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A new species of *Pseudopaludicola* Miranda-Ribeiro, 1926 (Anura: Leptodactylidae: Leiuperinae) from northwestern state of São Paulo, Brazil

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Abstract

A new species of *Pseudopaludicola* is described from human-altered areas originally covered by Semideciduous Forest in northwestern state of São Paulo, southeastern Brazil. Morphologically, the new species differs from four species belonging to the *P. pusilla* group by the absence of either T-shaped terminal phalanges or toe tips expanded, and from all other congeners except *P. canga* and *P. facureae* by possessing an areolate vocal sac, with dark reticulation. The higher duration (300–700 ms) of each single, pulsed note (9–36 nonconcatenated pulses) that compose the call in the new species distinguishes it from all other 14 species of *Pseudopaludicola* with calls already described (10–290 ms). Absence of harmonics also differ the advertisement call of the new species from the call of its sister species *P. facureae*, even though these two species presented unexpected low genetic distances. Although we could not identify any single morphological character distinguishing the new species from *P. facureae*, a PCA and DFA performed using 12 morphometric variables evidenced significant size differences between these two species.

Key words: Amphibia, taxonomy, advertisement call, genetic distance

Introduction

Species from the genus *Pseudopaludicola* Miranda-Ribeiro, 1926 are distributed in open grasslands (seasonally flooded or not), open environments in the vicinities or amidst tropical rainforests, and dry forests that occur throughout South America (Lynch 1989; Pansonato *et al.* 2012a; Frost 2014). The genus currently comprises 17 valid species (Frost 2014; Pansonato *et al.* 2014).

According to former phylogenetic analyses by Lobo (1995) and by Cardozo and Suárez (2012), only the *Pseudopaludicola pusilla* group, characterized by T-shaped terminal phalanges was recognized as monophyletic. Four species of *Pseudopaludicola* were assigned to this group: *P. boliviana* Parker, 1927; *P. ceratophyes* Rivero & Serna, 1984; *P. llanera* Lynch, 1989; and *P. pusilla* (Ruthven, 1916). Until recently, other 14 species remained unassigned to this or to any other monophyletic group (Lynch 1989; Cardozo & Suárez 2012; Andrade & Carvalho, 2013; Roberto *et al.* 2013; Magalhães *et al.* 2014): *P. ameghini* (Cope, 1887); *P. canga* Giaretta & Kokubum, 2003;

Geographical, morphological, ecological, bioacoustic, and genetic patterns of co-occurring species of *Pseudopaludicola* should be evaluated using integrative approaches, for a better understanding of habitat use, geographic distribution, and evolution in the genus.

TABLE 5. Measurements of acoustic parameters of specimens of *Pseudopaludicola facureae* from the type locality (Uberlândia, Minas, Brazil). Values are: mean \pm standard deviation (minimum–maximum). N: number of calls (= notes) analyzed (number of specimens recorded).

Advertisement call parameters	<i>Pseudopaludicola facureae</i> N=280 (8)
Number of notes per series (s)	15.8 \pm 10.1 (2–55)
Series duration (s)	0.8 \pm 0.6 (0.1–4.3)
Inter-series interval (s)	0.5 \pm 0.2 (0.2–1.7)
Note duration (s)	0.02 \pm 0.005 (0.01–0.04)
Inter-notes interval (s)	0.03 \pm 0.03 (0.01–0.4)
Minimum frequency (Hz)	2688.5 \pm 573.9 (1114.3–3992.6)
Maximum frequency (Hz)	5947.9 \pm 336.8 (5372.1–6771.4)
Dominant frequency (Hz)	4559.4 \pm 212.2 (4306.6–4995.7)
Harmonic 1 (Hz)	4306–4995
Harmonic 2 (Hz)	8806–9495
Harmonic 3 (Hz)	13306–13995
Average rate of notes/min	1249.1 \pm 388.5 (646–2000)

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APPENDIX 1. Voucher specimens examined.

Pseudopaludicola facureae: BRAZIL: MINAS GERAIS: **Uberlândia**: Males: AAG-UFU 853–855; 2277–8; 2528; 2622; 2681; 3586; 3588; UFMT 17745–5; 17748; and ZUEC 13650–2. Females: AAG-UFU 2279; 2282; 3585; 3587; 3589; 3591; 4731 and ZUEC 13653–4.

APPENDIX 2. Analyzed sound files.

Pseudopaludicola atragula sp. nov.: BRAZIL: SÃO PAULO: **Icém**: LH 702 (voucher specimen UFMT 16198); LH 703 (voucher specimen UFMT 16206); LH 439–440 (no voucher specimens).

Pseudopaludicola facureae: BRAZIL: MINAS GERAIS: **Uberlândia**: LH 721–723 (no voucher specimens); LH 724 (voucher specimen UFMT 17745); LH 725 (voucher specimen UFMT 17746); LH 726 (voucher specimen UFMT 17748).