

## THE ADVERTISEMENT CALL OF *ARGENTEOHYLA SIEMERSI PEDERSENI* (AMPHIBIA, ANURA, HYLIDAE), AND COMMENTS ON ITS TAXONOMIC STATUS

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**ABSTRACT:** Two subspecies of *Argenteohyla siemersi*, nominate *A. s. siemersi* and *A. s. pedersenii*, are currently recognized. It was suggested that analysis of nuptial calls and chromosome structure would contribute to clarify their taxonomic status. In this paper we describe the advertisement call of *Argenteohyla siemersi pedersenii* from Reserva Natural Provincial Iberá, Corrientes, Argentina, and comment on its taxonomic status. The advertisement call of *A. s. pedersenii* is quite variable in duration and number of notes. Additionally it seems to perform synchronized duets. The call of *A. s. pedersenii* is similar to that of *A. s. siemersi* in note structure and duration, but the fundamental frequency and the number of notes for call were higher in *A. s. pedersenii* than in *A. s. siemersi*. These data suggest that *siemersi* and *pedersenii* could belong to different biological species, although further work is needed to support this assertion.

**RESUMEN:** Actualmente se reconocen dos subespecies de *Argenteohyla siemersi*, la nominal *A. s. siemersi* y *A. s. pedersenii*. Se ha sugerido que estudios cromosómicos y bioacústicos podrían ayudar a clarificar su estado taxonómico. En este trabajo describimos por primera vez el canto de advertencia de *Argenteohyla siemersi pedersenii* sobre la base de una población procedente de la Reserva Natural Provincial Iberá, cerca de la localidad de Colonia Carlos Pellegrini, Corrientes, Argentina. El canto de *A. s. pedersenii* es muy variable en duración y número de notas. Además, parecen vocalizar en dúos sincronizados evitando la superposición de notas. En comparación con la subespecie nominal, existen diferencias con respecto a la frecuencia fundamental y al número de notas por canto, siendo mayor en *A. s. pedersenii* que en *A. s. siemersi*. Estos datos sugieren que *siemersi* y *pedersenii* podrían corresponder a dos especies biológicas distintas, pero más trabajo es necesario para corroborar esta propuesta.

**Key words:** *Argenteohyla*, bioacoustic, vocalization, nuptial call, taxonomy.

**Palabras claves:** *Argenteohyla*, bioacústica, vocalización, canto de anuncio, taxonomía.

### INTRODUCTION

*Argenteohyla siemersi* (Mertens, 1937) is an uncommon neotropical hylid frog listed as Endangered (Lavilla *et al.*, 2008). In Argentina, the species has been listed as Vulnerable by Lavilla *et al.* (2000). Two subspecies are currently recognized based on color patterns, general size and distribution (Williams and Bosso, 1994). *A. s. siemersi* occurs in Argentina, in the delta of the Paraná river (Entre Ríos and Buenos Aires provinces), and Uruguay (San José and Rocha departments), while *A. s. pedersenii* inhabits NW Corrientes province in Argentina, and Villa Rica, Guairá, in Paraguay (Williams and Bosso, 1994; Núñez *et al.*, 2004; and Brusquetti and Lavilla, 2006). Some natural history

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aspects of *A. s. pederseni* were studied by Céspedes (2000), and recently Díminich and Zaracho (2008) described its reproductive mode. Williams and Bosso (1994) suggested that analysis of the nuptial call and of the chromosomal structure of both subspecies would contribute to clarify their taxonomic status. The chromosomal structure of *A. s. pederseni* was studied by Morand and Hernando (1996) and the advertisement call of *A. s. siemersi* was described by Barrio (1966). The chromosomal structure of *A. s. siemersi* and the nuptial call of *A. s. pederseni* remain unknown. Nominative *A. s. siemersi* has presumably experienced a drastic population decline in Argentina and Uruguay, and the last confirmed record is from Uruguay in 1977 (Langone *et al.*, 2004).

Here we provide the first description of the advertisement call of *Argenteohyla siemersi pederseni* and comments on its taxonomic status.

## MATERIALS AND METHODS

Vocalizations of adult males of *Argenteohyla siemersi pederseni* were recorded in the Reserva Natural Provincial Iberá, close to the town of Colonia Carlos Pellegrini, Corrientes, Argentina (28° 41' S, 57° 26' W, datum: WGS84; elev. 65 m). On October 20<sup>th</sup>, 2005 (21:00 h, unknown temperature and humidity) two individuals were tape recorded by JIA with a Marantz-PMD222 tape recorder and Sennheiser-ME67 microphone, but none of them was sighted. Other individuals were recorded on September 28<sup>th</sup>, 2006 with a Sony DSC-P73 digital camera (23:30 h; environment temperature: 14.5 °C; water temperature: 17.5 °C; humidity: 74%) and on August 26<sup>th</sup>, 2008 a specimen was recorded with a Sony TCM-200DV tape recorder, internal microphone (21:05 h; environment temperature: 18.8 °C; water temperature: 19.9 °C; humidity: 97 %), and later collected by VHZ (voucher at Colección Herpetológica de la Universidad Nacional del Nordeste, UNNEC 10139, Fig. 1).

Spectrograms were built with Syrinx 2.6h ([www.syrinxpc.com](http://www.syrinxpc.com)). Sound measurements were obtained with on screen cursor using Raven 1.3 ([www.birds.cornell.edu/raven](http://www.birds.cornell.edu/raven)) with the following spectrogram parameters: hann window, window size 256 samples, hop size 128 samples, overlap 50 percent.

## RESULTS

We recorded males of *Argenteohyla siemersi pederseni* calling in semi-permanent ponds and only after heavy rains, from 1800 h to past midnight (Fig. 2). The males had paired sacs and called from the water, floating in open spaces or close to the edge of the ponds among vegetation (Figure 3). At the same ponds we recorded *Elachistocleis bicolor*, *Scinax squalirostris*, *Scinax berthae*, *Dendropsophus sanborni*, *Phyllomedusa azurea*, *Rhinella fernandezae*, *Pseudopaludicola falcipes* and *Leptodactylus ocellatus*.

Although we recorded at least six different individuals (including those in the background of our recordings), we obtained sound measurements of four individuals for which recordings were of sufficient quality (Table 1). The call of *A. s. pedersenii* is quite variable in duration and number of notes (Table 1, Figures 4-5). We found individuals vocalizing alone, and also forming aggregations of two and three individuals uttering alternate calls (duets) (Table 1, Figs. 4-6).

During the duets, we observed the presence of coupled notes (i.e., notes that are closer to each other than to another couple of notes). As the duet advances, the distance between notes in a pair increases through time in consecutive pairs, but later the distance between notes in a pair is reduced until a single individual vocalizes with solitary equidistant notes (Fig. 6). At unpredictable moments, these coupled notes can reappear without following a clear pattern and they can also repeat the pattern of increasing/decreasing time interval among coupled notes.



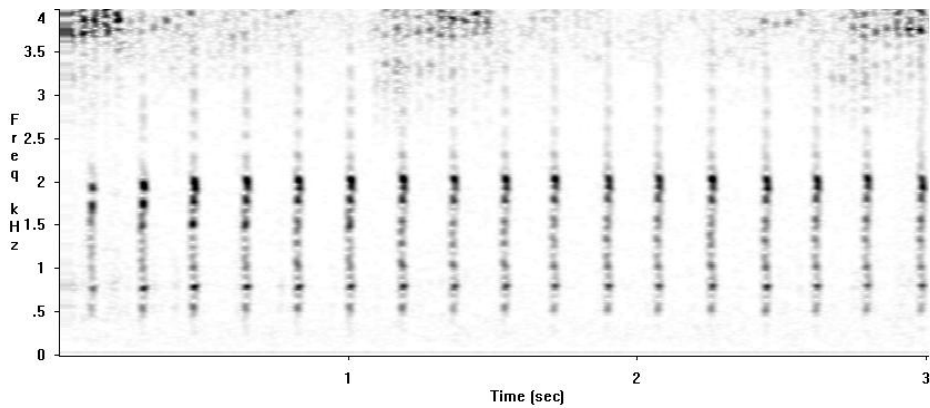
**Fig. 1:** *Argenteohyla siemersi pedersenii* (UNNEC 10139) from Reserva Natural Provincial Iberá, Corrientes, Argentina.



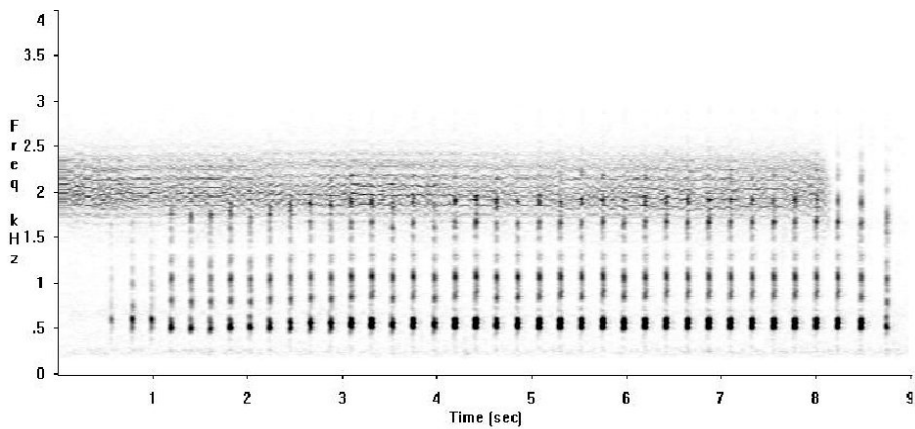
**Fig. 2:** Calling site of *Argenteohyla siemersi pedersenii* in the Reserva Natural Provincial Iberá, Corrientes, Argentina.



**Fig. 3:** Male *Argenteohyla siemersi pedersenii* calling in a semi-permanent pond.

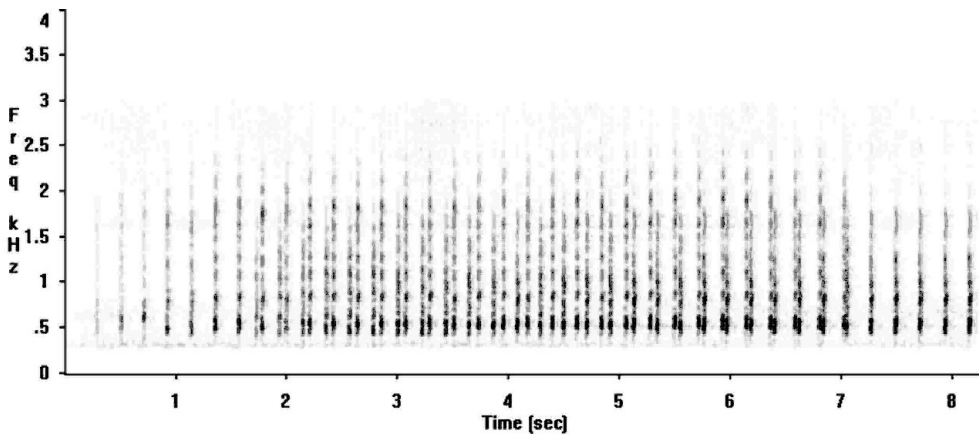


**Fig. 4:** Spectrogram of advertisement call (17 notes) of a single individual of *A. s. pederseni* (UNNEC 10139). Reserva Provincial Iberá, Corrientes, Argentina, 26 August 2008, 21:05 h, water temperature 19,9 °C, air temperature 18,8 °C. See measurements of Solitary voucher in Table 1.



**Fig. 5:** Spectrogram of advertisement call (38 notes) of a single individual of *A. s. pederseni*, Reserva Provincial Iberá, Corrientes, Argentina; 28 September 2006; 23:30 h; water temperature 17,5 °C; air temperature 14,5 °C. See measurements of Solitary in Table 1.





**Fig. 6:** Spectrogram of presumably duetting *A. s. pedersenii*. Reserva Provincial Iberá, Corrientes, Argentina, 20 October 2005, ca. 20:30 h, water temperature unknown, air temperature unknown. See measurements of Duet in Table 1.

#### DISCUSSION

The advertisement call of *A. siemersi pedersenii* described in this paper is similar to that of *A. s. siemersi* (Barrio, 1966) in note structure and duration. However, there seem to be consistent differences among them, including the fundamental frequency and the number of notes for call higher in *A. s. pedersenii* than in *A. s. siemersi* (280-440 vs 250 khz, and 18-34 vs 9-18 notes, respectively). Additionally, the individuals of *A. s. pedersenii* seem to perform synchronized duets, and this has not been reported for *A. s. siemersi*.

These differences provide some evidence to suggest full species status for the distinctive and allopatric subspecies *A. s. pedersenii*. However, the only known recordings of *A. s. siemersi* were made by Avelino Barrio in the Isla Talavera (Buenos Aires, 24 November 1965, 21:00 h, water temperature: 19.5 °C) and were not available for direct comparison with our recordings. Intense surveys in the Colección de Sonidos Naturales del Museo Argentino de Ciencias Naturales (Buenos Aires, Argentina), the Macaulay Library of Natural Sounds (Cornell Lab of Ornithology, Ithaca, USA), and enquiries to brazilian colleagues failed to return any definitive information on the whereabouts of Barrio's recordings (D. S. Fernandes, J.P. Pombal Jr., J. Vielliard, and A. Giarretta, *in litt.*). Until these recordings are located, or new recordings of *A. siemersi siemersi* become available, the extent of comparisons between both subspecies, and any interpretation on their meaning, must remain cursorial. More recordings of both subspecies will provide key data to evaluate the apparent differences between *A. s. siemersi* and *A. s. pedersenii* here suggested based on the first known recordings for *A. s. pedersenii*.

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**Table 1:** Sound measurements for seven variables of vocalizations of four male *Argenteohyla siemersi pederseni* from Reserva Provincial Iberá, Corrientes, Argentina. Values are expressed as mean [SD], (range) and N.

INDIVIDUAL	Duration call (s)	Range notes/call	Note duration (s)	Interval between notes (s)	Fundamental frequency (Hz)		Maximum frequency (Hz)	Low-high peak frequency (Hz)
					Individual 1	Individual 2		
Solitary voucher (Fig. 4)	3,38 [0,81]		0,024 [0,002]	0,154 [0,005]	280 [47]	-	2345 [102]	
	(2,69-5,1)	(16-30)	(0,019-0,027)	(0,139-0,163)	(192-353)	-	(2211-2660)	520-1895
Solitary (Fig. 5)	7,95 [0,35]		0,030 [0,006]	0,190 [0,011]	431 [19]	-	2447 [48,27]	
	(7,7-8,2)	(36-38)	(0,019-0,041)	(0,171-0,235)	(399-513)	-	(2392-2469)	?-1875
Duet (Fig. 6)	2	2	38	37	38	-	38	
	13,87 [7,77]	(18-34)	0,033 [0,003]	0,044 [0,009]	438 [11,9]	360 [ 14,1 ]	2611 [39,83]	520-1895
	(3,7-27,91)	14	(0,028-0,046)	(0,023-0,059)	(420-451)	(343,3-420,2)	(2376-2686)	
	12		62	25	31	31	62	





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