

Distress call of *Hypsiboas faber* (Anura: Hylidae) during a *Liophis miliaris* (Serpentes: Colubridae) attack

Lucas R. Forti^{1,*} and Jaime Bertoluci²

Vocalization is a conspicuous anuran communication behavior usually used for reproductive and territorial purposes (Duellman and Trueb, 1994), but some frogs may emit different calls during courtship and defense against predation (Wells, 2007). Bogert (1960) defined the sound produced by frogs during the attack of predators as “distress call,” and its function seems to be alerting neighbors to the danger and surprising the predator, thereby allowing the prey to escape (Wells, 2007).

The Blacksmith Treefrog, *Hypsiboas faber* (Wied-Neuwied, 1821), is a tropical hylid with a wide distribution in western to southern Brazil and southeastern Paraguay and northeastern Argentina (Frost, 2011). Its reproduction is associated with the rainy season (Bertoluci, 1998; Bertoluci and Rodrigues, 2002a; Canelas and Bertoluci, 2007; Narvaes, Bertoluci and Rodrigues, 2009) when males build small mud pools for egg deposition (Martins and Haddad, 1988). The natural history and call repertoire of *H. faber* are relatively well known (Martins and Haddad, 1988; Martins, 1993; Martins, Sazima and Egler, 1993; Bertoluci and Rodrigues 2002b; Narvaes, Bertoluci and Rodrigues, 2009). Martins and Haddad (1988) described the distress call of *H. faber* by shaking male frogs and compressing them in their hands.

The present paper describes a variation of the distress call emitted during a natural attack of the snake *Liophis miliaris* (Linnaeus, 1758) in a typical reproductive habitat in the Estação Biológica de Boracéia, an Atlantic Forest reserve located in the state of São Paulo, southeastern Brazil (23°38'16.33" S, 45°50'24.89" W; 890 m altitude). Details on the climate and vegetation

of the study site are in Heyer et al. (1990) and Bertoluci and Rodrigues (2002a).

The predation attempt was recorded at 21:30 hr on 21 October 2010 in the vicinity of a pond, where several frog species were vocally active. The snake was found biting the right leg of a male *H. faber* that tried to escape by holding onto the grass vegetation with their hands. During predation event, the frog emitted a sequence of conspicuous vocalizations, just like a “cry” (Fig. 1). The frog tried to escape forward and the snake, with its tail tightly wrapped around the vegetation, pulled it back and swallowed the whole leg of the frog. The interaction lasted approximately 40 min, and the snake eventually released the prey, probably because the frog was too large to ingest.

The distress calls emitted by the treefrog were recorded with a digital Marantz PMD660 recorder and YOGA EM 9600 microphone (48 KHz and 16-bit resolution). The calls were analyzed in Raven 1.3 software for Windows, with FFT (Fast Fourier Transformation) = 256 and overlap = 50. The snout–vent length of the treefrog was about 100 mm; after measuring the frog, it was released. Some scars were noticed along its right leg. The snake was about 60 cm total length.

Contrary to the distress call described by Martins and Haddad (1988), the call we recorded did not show modulation and occupied much lower frequencies, with minimum frequency averaging 93.4 ± 26.3 Hz ($n = 10$), maximum frequency averaging 1279 ± 141.4 Hz ($n = 10$), and dominant frequency averaging 548.6 ± 54.8 Hz ($n = 10$) (Fig. 1). The distress call described by Martins and Haddad (1988) occupied band frequencies between 1300 and 4900 Hz. The vocalization described in the present paper averaged 0.7 ± 0.2 s ($n = 10$), with intervals of 20 ± 27 s ($n = 10$), and averaged 85.5 ± 22.4 pulses per call ($n = 10$). These values do not differ greatly from those of Martins and Haddad (1988), who registered call duration between 0.5 and 1.0 s and a high number of repetition pulses per call.

The differences in call properties found by Martins and Haddad (1988) and us may be associated with

1 Programa de Pós-Graduação Interunidades em Ecologia Aplicada, ESALQ/CENA-USP. Av. Centenário, 303, CEP 13400-970, Piracicaba, SP, Brazil; e-mail: lucas_forti@yahoo.com.br

2 Departamento de Ciências Biológicas, Escola Superior de Agricultura Luiz de Queiroz, Universidade de São Paulo. Av. Pádua Dias, 11, CEP 13418-900, Piracicaba, SP, Brazil

*Corresponding author

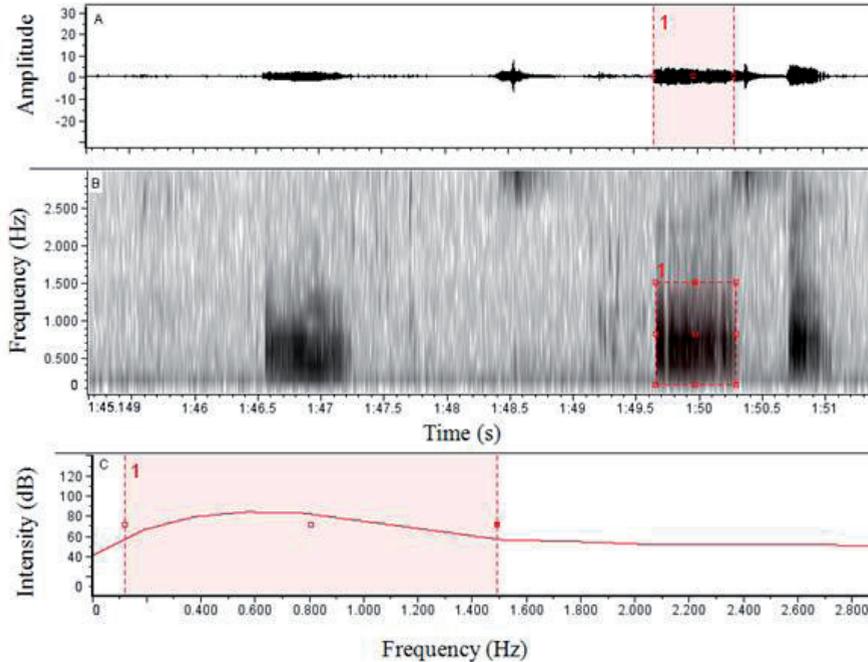


Figure 1. Oscilogram (A), sonogram (B), and intensity spectrum (C) of the distress call of *Hypsiboas faber* from Estação Biológica de Boracéia, state of São Paulo, southeastern Brazil. Relative Humidity = 92 % and air temperature = 11°C; call recorded on 21 October 2010.

different temperatures when the call was recorded. Martins and Haddad (1988) recorded the call when the air temperature was 21°C (11°C in the present paper).

Acknowledgments. We are grateful to Fábio Augusto Miguel Martins for help during fieldwork. We thank Márcio Martins for comments on the manuscript and Linda Trueb for review of the English. The doctoral scholarship of LRF was provided by FAPESP (process number 2009/13987-2). JB is researcher of CNPq (process number 305868/2009-8).

References

- Bertoluci, J. (1998): Annual patterns of breeding activity in Atlantic Rainforest anurans. *J. Herpetol.* 32: 607–611.
- Bertoluci, J., Rodrigues, M.T. (2002a): Seasonal patterns of breeding activity of Atlantic Rainforest anurans at Boracéia, Southeastern Brazil. *Amphibia-Reptilia* 23: 161–167.
- Bertoluci, J., Rodrigues, M.T. (2002b): Utilização de habitats reprodutivos e micro-habitats de vocalização em uma taxocenose de anuros (Amphibia) da Mata Atlântica do sudeste do Brasil. *Pap. Avul. de Zool., São Paulo* 42: 287–297.
- Bogert, C.M. (1960): The influence of sound on the behavior of amphibians and reptiles. In: *Animal sounds and communication*, p. 137–320. Lanyon, W.E., Tavolga, W.N., Eds., Washington, DC, American Institute of Biological Sciences.
- Canelas, M.A.S., Bertoluci, J. (2007): Anurans of the Serra do Caraça, southeastern Brazil: species composition and phenological patterns of calling activity. *Iheringia, Sér. Zool.* 97: 21–26.
- Duellman, W.E., Trueb, L. (1994): *Biology of amphibians*. Baltimore, The John Hopkins University Press.
- Frost, D.R. (2011): *Amphibian Species of the World: an Online Reference, Version 5.5*. American Museum of Natural History, New York. Accessed on 31 January 2012.
- Heyer, W.R., Rand, A.S., Cruz, C.A., Peixoto, O., Nelson, C.E. (1990): Frogs of Boracéia. *Arq. Zool. (São Paulo)*. 31: 231–410.
- Martins, M. (1993): Observations on the reproductive behavior of the smith frog, *Hyla faber*. *Herpetol. J.* 3: 31–34.
- Martins, M., Haddad, C.F.B. (1988): Vocalizations and reproductive behavior in the smith frog, *Hyla faber* Wied (Amphibia: Hylidae). *Amphibia-Reptilia* 9: 49–60.
- Martins, M., Sazima, I., Egler, S.G. (1993): Predators of the nest building gladiator frog, *Hyla faber*, southeastern Brazil. *Amphibia-Reptilia* 14: 307–309.
- Narvaes, P., Bertoluci, J., Rodrigues, M.T. (2009): Composição, uso de habitat e estações reprodutivas das espécies de anuros da floresta de restinga da Estação Ecológica Juréia-Itatins, sudeste do Brasil. *Biota Neotropica*. 9: 117–123.
- Wells, K.D. (2007): *The ecology and behavior of amphibians*. The University of Chicago Press.