En cuanto a la época estival, cuando las charcas de naturaleza temporal se encuentran sin agua, la información disponible sobre el tema es aún más escasa, y se desconoce el paradero de los juveniles. Durante el año 2006, en una de las visitas realizadas en el mes de agosto a la charca temporal de Jimena, se descubrió la presencia de 45 individuos juveniles y una hembra adulta debajo de una misma roca localizada en el lecho, completamente seco, de la laguna (Figuras 1 y 2). Se tomaron medidas de longitud total de varios juveniles y sus tamaños oscilaron en un rango de 2.3 y 4.6 cm, con una media de 3.38 ± 0.88 cm (SD). La hembra midió 8.5 cm de longitud total. La roca, que actuaba como refugio, era de naturaleza arenisca con unas medidas de 29 cm de ancho por 38 cm de longitud. Durante la prospección se levantaron otras piedras al azar en distintas zonas de la misma laguna, y sólo bajo una, había otros 2 individuos juveniles de 4.7 y 2.6 cm de longitud total.

Foto Luis Alberto Fernández

Figura 2. Detalle de alguno de los individuos de juveniles detectados.

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Effect of temperature on the advertisement call of *Physalaemus bilingonigerus* (Anura: Leptodactylidae)

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RESUMEN. Se estudiaron las características acústicas del canto de *Physalaemus biligonigerus*, describiendo sus propiedades temporales y espectrales, y analizando sus variaciones con respecto a la temperatura del agua. Todas las variables variaron con la temperatura, a excepción de la frecuencia dominante.

Animal communication is subject to different environmental pressures, such as temperature and humidity, which may affect the transmission and detection of the signal by attenuation of the frequency or by effect on the temporal structure (Blair, 1958; Schneider, 1977; Brenowitz, 1986; Ryan & Sullivan, 1989; Dawkins, 1993; Sueur & Sanborn, 2003). Male advertisement calls are the primary mating displays of anurans, and most male frogs advertise to females using vocalizations (Gerhardt & Huber, 2002). Temperature affects preferences of female frogs, since the call properties of males are affected by the temperature (Gerhardt, 2005).

An analysis of the properties of the *Physalaemus biligonigerus* call and their variation in function of the temperature has not been conducted previously. Therefore, it would be important to investigate the call of *P. biligonigerus*, analyzing their temporal and spectral properties, and to assess whether the call pattern varies with temperature.

The sampling was carried out in Rio Cuarto, Cordoba, Argentine (33°10`S / 64°20`W; 420 m a.s.l.). *P. biligonigerus* males sing semi submerged in the water and between the emergent vegetation of temporary pools. The advertisement calls were recorded (distance to the calling male = 1 m) using a recorder AIWA HS-JS-315 with stereo microphone AIWA and tapes TDK A-60. Water temperature was recorded at the individual calling sites (range 18° to 29° C) with a digital thermometer Tes-1300 (precision = 0.1° C).

Series of 8-21 advertisement calls (total 115 calls) given by different individuals (n = 11 males) were analyzed. Oscillograms, sonograms and power spectra of the call series were prepared with Canary V.1.2. signal processing system (Apple Macintosh, PC Power 7200/120). Each call series was characterized by the following parameters: i) call duration (DTC) is the time from the beginning to the end of a single call measured in ms; ii) pulse rate per call (TPTC) is measured as (1000*N°TPC)/ DTC, where N°TPC = (DTCx10)/duration of 10 pulse (ms); and iii) the dominant frequency (FD) is the frequency in the call containing the greatest energy measured in Hz.

The results of the present study should be treated with caution because there is a problem of pseudoreplication since each male can contribute with several calls to the sample.

For statistical analysis we used Microsoft Excel 2000 and the statistics package Statistica'99, V.5.5. Average values of acoustic parameters were compared across different temperatures using a nonparametric Kruskal-Wallis test after testing for normality of the data. Finally, in order to assess the relationship between call structure and temperature, we performed a Spearmann correlation analyses.

All variables showed significant differences among the different temperature ($p < 0.0001$), with the exception of FD ($p = 0.06$). Spearman correlation analyses showed significant correlations between temperature and both DTC ($r = -0.50$, $p < 0.001$) and TPTC ($r = 0.66$, $p < 0.001$) (Figure 1).

Vocalization in anuran amphibians is significantly affected by temperature (Fouquette, 1980; Brenowitz, 1986; Heyer, 1994). In the present study, all variables showed significant differences among temperatures, except FD. In other species, FD is affected by male size, such as in *Physalaemus pustulosus* (Ryan 1980, 1985), neotropical hylid frogs (Duellman & Pyles, 1983), species of the families Bufonidae and Hylidae (Cocroft & Ryan, 1995), *Bufo americanus* (Howard & Young, 1998) and *Hypsiboas albomarginatus* (Giasson & Haddad, 2006). In addition, DTC and TPTC showed significant correlations with temperature (negative and positive respectively). Other studies also found a strong correlation of both variables and temperature (Blair, 1958; Barrio, 1963; Littlejhon, 1968; Schneider, 1977; Gayou, 1984; Duellman & Trueb, 1994; Cocroft & Ryan, 1995; Sullivan *et al.*, 1996; Howard & Young, 1998; di Tada *et al.*, 2001; Martino & Sinsch, 2002). One functional explanation is that, as these acoustic parameters are associated to the physiology of the individual, they are

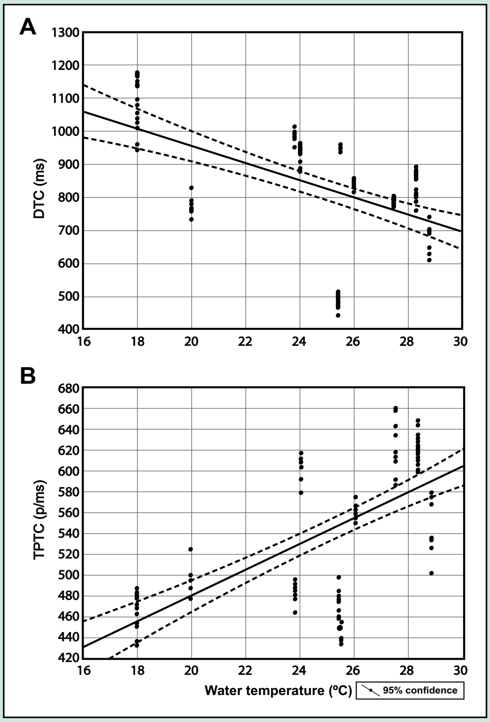

Figure 1. Relationship of call duration (DTC) (a) and pulse rate per call (TPTC) (b) with water temperature. Dashed lines are 95% of confidence intervals.

Figura 1. Relación entre la duración de la llamada (DTC) (a) y la tasa de pulsación por canto (TPTC) (b) con la temperatura del agua. Las líneas discontinuas representan el intervalo de confianza del 95%.

commonly affected by the environmental temperature and therefore constitute very divergent characters. In insects, several studies have examined the effect of ambient temperature on acoustic systems. The effect of ambient temperature on calling is assumed to be the result of thermal effects in the response of the acoustic system, for example, muscle activity of the acoustic system being temperature-dependent (see Fonseca & Revez, 2002; Sueur & Sanborn, 2003).

Barrio (1963) and Gayou (1984) consider that the positive association between TPTC and water temperature determines the negative association with DTC. Since TPTC increases (pulses are closer together in time), the pulses shorten, and there is a tendency for fewer pulses per call and call duration is reduced.

TPTC showed a more abrupt change with temperatures about 26º C. This temperature may constitute the beginning of substantial changes in the temporary structure of call. Since temperature may act as interference in communication (Basso & Basso, 1992), therefore, we assume that individuals frequently modify these components of call to surpass the contamination and thus, to improve the intraspecific communication.

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Intento de depredación de mantis sobre juvenil de galápago europeo

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El galápago europeo *Emys orbicularis* se distribuye por la mayor parte de zonas húmedas de la isla de Menorca, donde ocupa una gran diversidad de hábitats. Actualmente es una especie relativamente común, aunque la progresiva destrucción de sus hábitats, especialmente de los humedales costeros, la recolección ilegal y la interacción con otras especies alóctonas (cangrejo de río americano *Procambarus clarckii* y galápagos exóticos) constituyen una amenaza para sus poblaciones. Debido a que las poblaciones menorquinas posiblemente están en declive, está incluido en la categoría de Casi Amenazada (NT) (Viada, 2006).

El 20 de octubre de 2007 se observó una mantis *Mantis religiosa* intentando comerse una cría de galápago europeo (Figura 1) en el sistema dunar de Tirant, término municipal de Mercadal (Menorca, UTM 31T EE93). La observación se realizó aproximadamente a las 12 del mediodía, momento en que la mantis mantenía sujeta a la cría de galápago europeo boca abajo y le devoraba la parte trasera. Al acercarnos, la mantis liberó al galápago, que estaba vivo, y observamos que éste presentaba importantes heridas en la cola y las patas posteriores. A pesar de las heridas, el galápago se reincorporó y se escondió rápidamente entre la vegetación. El galápago europeo era un juvenil de pocos días de edad, que aún se encontraba lejos del torrente que transcurre por la zona (a 75 m del punto más cercano).

Figura 1. Mantis huyendo tras el intento de depredación de la cría de galápago europeo.

Entre las referencias consultadas, que incluyen las principales síntesis sobre la biología del galápa-