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Advertisement and courtship calls of *Phyllodytes wuchereri* (Peters, 1873) (Anura: Hylidae)

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The genus *Phyllodytes* Wagler comprises 11 species, of which six have vocalizations already described [*P. edelmoi* Peixoto, Caramaschi & Freire, 2003 (Lima *et al.* 2008); *P. gyrinaethes* Peixoto, Caramaschi & Freire, 2003 (Roberto & Ávila 2013); *P. luteolus* (Wied-Neuwied, 1824) (Weygoldt 1981); *P. melanomystax* Caramaschi, Silva & Britto-Pereira, 1992 (Nunes *et al.* 2007); *P. kautskyi* Peixoto & Cruz, 1988 (Simon & Peres 2012); and *P. tuberculosus* Bokermann, 1966 (Juncá *et al.* 2012)]. Here we describe the advertisement and courtship calls of *P. wuchereri* (Peters, 1873) recorded at the Private Reserve of Natural Heritage (RPPN) Serra Bonita, in the Camacan municipality, Bahia State, Brazil (15°23'S, 39°33'W; 900 m a.s.l.). This is the first description of a courtship call of the genus *Phyllodytes*.

Three specimens of *P. wuchereri* were found in two epiphytic bromeliads 5 m apart. One gravid female (UFBA 9628, SVL 26.6 mm) and one male (UFBA 9629, SVL 27.3 mm) were captured in a bromeliad 2 m above ground (fig. 1A–B). The male was emitting advertisement and courtship calls (*sensu* Wells 2007). Another male (UFBA 9630, SVL 27.7 mm) emitted advertisement calls from another bromeliad 2.5 m above ground.

The calls from both males were recorded in the field on November 5th 2009 (full moon, air temperature 19.7°C, air humidity 80%) using a Marantz Portable Cassette Recorder PMD222 with a Sennheiser ME66 directional microphone at a distance of ca. 50 cm. Calls were digitized with a sampling frequency of 10 kHz and sample size of 16 bits. Temporal parameters of the calls were measured and counted on waveforms using the Avisoft-SAS Lab Light 3.74 software and spectral parameters with Sound Ruler Acoustic Analysis 0.941 software. Spectrograms were obtained by a FFT length of 256 points, frame size 100%, Window flat top, 75% overlap for the advertisement call and 93.75% for the courtship call. Vouchered specimens (UFBA 9628–9630) were deposited in the Museu de Zoologia da Universidade Federal da Bahia, and recording files at the Sound Library of the Laboratório de Taxonomia e História Natural de Anfíbios, both in the Universidade Federal da Bahia, Salvador municipality, Bahia State, Brazil.

Advertisement calls (fig. 1C–F) were emitted sporadically, with long and irregular intercall intervals. Calls consisted of 10–21 pulsed notes (\bar{x} = 16.18 ± 3.25, n = 11), call duration 2.75–6.75 s (\bar{x} = 4.70 ± 1.23, n = 11), note duration 0.11–0.32 s (\bar{x} = 0.19 ± 0.04, n = 133), internote intervals 0.09–0.21 s (\bar{x} = 0.12 ± 0.02, n = 128) and note rate 3.05–4.03 notes/s (\bar{x} = 3.56 ± 0.36, n = 11). Notes with 3–9 pulse groups (\bar{x} = 5.39 ± 2.01, n = 114), each group composed of 27–44 pulses (\bar{x} = 37.70 ± 3.42, n = 706). Pulse groups formed by 3–4 distinct pulses, the last two groups with five or more pulses. Note pulse rate 112.5–300 pulses/s (\bar{x} = 204.60 ± 41.36, n = 130). Two main bandwidths (harmonics) are distinguishable in a call from the power spectrum. The lowest-pitched harmonic (LPH) ranged from 0.75 to 1.63 kHz and the highest-pitched harmonic (HPH) from 2.41 to 3.60 kHz. Call dominant frequencies were observed in both bandwidths (one per call, never co-dominants). In the lowest-pitched harmonic (fundamental frequency), dominant frequencies ranged from 1.29 to 1.46 kHz (\bar{x} = 1.35 ± 0.10, n = 3) and in the highest-pitched harmonic from 3.01 to 3.52 kHz (\bar{x} = 3.30 ± 0.14, n = 8). A similar pattern of variation was found in note dominant frequencies (see Table 1).

Courtship calls (fig. 1G–J) were emitted when male UFBA 9629 noticed the female UFBA 9628 in the same leaf axil. Call consisted of 1–2 notes (n = 4), call duration 0.60–1.30 s (\bar{x} = 0.96 ± 0.35, n = 4), intercall interval 2–8 s (\bar{x} = 5.4 ± 3.4, n = 3), note rate 1.53–1.66 notes/s (\bar{x} = 1.58 ± 0.06, n = 4) and note pulse rate 128–165 pulses/s (\bar{x} = 153.28 ± 15.23, n = 6). Call lowest-pitched harmonic (LPH) ranged from 0.81 to 1.59 kHz and the highest-pitched harmonic (HPH) from 2.41 to 3.40 kHz. Call dominant frequency often at LPH (1.29 kHz, n = 3; 3.19 kHz, n = 1). Two

gyrinaethes has less notes (4.9 ± 0.6 notes, 4–6), shorter call (1.7 ± 0.3 s, 1.3–2.3) and note duration (0.04 ± 0.01 s, 0.02–0.07). However, the internote intervals of *P. gyrinaethes* call (0.4 ± 0.03 s, 0.3–0.5) are much longer than those of *P. wuchereri*. The number of pulses per note of *P. wuchereri* call is greater than that of *P. edelmoi* (20.26 ± 2.85 pulses, 6–32) and *P. tuberculosis* (24.55 ± 4.36 pulses, 13–34), but with narrow overlapping.

TABLE 1. Advertisement call and courtship call of *Phyllodytes wuchereri* from the RPPN Serra Bonita, Camacan municipality, Bahia State, Brazil. Values are means \pm standard deviation, range and sample number.

	Advertisement call			Courtship call	
	Mean	UFBA 9629	UFBA 9630	UFBA 9629	
Call duration (s)	4.70 ± 1.23 2.75–6.75; n=11	5.93 ± 0.76 4.91–6.75; n=4	4.10 ± 0.67 2.75–4.71; n=7	0.96 ± 0.35 0.60–1.30; n=4	
Note rate (notes/s)	3.56 ± 0.36 3.05–4.03; n=11	3.12 ± 0.05 3.05–3.17; n=4	3.81 ± 0.12 3.63–4.03; n=7	1.58 ± 0.06 1.53–1.66; n=4	
Pulse rate (pulses/s)	204.60 ± 41.36 112.50–300; n=130	172.10 ± 32.37 112.50–272.72; n=61	233.33 ± 23.15 178.94–300; n=69	153.28 ± 15.23 128–165; n=6	
Note number	16.18 ± 3.25 10–21; n=11	17.75 ± 2.75 15–21; n=4	15.28 ± 3.35 10–18; n=7	1–2; n=4	
Note duration (s)	0.19 ± 0.04 0.11–0.32; n=133	0.22 ± 0.05 0.11–0.32; n=63	0.16 ± 0.01 0.11–0.19; n=70	Note type A $0.60–0.62$; n=4	Note type B $0.41–0.50$; n=2
Internote intervals (s)	0.12 ± 0.02 0.09–0.21; n=128	0.13 ± 0.24 0.10–0.21; n=60	0.15 ± 0.01 0.09–0.19; n=68	—	—
Pulse number	37.70 ± 3.42 27–44; n=706	36.60 ± 3.78 27–44; n=439	38.60 ± 2.93 33–44; n=267	96–102; n=4	56–64; n=2
Pulse groups number	5.39 ± 2.01 3–9; n=114	7.31 ± 1.12 5–9; n=60	3.75 ± 0.74 3–6; n=54	26–26; n=4	16; n=2
Note dominant frequency at LPH (kHz)	1.30 ± 0.05 1.12–1.46; n=57	1.29 ± 0.03 1.12–1.46; n=46	1.29 ± 0.09 1.12–1.46; n=11	1.29; n=3	1.29; n=2
Note dominant frequency at HPH (kHz)	3.33 ± 0.17 2.67–3.53; n=78	2.96 ± 0.17 2.67–3.19; n=19	3.37 ± 0.05 3.35–3.53; n=59	3.19; n=1	—

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