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Acoustic characteristics of the advertisement call of *Trachycephalus atlas* Bokermann, 1966 (Anura: Hylidae)

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Only three of the 12 recognized species of *Trachycephalus* Tschudi (Frost 2011) present an occipital crest—*Trachycephalus atlas* Bokermann, *T. nigromaculatus* Tschudi, and *T. jordani* (Stejneger and Test). The latter species is found in Colombia, Ecuador, and Peru. *Trachycephalus nigromaculatus* is found in the Brazilian Atlantic Forest of São Paulo, Rio de Janeiro, Espírito Santo, Minas Gerais, and southern Bahia states, while *T. atlas* is restricted primarily to the Caatinga of the Brazilian Northeast (Frost 2011), but overlaps with *T. nigromaculatus* in the Atlantic Forest of southern Bahia. The two species can be differentiated by the more pronounced posterior cephalic plate, wider inter-orbital distance, and lower and wider head in *T. atlas* (Bokermann 1966). Herein we describe the acoustic characteristics of advertisement call of *T. atlas* and compared with other *Trachycephalus* species.

Data collection. Males of *Trachycephalus atlas* (Fig. 1A) were heard calling at a temporary pool on February 25 and 26, 2011, in the Raso da Catarina Ecological Station (09°55'01.0"S; 38°41'55.6"W), in the municipality of Jeremoabo in northern Bahia state. The Raso da Catarina is a high plateau, with altitudes exceeding 500 m a.s.l., and a hot, semi-arid climate (Köppen type Bhs), characterized by irregular precipitation, high temperatures (mean of approximately 27°C), and low relative humidity of the air. Evaporation is much higher than annual precipitation (Sick *et al.* 1987; Velloso *et al.* 2002).

Eight males of *Trachycephalus atlas* were calling in the water or on the humid margin of the temporary pool. Five of them were recorded using the built-in microphone of an M-audio Microtrack II digital audio recorder with a resolution of 24 bits, at a distance of approximately one meter. During the recordings, the mean temperature of the water was 26.6±3.3°C (range: 21.3–29.5°C) and that of the air, 24.5±2.7°C (range: 24.5–26.0°C), while mean relative humidity of the air was 75±6% (range: 69–81%). These measurements were taken using a digital thermo-hygrometer with a precision of 0.1°C/%. The files of the recordings were deposited at the Sound Library of the Feira de Santana State University, under catalog numbers SUEFS 100-184 to 100-188. The voucher specimens of *T. atlas* were deposited at the UEFS Zoology Museum in Feira de Santana, Bahia, Brazil (catalog numbers MZFS 3727–3728), and the herpetological collection of the Federal University of Sergipe, in São Cristóvão, Sergipe (CHUFS 1736). The advertisement calls (n = 64; five males) were analyzed using the Raven Pro 1.3 program for Windows, with the following resolution parameters – fast Fourier transform size 512, overlap of 50%, 176 Hz bandwidth filter, 4.09 s time grid, and 46.9 Hz frequency grid.

Results. The advertisement call consisted of 10 to 15 multipulsed notes (mean = 12.4±1.0, n = 84; Fig. 1B). The mean duration of notes was 0.005±0.002 s (range: 0.003–0.006 s, n = 20) and the mean interval between notes was 0.009±0.003 s (range: 0.007–0.015 s, n = 20). The mean emission rate was 71.3±3.9 notes per second (range: 59.1–80.2 notes/s, n = 84). Call duration varied from 0.14 to 0.22 s (mean: 0.17±0.02, n=84), while the mean interval between calls was 0.35±0.06 s (range: 0.22–0.54 s, n = 64). The mean frequency was 1.51±0.17 kHz (range: 1.19–2.10 kHz, n = 84). Three bands of frequency were emitted more intensely (Fig. 1C). The lower, i.e. the fundamental frequency, varied from 0.56 to 1.50 kHz (mean: 0.78±0.20 kHz, n = 80), and the intermediate band corresponded to the dominant frequency and ranged from 1.69 to 1.88 kHz (mean: 1.84±0.07, n = 84). A third band was observed in the 3 kHz region (Fig. 1C). The first three or four notes were much more intense than the subsequent ones.

Comparisons. Only the advertisement calls of four species of *Trachycephalus* have been studied in detail. The call of *T. atlas* differs from that of *Trachycephalus dibernardoi* in the smaller number of notes, shorter duration (Kwet & Solé 2008 recorded 30 notes in 1 min in *T. dibernardoi*), and higher dominant frequency (Kwet & Solé 2008; Conte *et al.* 2010). *Trachycephalus mesophaeus* and *T. resinifictrix* have harmonic advertisement calls with a single note, with