

Correspondence

Description of the advertisement call of *Physalaemus lisei* (Anura: Leiuperidae)

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The genus *Physalaemus* currently comprises 45 described species, distributed in South America east of the Andes, ranging from southeastern Colombia and southern Venezuela to Uruguay and adjacent Argentina (NASCIMENTO et al. 2005, FROST 2011). Seven species groups in the genus were identified by NASCIMENTO et al. (2005). The *Physalaemus gracilis* species group is composed of five species: *Physalaemus barrioi* BOKERMANN, 1967, *P. evangelistai* BOKERMANN, 1967, *P. gracilis* (BOULENGER, 1883), *P. jordanensis* BOKERMANN, 1967, and *P. lisei* BRAUN & BRAUN, 1977. It is distributed from northern Argentina, Uruguay and Paraguay through southern and southeastern Brazil (NASCIMENTO et al. 2005). Information on advertisement calls is available for *P. barrioi*, *P. evangelistai*, *P. gracilis*, and *P. jordanensis* (BARRIO 1965, BOKERMANN 1967, PROVETE et al. 2012).

Physalaemus lisei (Fig. 1) occurs in the southern portion of the Brazilian Atlantic rainforest, in northeastern Rio Grande do Sul and adjacent Santa Catarina states, where it is found in damp woodland, secondary forests, or transition zones from woodland to grassland (KWET et al. 2010). Although BOTH et al. (2006) provided some information on the breeding ecology of *P. lisei*, the advertisement call of this species has remained undescribed. Bioacoustic information is particularly important for future ecological and taxonomic studies in this genus, as there are species with very similar morphologies, and advertisement calls may help to properly identify them. Herein, we describe for the first time the advertisement call of *P. lisei* from southern Brazil.

Recently, KWET & MÁRQUEZ (2010) edited an acoustic guide with two audio CDs containing the calls of 109 am-

phibian species from southern Brazil and Uruguay, including the advertisement call of *P. lisei* (see also call clipping at <http://www.kwet.de/>; accessed on May 29, 2012), but no numerical parameters for these calls are available to date.

For our call analyses, we used the advertisement calls of three males of *P. lisei* recorded in the municipalities of São Francisco de Paula (29°26' S, 50°15' W; 1 December 1995; 3:00 h; air temperature 17°C) and Canela (29°28' S, 50°45' W; 3 December 1995; 23:30 h; air temperature 17°C), Rio Grande do Sul state, Brazil. We obtained these recordings from the Fonoteca Zoológica (Museo Nacional de



Figure 1. *Physalaemus lisei*, adult male from Torres, Rio Grande do Sul, Brazil. Photo by A. KWET.

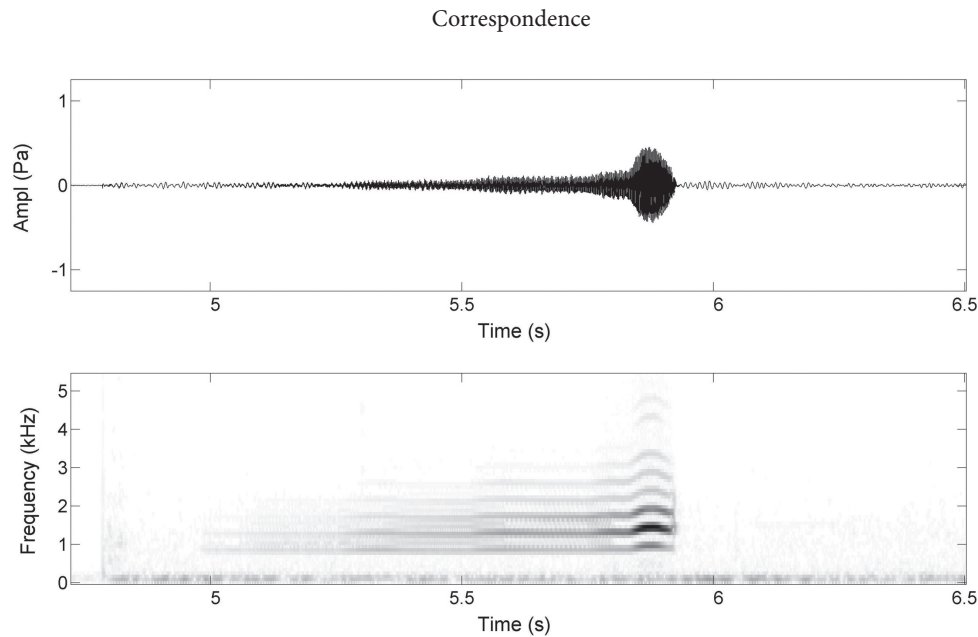


Figure 2. (A) Oscillogram and (B) spectrogram of the advertisement call of *Physalaemus lisei* from Pró-Mata, São Francisco de Paula municipality, Rio Grande do Sul state, southern Brazil (recording AK 2B12; record number of Fonoteca = 5850; 1 December 1995; 3:00 h; air temperature 17°C; voucher specimen within the series MCT 1786–1789).

Ciencias Naturales; <http://www.fonozoo.com/>; accessed on May 29, 2012). Recordings were edited with sampling frequencies of 22 kHz and 16 bit resolution. The voucher specimen of the call depicted in Figure 2 was collected and is now deposited in the collection of the Museu de Ciência e Tecnologia (MCT) at Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS), within a series of four specimens, MCT 1786–1789. The calls were analysed with Cool Edit 96® (i.e., spectral variables) and Avisoft-SASLab Lite® (i.e., temporal variables) software. Frequency information was obtained through Fast Fourier Transformation (FFT; width 1024 points). The spectrograms and oscillograms were created with Sound Ruler software (GRID-PAPP 2007) with overlap (75%), FFT of 256 in the Hamming window function. Note duration (s), fundamental frequency (Hz), dominant frequency (Hz), time intervals between calls (s), and repetition rate (calls/minute) were measured. Call description and terminology follows GERHARDT (1998). In numerical parameters, the range is followed by mean \pm standard deviation in parentheses.

The rather gentle, whine-like advertisement call of *P. lisei* (Fig. 2) is composed of a single, unimpulsed note, emitted isolated or in short series of two or three notes. The average note duration ranged from 0.71–2.14 s (1.3 ± 0.38 s; $N = 16$ calls). Notes were emitted at rather irregular time intervals of 0.21–87.70 s ($\bar{X} = 18.83 \pm 27.52$ s; $N = 16$ calls), with repetition rates of 2.00–5.66 calls/minute (3.77 ± 1.83 ; $N = 3$ males). The notes exhibit a gradually increasing amplitude (call intensity) towards the end of the call and slight frequency modulation (ascendant frequency modulation at the end of the call). Parallel frequency bands are recognizable and a harmonic structure was observed in the advertisement call of *P. lisei*, in which the fundamental harmon-

ic varied from 430–602 Hz (516 ± 60.81 ; $N = 6$ calls) and the dominant frequency was modulated between 1023 and 1464 Hz (1272 ± 354 ; $N = 6$ calls).

Compared with the published calls of the other species in the *P. gracilis* group, the advertisement call of *P. lisei* differed considerably, confirming the specific identity of this taxon. The mean dominant frequency of the advertisement call of *P. lisei* is lower than that of *P. barrioi* (2265 Hz; PROVETE et al. 2012), *P. evangelistai* (2000–4000 Hz; BOKERMANN 1967), and *P. gracilis* (4000–5000 Hz; BARRIO 1965). In the original description of the call of *P. jordanensis*, there were no dominant frequency values given, however estimating it from the spectrogram provided by BOKERMANN (1967), the fundamental frequency in this species may be close to that observed in *P. lisei*, varying approximately between 100 and 500 Hz. The call duration of *P. lisei* was on average longer than in *P. barrioi* (1.24 s; Provete et al. 2012), *P. evangelistai* (1.0–1.2 s; BOKERMANN 1967), and *P. gracilis* (0.9–1 s; BARRIO 1965), but shorter than in *P. jordanensis* (1.4–1.6 s; BOKERMANN 1967). The mean repetition rate of the calls of *P. lisei* was considerably lower than in *P. barrioi* (7.64 calls/min; PROVETE et al. 2012), *P. evangelistai* (8 calls/min; BOKERMANN 1967), *P. gracilis* (40 calls/min; BARRIO 1965), and *P. jordanensis* (10 calls/min; BOKERMANN 1967), although this difference could be partly due to the low air temperature (17°C) at the time of our recordings and differences in male motivation.

Apart from the specific differences mentioned, the harmonic composition and overall structure of the advertisement call of *P. lisei* is similar to the calls of other species in the *P. gracilis* group, thus corroborating a close relationship between the species in this clade of frogs (see GOICOECHEA et al. 2010).

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