Acoustic characteristics of the advertisement call of *Dendropsophus elegans* (Anura: Hylidae)

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**Abstract.** The aim of the present study was to describe the advertisement call of *Dendropsophus elegans* (Wied-Neuwied 1824) specimens found in the Parque Estadual Dois Irmãos, which is located in Recife, Pernambuco (Brazil). The data obtained were compared with available information on advertisement calls of the *D. leucophyllatus* group. So far, within this group the advertisement call has only been described for *D. anceps*, *D. bifurcus* and *D. ebraccatus*.

**Key Word:** Amphibians; Anura; Bioacoustics; *Dendropsophus leucophyllatus* group

**Introduction**

Among anuran amphibians, vocalization and other behavioural aspects are the primary mode of communication and principal mediator in social interaction (Ryan 2001; Bastos and Haddad 2002; Gerhardt and Huber 2002). Advertisement calls have great taxonomic significance. They are specific to each species (Gerhardt 1988) and are a useful tool to identify and describe cryptic species (Heyer, 1984; Channing et al. 2002). Advertisement calls also facilitate the distinction of morphologically similar taxa, based on bioacoustic characteristics (Thomas 1966; Minter 1997; Channing et al. 2002).

The genus *Dendropsophus* can be found in almost all Neotropical regions and contains more than 90 species which are divided into nine distinct phylogenetic groups. *Dendropsophus elegans* belongs to the *D. leucophyllatus* group (Faivovich et al. 2005), which contains eight morphologically similar species. Vocalization is a useful tool to distinguish members of this group (Heyer 1984; Faivovich et al. 2005; Frost 2011). The advertisement calls of three species from the *D. leucophyllatus* group have previously been described: *D. anceps* from Ribeirão Claro and Telêmaco Borba in the state of Paraná, Brazil (Conte et al. 2010) as well as the city of Caçapava in São Paulo state, Brazil (Gomes and Martins 2006); *D. bifurcus* from the Napo province of Ecuador (Jungfer et al., 2010); and *D. ebraccatus* from Panama and Costa Rica (Ohmer et al. 2009).

*Dendropsophus elegans* (Wied-Neuwied 1824) is a small species with a robust frame. The snout-vent length (SVL) does not exceed 40 mm. The species is common in Atlantic forests and is widely distributed along the Brazilian coastline from Rio Grande do Norte to Paraná (AmphibiaWeb 2015). *Dendropsophus elegans* lives in open areas from sea level up to approximately 2000 meters above sea level. Males call from branches in swamps, both in open lowlands and on forest edges (Izecksohn and Carvalho-e-Silva 2001). They usually vocalize within a few centimeters of the water surface around the edges of puddles and ponds which contain emergent, floating or herbaceous vegetation (Frost 2011).
The aim of the present study was to describe the acoustic characteristics of the advertisement call of *Dendropsophus elegans* (Wied-Neuwied 1824) using specimens from the Atlantic forest in the state of Pernambuco, Brazil.

**Materials and Methods**

The data were collected in May 2012, between 19:00h and 21:00h, from an area of permanent water in the *Dois Irmãos* zoological gardens (07°60’S 34°50’W) in Recife, (Pernambuco). The zoo is located within the *Parque Estadual Dois Irmãos*, which contains approximately 384.4 hectares. This park is considered to be one of the largest areas of Atlantic forest in an urban area in Pernambuco. The climate of this region is hot and humid with rainfall in autumn and winter (*Ab’saber* 1967; *Ayoade* 1986).

Males of *D. elegans* were observed vocalizing around the edges of the aforementioned body of water. The majority were found near herbaceous plants, although others were found on the ground or on aquatic plants. Seven specimens were recorded using a digital SONY IC Recorder (ICD-P530F), at a distance of approximately one meter from the animal. The mean temperature of the environment and the relative air humidity during sound recordings were measured using a digital thermo-hygrometer. Once the recording was completed, specimens were captured to measure the snout-vent length (SVL) using a digital caliper. The mass of the specimens was also measured using digital scales. The voucher-specimens (CHUFRPE 1091-1099) and the acoustic recordings (CS-UFRPE 20-27) were placed in the Herpetological and Paleoherpetological collection of the Federal Rural University of Pernambuco. In total, 63 advertisement calls were analyzed using Windows SoundRuler software version 0.9.6.0 as described by *Gridi-Papp* (2007).

**Results**

The air temperature was measured at 29°C, with relative humidity of 71%. The specimens vocalized approximately 15cm from the water’s edge and from an
average height of 30cm in relation to the water surface. The biometric data confirmed a mean SVL of 22 mm (SD= 0.70) and mean weight of 0.86g (SD= 0.18).

The advertisement call of *D. elegans* is composed of two notes (Figure 1). The call has a mean duration of 0.086s (SD= 0.014), of which the first note exhibited a mean duration of 0.050s (SD= 0.013) and between five and 16 pulses (mean = 8.7; SD = 2.8). The second note exhibited a mean duration of 0.014s (SD= 0.004) and between two and five pulses (mean = 2.6; SD= 0.9). The mean interval between the notes was 0.023s (SD= 0.005). Based on the results of the spectrogram and the power spectrum (Figure 1- B and C), there was no harmony present other than the fundamental and dominant frequency. For the first note, the mean dominant frequency was at 3.57kHz (2.72–3.91kHz; SD= 0.28). The second note exhibited a slightly higher frequency, with a mean value of 3.93kHz (3.53–6.46kHz; SD= 0.38).

**Discussion**

Upon comparison, the advertisement calls of species from the *D. leucophyllatus* group have the same structure: a longer first note with many pulses followed by a shorter second note with less pulses, as well as a higher dominant frequency in the second note (Table 1) (Gomes and Martins 2006; Ohmer et al. 2008; Conte et al. 2010; Jungfer et al. 2010). The highest mean values recorded were for the species *D. elegans* (3.57kHz to 3.93kHz) and *D. anceps* (3.46 kHz). The number of pulses in the first note was quite similar between *D. elegans* and *D. bifurcus* with mean values of 8.7 and 7.8 pulses, respectively (Jungfer et al. 2010). This result differs from that found for *D. anceps*, which exhibited a greater mean value that those observed in the call analysis of the other species (12 pulses) (Gomes and Martins 2006; Conte et al. 2010). The mean number of pulses in the second note of *D. elegans* (2.6) was greatly different to that of *D. anceps* (5.4 and 6.0) (Gomes and Martins 2006), although similar to the mean of *D. bifurcus* (2.0) (Jungfer et al. 2010) (Table I).

The longest duration of the first note was found in *D. ebraccatus* (0.14 to 0.19s) (Ohmer et al. 2008) and *D. anceps* (0.16s and 0.12s) (Gomes and Martins 2006; Conte et al. 2010). *Dendropsophus elegans* and *D. bifurcus* exhibited much lower values for this.
particular variable, with mean values of 0.05s and 0.09s, respectively (Jungfer et al. 2010) (Table I). The duration of the second note for D. bifurcus (0.0205s) exhibited mean values close to the species recorded in the present study. D. anceps was the species that was furthest from these levels (0.04s and 0.07s) (Gomes and Martins 2006; Conte et al. 2010).

The greatest similarity in the advertisement calls studied was found between D. elegans and D. bifurcus, which exhibited similar mean values for the duration of the call, the first and second notes, and the number of pulses in the second note. These similarities may be explained by the fact that these species are found in different areas (Pernambuco-Brazil and Napo-Ecuador, respectively), as well as the fact that they are geographically isolated and thus, the two species do not require different advertisement calls.

References


Accepted by Iris Starnberger