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A New Species of *Pseudopaludicola* Miranda-Ribeiro, 1926 (Anura: Leptodactylidae: Leiuperinae) from an Amazonia-Cerrado Transitional Zone, State of Tocantins, Brazil

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Abstract.—**The Neotropical genus *Pseudopaludicola* includes 24 species distributed throughout South America. Herein, we formally describe the 25th member of this Neotropical clade as a new species: *Pseudopaludicola jazmynmcdonaldae* sp. nov. from an Amazon-Cerrado transitional zone in Brazil. The recognition of this new species is supported by adult morphology, advertisement call, and molecular data. It is diagnosed mainly by the following characters: small size; upper eyelids smooth, with no palpebral tubercles; heel smooth, with no enlarged conical tubercle; terminal phalanges knobbed, with no T-shaped terminal phalanges or expanded toe tips; relatively short hind limbs (tibiotarsal articulation just reaching the corner of the mouth); single, subgular, smooth, dark vocal sac in life, with no warty texture; and an advertisement call composed of regular series of short multipulsed notes, emitted at high rate.**

Resumo.—**O gênero *Pseudopaludicola* é composto por 24 espécies distribuídas na América do Sul. Aqui, descrevemos o vigésimo quinto membro deste clado neotropical a partir de espécimes coletados numa zona de transição Amazônia-Cerrado do Brasil Central. O reconhecimento desta nova espécie é suportado por morfologia de adultos, canto de anúncio e dados moleculares. A espécie é diagnosticada principalmente pelo seu pequeno tamanho; pálpebras superiores lisas, sem tubérculos palpebrais; calcanhar liso, sem tubérculo cônico hipertrofiado; ausência de falanges terminais em forma de T ou pontas dos dedos do pé expandidas; membros posteriores relativamente curtos (articulação tibiotarsal atingindo apenas o canto da boca); saco vocal único, subgular, escuro em vida e liso, sem textura verrucosa; e um canto de anúncio composto por uma série regular de notas curtas pulsadas, emitidas a uma taxa elevada.**

Despite the increase in information on global biodiversity over the past several decades, biodiversity in some regions and taxonomic groups remains greatly underestimated (e.g., Fouquet et al., 2007; Pfenninger and Schwenk, 2007; Vieites et al., 2009). Overcoming this requires an intensive endeavor to describe unnamed lineages, mainly ones from poorly sampled areas. Unfortunately, trends of species descriptions often are constrained both by socioeconomic factors and intrinsic data limitations in some taxonomic groups (Diniz-Filho et al., 2005; Moura et al., 2018). This situation perfectly describes the dwarf swamp Neotropical frog genus *Pseudopaludicola* Miranda-Ribeiro, 1926 (Veiga-Menoncello et al., 2014).

The genus *Pseudopaludicola* currently comprises 24 species that occur throughout South America east of the Andes (Lynch, 1989; Andrade et al., 2018a; Frost, 2018). This genus has a complex taxonomic history, mostly because of its conservative morphology and the vast gaps of distribution knowledge (e.g., Milstead, 1963; Bokermann, 1966; Lobo, 1994; Toledo, 2010; Pansonato et al., 2013, 2014a; Veiga-Menoncello et al., 2014; Carvalho et al., 2015b). Nevertheless, *Pseudopaludicola* has been strongly supported as a monophyletic group based on both morphological (i.e., presence of hypertrophied antebrachial tubercle and osteological features) and molecular data (mtDNA) (Lynch, 1989; Lobo, 1995; Veiga-Menoncello et al., 2014; Andrade et al., 2016a). Almost half of the currently recognized *Pseudopaludicola* species were described in only the last decade, due mainly to the implementation of wide taxonomic appraisals based on integrative approaches (Toledo et al., 2010; Carvalho, 2012; Pansonato et al., 2012, 2014b, 2016; Andrade and Carvalho, 2013; Roberto et al., 2013; Magalhães et al., 2014; Andrade et al., 2016a, 2018a,b; Cardozo et al., 2018).

During recent field trips, we collected specimens of *Pseudopaludicola* from an Amazon-Cerrado transitional zone, in state of Tocantins, Brazil, that aroused questions about their specific status especially based on their call. We combined bioacoustical, morphological, and mtDNA evidence to elucidate its status and concluded that no available name could be applied to it. Herein, we describe it as a new taxon.

Materials and Methods

Reference Specimens.—Specimens of the type series of the new species were collected by L. A. Silva, R. M. Fadel, C. Galvão, and M. Hoffman and recorded by L. A. Silva in the municipality of Caseara (9°24′56′′S, 49°58′28′′W, 177 m above sea level [a.s.l.]; datum WGS84) in the state of Tocantins, Brazil. Examined individuals were collected under permit 51036-2 issued by SISBIO/Instituto Chico Mendes de Conservação da Biodiversidade. Access to the National System for the Management of Genetic Heritage and Associated Traditional Knowledge was registered (SISGen A2FCFCC) according to current legislation. Individuals were killed by applying 5% lidocaine to their skin following the recommendations of the Herpetological Animal Care and Use Committee of the American Society of Ichthyologists and Herpetologists (http://www.asih.org/publications) and approved by SISBIO/Institute Chico Mendes de Conservação da Biodiversidade as a condition for the concession license. We fixed specimens in 10% formalin and transferred them to 70% ethanol for permanent storage. Type specimens are

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deposited in the amphibian collection of Museu de Zoologia "Adão José Cardoso" (ZUEC) of the Universidade Estadual de Campinas (Unicamp), Campinas, state of São Paulo, and in the zoological collection (ZUFMS) of the Universidade Federal de Mato Grosso do Sul (UFMS), Campo Grande, state of Mato Grosso do Sul, both in Brazil. We collected muscle tissue from the thigh of some individuals just after killing and stored samples in absolute alcohol. Our new species hypothesis was written under the general lineage concept (de Queiroz, 1998, 2007) that treats species as separately evolving metapopulation lineages.

Morphometry.—Following Watters et al. (2016), we measured these morphometric traits for 17 adult males and 3 adult females (type series): snout–vent length (SVL), head length (HL), head width (HW), eye diameter (ED), interorbital distance (IOD), eye–nostril distance (END), snout length (SL), internarial distance (IND), hand length (HAL), thigh length (TL), tibia length (TBL) (=shank length), tarsus length (TAL), and foot length (FL). Snout shape follows Heyer et al. (1990). We measured SVL with an absolute digital caliper (±0.1 mm; Mitutoyo Corp., Takatsu-ku, Japan); we measured all other traits under a Stemi 2000 stereomicroscope (Carl Zeiss AG, Oberkochen, Germany) coupled to an ocular micrometer.

We examined five topotypic males of *P. atragula* (AAG-UFU 5103–05, 5107, and 5109) for morphological comparisons. Further details on examined specimens are listed in Appendix 1.

Bioacoustics.—We recorded calls from 24 males with a digital recorder (DR 40 WL, Tascam, Montebello, CA) at a sampling rate of 44.1 kHz and a sample size of 16 bits. Recordings were made between 23 January 2018 and 1 February 2018 at 1600–2000 h. From these calls, we analyzed 240 pulsed notes with Raven Pro 1.5, 64-bit version (Bioacoustics Research Program, 2014) with the following settings: window type, Hann; window size, 256 samples; 3-dB filter bandwidth, 248 Hz; brightness, 50%; contrast, 50%; overlap, 85% (locked); DFT size, 1,024 samples (locked); and grid spacing (spectral resolution), 43.1 Hz. Temporal and spectral traits were measured on oscillograms and on spectrograms, respectively. Raven obtained the peaks of dominant frequency through the "Peak Frequency (Hz)" function; the frequency values with 5 and 95% of call energy were obtained by "Frequency 5% (Hz)" and "Frequency 95% (Hz)" functions (Charif et al., 2010) and were considered as the minimum and maximum dominant frequencies (Hz), respectively. We accessed frequency modulation through the "1st Quartile Frequency" and "3rd Quartile Frequency" functions; these Raven functions provide the frequencies that divide the selection into two frequency intervals containing 25 and 75% of the energy in the selection, respectively (Charif et al., 2010). Call duration was considered the time extent that males spent emitting the series of multipulsed notes. We generated call figures using the Seewave 2.1.0 package (Sueur et al., 2008) in R version 3.4.3 64-bit (R Core Team, 2017). Seewave settings were Hanning window, 90% overlap, and 256 points resolution (Fast Fourier Transform). Pulse terminology follows Magalhães et al. (2014) and overall acoustic terminology follows Köhler et al. (2017). We calculated mean ± SD of individual males; the range (variation) calculations encompassed the minimum and maximum values for all call samples. Pulse rate was calculated as number of pulses per note/note duration.

For acoustic comparisons, we also recorded and analyzed one topotypic male and three males of *P. atragula* from municipality of São José do Rio Preto, state of São Paulo, Brazil. Voucher specimens of the new species for call recordings are as follows: ZUFMS-AMP 11251–58 and ZUEC 24457–58, 24460–64 (total of 15 adult males). Further details of the analyzed sound files are in Appendix 2. For the statistical tests, we used the following acoustic traits: pulse duration, interpulse interval, pulse rate, note duration, internote interval, notes per minute, pulses per note, and dominant frequency. We tested these traits for statistical significance differences between species through the exact Wilcoxon Mann-Whitney rank sum test using the Coin 1.2-2 package (Resampling Statistics model) (Hothorn et al., 2008; function "wilcox_test") in R. Significance was considered at $P < 0.01$.

Phylogenetic Inference and Genetic Distances.—We took whole genomic DNA of two paratypes (ZUFMS-AMP 11256–57) using the DNeasy Blood and Tissue kit (Qiagen). We completed polymerase chain reaction (PCR) amplification and sequencing for part of the mitochondrial 16S ribosomal RNA gene (16s) and 12S ribosomal RNA gene (12s) using the primers 16Sa (5′-CGC CTG TTT ATC AAA AAC AT-3′) and 16Sb (5′-CCG GTC TGA ACT CAG ATC ACGT-3′) of Palumbi et al. (2002) and 12SMVZ59 (5′-ATA GCA CTG AAA AYG CTD AGA TG-3′) and 12SMVZ50 (5′-TYT CGG TGT AAG YGA RAK GCT T-3′) of Graybeal (1997), respectively. PCR conditions for amplification consisted of 1× buffer, dNTP at 0.2 mM, each primer at 0.2 μM, $MgCl_2$ at 2 mM, 1 U of Taq polymerase, and 2 μL of template DNA, in a total reaction volume of 25 μL. We used the following PCR cycling program: 94°C for 2 min, followed by 35 cycles of 94°C for 45 sec, 50°C for 30 sec, and 72°C for 1 min, and concluding with a 5 min extension at 72°C. PCR products were purified by ethanol/sodium acetate and directionally sequenced in ABI 3130 Genetic Analyzer (Applied Biosystems).

We used GENEIOUS version 11.1.5 (https://www.geneious.com) to check sequence quality of both strands by comparison to their respective chromatograms and to assemble and edit if necessary. Our DNA sequences were compared to and evaluated together with mtDNA fragments of *Pseudopaludicola* species, or candidate species, and six outgroup species obtained from GenBank. For an overview of all samples and GenBank accession numbers, see Table S1. We aligned sequences for each gene loci using the Muscle version 3.8.425 (Edgar, 2004) module implemented in GENEIOUS with default settings. We eliminated poorly aligned positions and divergent regions of an alignment of each DNA locus using GBLOCKS 0.91b (Castresana, 2000). The final data sets, which were used for analysis, have 400 bp for 16S (including 16S sequences of *P. llanera*, *P. pusilla*, and *P. restinga*) and 885 bp for concatenated 12S and 16S rRNA sequences.

Phylogenetic tree inference using the concatenated 12S and 16S rRNA sequences was performed by using Mr. Bayes version 3.2.6 (Ronquist et al., 2012) with two independent runs, each run with four chains, and running for 50 million generations sampling every 1,000 generations. We determined the model of nucleotide substitution for 12S-16S sequences with jModelTest (Darriba et al., 2012) using the Bayesian Information Criterion. The best-fit model was GTR+I+G. Convergence was assessed by examining all parameters in TRACER version 1.6 (Rambaut et al., 2014) after discarding the first 10% of samples as burn in. In addition, we calculated sequence divergence of 16S (uncorrected p-distance) among *Pseudopaludicola* species/individuals using MEGA version 7.0.26 (Kumar et al., 2016).

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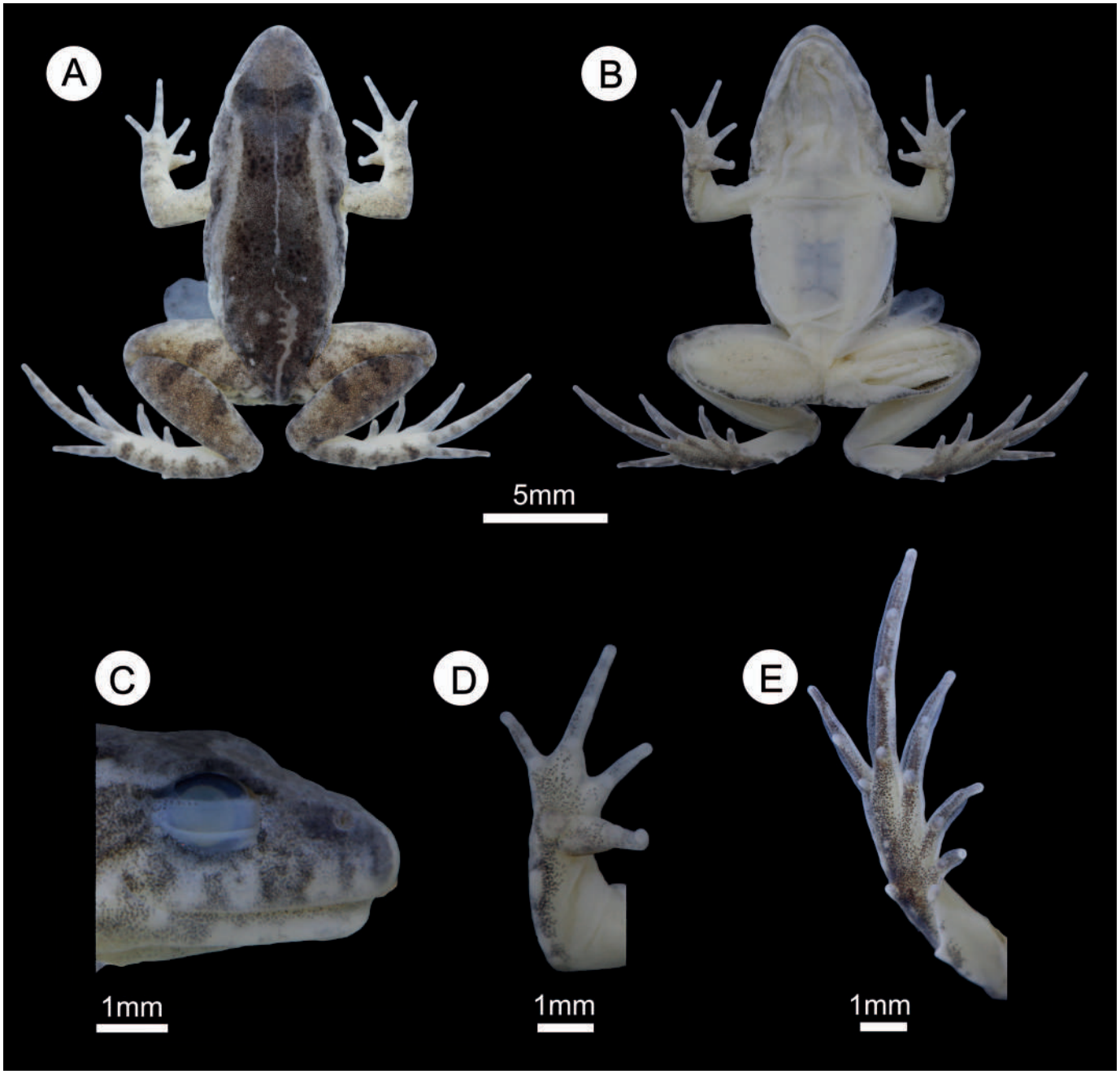

FIG. 1. *Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. holotype (ZUFMS-AMP 11255, SVL = 14.7 mm), an adult male. (A) Dorsal and (B) ventral views; (C) lateral view of head; ventral views of (D) hand and (E) foot.

RESULTS AND DISCUSSION

Pseudopaludicola ***jazmynmcdonaldae*** sp. nov.

Figures 1–2A; Tables 1–2

Holotype.—ZUFMS-AMP 11255, adult male (Figs. 1–2A, call voucher), collected at Lagoa da Sucuri, Canadá Farm, municipality of Caseara, state of Tocantins, Brazil (9°24′56′′S, 49°58′28′′W, 177 m a.s.l.) on 1 February 2018 by L. A. Silva, R. M. Fadel, C. Galvão, and M. Hoffman.

Paratypes.—Sixteen adult males: ZUEC 24457–58 collected at the type locality on 23 January 2018; ZUEC 24460–64 and ZUFMS-AMP 11248–49 collected at the type locality on 26 January 2018; ZUFMS-AMP 11251–52 collected at the type locality on 30 January 2018; ZUFMS-AMP 11253–54 collected at Santa Juliana Farm, municipality of Caseara, state of Tocantins (9°17′06′′S, 49°48′34′′W, 174 m a.s.l.) on 31 January 2018; and ZUFMS-AMP 11256–58 collected with the holotype. Three adult females: ZUEC 24459 collected at the type locality on 23 January 2018; ZUFMS-AMP 11247 and 11250 collected at the type locality on 26 January 2018. The same collectors of the holotype collected all paratypes.

Diagnosis.—*Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. is assigned to the genus *Pseudopaludicola* by having a hypertrophied antebrachial tubercle (see Lynch, 1989; Lobo, 1995). The new species is characterized by the following combination of characters: 1) small size (SVL 12.8–14.8 mm in adult males); 2) upper eyelids smooth, with no palpebral tubercles; 3) heel smooth, with no enlarged conical tubercle; 4) terminal phalanges

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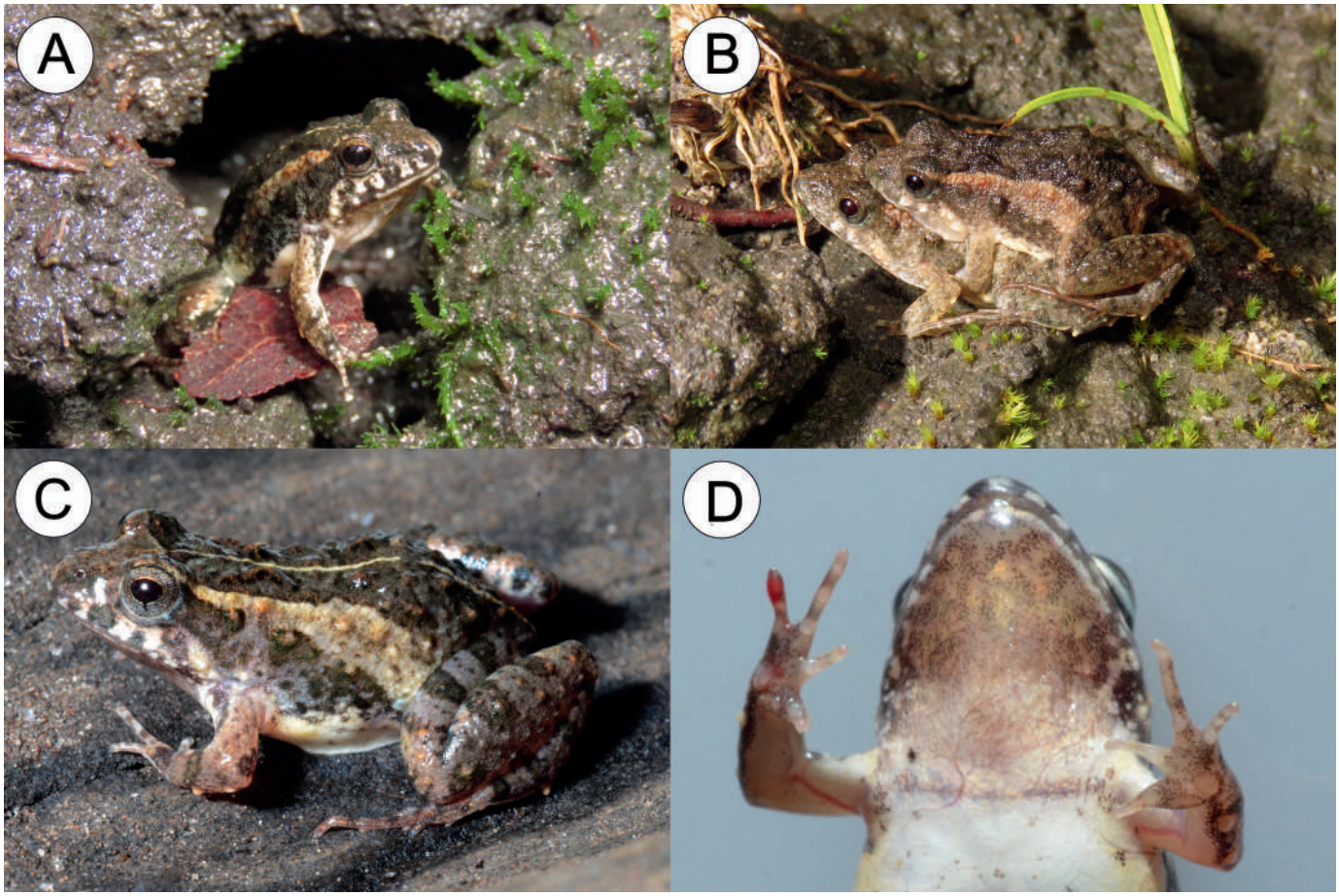

FIG. 2. Holotype and three paratypes of *Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. in life. (A) ZUFMS-AMP 11255 (holotype, adult male, call voucher, SVL = 14.7 mm); (B) couple in axillar amplexus (adult male: ZUFMS-AMP 11249, SVL = 13.9 mm; adult female: ZUFMS-AMP 11250, SVL = 14.7 mm); (C) ZUFMS-AMP 11257 (adult male, call voucher, SVL = 14.4 mm); and (D) its single, subgular, smooth, dark vocal sac in life, with no warty texture skin.

knobbed, with no T-shaped terminal phalanges or expanded toe tips (verified by clearing and staining); 5) relatively short hind limbs (tibiotarsal articulation just reaching the corner of the mouth); 6) single, subgular, smooth, dark vocal sac in life, with no warty texture; 7) advertisement call composed of regular series of short multipulsed notes (note duration, 58–174 ms), emitted at high rate (107–189 notes/min), and with 9–24 nonconcatenated pulses.

Comparison with Other Species.—*Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. is promptly diagnosed from the *P. pusilla* species group (Lynch, 1989) that includes *P. boliviana*, *P. ceratophyes*, *P. llanera*, *P. pusilla*, and *P. motorzinho* by the absence of either T-shaped terminal phalanges or expanded toe tips (disks or pads). The new species has terminal phalanges knobbed, similar in shape to those of *P. falcipes* (fig. 2B in Cardozo and Suárez, 2012). *Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. is also distinguished

TABLE 1. Morphometry of *Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. type series (including the holotype) from municipality of Caseara, state of Tocantins, Brazil. Values presented in millimeters as mean ± SD (minimum–maximum); *N*, number of measured specimens.

	Type series		
Morphometric trait	Holotype	Males ($N = 16$)	Females ($N = 3$)
SVL	14.7	14.1 ± 0.7 (13.2–15.7)	15.0 ± 0.3 (14.7–15.3)
HL	4.0	3.9 ± 0.2 (3.7–4.2)	4.5 ± 0.1 (4.5–4.6)
HW	4.8	4.6 ± 0.2 (4.2–4.9)	5.1 ± 0.1 (5.0–5.2)
ED	1.7	1.7 ± 0.1 (1.4–1.8)	1.9 ± 0.0 (1.9–1.9)
IOD	1.5	1.5 ± 0.1 (1.3–1.5)	1.7 ± 0.1 (1.6–1.7)
END	1.1	1.1 ± 0.1 (1.0–1.5)	1.3 ± 0.1 (1.2–1.3)
SL	2.2	2.1 ± 0.1 (2.0–2.3)	2.4 ± 0.2 (2.2–2.6)
IND	1.2	1.2 ± 0.1 (1.0–1.5)	1.4 ± 0.1 (1.3–1.5)
HAL	4.0	3.7 ± 0.2 (3.5–4.1)	4.0 ± 0.1 (3.9–4.1)
TL	6.6	6.7 ± 0.2 (6.4–7.1)	7.4 ± 0.3 (7.2–7.7)
TBL	7.4	7.4 ± 0.3 (7.0–7.9)	8.0 ± 0.3 (7.8–8.4)
TAL	4.0	3.9 ± 0.1 (3.7–4.2)	4.3 ± 0.4 (3.9–4.7)
FL	7.8	7.8 ± 0.3 (7.4–8.5)	8.3 ± 0.4 (8.0–8.7)

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TABLE 2. Advertisement call traits based on the recordings of 24 males (240 analyzed notes) of *Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. from the type locality. Values presented as mean ± SD (minimum–maximum)

Trait	Value
Call duration (sec)	94.5 ± 43.1 (22.5–172.8)
Series of notes duration (sec)	22.0 ± 13.7 (1.2–79.6)
Interseries interval (sec)	4.4 ± 2.8 (0.6–15.9)
Note duration (msec)	136 ± 18 (58–174)
Internote interval (msec)	285 ± 86 (165–664)
Notes/min	148.9 ± 22.6 (106.8–189.5)
Pulse duration (msec)	5 ± 1 (1–9)
Interpulse interval (msec)	3 ± 1 (1–31)
Pulses/sec	133.5 ± 20.5 (92.6–195.7)
Pulses/note	17.8 ± 2.1 (9.0–24.0)
Dominant frequency (Hz)	4,696.2 ± 188.8 (4,048.2–5,211.0)
Minumum dominant frequency reached (Hz)	4,095.6 ± 227.5 (3,402.2–4,565.0)
Maximum dominant frequency reached (Hz)	5,086.3 ± 155.1 (4,522.0–5,426.4)
First quartile frequency	4,458.3 ± 193.9 (3,919.0–4,866.5)
Third quartile frequency	4,829.5 ± 145.3 (4,177.4–5,211.0)
Air temperature (°C)	25.0–31.7

from *P. ceratophyes* by having upper eyelids smooth; *P. ceratophyes* has upper eyelids with an enlarged palpebral tubercle (Lynch, 1989). The new species differs from *P. boliviana* and *P. motorzinho* also by having a smooth heel, with no enlarged, conical tubercle on the heel (Pansonato et al., 2016).

Pseudopaludicola ***jazmynmcdonaldae*** sp. nov. is promptly distinguished from the *P. saltica* species group that includes *P. saltica*, *P. murundu*, and *P. jaredi* by having short hind limbs (tibiotarsal articulation reaching near the corner of the mouth), whereas all three above-mentioned species have long hind limbs (tibiotarsal articulation extending beyond the tip of snout; Andrade et al., 2016a).

The color and skin texture in life of the vocal sac of the new species is dark and smooth, with no warty texture (Fig. 2D), thereby distinguishing it from *P. ameghini*, *P. ternetzi*, *P. falcipes*, *P. giarettai*, *P. hyleaustralis*, *P. canga*, *P. parnaiba*, *P. florencei*, *P. pocoto*, *P. mineira*, *P. restinga*, *P. matuta*, *P. mystacalis*, *P. ceratophyes*, *P. llanera*, *P. boliviana*, *P. motorzinho*, *P. ibisoroca*, and *P. saltica* that have vocal sacs that are whitish, yellowish, or light cream, with no warty texture (combined characters of the vocal sac of all above-mentioned species; Miranda-Ribeiro, 1937; Ruthven, 1916; Rivero and Serna, 1985; Haddad and Cardoso, 1987; Lynch, 1989; Lobo, 1994; Giaretta and Kokubum, 2003; Carvalho, 2012; Pansonato et al., 2012, 2013, 2016; Roberto et al., 2013; Magalhães et al., 2014; Carvalho et al., 2015b, Andrade et al., 2017a, 2018a,b; Cardozo et al., 2018); from *P. facureae* that has a whitish cream vocal sac, with a warty texture (Carvalho et al., 2015b); and from *P. atragula* that has a white vocal sac with warty texture and dark-colored reticulations (Pansonato et al., 2014b).

Temporal domain properties of the advertisement call of new species support its diagnosis from all known congeners. *Pseudopaludicola* ***jazmynmcdonaldae*** sp. nov. has a call composed of regular series of short multipulsed notes (58–174 ms), emitted at rates of 107–189 notes/min; notes have 9–24 nonconcatenated pulses separated by intervals of 1–31 ms. *Pseudopaludicola canga* (Giaretta and Kokubum, 2003; Pansonato et al., 2012; Carvalho et al., 2015b), *P. giarettai* (Carvalho, 2012; Carvalho et al., 2015a), *P. hyleaustralis* (Pansonato et al., 2012), *P. facureae* (Andrade and Carvalho, 2013; Carvalho et al., 2015b),

TABLE 3. Average uncorrected (p-distance) sequence divergence separating the different *Pseudopaludicola* taxa. Data in bold are the intraspecific divergences.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	*P. **jazmynmcdonaldae*** sp. nov.	**0.003**																			
2	*P. mystacalis*	0.057	**0.011**																		
3	*P. atragula*	0.071	0.083	**0.000**																	
4	*P.* sp. 1 (Barreirinhas MA)	0.072	0.061	0.064	**0.002**																
5	*P. facureae*	0.076	0.086	0.035	0.061	**0.000**															
6	*P. canga*	0.084	0.063	0.073	0.013	0.068	**0.000**														
7	*P. ameghini*	0.112	0.087	0.105	0.075	0.105	0.083	**0.003**													
8	*P. ternetzi*	0.113	0.088	0.109	0.074	0.109	0.077	0.019	**0.003**												
9	*P. pusilla*	0.156	0.137	0.140	0.125	0.143	0.125	0.098	0.105	**0.000**											
10	*P. murundu*	0.162	0.144	0.145	0.128	0.144	0.130	0.108	0.116	0.111	**0.003**										
11	*P. falcipes*	0.167	0.158	0.167	0.141	0.158	0.143	0.128	0.133	0.137	0.069	**0.004**									
12	*P. mineira*	0.171	0.150	0.168	0.155	0.168	0.158	0.121	0.130	0.110	0.052	0.067	**0.000**								
13	*P. saltica*	0.172	0.157	0.149	0.147	0.151	0.149	0.121	0.129	0.116	0.021	0.083	0.061	**0.002**							
14	*P. jaredi*	0.174	0.156	0.150	0.138	0.153	0.140	0.115	0.123	0.105	0.017	0.082	0.060	0.019	**0.000**						
15	*P. llanera*	0.177	0.159	0.164	0.150	0.156	0.150	0.115	0.116	0.103	0.123	0.124	0.134	0.135	0.128	**0.007**					
16	*P. boliviana*	0.179	0.152	0.170	0.148	0.165	0.148	0.116	0.112	0.109	0.112	0.110	0.109	0.122	0.119	0.057	**0.003**				
17	*P. motorzinho*	0.180	0.150	0.161	0.136	0.153	0.131	0.104	0.101	0.103	0.121	0.127	0.136	0.131	0.123	0.058	0.059	**0.003**			
18	*P. restinga*	0.181	0.167	0.178	0.158	0.173	0.155	0.131	0.135	0.120	0.052	0.074	0.043	0.056	0.055	0.129	0.116	0.128	**0.000**		
19	*P. florencei*	0.183	0.161	0.180	0.160	0.175	0.157	0.127	0.135	0.117	0.059	0.073	0.047	0.063	0.062	0.127	0.113	0.130	0.040	**0.001**	
20	*P. pocoto*	0.184	0.173	0.180	0.154	0.178	0.158	0.133	0.141	0.120	0.055	0.072	0.046	0.060	0.058	0.131	0.118	0.133	0.034	0.030	**0.011**

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and *P. parnaiba* (Roberto et al., 2013; Carvalho et al., 2015b) have a trilled advertisement call pattern, that is, calls with nonpulsed notes. *Pseudopaludicola mystacalis*, *P. boliviana*, and *P. ibisoroca* have calls composed of pulsed notes, with concatenated pulses (lack of silent intervals between them; Duré et al., 2004; Pansonato et al., 2013, 2016).

In relation to species with calls composed of pulsed notes with nonconcatenated pulses (their pulses are spaced by silence intervals), the new species is also promptly diagnosed by its temporal traits, especially in the number of pulses per note trait. *Pseudopaludicola falcipes*, *P. mineira*, *P. restinga*, and *P. matuta* have calls composed of series of two-pulsed stereotyped notes, emitted at higher rates of 238–535 notes/min (combined values; Pereira and Nascimento, 2004; Haddad and Cardoso, 1987; Andrade et al., 2018a,b; Cardozo et al., 2018). *Pseudopaludicola pocoto* and *P. florencei* have calls composed of series of three-pulsed stereotyped notes (Magalhães et al., 2014; Andrade et al., 2017b, 2018b). The three long-legged species (*P. saltica*, *P. murundu*, and *P. jaredi*) vary the number of pulses in their notes between two and seven pulses (combined values; Andrade et al., 2016a). *Pseudopaludicola ternetzi* and *P. ameghini* have calls composed of pulsed notes with three to six pulses each, emitted at higher rates of 348–921 notes/min (combined values; Andrade et al., 2017a).

Pseudopaludicola atragula is the species with the most similar advertisement call compared to the new species, because it also has a call composed of series of multipulsed notes with nonconcatenated pulses. There are two remarkable differences however in temporal domain of their calls: *Pseudopaludicola atragula* has both a longer note duration (300–700 ms) and a lower note rate (42–98 notes/min; Pansonato et al., 2014b; this study) than the new species. In addition, the new species can be significantly differentiated from *P. atragula* by having shorter pulse duration and interpulse interval and a higher pulse rate (Wilcoxon Mann-Whitney test: $P < 0.01$).

Description of the Holotype.—Body elliptic and broad (Fig. 1A–B; Table 1). Head elliptical, slightly wider than long. Snout subovoid in dorsal view and rounded in profile (Fig. 1A, C). Eye not protuberant. Eye diameter larger than the interorbital distance. Interorbital area flat. Pupil rounded. Upper eyelid without tubercles. Nostril not protuberant and closer to the snout tip than to the eye. Canthus rostralis rounded, smooth. Loreal region slightly concave. Single subgular vocal sac, externally expanded, smooth with discrete longitudinal folds, with no warty texture. Choanae rounded and well separated from each other. Vocal slits present. Tympanum indistinct. A discrete tympanic ridge runs from behind the eyes to the proximal portion of the arms. An enlarged, rounded tubercle present just above the insertion of the arm. Mouth opening ventral. Vomerine teeth absent (unnoticeable also to the touch). Tongue elliptical, longer than wide, free posteriorly, without pigmentation at its base. Flanks without granules. One ovoid antebrachial tubercle present in the first quarter of the forearm and a second ovoid tubercle closer to elbow. Finger and toe tips not expanded. Outer metacarpal tubercle ovoid and well defined, inner metacarpal tubercle poorly developed. Fingers with single and rounded subarticular tubercles. Palm of hand smooth, with no supernumerary tubercles. Thumb with a keratinized, light brown nuptial pad, extending from the base of the hand to the proximal limit of the terminal phalanx, covering almost the entire external portion of the finger. Webbing absent between fingers. Relative finger lengths, when adpressed one to another: I < IV < II < III (Fig. 1D). Outer metatarsal tubercle well defined, conical. Inner metatarsal tubercle elliptical. Toes with well-defined, single, enlarged, and rounded subarticular tubercles. Sole of the foot smooth, with no supernumerary tubercles. Toes webbed basally and fringed along their sides to almost their tips. Fringes developed on all toes (mainly II, III, and IV). External fringe on Toe V continues almost to the outer metatarsal tubercle. Well-developed fold from internal metatarsal tubercle to the midventral tarsus, ending in a tarsal tubercle. Relative toe lengths, when adpressed one to another: I < II <V < III < IV (Fig. 1E). The tibiotarsal articulation reaches near the corner of the mouth when adpressed to the body. Thigh shorter than tibia. Foot longer than thigh and tibia. Tubercle absent on calcaneus. Belly skin smooth. Abdominal fold present. Dorsal surfaces of head, body, and limbs smooth. Dorsal surface of body interspersed with some discrete tubercles. Cloacal region smooth (Fig. 1B). Measurements of the holotype presented in Table 1.

Color Pattern of the Holotype in Life.—Dorsum brown with dark gray, and dark brown blotches (Fig. 2A). Light brown dorsolateral stains on body, from posterior corner of eyes to the region of insertion of legs (Fig. 2A). Vertebral line yellowish. Belly and chest whitish, with small black dots of scattered pigmentation. Vocal sac dark, particularly evident in the anterior half of the vocal sac. Region between upper lip and eyes with alternating vertical brown and whitish stripes (Fig. 2A). A grayish transverse blotch in the interorbital region connects one eyelid to another. Dorsal faces of arms light grayish with dark brown blotches. Dorsal faces of legs light brown with dark brown transversal discontinuous stripes and with scattered brown blotches. Transverse stripes on thighs (two or three), shanks (three or four), feet (three or four). A remarkable yellowish stripe on the thigh, from the region near the cloaca to the back of the knee. Light brown nuptial pads.

Color Pattern of the Holotype in Preservative.—Dorsum grayish with dark gray, light beige, and brown blotches. Light beige dorsolateral stains on body, from posterior corner of eyes to the region of insertion of legs. Vertebral line light beige. Belly and throat whitish, with small black dots of pigmentation scattered. Dorsum darker than the dorsal surfaces of limbs. Ventral faces of arms and legs unpigmented, except of the thigh (pigmented as in belly and throat). Palm of hand and sole of foot pigmented. Color of the sole of the foot similar to that of dorsal leg. Dorsal faces of arms light grayish with dark brown blotches. Dorsal faces of legs light brown with dark brown transversal discontinuous stripes and with scattered brown blotches. Transverse stripes on thighs, shanks, and feet. A remarkable whitish stripe on the thigh, from the region near the cloaca to the back of the knee. Light brown nuptial pads.

Variation in Type Series.—Dorsal surface of body varies among dark gray, dark brown, and black with black or dark brown irregular blotches (Fig. 2B–C). The specimens ZUEC 24457, 24459, 24461, 24462–64, ZUFMS-AMP 11247–48, 11250–51, 11253–54, and 11256 have no vertebral line. The specimens ZUEC 24464 and ZUFMS-AMP 11256 do not have dorsolateral stains on body, from posterior corner of eyes to the region of insertion of legs. The specimens ZUEC 24459, 24461–62, ZUFMS-AMP 11248, and 11250–51 have a transverse stripe on dorsum, connecting both dorsolateral stains on body. The specimens ZUEC 24461–62, ZUFMS-AMP 11248 and 11250–52 have no discrete tympanic ridge from behind the eyes to the proximal portion of the arms. The specimens ZUFMS-AMP 11251 has white blotches on the region between the mouth corner and the insertion of the arms and flanks. The specimens ZUEC 24461 and ZUFMS-AMP 11250 do not have an enlarged, rounded tubercle just above the

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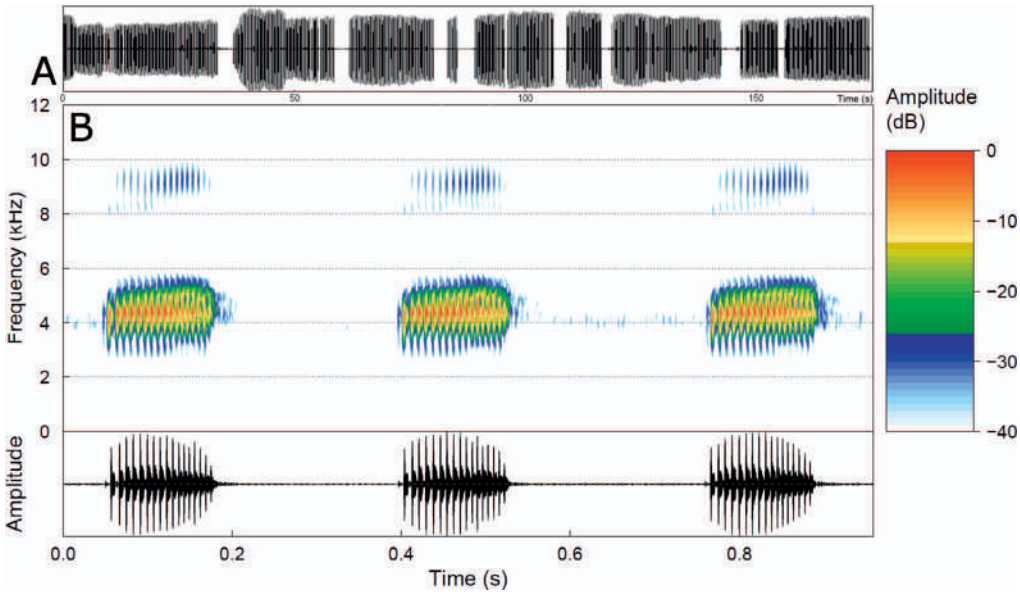

FIG. 3. (A) Oscillogram of the entire advertisement call with ten series of multi-pulsed notes and (B) audiospectrogram (top) and corresponding oscillogram (bottom) detailing three multi-pulsed notes of the holotype of *Pseudopaludicola jazmynmcdonaldae* sp. nov. (ZUFMS-AMP 11255). The holotype was recorded on 01 February 2018 at 1811 h; air temperature 29.7°C, relative humidity 91%.

insertion of the arm. Females have a more robust body and no nuptial pads, vocal sac, or vocal slits.

Advertisement Call.—The advertisement call of *P. **jazmynmcdonaldae*** sp. nov. (22–173 sec) consists of series of multipulsed notes (1–12 series of multipulsed notes per call) that last 1–80 sec, separated by interseries intervals of 0.6–16 sec (Fig. 3A). Notes last 58–174 msec separated by intervals of 165–664 msec and are released at a rate of 107–189 notes/min; notes have a slight increase in amplitude from the beginning of the note to the midpoint of note, followed by a decrease in amplitude until the end of the note (Fig. 3B). Notes are composed of 9–24 nonconcatenated pulses (Fig. 3B). Their pulses vary from 1 to 9 msec, separated by intervals of 1–31 msec and are released at a rate of 93–196 pulses/sec (Fig. 3B). The first pulse of the notes always has very little sound energy compared to the other pulses (Fig. 3B). The most centralized pulses are separated by shorter intervals than those of the beginning and end of the same note. Each note has a slight increase in frequency along its duration; on average, the notes have an increase of 371 Hz from the first to the third quartiles frequencies. Dominant (=fundamental) frequency peaks are between 4,048 and 5,211 Hz; minimum frequency ranges are between 3,402 and 4,565 Hz, and maximum frequency ranges are between 4,522 and 5,426 Hz. Notes present up to two harmonics, with the second ranging from 7,106–9,948 Hz (mean = 8,948 ± 417; Fig. 3B). Air temperature of recorded calls varied from 25 to 32°C. We summarized the call quantitative traits in Table 2. In addition, a video of the holotype (ZUFMS-AMP 11255) emitting the advertisement call is available at https://youtu.be/ftnxPDofooU. Ambient temperature had no observable effect on call traits.

Phylogenetic Inferences and Mitochondrial DNA Divergences.—Following Veiga-Menoncello et al. (2014) and Andrade et al. (2016a, 2018b), we recovered the same tree topology inferred for the genus *Pseudopaludicola* (Fig. 4). We recovered *P. **jazmynmcdonaldae*** sp. nov. as sister to *P. mystacalis* with high probability. The average uncorrected p-distance of 16S rRNA sequences between *P. **jazmynmcdonaldae*** sp. nov. and *P. mystacalis* was 5.7% (range, 5.3–6.0%; Tables 3 and S2), between *P. **jazmynmcdonaldae*** sp. nov. and *P. atragula* was 7.1% (range, 7.0–7.3%; Tables 3 and S2), and between *P. **jazmynmcdonaldae*** sp. nov. and *P.* sp. 1 (Barreirinhas MA) was 7.2% (range, 7.0–7.5%; Tables 3 and S2). The mean intraspecific distance for *P. **jazmynmcdonaldae*** sp. nov. was 0.3%, and it ranged from 0 to 1.1% in other species analyzed (Table 3). No molecular data are available for *P. ceratophyes*, *P. hyleaustralis*, *P. parnaiba*, *P. giarettai*, and *P. ibisoroca*; however, the new species is easily diagnosed from these species by morphology and acoustics (see further details in Comparison with Other Species section).

Like other studies (e.g., Cardozo et al., 2018), this article also uses only mitochondrial genes for the analysis of genetic divergence. Although most species show differences higher than 3%, the genetic divergence can vary among the clades (e.g., Lötters et al., 2005, 2009), being careful not to consider this evidence alone. Nevertheless, the present study provides a broad set of morphological, molecular, and bioacoustic data that support and reinforce the validity of the new species.

Etymology.—The name is a noun in the genitive case honoring Jazmyn McDonald. She is a conservation hero for endangered species and threatened rain forests. An avid naturalist, Jazmyn counts Latin America and her home state of Wyoming among her favorite birding areas. As a leadership supporter to Rain Forest Trust, Jazmyn has focused on directing substantial support towards protecting areas rich in biodiversity, including Brazil. She recognizes the importance of all living things and the roles they play in the environment.

Distribution.—*Pseudopaludicola **jazmynmcdonaldae*** sp. nov. is known only from its type locality.

Natural History.—We observed dozens of specimens of *P. **jazmynmcdonaldae*** sp. nov. along wet and/or partially flooded open areas, both in natural fragments of grasslands and cerrado stricto sensu (i.e., Lagoa da Sucuri) and the margins of a lagoon surrounded by pasture (i.e., Fazenda Santa Juliana). In these places, we found several males calling on the ground during evening and night (1600–2000 h), especially after rains. In the field, we observed a male vocalizing inside a burrow (https://youtu.be/1JOD0ad_Kg8); however, males of *Pseudopaludicola*

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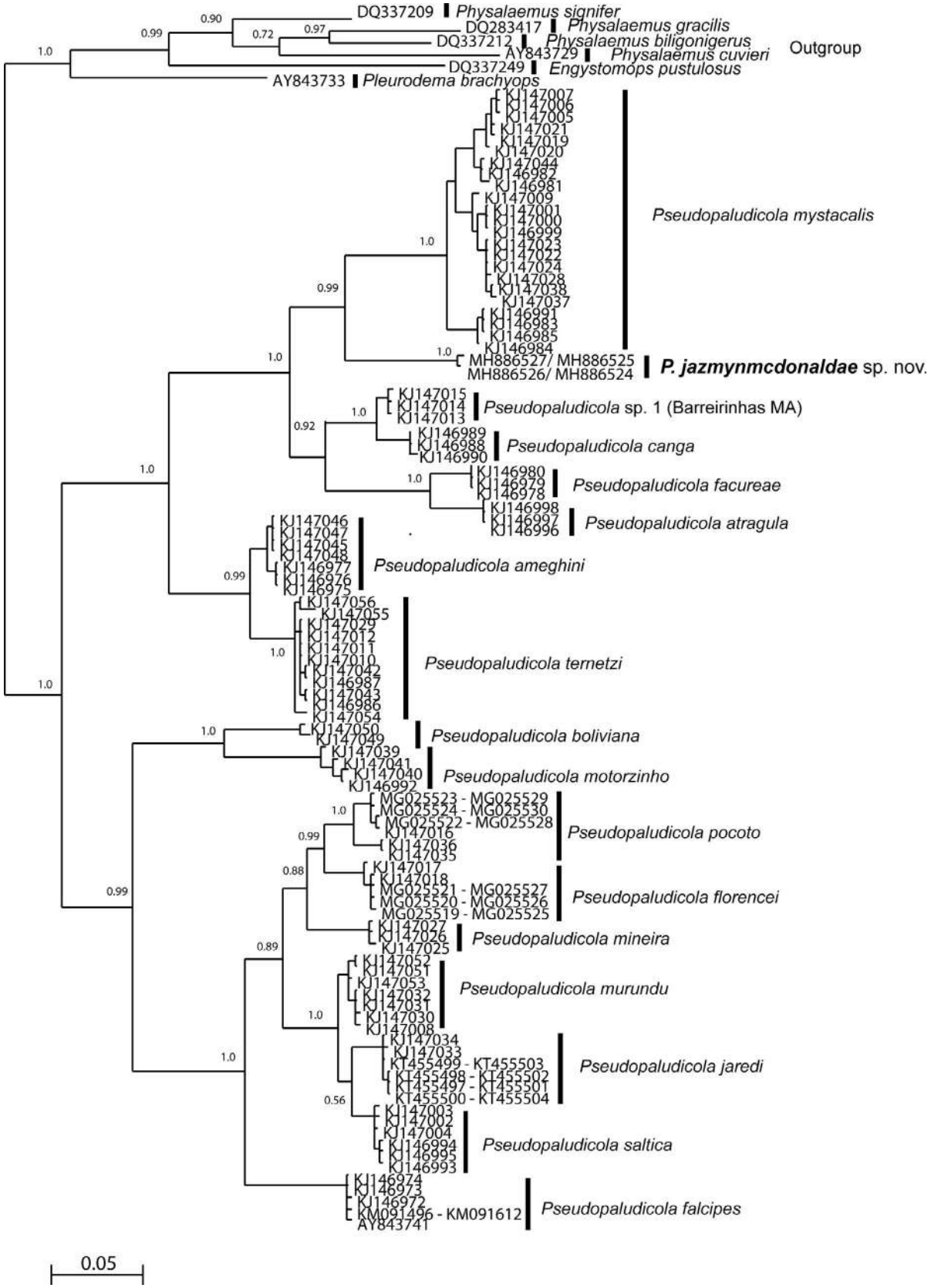

FIG. 4. Phylogenetic relationships of the species of the genus *Pseudopaludicola* based on the 12S and 16S rDNA mitochondrial genes. Bayesian posterior probabilities are given near the nodes.

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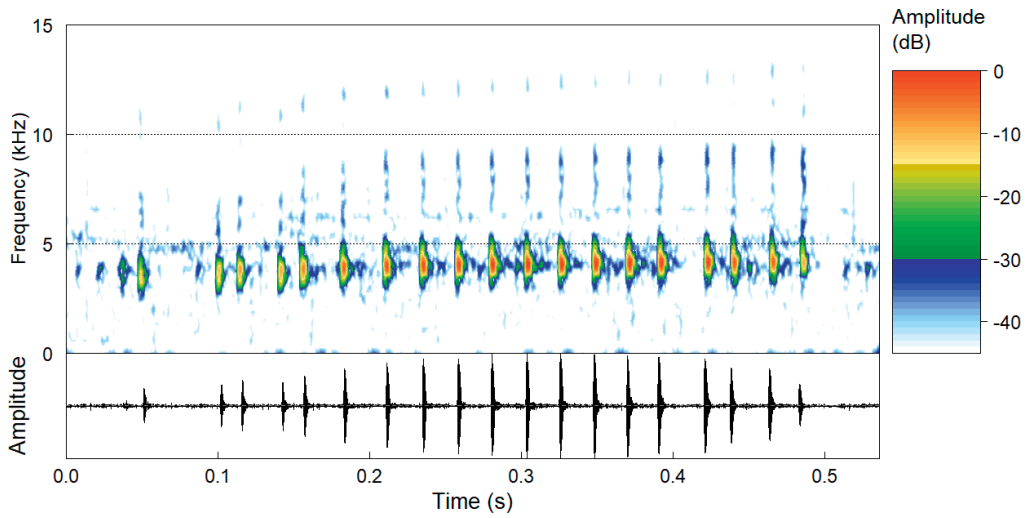

FIG. 5. Audiospectrogram (top) and corresponding oscillogram (bottom) detailing the multipulsed note of a topotypic male of *Pseudopaludicola atragula*. This male was recorded by Ariovaldo A. Giaretta on 18 February 2015 at 1657 h; air temperature, 27.0°C.

usually call exposed in open areas. In addition, we noticed two males vocalizing synchronously beside one another (https://youtu.be/svZG22Qzsgk), and another male vocalizing very close to a male/female pair in axillary amplexus (https://youtu.be/OMXC8zoy0Ng). We observed dozens of specimens of *P. **jazmynmcdonaldae*** sp. nov. occurring syntopically with *P. canga*, being *P. canga* the most abundant. Additional sympatric species include both Cerrado endemics, such as *Adenomera saci*, *Dendropsophus anataliasiasi*, and *Rhinella ocellata*; Amazon lineages include *Allobates crombiei*, *Lithodytes lineatus*, and *Rhaebo guttatus*. During an additional expedition in the type locality in May 2018 (i.e., dry season), we did not find adult specimens of *P. **jazmynmcdonaldae*** nov., suggesting the reproductive season of the new species is restricted to the rainy season. In this expedition during the dry season, we did find only *P. canga*. The individual ZUFMS-AMP 11257 performed mouth gaping behavior during a photographic session in the laboratory.

Remarks on the Advertisement Call of P. atragula.—The acoustic characterization of *P. atragula* carried out by us here is in accordance with Pansonato et al. (2014b) and corroborates the diagnosis for this species with all its congeners. Pansonato et al. (2014b) suggested the absence of harmonics as a diagnostic character of *P. atragula*, which was used to differentiate the advertisement call of this species from those of *P. giarettai* and *P. facureae* (Pansonato et al., 2014b). In contrast, we were able to identify up to three harmonics (second harmonic, 7,125–9,000 Hz) in the advertisement call of *P. atragula*, with the dominant frequency (3,919–4,737 Hz) as the first of them (Fig. 5). One can also see the presence of harmonics in the two multipulsed notes that were illustrated by Andrade et al. (2016b). Therefore, we find that the absence of harmonics is not a universal diagnostic character for *P. atragula*; however, the acoustic diagnosis of *P. atragula* from *P. giarettai* and *P. facureae* is easily accomplished by its distinctive advertisement call patterns. *Pseudopaludicola atragula* has an advertisement call composed of series of multipulsed notes (Pansonato et al., 2014b); the call of *P. giarettai* consists of series of nonpulsed notes, resembling whistles (Carvalho, 2012; Carvalho et al., 2015a); and *P. facureae* has a trilled advertisement call pattern, with nonpulsed notes (Andrade and Carvalho, 2013; Carvalho et al., 2015b).

Remarks on Conservation.—Despite the type locality (i.e., Lagoa da Sucuri) near the integral Brazilian conservation unit Parque Estadual do Cantão (PEC; nearly 1,500 m in straight line), we were unable to find *P. **jazmynmcdonaldae*** sp. nov. in this location. In fact, the environment of the PEC (i.e., forest formations that become almost entirely flooded during the rainy season) dramatically differs from the type locality. By contrast, we found the new species in the vicinity of the recently created Reserva Particular do Patrimônio Natural (RPPN) Canto do Obrieni, a protected area proposed by the Instituto Araguaia and subsidized by the Rain Forest Trust. Actually, the description of the *P. **jazmynmcdonaldae*** sp. nov. was possible only after the creation of this RPPN, showing the crucial role of the implantation of legally protected areas to preserve and improve our knowledge of biodiversity under threat from development. In fact, the type locality is currently surrounded by extensive soybean plantations and pastures, highlighting the importance of the RPPN Canto do Obrieni and the PEC to maintain local protection of biota.

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Supplementary Data

Supplementary data associated with this article can be found online at http://dx.doi.org/10.1670/15-040.s1.

Appendix 1

Specimens Examined

Pseudopaludicola ameghini: BRAZIL: Mato Grosso: *Chapada dos Guimarães*: ZUEC 14138–9, 14141–5.

Pseudopaludicola atragula: AAG-UFU 5103–05, 5107, and 5109.

Pseudopaludicola boliviana: ARGENTINA: Chaco: *Departamento San Fernando: Antequera*: MNRJ 75298; Corrientes: *Departamento General Paz*: Itaibaté: MNRJ 75299; Santa Fé: Departamento General Obligado: MNRJ 75300; Formosa: *Departamento Formosa*: Três Marias: MNRJ 75301; Riacho Formosa: MNRJ 75303; Tatoné: MNRJ 75304–8; Formosa: *Departamento Pilagas*: Virasol: MNRJ 75309–12; *Departamento Patiño*: Colônia Salvación: MNRJ 75322.

Pseudopaludicola canga: BRAZIL: Pará: *Marabá*: Serra dos Carajás: ZUEC 9990, 10034, 14370, 14372–4, 14378.

Pseudopaludicola ***jazmynmcdonaldae*** sp. nov.: BRAZIL: Tocantins: *Caseara*: ZUFMS-AMP 11247–58, and ZUEC 24457–64.

Pseudopaludicola facureae: BRAZIL: Minas Gerais: *Uberlândia*: AAG-UFU 0853–5, ZUEC 13651–2, 14215, 14218–9, 14221, 14224.

Pseudopaludicola falcipes: BRAZIL: Rio Grande do Sul: *Eldorado do Sul*: ZUEC 11468; *Novo Hamburgo*: ZUEC 4876; *Porto Alegre*: ZUEC 10387–8, 13999–000, 14002–3, 14005–6, 14008–9, 14016–7, 14022, 14162–66, 14168; *Santana do Livramento*: ZUEC 10355–6; Viamão: ZUEC 5297–9.

Pseudopaludicola florencei: BRAZIL: Bahia: *Andaraí*: urban area: ZUEC 23512–30; *Área de Proteção Ambiental Marimbus-Iraquara*: UFMG 4310–16.

Pseudopaludicola giarettai: BRAZIL: Minas Gerais: *Curvelo*: AAG-UFU 0309–17.

Pseudopaludicola jaredi: BRAZIL: Ceará: *Viçosa do Ceará*: CFBH 32609, 32614, 32617–25, ZUEC 20477–84; *Nísia Floresta*: ZUEC 21858–72.

Pseudopaludicola matuta: BRAZIL: Minas Gerais: *Curvelo*: ZUEC 24302–06, 24308–10, 24313, 24315–18.

Pseudopaludicola mineira: BRAZIL: Minas Gerais: *Jaboticatubas (Serra do Cipó)*: ZUEC 1570, 1572–89, 1591.

Pseudopaludicola murundu: BRAZIL: São Paulo: *Águas de Santa Bárbara*: ZUEC 20507–8; *Rio Claro*: AAG-UFU 5125–6, CFBH 8235–42, ZUEC 14284–90; Minas Gerais: *Brumadinho*: ZUEC 16396–8, 16442–3, 19549, 19551, 19555, 19557–78, 19560; *Santana do Riacho*: ZUEC 2323; *São João del Rei*: ZUEC 16447–52; 16455–6.

Pseudopaludicola mystacalis: BRAZIL: Goiás: *Itapirapuã*: ZUEC 10222; Mato Grosso: *Cáceres*: ZUEC 10286; *Chapada dos Guimarães*:

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ZUEC 5115, 5117, 5119, 5121, 10685; MATO GROSSO DO SUL: *Três Lagoas*: ZUEC 16720, 16949; TOCANTINS: *Formoso do Araguaia*: ZUEC 10154.

Pseudopaludicola pocoto: BRAZIL: CEARÁ: Novas Russas: CFBH 20285–7; SANTA QUITÉRIA (TYPE LOCALITY): CFBH 26842–7; BAHIA: *Rio de Contas*: ZUEC 25506–10, UFMG 5902–11.

Pseudopaludicola saltica: BRAZIL: MATO GROSSO: *Chapada dos Guimarães*: ZUEC 14228, 14230–3, 14235, 14239–40, 14244, 14247, 14272, 5134–46, 5854–5; MINAS GERAIS: *Uberlândia*: AAG-UFU 2308, 2630, 4598, 4631, 4735, 4707–11.

Pseudopaludicola ternetzi: BRAZIL: GOIÁS: *Uruaçu*: MNRJ 445–47, 5460–62, 5442; MINAS GERAIS: *Uberlândia*: ZUEC 14036–9, 14170–1; TOCANTINS: *Formoso do Araguaia*: ZUEC 10140–3, 10145, 10147, 10150, 10153.

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APPENDIX 2. *Analyzed Sound Files (.wav format) of* Pseudopaludicola jazmynmcdonaldae *sp. nov. and* P. atragula

Label	Date	Municipality (state)	Time (h)	Air (°C)	Relative humidity (%)	Recorder	Voucher
MAP3249_0289_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	23 Jan 2018	Caseara (TO)	—	—	—	Tascam DR 40 WL	ZUEC 24457
MAP3250_0288_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	23 Jan 2018	Caseara (TO)	2000	—	—	Tascam DR 40 WL	ZUEC 24458
MAP3329_0304_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	26 Jan 2018	Caseara (TO)	1656	27	80	Tascam DR 40 WL	ZUEC 24460
MAP3330_0303_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	26 Jan 2018	Caseara (TO)	1635	28.4	80	Tascam DR 40 WL	ZUEC 24461
MAP3331_0301_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	26 Jan 2018	Caseara (TO)	1600	—	—	Tascam DR 40 WL	ZUEC 24462
MAP3332_0306_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	26 Jan 2018	Caseara (TO)	1743	27	80	Tascam DR 40 WL	ZUEC 24463
MAP3333_0305_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	26 Jan 2018	Caseara (TO)	1713	27	80	Tascam DR 40 WL	ZUEC 24464
MAP3488_0338_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	30 Jan 2018	Caseara (TO)	1630	32.4	77	Tascam DR 40 WL	ZUFMS-AMP 11251
MAP3489_0339_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	30 Jan 2018	Caseara (TO)	1630	31	76	Tascam DR 40 WL	ZUFMS-AMP 11252
MAP3547_0347_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	31 Jan 2018	Caseara (TO)	1830	29.6	86	Tascam DR 40 WL	ZUFMS-AMP 11253
MAP3548_0351_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	31 Jan 2018	Caseara (TO)	1945	26.1	99	Tascam DR 40 WL	ZUFMS-AMP 11254
MAP3571_0364_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	1 Feb 2018	Caseara (TO)	1811	29.7	91	Tascam DR 40 WL	ZUFMS-AMP 11255
MAP3575_0362_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	1 Feb 2018	Caseara (TO)	1920	30.7	89	Tascam DR 40 WL	ZUFMS-AMP 11256
MAP3576_0363_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	1 Feb 2018	Caseara (TO)	—	31.7	93	Tascam DR 40 WL	ZUFMS-AMP 11257
MAP3577_0365_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	1 Feb 2018	Caseara (TO)	1830	29.9	97	Tascam DR 40 WL	ZUFMS-AMP 11258
Unvouchered_0283_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	23 Jan 2018	Caseara (TO)		25	—	Tascam DR 40 WL	—
Unvouchered_0284_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	23 Jan 2018	Caseara (TO)	1930	25	—	Tascam DR 40 WL	—
Unvouchered_0285_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	23 Jan 2018	Caseara (TO)	2000	25	—	Tascam DR 40 WL	—
Unvouchered_0286_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	23 Jan 2018	Caseara (TO)		25	—	Tascam DR 40 WL	—
Unvouchered_0302_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	26 Jan 2018	Caseara (TO)	1600	—	—	Tascam DR 40 WL	—
Unvouchered_0337_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	30 Jan 218	Caseara (TO)	1600	—	—	Tascam DR 40 WL	—
Unvouchered_0348_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	31 Jan 2018	Caseara (TO)	1850	27.7	87	Tascam DR 40 WL	—
Unvouchered_0349_Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	31 Jan 2018	Caseara (TO)	1900	26.8	89	Tascam DR 40 WL	—
Unvouchered_0350_ Pseudopaludicola_jazmynmcdonaldae_Caseara-TO.wav	31 Jan 2018	Caseara (TO)	1915	26.4	97	Tascam DR 40 WL	—
Pseudop_atragulaIcemSP1aAAGm671.wav	18 Feb 2015	Icém (SP)	1657	27	—	Marantz PMD 671	—
000121_0269_Pseudopaludicola_atragula	14 Nov 2017	São José do Rio Preto (SP)	1800	—	—	Tascam DR 40 WL	—
000121_0271_Pseudopaludicola_atragula	14 Nov 2017	São José do Rio Preto (SP)	1800	—	—	Tascam DR 40 WL	—
000122_0272_Pseudopaludicola_atragula	14 Nov 2017	São José do Rio Preto (SP)	1800	—	—	Tascam DR 40 WL	—