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# Distribution and calls of two South American frogs (Anura)

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**Abstract.** The anuran fauna of Serra do Cipó (Minas Gerais state, Brazil) is relatively well known and is currently represented by 43 species. Herein we report on two new records of frog species to this locality, *Barycholos ternetzi* and *Hypsiboas crepitans;* their advertisement calls are also described. In a divergence from the literature, we found two types of notes in the advertisement calls of *B. ternetzi* and extended its distribution about 350 km to the east. Our data on the call of *H. crepitans*, which is the closer to the type locality, reinforce published discussions regarding populations of Middle America and northern South America as representing different species from those south of the Amazon Basin.

Key words. Vocalization, Serra do Cipó, Cerrado Biome, *Hypsiboas crepitans*, *Barycholos ternetzi*.

## Introduction

The anuran fauna of Serra do Cipó (state of Minas Gerais, Brazil) is relatively well known and 43 species have been listed there (review in Eterovick & Sazima 2004). Herein we report on two new records of frog species from this locality: *Barycholos ternetzi* (Miranda-Ribeiro) (Eleutherodactylinae) and *Hypsiboas crepitans* (Wied) (Hylidae). *Barycholos ternetzi* was described from Rio Maranhão, state of Goiás (Frost 2007), and seems to be restricted to Brazilian Cerrado Biome in the Central and Southeastern regions (Bastos et al. 2003, Araújo et al. 2007, Frost 2007, Giaretta et al. in press). *Hypsiboas crepitans* was described from the state of Bahia (Brazil) and, as presently recognized, occurs as disjunct populations in relatively dry habitats in Middle America (Panama), northern South America (Colombia, Guianas and Venezuela), and Northeastern to Central Brazil (Duellman 2001, Frost 2007).

In this report we extend the distributional range of both these species and also describe their advertisement calls. In contrast to previous reports, we found two types of notes in the advertisement call of *B. ternetzi*. Our data on the call of *H. crepitans* reinforce published discussions that populations from Middle America and northern South America represent different species from that south of the Amazon Basin.

## Materials and Methods

The Serra do Cipó lies within the Serra do Espinhaço mountain chain in Minas Gerais State, southeastern Brazil. This range is mostly covered by Cerrado floristic physiognomies (Oliveira & Marquis 2002), mainly grasslands and rocky fields; gallery forests may occur along drainages (Giulietti et al. 1987, Callisto et al. 2001). The local climate is wet/hot from October to March and dry/mild between April and September, with the annual mean precipitation around 1500 mm (Giulietti et al. 1987, Madeira & Fernandes 1999).

Both frog species were studied at the top of hills (around S 19°17', W 43°35'; beside MG 10 Highway; 900 m altitude; December 2005) of Santana do Riacho municipality. For comparative purposes, we also present data on calls of *B. ternetzi* from the municipalities of Perdizes (about S 19°12', W 47°08'; 890 m altitude; December 2003), state of Minas Gerais and Caldas Novas (about S 17°46', W 48°39'; 906 m altitude; December 2004), state of Goiás.

Calls were recorded with a Boss 864 digital recorder (44100 Hz, 16 bit resolution) and a Sennheiser ME67 microphone. We analyzed the data in the Sound Ruler software (Gridi-Papp 2007), using a FFT (Fast Fourier Transformation) length of 256. The terminology used in the call descriptions essentially followed Duellman & Trueb (1986).

## Results

For *Barycholos ternetzi* we analyzed five calls of one individual from each of the three localities (Tab. 1). The advertisement call presents two different notes (Fig. 1). The first note (*A*) is composed of partially fused pulses. The second note (*B*) is shorter than the "*A*" and has two harmonics. Typically an individual starts a call sequence emitting 6-16 "*A*" notes. After this introductory "*A*" note sequence, a note "*B*" is emitted after each two "*A*" notes, resulting in a three-noted (*AAB*) call. Intervals among "*A*" notes are more variable than that among "*AB*" in "*AAB*" sets. Sequences composed of just "*A*" notes were often heard in the field (N = 3 males).

At Serra do Cipó the recorded male was calling in the leaf litter of a mix of natural vegetation and scattered eucalyptus trees. In the other localities (Perdizes and Caldas Novas), males (N = 20) also called from the ground, within forests, forest borders, and open area habitats.

The calls (N = 1 male; N = 5 calls) of *Hypsiboas crepitans* (Fig. 2) present two different notes, both composed of partially fused pulses. The first note is shorter (65 ± 2 ms, about four pulses, emitted at 68 pulses per second) than the second (344 ± 10 ms, about 27 pulses, emitted at 77 pulses per second). Between note intervals average 49 ± 3 ms and between calls 517 ± 95 ms. Total call (both notes) duration is 459 ± 11 ms; calls emitted at a rate of 65 per minute. The dominant frequency ranges from 530 ± 25 Hz to 1300 ± 14 Hz, with the maximum energy at 863 ± 4 Hz. The calling male (Fig. 3) called from a rock crevice at the margins of a creek (approx. 2 m wide, 40 cm deep) in an open area.

## Discussion

The previously reported advertisement call of *Barycholos ternetzi* (Guimarães et al. 2001, Bastos et al. 2003) presents a single note, which corresponds to our note "*A*" in

Tab. 1. Acoustic parameters of the advertisement call of *Barycholos ternetzi* from different localities in central and Southeastern Brazil. Note types (*A* and *B*) defined in the text and illustrated in Fig. 1. Calls from one male per locality and five calls analyzed per male. [1)] 20.9 °C; [2)] 25.5 °C; [3)] 22.2 °C.

| | Localities | | |
|---|---|---|---|
| Call features | Serra do Cipó (MG)[1] | Perdizes (MG)[2] | Caldas Novas (GO)[3] |
| Note duration (ms) *A* | 59 ± 7 | 54 ± 6 | 51 ± 2 |
| Note duration (ms) *B* | 20 ± 3 | 1 ± 2 | 10 ± 1 |
| Fundamental freq. (Hz) *B* | 1782 ± 41 | 1957 ± 60 | 2191 ± 60 |
| Dominant frequency (Hz) *A* | 3665 ± 96 | 3502 ± 42 | 4195 ± 123 |
| Dominant frequency (Hz) *B* | 3536 ± 41 | 3744 ± 101 | 4310 ± 12 |
| Note pulse number *A* | 7 - 13 | 7 - 11 | 6 - 10 |
| Introductory note *A* (min.$^{-1}$) | 96 | 205 | 160 |
| *AAB* call duration (ms) | 408 ± 9 | 403 ± 17 | 472 ± 62 |
| *AAB* emission rate (calls/min) | 59 | 83 | 79 |
| *AAB* inter-call interval (ms) | 611 ± 37 | 241 ± 30 | 289 ± 11 |
| *AA* inter-note interval (ms) | 121 ± 10 | 182 ± 43 | 243 ± 51 |
| *AB* inter-note interval (ms) | 116 ± 19 | 98 ± 26 | 105 ± 15 |

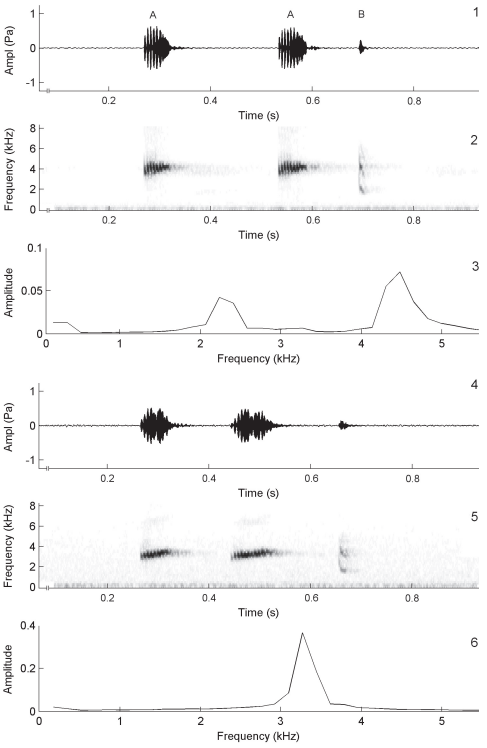


Fig. 1. Waveform (1 and 4), Spectrogram (2 and 5) and Power Spectrum (3, note B and 6, note A) of two advertisement calls (*AAB* sequence) of *Barycholos ternetzi*. Note types (*A* and *B*) defined in the main text. 1-3: Caldas Novas (GO) (air = 22.5°C; 19:20 h; December 2004); 4-6: Santana do Riacho, Serra do Cipó (MG) (air = 20.9°C; 18:20 h; December 2005). Unvouchered records. Record files: BarychternetGO1AAGb and BarychternetMG3AAGb, respectively.

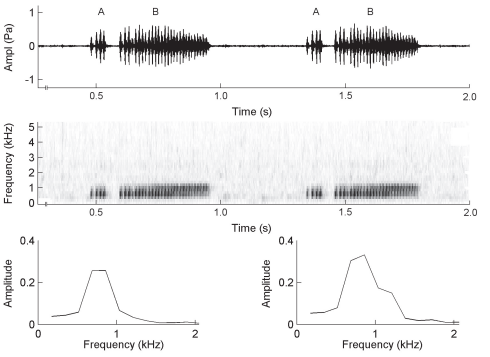


Fig. 2. Waveform (above), Spectrogram (middle) and Power Spectrums (below, notes A and B, respectively) of two advertisement calls of *Hypsiboas crepitans*. The two notes (A and B) of each call are represented. Santana do Riacho, Serra do Cipó (MG). Air = 20.5°C, water = 21.9°C; 19:00 h; December/2005; voucher photo in Fig. 3. Record file: HypsiboasspMGAAGb.

its pulsed structure, dominant frequency and duration. As long pure "*A*" sequences are common it is possible the note "*B*" had been missed in the previous studies. Our present report appears to extend the known distribution of the species (Giaretta et al. in press) about 350 km to the east.

The advertisement call of *Hypsiboas crepitans* we described is substantially different from those previously reported from northern South America (Bernal et al. 2004) and Middle America (Fouquette 1966, Duellman 2001). The duration (312 ms), the dominant frequency (350 Hz), and the pulse number (3-11) of calls from Colombia are lower than ours. In the Panamanian populations the call is trilled, shorter (200 ms), and presents a lower rate of emission (20/min.) compared to ours. Considering the extensive geographical distribution and the great inter-populational variability in color, body size, advertisement call, and breeding biology, several different species may be included under the name *H. crepitans* (Kluge 1979, Duellman 2001, Lynch & Suárez-Mayor-

Fig. 3. The recorded male of *Hypsiboas crepitans* in life. Santana do Riacho, Serra do Cipó, Minas Gerais State, Brazil.

ga 2001). We are unaware of any report of the call of *H. crepitans* in Brazil. As our record is only about 500 km south of its presumed type locality (Tamboril municipality, state of Bahia), there is a good chance that it corresponds to the nominal species.

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