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## New bioacoustic and distributional data on *Bokermannohyla sapiranga* Brandão *et al.*, 2012 (Anura: Hylidae): revisiting its diagnosis in comparison with *B. pseudopseudis* (Miranda-Ribeiro, 1937)

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### Abstract

In this paper, we provide new bioacoustic and distributional data on *Bokermannohyla sapiranga*, as well as additional comparative bioacoustic data on topotypes of *B. pseudopseudis*, and re-evaluate the differential diagnosis of the former species with respect to the latter. Head shapes (dorsal and lateral views) presented such variation that should not be used to differentially diagnose them as originally proposed. On the other hand, the presence of a dermal ridge along outer tarsi, and color patterns of the eyes and dorsal surface of hand/toe disks still represent diagnostic characters between both species. We also found differences in temporal (call duration; notes per call), spectral (dominant frequency; harmonics), and structural (pulsed/non-pulsed note structure) traits of their calls. Distribution of *B. sapiranga* is extended eastward (Paracatu), which corresponds to the first record for the State of Minas Gerais, whereas *B. pseudopseudis* distribution seems to be restricted to rocky montane field environments of northern Goiás State.

**Key words:** Advertisement call, Cerrado domain, rocky montane fields, taxonomy

### Introduction

The *Bokermannohyla pseudopseudis* (Miranda-Ribeiro, 1937) species group (*sensu* Faivovich *et al.* 2005) currently comprises nine species distributed in highlands of central (Chapada dos Veadeiros and Planalto Central), southeastern (Serra da Canastra and Espinhaço mountain ranges), and northeastern Brazil (Chapada Diamantina), usually associated with rocky montane fields (Leite *et al.* 2011, 2012; Brandão *et al.* 2012). *Bokermannohyla pseudopseudis* was described from the Chapada dos Veadeiros, Alto Paraíso de Goiás Municipality, Goiás State (Miranda-Ribeiro 1953), and was thought to also occur southward in the Distrito Federal (Pombal & Caramaschi 1995). Recently, this southern population was named, *Bokermannohyla sapiranga* Brandão *et al.*, 2012, and was reported to occur in a few municipalities of Goiás (Pirenópolis, Cristalina, and Catalão) in addition to its type locality, and had its advertisement call described from Distrito Federal and Pirenópolis (Brandão *et al.* 2012).

In this paper, we provide new bioacoustic and distributional data on *B. sapiranga* and additional bioacoustic data on *B. pseudopseudis*, and a re-evaluation, mainly through a bioacoustic approach, of *B. sapiranga* differential diagnosis in comparison with *B. pseudopseudis*.

### Material and methods

Specimens and calls of topotypes of *B. pseudopseudis* were obtained at the Fazenda São Bento (14°10'30.56" S;

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## APPENDIX 1. Examined specimens.

- Bokermannohyla ibitiguara*—BRAZIL: MINAS GERAIS: Capitólio (AAG-UFU 4746; 4849–4852); São Roque de Minas (AAG-UFU 2141; 0060–0062);
- Bokermannohyla oxente*—BRAZIL: BAHIA: Piatã (AAG-UFU 1684–1685);
- Bokermannohyla pseudopseudis*—BRAZIL: GOIÁS: Alto Paraíso de Goiás (AAG-UFU 0103–0104, 1326; CHUNB 511, 514–517, 519–521, 425, 453–454, 484, 523–528, 14065, 14382, 14389, 14385, 17527–17528, 17531–17532, 32619, 42522, 43650, 47516, 58873–58874, 58876, 58878–58879, 59086, 58789, 58791–58794, 62512, 62518, 69153); Minaçu (CHUNB 14367–14368, 14394–14395);
- Bokermannohyla sapiranga*—BRAZIL: DISTRITO FEDERAL: Brasília (Holotype: CHUNB 62384); GOIÁS: Caldas Novas (AAG-UFU 4352, 4563–4565, 0101); Novo Gama (CHUNB 65405–65406); Pirenópolis (Paratypes: CHUNB 14387, 14390); MINAS GERAIS: Paracatu (AAG-UFU 1537–1538);
- Bokermannohyla saxicola*—BRAZIL: MINAS GERAIS: Santana do Riacho (AAG-UFU 0026).

**APPENDIX 2.** List of analyzed sound files of *Bokermannohyla pseudopseudis* and *Bokermannohyla sapiranga* for each locality.

Species	Locality	Sound file	Voucher	
<i>Bokermannohyla pseudopseudis</i>	Chapada dos Veadeiros (GO)	Bokerm_pseudopVeadGO1aAAGm	AAG-UFU 0103 or 0104	
		Bokerm_pseudopVeadGO1bAAGm	AAG-UFU 0103 or 0104	
		Bokerm_pseudopVeadGO1cAAGm	AAG-UFU 0103 or 0104	
		Bokerm_pseudopVeadGO2aAAGm	AAG-UFU 0103 or 0104	
		Bokerm_pseudopVeadGO2bAAGm	AAG-UFU 0103 or 0104	
<i>Bokermannohyla sapiranga</i>	Caldas Novas (GO)	Bokerm_sapirCNovasGO1AAGmt	Unvouchered	
		Bokerm_sapirCNovasGO2LM_AAGb	Unvouchered	
		Bokerm_sapirCNovasGO3AAGb	AAG-UFU 4563 or 4565	
		Bokerm_sapirCNovasGO4LM_AAGb	Unvouchered	
		Bokerm_sapirCNovasGO5aAAGm	AAG-UFU 0101	
		Bokerm_sapirCNovasGO5bAAGm	AAG-UFU 0101	
		Bokerm_sapirCNovasGO5cAAGm	AAG-UFU 0101	
		Bokerm_sapirCNovasGO5dAAGm	AAG-UFU 0101	
		Bokerm_sapirCNovasGO6aAAGm671	Unvouchered	
		Bokerm_sapirCNovasGO6bAAGm671	Unvouchered	
		Bokerm_sapirCNovasGO6cAAGm671	Unvouchered	
		Bokerm_sapirCNovasGO6dAAGm671	Unvouchered	
		Bokerm_sapirCNovasGO6eAAGmt	Unvouchered	
		Bokerm_sapirCNovasGO7aAAGm671	Unvouchered	
		Bokerm_sapirCNovasGO7bAAGmt	Unvouchered	
		Bokerm_sapirCNovasGO7cAAGmt	Unvouchered	
		Bokerm_sapirCNovasGO7dAAGmt	Unvouchered	
		Bokerm_sapirCNovasGO7eAAGmt	Unvouchered	
		Bokerm_sapirCNovasGO8aAAGm671	Unvouchered	
		Bokerm_sapirCNovasGO8bAAGm671	Unvouchered	
		Cristalina (GO)	Bokerm_sapirCristalGO1aAAGm	Unvouchered
			Bokerm_sapirCristalGO1bAAGm	Unvouchered
		Pirenópolis (GO)	Bokerm_sapirPirenopGO1aAAGm	Unvouchered
			Bokerm_sapirPirenopGO1bAAGm	Unvouchered
			Bokerm_sapirPirenopGO1cAAGm	Unvouchered
			Bokerm_sapirPirenopGO1dAAGm	Unvouchered
		Paracatu (MG)	Bokerm_sapirParacatuMG1TRC_AAGm671	AAG-UFU 1537
Bokerm_sapirParacatuMG2BFVT_AAGmt	AAG-UFU 1538			