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Three new species of *Proceratophrys* Miranda-Ribeiro 1920 from Brazilian Cerrado (Anura, Odontophrynidae)

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Abstract

Based on the analyses of specimens collected at several areas in the Cerrado domain from Central Brazil and others housed in scientific collections and on specimens collected at the type-locality, herein we describe three new species belonging to the *P. cristiceps* group: *Proceratophrys bagnoi* sp. nov., from UHE Serra da Mesa power plant (13°49'47.5"S, 48°19'17"W; 570 m a.s.l.; WGS84 datum), Municipality of Minaçu, State of Goiás; *Proceratophrys branti* sp. nov., from Jalapão, Municipality of Mateiros (05°15'25"S, 48°12'00"W; 109 m a.s.l.; WGS84 datum), State of Tocantins; and *Proceratophrys dibernardoii* sp. nov., Municipality of Mineiros (17°33'52"S, 52°33'20"W; 803 m a.s.l.; WGS84 datum), State of Goiás. The diversity of *Proceratophrys* in Brazilian Cerrado is still underscored and several species will be described in the following years.

Key words: Amphibia, *Proceratophrys goyana*, *Proceratophrys bagnoi* sp. nov., *Proceratophrys branti* sp. nov., *Proceratophrys dibernardoii* sp. nov., Taxonomy

Introduction

Despite lacking a formal definition based on synapomorphies, the genus *Proceratophrys* Miranda-Ribeiro, 1920 is considered homogeneous based on overall morphology and it is likely a monophyletic taxon, with *Odontophrynus* Reinhardt & Lütken, 1862 + *Macrogenioglottus* Carvalho 1946 as its sister group (Frost *et al.* 2006; Pyron & Wiens 2011). All species in the genus share the following combination of characters: body without enlarged glands, absence of nuptial pads on thumbs, toes not webbed but laterally fringed, supernumerary tubercles present on hands and feet, dorsal surfaces of fingers and toes rugose, zygomatic ramus of squamosal bone close to or in sutural contact with maxilla, and cervical cotylar arrangement type II (cotyles closely approximated) (Savage and Cei 1965; Lynch 1971; Prado and Pombal 2008; Martins and Giaretta 2011). Currently, the genus is composed of 29 species (Ávila *et al.* 2012; Cruz *et al.* 2012; Frost 2013), distributed in four putative species groups based mainly on morphological traits (Kwet and Faivovich 2001; Giaretta *et al.* 2000; Prado and Pombal 2008; Cruz and Napoli 2010; Dias *et al.* 2013). These groups have not been accessed in a comprehensive phylogenetic analysis, and unfavorable evidence based on molecular data has been presented by Amaro *et al.* (2009), Pyron and Wiens (2011), Teixeira Jr. *et al.* (2012), and Dias *et al.* (2013). Herein we keep the traditional taxonomic arrangement for the genus, providing comparisons when necessary.

The *Proceratophrys bigibbosa* species group, characterized by the presence of developed postocular swellings and absence of prominent palpebral appendages, was reviewed by Kwet and Faivovich (2001) and includes *P.*

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Appendix 1

Additional specimens examined

- Odontophrynus salvatori*.—BRAZIL: State of Goiás: Municipality of Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, MNRJ 15870 (holotype), MNRJ 15871 (paratype).
- Proceratophrys aridus*.—BRAZIL: State of Ceará: Milagres, Minador farm, MNRJ 55782 (holotype), MNRJ 55349, 55778–55781, 55783–55822, 75156–75157, 75158–75168 (paratypes); Jardim, CHUNB 56961–56962; Crato, CHUNB 64738–64745.
- Proceratophrys caramaschii*.—BRAZIL: State of Ceará: Fortaleza, Mucuripe, MNRJ 16592 (holotype), MNRJ 1419–1420, 1680, 16470–16484, 16487–16591, 16593–16600 (paratypes). State of Piauí: Piri-piri, Parque Nacional de Sete Cidades, CHUNB 61185–61218.
- Proceratophrys cristiceps*.—BRAZIL: State of Pernambuco: Caruaru, CHUNB 35793; Arco Verde, MNRJ 58030; Casinhas, MNRJ 307. State of Bahia: Feira de Santana, MNRJ 47839. State of Paraíba: Areia, MNRJ 50378; Maturéia, MNRJ 54756–54758. State of Rio Grande do Norte: Macaíba, MNRJ 1775, 1777. State of Sergipe: Brejo Grande, MNRJ 50376; São Cristóvão, MNRJ 50377.
- Proceratophrys goyana*.—BRAZIL: State of Goiás: Minaçu, Serra da Mesa, MNRJ 17309–17313, 17314, 20209–20212; Colinas do Sul, MNRJ 66224–66225, 66527.
- Proceratophrys concavitympanum*.—BRAZIL: State of Tocantins: Palmas, CHUNB 15263, 16121, 24260. State of Pará: Novo Progresso, CHUNB 44890–44891; Parauapebas, Serra dos Carajás, MNRJ 58854–58855.
- Proceratophrys cururu*.—BRAZIL: State of Minas Gerais: Parque Nacional da Serra do Cipó, MNRJ 17905 (paratype).
- Proceratophrys huntingtoni*.—BRAZIL: State of Mato Grosso: Chapada dos Guimarães, Parque Nacional da Chapada dos Guimarães, CHUNB 35975.
- Proceratophrys moratoi*.—BRAZIL: State of São Paulo: Botucatu, Rubião Júnior, MNRJ 14248–14249; 15872 (paratypes).
- Proceratophrys rotundipalpebra*.—BRAZIL: State of Goiás: Colinas do Sul, CHUNB 50338–50342; 50344; 50347–50348; 50351–50353.
- Proceratophrys vielliardi*.—BRAZIL: State of Minas Gerais: Paracatu, CHUNB 26655, 38967–38971. Distrito Federal: Brasília, CHUNB 48361, 57484, 57501.