



Synonymy of *Crossodactylus bokermanni* Caramaschi & Sazima, 1985 with *Crossodactylus trachystomus* (Reinhardt & Lütken, 1862) and description of a new species from Minas Gerais, Brazil (Anura: Hylodidae)

BRUNO V.S. PIMENTA¹, ULISSES CARAMASCHI² & CARLOS ALBERTO GONÇALVES CRUZ²

¹*Bicho do Mato Meio Ambiente Ltda./Bicho do Mato Instituto de Pesquisa. Rua Perdigão Malheiros 222, Coração de Jesus. 30380-234 Belo Horizonte, MG, Brasil. E-mail: bvergueiropimenta@gmail.com*

²*Departamento de Vertebrados, Museu Nacional, Universidade Federal do Rio de Janeiro. Quinta da Boa Vista, São Cristóvão. 20940-040 Rio de Janeiro, RJ, Brasil. E-mail: ulisses@acd.ufrj.br; cagcruz@uol.com.br*

Abstract

The analysis of the external morphology variation in *Crossodactylus bokermanni*, *C. trachystomus*, and in unidentified specimens from 14 localities along the southern region of the Serra do Espinhaço, state of Minas Gerais, Brazil, revealed that all of these forms belong to the same taxon. *Crossodactylus bokermanni* is considered a junior synonym of *C. trachystomus*, whose holotype is redescribed and figured. The population from Serra da Canastra, western Minas Gerais, previously referred to as *Crossodactylus* cf. *trachystomus*, is herein described and figured as *Crossodactylus franciscanus*. Its advertisement call is redescribed and compared to those known for the genus.

Key words: taxonomy, *Crossodactylus trachystomus*, Cerrado

Resumo

A análise da variação de caracteres morfológicos externos em *Crossodactylus bokermanni*, *C. trachystomus* e de exemplares não identificados provenientes de 14 localidades ao longo da porção sul da Serra do Espinhaço, Estado de Minas Gerais, Brasil, revelou que todas essas formas são coespecíficas. *Crossodactylus bokermanni* é considerado sinônimo júnior de *C. trachystomus*, cujo holótipo é redescrito e ilustrado. A população da Serra da Canastra, oeste de Minas Gerais, referida em literatura como *Crossodactylus* cf. *trachystomus*, é descrita e ilustrada como *Crossodactylus franciscanus*. Sua vocalização de anúncio é redescrita e comparada com as vocalizações conhecidas para o gênero.

Palavras-chave: taxonomia, *Crossodactylus trachystomus*, Cerrado

Introduction

The genus *Crossodactylus* Duméril and Bibron currently comprises 14 diurnal species ranging from the Alagoas state in northeastern Brazil south to Misiones, Argentina, typically inhabiting streams in mountainous areas in the Atlantic Forest or montane savanna known as *campos rupestres* (Pimenta *et al.* 2014b). Two species are currently recognized in the southern region of the Serra do Espinhaço, a mountain range running from central Minas Gerais (southeastern Brazil) to northern Bahia (northeastern Brazil). *Crossodactylus trachystomus* Reinhardt & Lütken is known for Lagoa Santa, Ouro Preto, Nova Lima, and Belo Horizonte, state of Minas Gerais (Cochran 1955; Caramaschi & Kisteumacher 1989; Pimenta *et al.* 2014b). No other specimens than the holotype were ever collected in Lagoa Santa and the only specimens identified from Ouro Preto were those listed by Cochran (1955). This species has not been observed in the field since the mid 1980's, when a population decline followed by local extinction occurred in the Parque das Mangabeiras, Belo Horizonte (L.B. Nascimento, pers. comm.). Haddad *et al.* (1988) referred to a *Crossodactylus* population observed in Serra da Canastra, western Minas Gerais, and identified

also translated the papers in German; I. Nunes (MNRJ) for the photograph of the holotype of *C. franciscanus*; Alex Hettena for the English review; P.R. Nascimento and D. Pitta for the line drawings of *C. trachystomus* and *C. franciscanus*, respectively; IBAMA for collection permits (licenses 121/04 - IBAMA/RAN, 132/05 - IBAMA/RAN, and 038/2005 - IBAMA/DIREC, process n° 02022.002139/04–05); and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for fellowships and financial support.

References

- Afonso, L.G. & Eterovick, P.C. (2007a) Microhabitat choice and differential use by anurans in forest streams in southeastern Brazil. *Journal of Natural History*, 41, 937–948.
- Afonso, L.G. & Eterovick, P.C. (2007b) Spatial and temporal distribution of breeding anurans in streams in southeastern Brazil. *Journal of Natural History*, 41, 949–963.
- Bastos, R.P. & Haddad, C.F.B. (2002) Acoustic and aggressive interactions in *Scinax rizibilis* (Anura: Hylidae) during the reproductive activity in southeastern Brazil. *Amphibia-Reptilia*, 23, 97–104.
- Bastos, R.P. & Pombal Jr., J.P. (1995) New species of *Crossodactylus* (Anura: Leptodactylidae) from the Atlantic Rain Forest of southeastern Brazil. *Copeia*, 1995, 436–439.
<http://dx.doi.org/10.2307/1446907>
- Bokermann, W.C.A. (1966) *Lista Anotada das Localidades Tipo de Anfíbios Brasileiros*. Serviço de Documentação da Reitoria da Universidade de São Paulo, São Paulo, 181 pp.
- Boulenger, G.A. (1882) *Catalogue of the Batrachia Salientia s. Ecaudata in the Collection of the British Museum*. 2nd Edition. British Museum of Natural History, London, 503 pp. + 16 pls.
- Caldart, V.M., Iop, S. & Cechin, S.Z. (2011). Vocalizations of *Crossodactylus schmidtii* Gallardo, 1961 (Anura, Hylodidae): advertisement call and aggressive call. *North-Western Journal of Zoology*, 7, 118–124.
- Canelas, M.A.S. & Bertoluci, J. (2007) Anurans of the Santuário do Caraça, southeastern Brazil: species composition and phenological patterns of calling activity. *Iheringia, Série Zoologia*, 97, 21–26.
<http://dx.doi.org/10.1590/S0073-47212007000100004>
- Caramaschi, U. & Kistumacher, G. (1989) O girino de *Crossodactylus trachystomus* (Reinhardt e Lütken, 1862) (Anura, Leptodactylidae). *Revista Brasileira de Biologia*, 49, 237–239.
- Caramaschi, U. & Sazima, I. (1985) Uma nova espécie de *Crossodactylus* da Serra do Cipó, Minas Gerais, Brasil (Amphibia, Leptodactylidae). *Revista Brasileira de Zoologia*, 3, 43–49.
<http://dx.doi.org/10.1590/S0101-81751985000100005>
- Castellano, S., Cuatto, B., Rinella, R., Rosso, A. & Giacomina, C. (2002) The advertisement call of the European treefrogs (*Hyla arborea*): a multilevel study of variation. *Ethology*, 108, 75–89.
<http://dx.doi.org/10.1046/j.1439-0310.2002.00761.x>
- Cei, J.M. (1980) Amphibians of Argentina. *Monitore Zoologico Italiano*, New Series, 2 (Monographs), 1–609.
- Cochran, D.M. (1955) Frogs of Southeastern Brasil. *Bulletin of the United States National Museum*, 206, 1–423 + pls. 1–16.
<http://dx.doi.org/10.5479/si.03629236.206.1>
- Duméril, A.M. & Bibron, G. (1841) *Erpétologie Générale, ou Histoire Naturelle des Reptiles* 8. Libr. Encyclop. Roret, Paris, 792 pp.
- Eterovick, P.C., Carnaval, A.C.O.Q., Borges-Nojosa, D.M., Silvano, D.L., Segalla, M.V. & Sazima, I. (2005) Amphibian declines in Brazil: an overview. *Biotropica*, 37, 166–179.
<http://dx.doi.org/10.1111/j.1744-7429.2005.00024.x>
- Eterovick, P.C. & Sazima, I. (2004) *Anfíbios da Serra do Cipó, Minas Gerais, Brasil*. Editora PUC Minas, Belo Horizonte, 152 pp.
- Gerhardt, H.C. (1998) Acoustic signals of animals: recording, field measurements, analysis and description. In: Hopp, S.L., Owren, M.J. & Evans, C.S. (Eds.), *Animal Acoustic Communication. Sound Analysis and Research Methods*. Springer-Verlag Berlin Heidelberg, New York, pp. 1–25.
http://dx.doi.org/10.1007/978-3-642-76220-8_1
- Giacomina, C., Zugolaro, C. & Beani, L. (1997) The advertisement calls of the green toad (*Bufo viridis*): variability and role in mate choice. *Herpetologica*, 53, 454–464.
- Glaw, F. & Franzen, M. (2006) Type catalogue of amphibians in the Zoologische Staatssammlung München. *Spixiana*, 29, 153–192.
- Grant, T., Frost, D.R., Caldwell, J.P., Gagliardo, R., Haddad, C.F.B., Kok, P.J.R., Means, D.B., Noonan, B.P., Schargel, W.E. & Wheeler, W.C. (2006) Phylogenetic systematics of dart-poison frogs and their relatives (Amphibia: Athesphatanura: Dendrobatidae). *Bulletin of the American Museum of Natural History*, 299, 1–262.
[http://dx.doi.org/10.1206/0003-0090\(2006\)299\[1:PSODFA\]2.0.CO;2](http://dx.doi.org/10.1206/0003-0090(2006)299[1:PSODFA]2.0.CO;2)
- Haddad, C.F.B., Andrade, G.V. & Cardoso, A.J. (1988) Anfíbios anuros do Parque Nacional da Serra da Canastra, Estado de Minas Gerais. *Brasil Florestal*, 64, 9–20.
- Haddad, C.F.B., Garcia, P.C.A. & Pombal, J.P. Jr. (2003) Redescoberta de *Hylodes perplicatus* (Miranda-Ribeiro, 1926)

- (Amphibia, Anura, Leptodactylidae). *Arquivos do Museu Nacional*, 61, 245–254.
- Hensel, R. (1867) Beiträge zur Kenntniss der Wirbelthiere Südbrasilien. *Wiegmanns Archiv für Naturgeschichte*, 33, 120–162.
- Heyer, W.R., Rand, A.S., Cruz, C.A.G., Peixoto, O.L. & Nelson, C.E. (1990) Frogs of Boracéia. *Arquivos de Zoologia*, 31, 231–410.
- Leite, F.S.F., Juncá, F.A. & Eterovick, P.C. (2008) Status do conhecimento, endemismo e conservação de Anfíbios Anuros da Serra do Espinhaço, Brasil. *Megadiversidade*, 4, 158–176.
- Lutz, A. (1930) Observações sobre batrachios brasileiros. Taxonomia e biologia das Elosiinas. *Memórias do Instituto Oswaldo Cruz*, 24, 195–222 + 4 pls.
- Lutz, B. (1951) Nota prévia sobre alguns anfíbios anuros do Alto Itatiaia. *O Hospital*, 39, 705–707.
- Lutz, B. (1952) New frogs from Itatiaia Mountain, Brasil. *Copeia*, 1952, 27–28.
<http://dx.doi.org/10.2307/1437618>
- Lynch, J.D. (1971) Evolutionary relationships, osteology, and zoogeography of leptodactyloid frogs. *Miscellaneous Publications of the University of Kansas Museum of Natural History*, 53, 1–237.
- Lynch, J.D. & Duellman, W.E. (1997) Frogs of the genus *Eleutherodactylus* (Leptodactylidae) in Western Equador: systematics, ecology, and biogeography. *University of Kansas Special Publication*, 23, 1–236.
- Miranda-Ribeiro, A. (1923) Os hylodideos do Museu Paulista. *Revista do Museu Paulista*, 13, 825–846 + 3 pls.
- Miranda-Ribeiro, A. (1926) Notas para servirem ao estudo dos Gymnobatrachios (Anura) brasileiros. *Arquivos do Museu Nacional*, 27, 1–227 + 22 pls.
- Müller, L. (1924) Neue Batrachier aus Ost-Brasilien. *Senckenbergiana*, 6, 169–177.
- Müller, L. (1927) Amphibien und Reptilien der Ausbeute Prof. Bresslau's in Brasilien 1913–14. *Abhandlungen Senckenbergischen Naturforschenden Gessellschaft*, 40, 259–304.
- Nascimento, L.B., Cruz, C.A.G. & Feio, R.N. (2005a) A new species of diurnal frog in the genus *Crossodactylus* Duméril and Bibron, 1841 (Anura, Leptodactylidae) from Southeastern Brazil. *Amphibia-Reptilia*, 26, 497–505.
- Nascimento, L.B., Wachlevski, M. & Leite, F.S.F. (2005b) Anuros. In: Silva, A.C., Pedreira, L.C.V.S.F. & Abreu, P.A.A. (Eds.), *Serra do Espinhaço Meridional: Paisagens e Ambientes*, O Lutador, Belo Horizonte, pp. 209–229.
- Pimenta, B.V.S., Haddad, C.F.B. Nascimento, L.B., Cruz C.A.G. & Pombal, J.P. Jr. (2005) Comments on “Status and Trends of Amphibian Declines and Extinctions Worldwide”. *Science*, 309, 1999.
<http://dx.doi.org/10.1126/science.1112996>
- Pimenta, B.V.S., Wachlevski, M. & Cruz, C.A.G. (2008) Morphological and Acoustical Variation, Geographic Distribution, and Conservation Status of the Spinythumb Frog *Crossodactylus bokermanni* Caramaschi and Sazima, 1985 (Anura, Hylodidae). *Journal of Herpetology*, 42, 481–492.
<http://dx.doi.org/10.1670/07-164.1>
- Pimenta, B.V.S., Costa, D., Murta-Fonseca, R. & Pezzuti, T. (2014a) *Anfíbios: Alvorada de Minas, Conceição do Mato Dentro, Dom Joaquim - Minas Gerais*. Bicho do Mato Editora, Belo Horizonte, 196 pp.
- Pimenta, B.V.S., Cruz, C.A.G. & Caramaschi, U. (2014b) Taxonomic review of the species complex of *Crossodactylus dispar* A. Lutz, 1925 (Anura, Hylodidae). *Arquivos de Zoologia*, 45, 1–33.
- Pombal Jr., J.P., Feio, R.N. & Haddad, C.F.B. (2002) A new species of torrent frog genus *Hylodes* (Anura: Leptodactylidae) from Southeastern Brazil. *Herpetologica*, 58, 462–471.
[http://dx.doi.org/10.1655/0018-0831\(2002\)058\[0462:ANSOTF\]2.0.CO;2](http://dx.doi.org/10.1655/0018-0831(2002)058[0462:ANSOTF]2.0.CO;2)
- Reinhardt, J. & Lütken, C. F. (1862 “1861”) Bidrag til Kundskab om Brasiliens Padder og Krybdyr. *Videnskabelige Meddelelser fra den Naturhistoriske Forening i Kjobenhavn*, 3, 143–242.
- Sabaj Pérez, M.H. (Ed.) (2014) *Standard symbolic codes for institutional resource collections in herpetology and ichthyology: an Online Reference*. Version 5.0 (22 September 2014). Available from: <http://www.asih.org>. (accessed 12 December 2014)
- Steindachner, F. (1867) *Reise der Oesterreichischen Fregatte Novara um die Erde, in den Jahren 1857, 1858, 1859, unter den Befehlen des Commodore B. von Wüllerstorff-Urbair. Zoologischer Theil Band I. Heft 4. Amphibien*. Kaiserlich-Königliche Hof- und Staatsdruckerei, in Commission bei K. Gerold's Sohn, Wien, 70 pp. + 5 pls. [1861–75]
- Weber, L.N. & Caramaschi, U. (2006) Descrição da morfologia oral interna de larvas do gênero *Crossodactylus* Duméril e Bibron, 1841 (Amphibia, Anura, Leptodactylidae). *Arquivos do Museu Nacional*, 64, 141–149.
- Weygoldt, P. (1986) Beobachtungen zur Ökologie und Biologie von Fröschen in einem neotropischen Bergbach. *Zoologische Jahrbücher, Abteilung für Systematik, Ökologie und Geographie der Tiere*, 113, 429–454.
- Weygoldt, P. & Carvalho-e-Silva, S.P. (1992) Mating and oviposition in the hylodine frog *Crossodactylus gaudichaudii* (Anura: Leptodactylidae). *Amphibia-Reptilia*, 13, 35–45.
<http://dx.doi.org/10.1163/156853892X00210>