

## The advertisement call of *Physalaemus ephippifer* (Anura: Leiuperidae) from Brazilian Amazonia

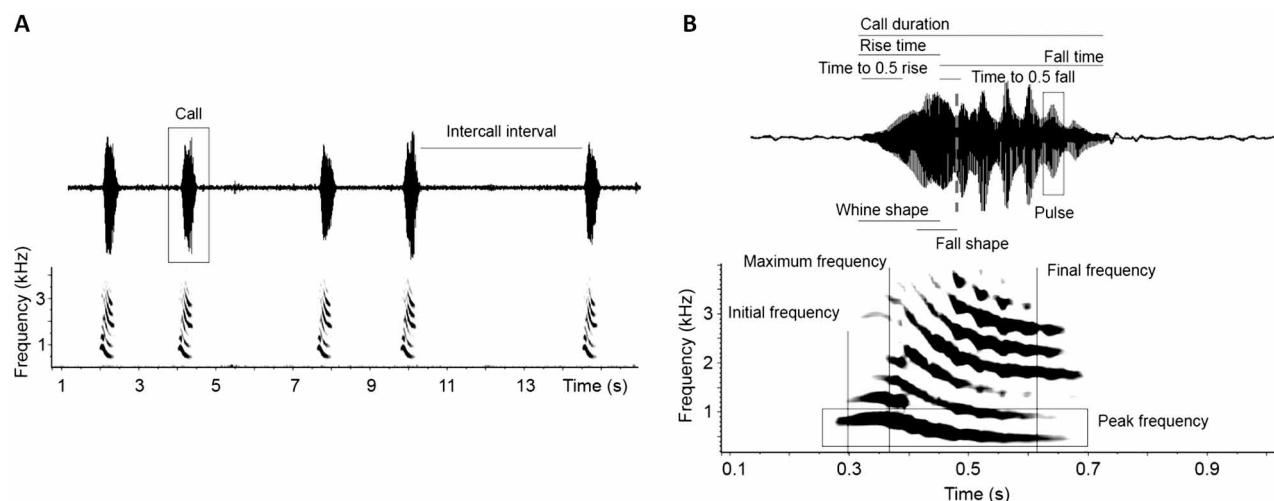
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*Physalaemus* is recognized as an important system for the study of mechanisms and evolution of animal communication, especially because of studies involving the *P. pustulosus* species group. *Physalaemus ephippifer* is considered, together with *P. fischeri* (*enesefae*) and an undescribed species, to be the most similar species to the *P. pustulosus* group in external morphology, osteology, and characteristics of the call. Because of this, *P. ephippifer* has been included as an outgroup in studies to interpret patterns of signal-receiver evolution in the genus. Whereas details of the advertisement call structure of *P. fischeri* have been described (Tárano 2001), information (e.g., detailed graphic representation and range of variation) on *P. ephippifer* calls remains unavailable.

We recorded calls of 18 *P. ephippifer* in the riverine Maracá Island, Roraima State, Brazil ( $3^{\circ}15'–3^{\circ}35'N$ ;  $61^{\circ}22'–61^{\circ}54'W$ ). Individuals from this locality were previously identified as *P. ephippifer* by Nascimento *et al.* (2005). We used a Marantz PMD-660 digital recorder and a Sennheiser K6/ME66 directional microphone, and analyzed three calls per male with the software Raven 1.2 (Blackman window, DFT 4080). Call traits were based on Ryan and Rand (1999), with five additional traits (number of pulses: pulses added after the whine component of the call; call rate: mean number of calls per minute; intercall interval: silence interval between two consecutive calls; initial frequency: first harmonic frequency at the call beginning; and peak frequency: frequency of higher intensity of the first harmonic) (Fig. 1). Mean air temperature was  $24.95^{\circ}\text{C} \pm 0.59$  (23.7–25.7) and mean male SUL was  $29.5\text{ mm} \pm 0.88$  (27.8–30.8). Voucher specimens (26502–26512) were deposited at INPA-H, Manaus, Brazil.



**FIGURE 1.** Oscillogram and spectrogram of (A) a sequence of five calls and of (B) a representative call of *Physalaemus ephippifer* from Brazil. The vertical dashed line represents the beginning of the pulsed portion of the call.

The whine-like advertisement call of *P. ephippifer* has a harmonic structure in which the fundamental harmonic is modulated from 818.17 Hz to 443.2 Hz over a period of ca. 0.3 s. Hence, the call has a descending frequency modulation, with an ascending modulation at its beginning. A representative call is 0.41 s long ( $\pm 0.08$ ; 0.27–0.62) and reaches its maximum amplitude at ca. 0.1 s ( $\pm 0.02$ ; 0.07–0.13), after which it declines steadily. Rise 0.5 (s):  $0.06 \pm 0.02$  (0.02–0.09); Fall 0.5 (s):  $0.05 \pm 0.04$  (0.02–0.13); Intercall interval (s):  $4.65 \pm 7.65$  (2.2–26.6); Call rate:  $11.75 \pm 6.44$  (2.23–