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THE ADVERTISEMENT CALL OF *CHIASMOCLEIS BASSLERI* (ANURA, MICROHYLIDAE) FROM SOUTHERN AMAZON, MATO GROSSO, BRAZIL

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Abstract. The advertisement call of *Chiasmocleis bassleri* is described from Aripuanã, northwestern State of Mato Grosso, Brazil. The call consists of many short multipulsed notes (3 to 6 pulses), emitted sporadically, with a mean duration of 0.059 s, the dominant frequency presenting a mean value of 3268.66 Hz, and interval between notes 0.042 s to 0.128 s. The acoustic parameters in the advertisement call of *C. bassleri* are intermediate among the calls described for other species in the genus.

Keywords. Advertisement call; Brazilian Amazon, *Chiasmocleis bassleri,* taxonomy.

Introduction

The genus *Chiasmocleis* Méhelÿ, 1904 is distributed from Panamá to southern South America and consists of 23 currently recognized species, 20 species occur in Brazil (Frost, 2009; SBH, 2009). Several species are morphologically similar and consequently the taxonomy of the genus is considered problematic (Peloso and Sturaro, 2008).

Anuran advertisement calls are generally species-specific (Gerhardt, 1988) and their specificity serves as an isolating mechanism and as a useful taxonomic character (Duellman and Trueb, 1994). Calls have been described for only four species of Amazonian *Chiasmocleis: C. hudsoni* Parker, 1940 (Rodrigues *et al.,* 2008); *C. panamensis* Dunn, Trapido, and Evans, 1948 (Nelson, 1973); *C. shudikarensis* Dunn, 1949 (Zimmerman and Bogart, 1988; Lescure and Marty, 2000) and *C. ventrimaculata* (Andersson, 1945) (Nelson, 1973; Schlüter, 2005). In addition, calls have also been described for five of the 11 species inhabiting the Atlantic Rain Forest: *C. atlantica* Cruz, Caramaschi, and Izecksohn, 1997 (Wogel *et al.,* 2004), *C. capixaba* Cruz, Caramaschi, and Izecksohn, 1997 (Wogel *et al.,* 2004), *C. carvalhoi* Cruz, Caramaschi, and Izecksohn, 1997 (Nelson, 1973; Hartmann *et al.,* 2002; Wogel *et al.,* 2004), *C. leucosticta* (Boulenger, 1888) (Nelson, 1973), and *C. schubarti* Bokermann, 1952 (Nelson, 1973) and for two species inhabiting Cerrado and Pantanal areas: *C. albopunctata* (Boettger, 1885) (De La Riva *et al.,* 1996; Oliveira-Filho and Giaretta, 2006) and *C. mehelyi* Caramaschi and Cruz, 1997 (Hartmann *et al.,* 2002).

Chiasmocleis bassleri Dunn, 1949 (Fig. 1) occurs in Peru, Ecuador, and Brazil (Frost, 2009). Herein, we describe the advertisement call of *C. bassleri* and compare it to reported calls of other species in the genus.

Material and Methods

Chiasmocleis bassleri was observed calling in temporary ponds on 5 March 2008 at forest edges in the area of Aproveitamento Hidrelétrico Dardanelos, Municipality of Aripuanã (9°10'45"S, 60°37'50"W), northwestern region of the State of Mato Grosso, Brazil. Calls of one male were recorded at 21:30h, air temperature 23°C, using a Sony P620® digital recorder with an internal microphone with a sampling frequency of 44,100 Hz and 16-bit resolution. The calls were analyzed with AVISOFT-SASLab Light for Windows (V. 3.74) and SoundRuler (V. 0.9.4.1). Audiospectrograms were produced with the following parameters:

Figure 1. *Chiasmocleis bassleri,* MZUFV 8507 (SVL 18.3 mm). Photo by D. J. Santana.

FFT = 256, *Frame* = 100, *Overlap* = 75, and flat top filter. The sonogram, oscillogram, and power spectrum were performed in SoundRuler (V. 0.9.4.1). Terminology follows Duellman and Trueb (1994), Tárano (2001), and Orrico *et al.* (2006). Comparative data for other species was obtained from the available literature; if the call of a species had been reported multiple times, we consider each as representing a different population. Voucher specimens are deposited in the *Museu de Zoologia João Moojen, Universidade Federal de Viçosa* (MZUFV), Viçosa, State of Minas Gerais, Brazil.

Results and Discussion

Males were found at night under rocks in temporary ponds at forest edges, or exposed near the ponds. When approached, they stopped calling and hid in holes or under stones. The recorded male (MZUFV 8507) was calling hidden under stones; three neighbouring males were observed within 1 m of the recorded male. The call (Figs. 2 and 3) was emitted sporadically and it consists of several multipulsed notes without a standard pattern. Note duration ranged (n = 98) from 0.039-0.074 s ($\overline{X}$ = 0.059; ± 0.007 s) and the dominant frequency ranged from 3266.67-3273.17 Hz ($\overline{X}$ = 3268.66; ± 3.01 Hz). The number of pulses per note varied from 3 to 6 pulses ($\overline{X}$ = 4.83; ± 0.64).

Among the described calls of the genus *Chiasmocleis* (*C. albopunctata, C. atlantica, C. capixaba, C. carvalhoi, C. hudsoni, C. leucosticta, C. mehelyi, C. panamensis, C. schubarti, C. shudikarensis,* and *C. ventrimaculata*), *C. bassleri* has the lowest dominant frequency and number of pulses per note in the

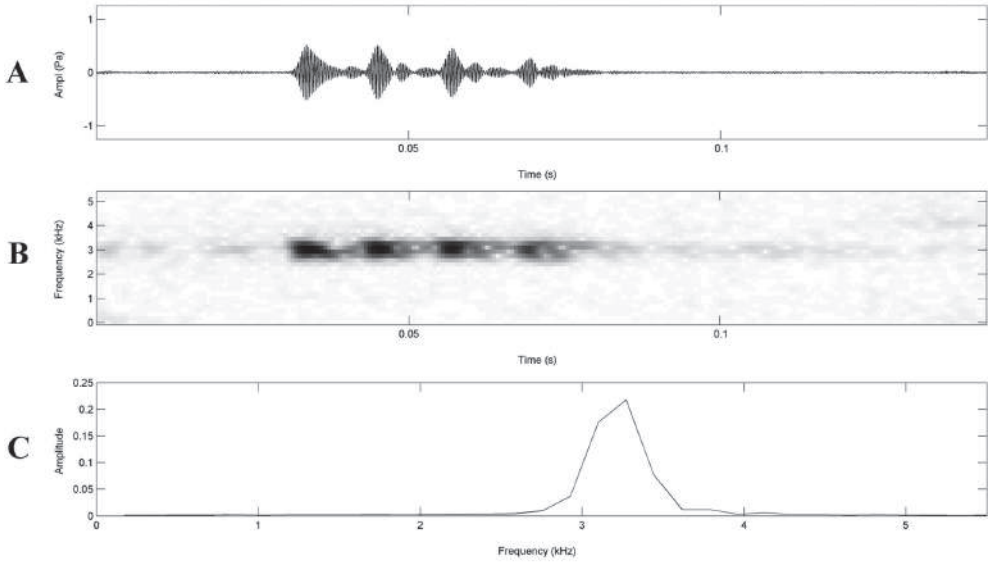

Figure 2. *Chiasmocleis bassleri,* advertisement call: (A) oscillogram, (B) audiospectrogram, and (C) power spectrum of a single note (air temperature = 25°C).

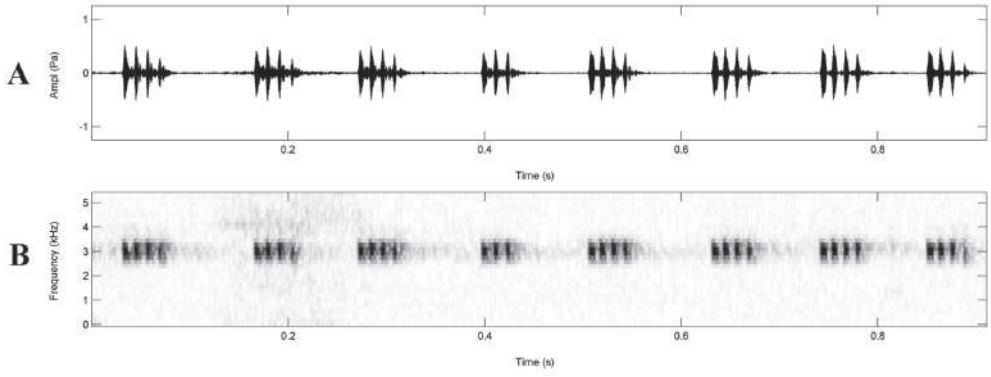

Figure 3. *Chiasmocleis bassleri,* advertisement call: (A) oscillogram and (B) audiospectrogram of a session of eight notes (air temperature = 25°C).

TABLE 1. Advertisement calls described for the genus *Chiasmocleis.* Values are presented as mean ± SD (range), SD = standard deviation.

Species	Dominant Frequency (Hz)	Num. Pulses/Note	Note duration (sec)	Interval between notes (sec)	References
C. albopunctata	4431.5 ± 101.7 (4311.0 - 4664.4)	7.1 ± 0.8 (5 - 8)	0.052 ± 0.008 (0.023 - 0.060)	—	De La Riva *et al.,* 1996
C. albopunctata	4306	9	0.06 ± 0.004 (0.05 - 0.06)	—	Oliveira-Filho and Giaretta, 2006
C. atlantica	3540 ± 110 (3320 - 3750)	16.7 ± 2.1 (7 - 22)	0.137 ± 0.022 (0.064 - 0.186)	0.028 ± 0.005 (0.023 - 0.047)	Wogel *et al.,* 2004.
C. bassleri	3268.66 ± 3.01 (3266.67 - 3273.17)	4.83 ± 0.64 (3 - 6)	0.059 ± 0.007 (0.039 - 0.074)	0.069 ± 0.018 (0.042 - 0.128)	Present work
C. capixaba	4750 ± 60 (4610 - 4870)	8.7 ± 0.8 (8 - 10)	0.052 ± 0.005 (0.047 - 0.061)	0.059 ± 0.007 (0.054 - 0.086)	Wogel *et al.,* 2004.
C. carvalhoi	4529 ± 71 (4465 - 4650)	—	0.06 ± 0.01 (0.05 - 0.07)	—	Nelson, 1973
C. carvalhoi	4000 - 4900	9.08 ± 1.06 (6-12)	—	Variable*	Hartmann *et al.,* 2002
C. carvalhoi	4840 ± 70 (4690 - 4960)	9.3 ± 0.9 (8 - 10)	0.048 ± 0.005 (0.042 - 0.054)	0.037 ± 0.001 (0.034 - 0.043)	Wogel *et al.,* 2004.
C. hudsoni[A]	3795.2 ± 837.5 (2551 - 4349)	9.2± 3.7 (6 -13)	249.2 ± 101.9 (137 - 349)	—	Rodrigues *et al.,* 2008
C. hudsoni[B]	4624.2 ± 153.5 (4263-4866)	5.3 ± 0.6 (5-8)	0.097 ± 0.012 (0.071 - 0.126)	0.026 ± 0.007 ((0.019 - 0.052)	Rodrigues *et al.,* 2008.
C. leucosticta	3647 ± 177 (3400 - 4000)	—	0.21 ± 0.03 (0.15 - 0.25)	—	Nelson, 1973
C. mehelyi	4700 - 5400	9.1 ± 0.93 (7-11)	—	Irregular*	Hartmann *et al.,* 2002
C. panamensis	4800 - 5500	—	0.03 - 0.04	—	Nelson, 1973
C. schubarti	3886 ± 136 (3700-4100)	—	0.22 ± 0.01 (0.20 - 0.24)	—	Nelson, 1973
C. shudikarensis	3380 - 3750	—	0.098	—	Lescure and Marty, 2000
C. shudikarensis	5890 - 7510	—	0.04 ± 0.01 (0.03-0.06)	0.02 ± 0.01 (0.01 - 0.03)	Zimmerman and Bogart, 1988
C. shudikarensis	5530 - 7460	—	0.03 ± 0.01 (0.01-0.05)	0.01 ± 0.03 (0.01-0.03)	Zimmerman and Bogart, 1988
C. ventrimaculata	3562 ± 110 (3350 - 3700)	—	0.13 ± 0.01 (0.10 - 0.18)	—	Nelson, 1973
C. ventrimaculata	5000 - 7000	—	—	—	Schlüter, 2005

[A] introductory note, [B] chorus notes, *exactly as cited by authors in previous paper.

call (Table 1). The note duration of *C. bassleri* has an intermediate range when comparing it with other species (Table 1), being greater than *C. albopunctata, C. capixaba, C. carvalhoi* (from Duas Bocas, Espírito Santo, Brazil, Wogel *et al.,* 2004), and *C. leucosticta,* similar to *C. carvalhoi* (from Rio de Janeiro, Brazil, Nelson,1973), and shorter than *C. atlantica, C. hudsoni, C. panamensis, C. schurbarti, C. shudikarensis,* and *C. ventrimaculata. Chiasmocleis bassleri* has the longest interval between notes, but this is not a comparable parameter since it is not reported in all of the described calls and it is highly variable with environmental conditions (Guimarães and Bastos, 2003; Lignau and Bastos 2007; Table 1).

A summary of calls of *Chiasmocleis* species is provided in Table 1. The dominant frequency of *C. ventrimaculata* from Colombia (3350-3700 Hz, Nelson, 1973) is significantly different from *C. ventrimaculata* from Peru (5000-7000 Hz, Schlüter, 2005). A similar difference was observed in *C. shudikarensis,* where dominant frequency for Manaus, Brazil, (5890-7510 Hz and 5530-7460 Hz, Zimmerman and Bogart, 1988) is significantly higher than that from Guyana (3380-3750 Hz, Lescure and Marty, 2000). These differences suggest that the populations examined might represent distinct species. Calls of populations of *C. ventrimaculata* and *C. shudikarensis* throughout their distributional range need to be incorporated with adult and larval morphological analyses to evaluate the existence of morphological similar species under these two names.

Descriptions of new species of *Chiasmocleis* commonly include morphological adult and larval data as well as biogeographical inferences in the context of the given biome in which the new species occurs, usually the Atlantic Rain Forest domain (*sensu*

Ab'Sáber, 1977) or the Amazonian domain, considering the two biomes as separate entities (*e.g.,* Cruz *et al.,* 1997; Cruz *et al.,* 2007; Moravec and Köhler, 2007; Rodrigues *et al.,* 2008; Peloso and Sturaro, 2008). Nevertheless, we found similiarites in many aspects of the advertisement calls among species occuring in Amazonia and in the Atlantic forest, as well as considerable differences between sympatric species within a given biome. However, comparisons are limited given the restricted number of parameters reported in previous descriptions and the standardization of the parameters here analyzed.

Resumo

O canto de anúncio de *Chiasmocleis bassleri* é descrito de Aripuanã, noroeste do Estado de Mato Grosso, Brasil. O canto consiste de muitas notas multipulsionadas (3 a 6 pulsos por nota), emitidas esporadicamente, com duração média de 0.059 s, freqüência dominante com valor médio de 3268,66 Hz e intervalo entre as notas de 0.042 s a 0.128 s. Os parâmetros acústicos do canto de anúncio de *C. bassleri* são intermediários entre os outros cantos descritos de espécies do gênero.

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