

Correspondence

Advertisement call and distribution of *Dendropsophus berthalutzae* (Anura: Hylidae)

MARIO RIBEIRO MOURA^{1,2}, JOÃO VICTOR ANDRADE LACERDA¹ & RENATO NEVES FEIO¹

¹⁾ Universidade Federal de Viçosa, Departamento de Biologia Animal, Museu de Zoologia João Moojen. Vila Gianetti 32. CEP 36570-000. Viçosa, MG, Brazil

²⁾ Ecos Biota Consultoria Ambiental, Rua Senador Vaz de Melo, 64/40. CEP 36570-000. Viçosa, MG, Brazil

Corresponding author: MARIO RIBEIRO MOURA, e-mail: mario.moura@ecosbiota.com.br

Manuscript received: 22 January 2012

The *Dendropsophus microcephalus* group is currently composed of 38 species, distributed in three clades, namely the *D. decipiens*, *D. microcephalus*, and *D. rubicundulus* clades (FAIVOVICH et al. 2005, KÖHLER et al. 2005, MORAVEC et al. 2006, 2008, FOUQUET et al. 2011). The *D. decipiens* clade currently contains four species (*D. decipiens*, *D. berthalutzae*, *D. haddadi*, and *D. oliveirai*) distributed in eastern Brazil, all of which deposit eggs on leaves overhanging water bodies (FAIVOVICH et al. 2005).

Anuran advertisement calls are species-specific (GERHARDT & DAVIS 1988) and their acoustic analysis can significantly contribute to resolving taxonomic issues (e.g., DUELLMAN & TRUEB 1994). As far as the *Dendropsophus decipiens* clade is concerned, advertisement calls are described for *D. decipiens*, *D. haddadi* and *D. oliveirai* (ABRUNHOSA et al. 2001, SANTANA et al. 2011, RUAS et al. 2012), but not for *D. berthalutzae*. Herein we describe the advertisement call of *D. berthalutzae* (Fig. 1) and review its geographic distribution.

Two males of this species were recorded perched on leaf near a temporary pond inside a forested area (20°44'05"S; 42°20'50"W, 780 m elevation), on 15 December 2011 at around 20:30 h, ca. 18 °C, in the surroundings of Serra do Brigadeiro mountain, municipality of Fervedouro, state of Minas Gerais, Brazil. After recording, the calling males were collected (collection permits issued by the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis [IBAMA] #20857-3), fixed in 10% formalin and deposited in the herpetological collection of the Museu de Zoologia João Moojen, Universidade Federal de Viçosa (MZUFV 11718–11719).

Calls were recorded using an Olympus DM-520® digital recorder coupled with an Audio-Technica Pro 24 stereo condenser microphone. The recordings were then analysed using Sound Ruler (V.o.9.6.o), at a sampling frequency of

44.1 kHz and 16 bit resolution. The oscillogram, spectrogram and amplitude spectrum were produced with the following parameters: FFT = 256, overlap = 0.9. Description and terminology of call characters follow DUELLMAN & TRUEB (1994). Numerical values are provided as ranges followed by mean ± standard deviation in parentheses.

In total we analysed 32 calls from two males of *Dendropsophus berthalutzae*. Fifteen of them contain one note only (here referred as note type A) and 17 contain two notes, namely type A as a first note and another secondary note, here referred to as type B. Notes of type A have durations of 23.0–46.8 ms (31.8 ± 7.0 ; n = 32), 7–12 pulses/



Figure 1. Adult male of *Dendropsophus berthalutzae* (MZUFV 11718; SVL 19.2 mm) from the municipality of Fervedouro, Minas Gerais state, Brazil (Photo M. R. MOURA).

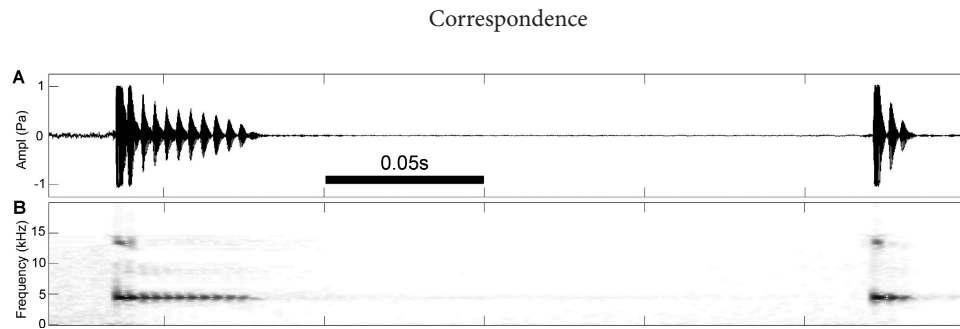


Figure 2. Oscillogram and spectrogram of a two-note call of *Dendropsophus berthallutzae* (note types A and B), recorded in the municipality of Fervedouro, Minas Gerais state, Brazil.

note (9.1 ± 1.3 ; $n = 32$), a pulse rate of 240.1–343.2 pulses/sec (291.2 ± 28.7 ; $n = 32$), and a dominant frequency of 4315.2–4765.0 Hz (4642.6 ± 103.7 ; $n = 32$). Notes of type B are shorter, with durations of 10.3–22.3 ms (15.1 ± 3.2 ; $n = 17$), 2–4 pulses/note (3.0 ± 0.7 ; $n = 17$), a pulse rate of 108.6–295.9 pulses/sec (205.9 ± 51.6 ; $n = 17$), and dominant frequencies of 4514.6–4700.4 Hz (4685.0 ± 44.0 ; $n = 17$). Calls with two notes (types A and B; Fig. 2) have durations of 246.7–300.5 ms (275.7 ± 15.8 ; $n = 17$) and intervals between notes range from 189.4 to 252.7 ms (230.3 ± 19.3 ; $n = 17$).

Considering the described vocalisations within the *D. decipiens* clade, calls of *Dendropsophus decipiens* have more notes (4–11 multipulsed notes), a longer note du-

ration (20–130 ms), and a higher dominant frequency (4770–5230 Hz) (ABRUNHOSA et al. 2001) than *D. berthallutzae*. Calls of *D. oliveirai* consist of a single multipulsed note, with a longer duration (62–155 ms), higher dominant frequency (5685–6869 Hz), and a lower pulse rate (55.6–161.3 pulses/sec) (SANTANA et al. 2011) than calls of *D. berthallutzae*. The mean number of pulses per note and the mean pulse rate, respectively, are lower in *D. haddadi* (2.8 pulses/note, 179.8 pulses/s; RUAS et al. 2012) compared to calls of *D. berthallutzae* (note type A, 9.1 pulses/note, 291.2 pulses/s and type B, 3.0 pulses/note, 205.9 pulses/s; Tab. 1). These differences are in agreement with species-specific differences, indicating that the analysis of anuran

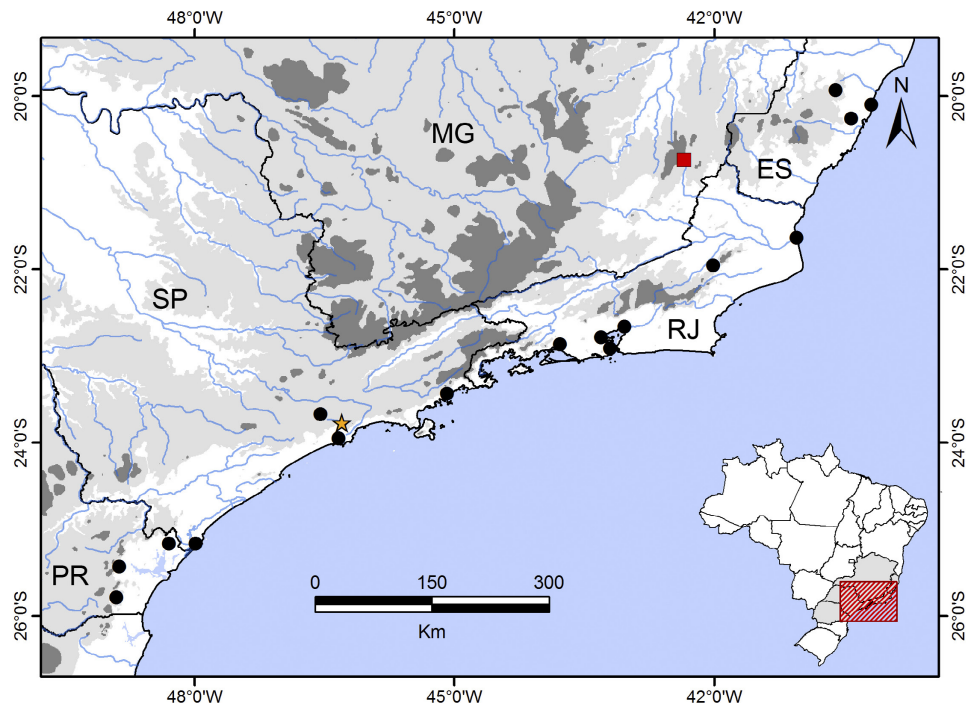


Figure 3. Map showing the known distribution of *Dendropsophus berthallutzae* in southeastern Brazil. State abbreviations: ES, Espírito Santo; MG, Minas Gerais; RJ, Rio de Janeiro; SP, state of São Paulo; PR, Paraná. Symbols: Circles = literature records (ALMEIDA et al. 2011, BERTOLUCI et al. 2007, BOKERMANN 1962, 1963, CRUZ et al. 2000, CONTE et al. 2009, SILVEIRA et al. 2011, TONINI et al. 2011); Square = New record (municipality of Fervedouro); Star = Type-locality (municipality of Paranapiacaba).

Table 1. Call parameters of advertisement calls described for the species within the *Dendropsophus decipiens* clade. Duration is expressed in milliseconds (ms) and frequency in Hertz (Hz). * Types A and B of notes combined.

Species	Number of calls	Notes per call	Pulses per note	Note duration [ms]	Dominant frequency [Hz]	Pulses per second	Reference
<i>Dendropsophus decipiens</i>	16	4–11	–	20–130	4770–5230	–	ABRUNHOSA et al. (2001)
<i>Dendropsophus haddadi</i>	86	1–3	1–8	4–59	4312–4875	60.2–421.0	RUAS et al. (2012)
<i>Dendropsophus oliveirai</i>	28	1	5–14	62–155	5685–6869	55.5–161.2	SANTANA et al. (2011)
<i>Dendropsophus berthaltutzae</i> *	32	1–2	2–12	10–46	4315–4765	108.6–343.2	This work

vocalisations can help clarify the partly complex taxonomy of species within the *D. microcephalus* group.

Dendropsophus berthaltutzae was previously recorded from lowland regions of eastern Paraná state to the central region of Espírito Santo state (FROST 2011). The record of *D. berthaltutzae* from the municipality of Fervedouro represents the most inland record of this species yet and its first record from Minas Gerais state, being located approximately 130 km north of the closest previous record, i.e., from the Serra do Desengano mountains, municipality of Santa Maria Madalena, state of Rio de Janeiro (SILVEIRA et al. 2011). The new record lies 530 km northeast of the type locality in the municipality of Paranapiacaba, state of São Paulo (Fig. 3).

Note added in proof

After this paper was accepted for publication, another study describing the advertisement call of *Dendropsophus berthaltutzae* was accepted and published in Zootaxa (FORTI et al. 2012).

Acknowledgements

The Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG, CRA-APQ-02370-09) and Project Idea Wild are thanked for financial support, and the Coordenação de Aperfeiçoamento de Nível Superior (CAPES) for a fellowship granted to JVAL. The authors are grateful to JÖRN KÖHLER for valuable comments on the manuscript.

References

- ABRUNHOSA, P. A., H. WOGEL & J. P. POMBAL JR. (2001): Vocalização de quatro espécies de anuros do Estado do Rio de Janeiro, Sudeste do Brasil (Amphibia, Hylidae, Leptodactylidae). – Boletim do Museu Nacional, Nova Série, Zoologia, **472**: 1–12.
- ALMEIDA, A. P., J. L. GASPARINI & P. L. V. PELOSO (2011): Frogs of the state of Espírito Santo, southeastern Brazil – The need for looking at the ‘coldspots’. – CheckList, **7**: 542–560.
- BERTOLUCI, J., R. A. BRASSALOTI, J. S. RIBEIRO-JÚNIOR, V. M. F. N. VILELA & H. O. SAWAKUCHI (2007): Species composition and similarities among anuran assemblages of forest sites in Southeastern Brazil. – Scientia Agricola, **64**: 364–374.
- BOKERMANN, W. C. A. (1962): Cuatro nuevos hylidos del Brasil (Amphibia, Salientia, Hylidae). – Neotropica Notas Zoológicas Sudamericanas, **8**: 81–91.
- BOKERMANN, W. C. A. (1963): Girinos de Anfíbios Brasileiros – I (Amphibia – Salientia). – Anais da Academia Brasileira de Ciências, **35**: 465–474.
- CONTE, C. E., M. V. GAREY, R. LINGNAU, M. X. SILVA, C. ARMSTRONG & M. T. HARTMANN (2009): Amphibia, Anura, *Limnomedusa macroglossa*, *Dendropsophus anceps*, *D. berthaltutzae*, *D. seniculus*, *Scinax littoralis*: new state records, distribution extension and filling gaps. – CheckList, **5**: 202–209.
- CRUZ, C. A. G., U. CARAMASCHI & A. G. DIAS (2000): Espécie nova de *Hyla* Laurenti, 1768 do estado do Rio de Janeiro, Brasil (Amphibia, Anura, Hylidae). – Boletim do Museu Nacional, Nova Série, Zoologia, **434**: 1–8.
- DUELLMANN, W. E. & L. TRUEB (1994): Biology of Amphibians. – Baltimore, The Johns Hopkins University Press.
- FAIVOVICH, J., C. F. B. HADDAD, P. C. A. GARCIA, D. R. FROST, J. A. CAMPBELL & W. C. WHEELER (2005): Systematic review of the frog family Hylidae, with special reference to Hylinae: phylogenetic analysis and taxonomic revision. – Bulletin of the American Museum of Natural History, **294**: 1–240.
- FORTI, L. R., F. A. M. MARTINS & J. BERTOLUCI (2012): Advertisement call and geographical variation in call features of *Dendropsophus berthaltutzae* (Anura: Hylidae) from the Atlantic Rainforest of southeastern Brazil. – Zootaxa, **3310**: 66–68.
- FOUQUET, A., B. P. NOONAN, M. BLANC & V. G. DILL ORRICO (2011): Phylogenetic position of *Dendropsophus gaucheri* (Lescure and Marty 2000) highlights the need for an in-depth investigation of the phylogenetic relationships of *Dendropsophus* (Anura: Hylidae). – Zootaxa, **3035**: 59–67.
- FROST, D. R. (2011): Amphibian Species of the World: an Online Reference. Version 5.5. – Electronic Database accessible at <<http://research.amnh.org/vz/herpetology/amphibia/American>> (accessed on 13 December 2011).
- GERHARDT, H. C. & M. S. DAVIS (1988): Variation in the coding of species identity in the advertisement calls of *Litoria verreauxi* (Anura: Hylidae). – Evolution, **42**: 556–563.
- KÖHLER, J., K.-H. JUNGFER & S. REICHLER (2005): Another new species of small *Hyla* (Anura, Hylidae) from Amazonian sub-Andean forest of western Bolivia. – Journal of Herpetology, **39**: 43–50.
- MORAVEC, J., J. APARICIO & J. KÖHLER (2006): A new species of tree frog, genus *Dendropsophus* (Anura: Hylidae), from the Amazon of northern Bolivia. – Zootaxa, **1327**: 23–40.

- MORAVEC, J., J. APARICIO, M. GUERRERO-REINHARD, G. CALDERON & J. KÖHLER (2008): Diversity of small Amazonian *Dendropsophus* (Anura: Hylidae): another new species from northern Bolivia. – *Zootaxa*, **1918**: 1–12.
- SANTANA, D. J., D. O. MESQUITA & A. A. GARDA (2011): Advertisement call of *Dendropsophus oliveirai* (Anura, Hylidae). – *Zootaxa*, **2997**: 67–68.
- RUAS, D. S., C. V. M. MENDES, I. R. DIAS & M. SOLÉ (2012): Description of the advertisement call of *Dendropsophus haddadi* (Bastos and Pombal 1996) (Anura: Hylidae) from southern Bahia, Brazil. – *Zootaxa*, **3250**: 63–65.
- SILVEIRA, A. L., R. C. PONTES & R. O. L. SALLES (2011): Novos registros geográficos e variação na coloração de *Dendropsophus pseudomeridianus* (Amphibia, Anura, Hylidae) no Estado do Rio de Janeiro, Brasil. – *Biotemas*, **24**: 145–151.
- TONINI, J. F. R., I. S. MENDONÇA, A. B. COUTINHO & J. L. GASPARINI (2011): Anurans from Costa Bela, state of Espírito Santo, southeastern Brazil: inventory at an urban area and the re-discovery of *Allobates* in the state. – *Herpetology Notes*, **4**: 435–444.