern Brazil (Frost 2011). Its geographic distribution is mainly associated with the Caatinga, a biome characterized by xeric shrub lands. This species lives or seeks refuge in bromeliads, tree holes and rock crevices, and reproduces in lentic water ponds during the rainy season (Jared *et al.* 1999). Although the distribution of *C. greeningi* is well known within the Caatinga, it is poorly known at higher latitudes, particularly in transition areas with the Cerrado biome.

Recently, Pombal *et al.* (2012) described a second species of *Corythomantis* from Bahia State, northeastern Brazil, and also reviewed the current distribution of *C. greeningi* based on collections and literature records. At this point, the southernmost record of *C. greeningi* is the middle Jequitinhonha River, in Cristália Municipality, Minas Gerais State, southeastern Brazil (Feio and Caramaschi 1995). Herein we report new records of *C. greeningi* for the Cerrado biome, based on specimens collected by us and deposited in the herpetological collection of the Museu de Zoologia João Moojen, Universidade Federal de Viçosa (MZUFV), Viçosa, Minas Gerais, Brazil. In order to improve the current geographic distribution map of *C. greeningi*, we also considered literature records and data available on CRIA's Species Link (2013), an information system that integrates data from Brazilian biological collections.

On 13 November 2011 at 10:00 h, a couple of *C. greeningi* (Figure 1) was found inside a bromeliad on the margin of a permanent stream (17°24'13" S, 45°03'36" W, 654 m elevation, datum SAD1969), in the rural zone of Buritizeiro Municipality, Minas Gerais State, Brazil (capture license provided by the Instituto Brasileiro do Meio Ambiente e Recursos Naturais Renováveis [IBAMA] #30677-1/2011). Voucher specimens are deposited in the herpetological collection of MZUFV under the labels MZUFV11705 (male) and MZUFV 11706 (female). An additional record was considered here based on a specimen collected on 2 January 1993 at Montes Claros Municipality and housed in MZUFV collection, under the label MZUFV 895.

After reviewing literature on records of this species it

was possible to trace 38 localities with confirmed records, including the new records reported here (see Table 1, Figure 2). Most of the records of *C. greeningi* were from biomes characterized by open vegetation, such as the Caatinga (63.16% of records, n = 24) and Cerrado (21.05%, n = 8), but they were also found in adjacent regions toward the Atlantic Forest (15.79%, n = 6). The record of *C. greeningi* from Buritizeiro Municipality, northern Minas Gerais, represents its southernmost record, extending its geographic distribution around 230 km in a straight line southwestward from the closest locality previously reported; Municipality of Cristália (Figure 2). The occurrence of *C. greeningi* was reported in higher latitudes, in the States of Rio de Janeiro (*e.g.* Miranda-Ribeiro 1926) and Espírito Santo (*e.g.* Condit 1964). The record from Rio de Janeiro State was considered improbable by Sazima and Cardoso (1980), who suggested an allopatric distribution between *C. greeningi* and *Aparasphenodon brunoii* Miranda-Ribeiro, 1920. Additionally, none register of *C. greeningi* from Espírito Santo State were encountered by Pombal *et al.*



FIGURE 1. Couple of *Corythomantis greeningi* (MZUFV 11705-11706) collected Buritizeiro Municipality, Minas Gerais State, Brazil.

TABLE 1. Literature records and new distribution points compiled for *Corythomantis greeningi* in Brazil.

MUNICIPALITY (LOCALITY)	STATE	LATITUDE	LONGITUDE	BIOME	REFERENCE
Água Branca	Alagoas	09°15'43" S	37°56'16" W	Caatinga	Pombal et al. (2012)
Piranhas (Dam Xingó)	Alagoas	09°37'24" S	37°45'24" W	Caatinga	Kasahara et al. (2003)
Carnaíba do Sertão	Bahia	09°35'45" S	40°25'09" W	Caatinga	Pombal et al. (2012)
Encruzilhada	Bahia	15°31'48" S	40°54'44" W	Atlantic Forest	Sazima and Cardoso (1980)
Feira de Santana (São José Mountain)	Bahia	12°06'00" S	39°01'48" W	Atlantic Forest	Juncá et al. (2007)
Jeremoabo	Bahia	10°04'06" S	38°20'49" W	Caatinga	Pombal et al. (2012)
Maracás	Bahia	13°26'07" S	40°25'56" W	Atlantic Forest	Pombal et al. (2012)
Miguel Calmon	Bahia	11°25'47" S	40°36'11" W	Caatinga	Pombal et al. (2012)
Morro do Chapéu (Lages)	Bahia	11°28'59" S	41°19'59" W	Caatinga	Juncá et al. (2007)
Paulo Afonso	Bahia	09°23'53" S	38°13'17" W	Caatinga	Pombal et al. (2012)
Crato	Ceará	07°14'03" S	39°24'33" W	Caatinga	Species Link
Crato	Ceará	07°12'55" S	39°24'37" W	Caatinga	Pombal et al. (2012)
Viçosa do Ceará	Ceará	03°33'43" S	41°05'31" W	Caatinga	Species Link
Viçosa do Ceará	Ceará	03°34'00" S	41°05'29" W	Caatinga	Pombal et al. (2012)
São Domingos	Goiás	13°23'59" S	46°19'18" W	Cerrado	Pombal et al. (2012)
Chapadinha	Maranhão	03°44'19" S	43°21'37" W	Cerrado	Sazima and Cardoso (1980)
Urbano Santos	Maranhão	03°12'23" S	43°23'16" W	Cerrado	Pombal et al. (2012)
Buritzeiro	Minas Gerais	17°24'13" S	45°03'36" W	Cerrado	This work
Cristália	Minas Gerais	16°42'57" S	42°51'25" W	Cerrado	Feio and Caramaschi (1995)
Montes Claros	Minas Gerais	16°43'41" S	43°51'28" W	Cerrado	This work
Grão Mogol	Minas Gerais	16°33'33" S	42°53'22" W	Cerrado	Species Link
Campina Grande	Parafba	07°13'19" S	35°52'23" W	Caatinga	Pombal et al. (2012)
Piancó	Parafba	07°11'34" S	37°55'43" W	Caatinga	Pombal et al. (2012)
São João do Cariri	Parafba	07°21'59" S	36°30'59" W	Caatinga	Vieira et al. (2007)
Soledade	Parafba	07°03'29" S	36°22'00" W	Caatinga	Pombal et al. (2012)
Caruaru	Pernambuco	08°17'04" S	35°58'11" W	Caatinga	Pombal et al. (2012)
Exu	Pernambuco	07°30'13" S	39°43'25" W	Caatinga	Pombal et al. (2012)
Garanhuns (Jabotão River)	Pernambuco	08°52'56" S	36°29'47" W	Atlantic Forest	Pombal et al. (2012)
Pesqueira	Pernambuco	08°21'28" S	36°41'52" W	Caatinga	Carvalho (1941)
Salgadinho	Pernambuco	07°55'36" S	35°39'01" W	Caatinga	Carvalho (1941)
Santa Cruz da Baixa Verde	Pernambuco	07°48'48" S	38°08'51" W	Caatinga	Silva et al. (2010)
Floriano	Piauí	06°46'18" S	43°01'26" W	Cerrado	Pombal et al. (2012)
Piracuruca	Piauí	03°55'41" S	41°42'33" W	Caatinga	Sazima and Cardoso (1980)
Piripiri	Piauí	04°16'26" S	41°46'36" W	Caatinga	Species Link
(Parque Nacional Sete Cidades)	Piauí	04°16'23" S	41°46'36" W	Caatinga	Pombal et al. (2012)
Angicos (Fazenda São Miguel)	Rio Grande do Norte	05°39'42" S	36°36'18" W	Caatinga	Jared et al. (2005)
São Paulo do Potengi	Rio Grande do Norte	05°53'57" S	35°45'51" W	Caatinga	Pombal et al. (2012)
(Estação Ecológica Serra Geral)	Tocantins	10°40'48" S	46°09'02" W	Cerrado	Valdujo et al. (2011)

al. (2012) after the examination of 89 specimens housed in several scientific collections.

Previous reports of *C. greeningi* present three inconsistencies: [1] Silva et al. (2010) provide the geographic coordinate [07°85'8.9" S, 38°17'7.09" W], referring to the Sítio Olho d'Água, in the Municipality of Santa Cruz da Baixa Verde, Pernambuco State. However, the geographic coordinate system only accepts values below 60 in the data field of minutes or seconds. According to IBGE (2011), Santa Cruz da Baixa Verde Municipality is located at 07°49'14" S, 38°09'10" W; [2] Pombal et al. (2012) included a record for Boa Vista Municipality, in Parafba State and cited Vieira et al. (2007). However, these last authors did not report the presence of *C. greeningi* in Boa Vista despite their paper dealt with studies on this site. Actually, Vieira et al. (2007) reported the occurrence of *C. greeningi* in the neighboring Municipality of São João do Cariri; and [3] according to Pombal et al. (2012: 8) "*C. greeningi* is known from northeastern, central, and southeastern Brazil ... and transition area to the Atlantic

Rain Forest or Cerrado biomes, including a locality in the State of Goiás, in the ecotone between Cerrado and Caatinga biomes (see Vaz-Silva et al., in press)". However, the paper of Vaz-Silva et al. (2012), cited by Pombal et al. (2012), did not report the occurrence of *C. greeningi* in Goiás State. Nevertheless, Pombal et al. (2012: 13) mentioned an examined specimen of *C. greeningi* from São Domingos Municipality, Goiás State. Therefore, the authorship of the first record of this species in Goiás State should be attributed to Pombal et al. (2012) instead of Vaz-Silva et al. (2012).

Besides *C. greeningi*, other species typically associated with the Caatinga biome have been reported for Cerrado regions, such as *Odontophrynus carvalhoi* Savage and Cei, 1965 (Haddad et al. 1988; Feio and Caramaschi 1995), *Physalaemus cicada* Bokermann, 1966, *Leptodactylus troglodytes* A. Lutz, 1926, and *Dendropsophus soaresi* Caramaschi and Jim, 1983 (Feio and Caramaschi 1995; Silveira 2006). Many of these species exhibit the limits of their geographic distributions in the boundaries between

the biomes Cerrado and Caatinga (Haddad *et al.* 1988; Feio and Caramaschi 1995; Silveira 2006). Historical climatic modeling of the Caatinga range predicted the expansion of some components of the nucleus of the Caatinga into the Cerrado regions of central and southeastern Brazil since the last glacial maximum (ca. 21,000 years ago) (Werneck and Coli 2006; Werneck 2011; Werneck *et al.* 2011). Therefore, the occurrence of these species, including *C. greeningi*, within the Cerrado biome may be associated to a relictual distribution of Seasonally Dry Tropical Forests in central Brazil.

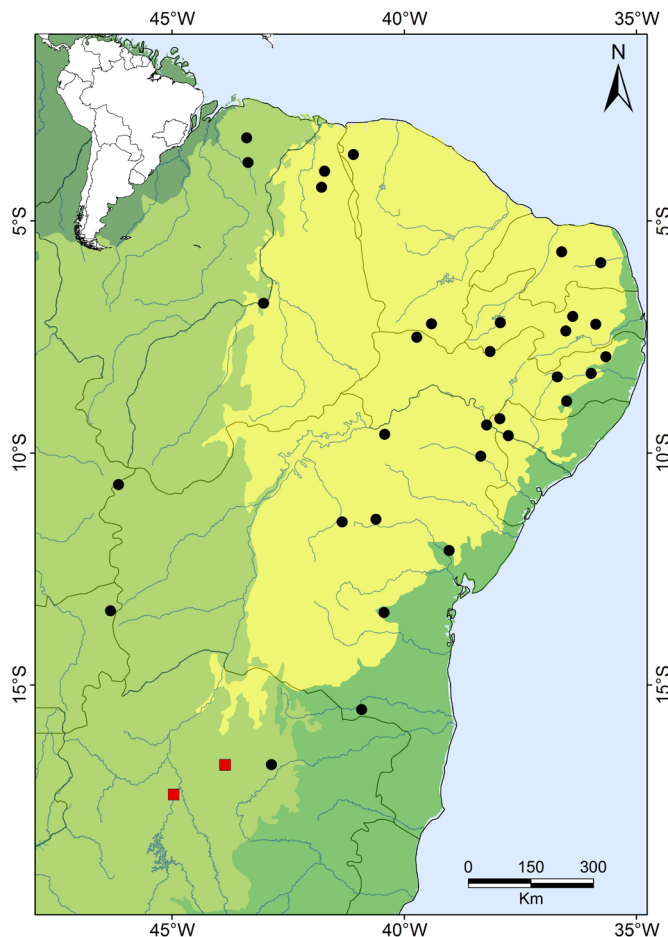


FIGURE 2. Geographic distribution of *Corythomantis greeningi* in Brazil, based on literature data (black circles), collection records from Species Link database (black squares), and new records (red square).

ACKNOWLEDGMENTS: We thank Juliana Zina and the anonymous referees for their valuable comments on the manuscript. André Luiz Gomes de Carvalho and Jessica Allen critically revised the English version of the draft. The Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for fellowships granted to LBG and MRM. Project Idea Wild for financial support.

LITERATURE CITED

Carvalho, A.L. 1941. Notas sobre os gêneros *Corythomantis* Boulenger e *Aparasphenodon* Miranda Ribeiro. *Papéis Avulsos do Departamento de Zoologia* 1(14): 101-110.

Condit, J.M. 1964. A list of the types of hylid frogs in the collection of the British Museum (Natural History). *Journal of the Ohio Herpetological Society* 4: 85-98.

Feio, R.N. and U. Caramaschi. 1995. Aspectos Zoogeográficos dos Anfíbios do médio Rio Jequitinhonha, Nordeste de Minas Gerais, Brasil. *Revista Ceres* 42: 53-61.

Frost, D.R. 2011. *Amphibian Species of the World: an Online Reference. Version 5.5* (31 January 2011). Electronic Database accessible at <http://research.amnh.org/vz/herpetology/amphibia>. Captured on 23 October 2012.

Haddad, C.F.B., G.V. Andrade and A.J. Cardoso. 1988. Anfíbios anuros no Parque Nacional da Serra da Canastra, estado de Minas Gerais. *Brasil Florestal* 64: 9-20.

IBGE 2011. *Instituto Brasileiro de Geografia e Estatística*. Electronic Database accessible at <http://www.ibge.gov.br/cidadesat>. Captured on 28 May 2012.

Jared, C., M.M. Antoniazzi, C.A. Navas, E. Katchburian, E. Freymüller, D.V. Tambourgiand and M.T. Rodrigues. 2005. Head co-ossification, phragmosis and defence in the casque-headed tree frog *Corythomantis greeningi*. *Journal of Zoology* 265(1): 1-8.

Jared, C., M.M. Antoniazzi, E. Katchburian, R.C. Toledo and E. Freymüller. 1999. Some aspects of the natural history of the casque-headed tree frog *Corythomantis greeningi* Boulenger (Hylidae). *Annales de Sciences Naturelles* 3: 105-115.

Juncá, F.A., M.C.L. Carneiro and N.N. Rodrigues. 2008. Is a dwarf population of *Corythomantis greeningi* Boulenger, 1896 (Anura, Hylidae) a new species? *Zootaxa* 1686: 48-56.

Kasahara, S., A.P. Zampeire Silva, S.L. Gruber and C.F.B. Haddad. 2003. Comparative cytogenetic analysis on four tree frog species (Anura, Hylidae, Hylinae) from Brazil. *Cytogenetic and Genome Research* 103: 155-162.

Miranda-Ribeiro, A. 1926. Notas para servirem ao estudo dos Gymnobatrachios (Anura) brasileiros. *Archivos do Museu Nacional* 27: 1-227.

Pombal, J.P.Jr, V.A. Menezes, A.F. Fontes, I. Nunes, C.F.D. Rocha and M. Van-Sluys. 2012. A second species of the casque-headed frog genus *Corythomantis* (Anura:Hylidae) from northeastern Brazil, the distribution of *C. greeningi*, and comments on the genus. *Boletim do Museu Nacional, Nova Série, Zoologia* 530: 1-14.

Sazima, I. and A.J. Cardoso. 1980. Notas sobre a distribuição de *Corythomantis greeningi* Boulenger, 1896 e *Aparasphenodon bruno* Miranda-Ribeiro, 1920 (Amphibia, Hylidae). *Iheringia, Série Zoologia* 55: 3-7.

Silva, G.L., E.M. Santos and J.P. Gomes. 2010. Predação de ovos de *Corythomantis greeningi* Boulenger, 1896 (Anura, Hylidae) por *Solenopsis invicta* Buren, 1972 (Formicidae: Myrmicinae). *Biotemas* 23(4): 153-156.

Silveira, A.L. 2006. Anfíbios do município de João Pinheiro, uma área de Cerrado no Noroeste de Minas Gerais, Brasil. *Arquivos do Museu Nacional* 64(2): 131-139.

Species link. 2008. Electronic Database accessible at http://slink.cria.org.br/centralized_search. Captured on 23 October, 2012.

Valdujo, P.H., A. Camacho, R.S. Recoder, M. Teixeira-Jr, J.M.B. Ghellere, T. Mott, P.M.S. Nunes, C. Nogueira and M.T. Rodrigues. 2011. Anfíbios da Estação Ecológica Serra Geral do Tocantins, região do Jalapão, Estados do Tocantins e Bahia. *Biota Neotropica* 11(1): 251-262.

Vaz-Silva, W., P.H. Valdujo and J.P. Pombal JR. 2012. New species of the *Rhinella crucifer* group (Anura, Bufonidae) from the Brazilian Cerrado. *Zootaxa* 3265: 57-65.

Vieira, W.L.S., C. Arzabe and G.G. Santana. 2007. Composição e distribuição espaço-temporal de Anuros no Cariri Paraibano, Nordeste do Brasil. *Oecologia Brasiliensis* 11(3): 383-396.

Werneck, F.P. and G.R. Coli. 2006. The lizard assemblage from Seasonally Dry Tropical Forest enclaves in the Cerrado biome, Brazil, and its association with the Pleistocenec Arc. *Journal of Biogeography* 33: 1983-1992.

Werneck, F.P. 2011. The diversification of eastern South American open vegetation biomes: Historical biogeography and perspectives. *Quaternary Science Reviews* 30: 1630-1648.

Werneck, F.P., G.C. Costa, G.R. Colli, D.E. Prado and J.W. Sites-Jr. 2011. Revisiting the historical distribution of Seasonally Dry Tropical Forests: new insights based on palaeodistribution modelling and palynological evidence. *Global Ecology and Biogeography* 20: 272-288.

RECEIVED: June 2012

ACCEPTED: October 2012

PUBLISHED ONLINE: March 2013

EDITORIAL RESPONSIBILITY: Juliana Zina