

## SCIENTIFIC NOTE

**FIRST RECORD OF THE MALE MATING CALL IN THE  
GENUS *TYRRHENOLECTRA CONSIGLIO*  
(PLECOPTERA: LEUCTRIDAE)<sup>1</sup>**Manuel J. López-Rodríguez<sup>2</sup> and J. Manuel Tierno de Figueroa<sup>2</sup>

Vibrational communication in Arctoperlaria stoneflies, produced by drumming and other mechanisms, plays an important role in mate finding and selection (Rupprecht, 1968; Stewart, 2001), and also can act as a reproductive isolating mechanism among species (Stewart and Zeigler 1984; Tierno de Figueroa and Sánchez-Ortega, 1999). Furthermore, vibrational duets formed by males and females in Plecoptera are one of the most diverse and complex known in insects (Stewart and Sandberg, 2006).

Among Leuctridae, only the vibratory calls (drumming calls in all cases) of a few species belonging to three genera (*Leuctra* Stephens, *Zealeuctra* Ricker and *Megaleuctra* Neave) have been described (Stewart and Sandberg, 2004). Stewart and Sandberg (2004) proposed a model of the evolution of drumming in this family, confirming the paradigm previously proposed by Stewart (2001) for Arctoperlaria, but pointed out the necessity of additional studies in other taxa.

The genus *Tyrrhenoleuctra* Consiglio, present in the West Mediterranean area, includes a complex of species the taxonomical status of which is being revised, particularly in the Iberian populations (Fochetti et al., 2004). The aim of this work was to study the calls of a *Tyrrhenoleuctra* sp. population from Río Despeñaperros (Sierra Morena, Jaén, Spain; UTM: 30SVH5648, 650 m.a.s.l.) and discuss the results in an evolutionary context. This population can presently be attributed to *Tyrrhenoleuctra minuta* (Klapálek, 1901), but new studies could modify its status.

Groups of adults of *Tyrrhenoleuctra* (both males and females), collected on March 28, 2008, were placed in three different crystal containers with a piece of paper at the opening. Records were taken during 45 minutes in the evening (from 5:30 PM to 6:15 PM GMT) in a room with an approximately constant temperature of 22.5°C and with a low light intensity. Up to ten similar calls were also heard during the night in absolute darkness (from 10:30 PM to 10:45 PM GMT at 23°C), although they were not recorded. Evening calls were recorded using a microphone (100 - 16000 Hz; 44 dBV/Pascal) positioned in light contact with the paper surface, and connected to a computer. Audacity® software version 1.2.6 was used for recording and analyzing the calls. Six calls belonging to six different males were analyzed. In each call, only parameters that could be appropriately measured were considered. No female answers were detected.

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Table 1. Drumming call characteristics of the male of *Tyrrhenoleuctra* sp. in Río Despeñaperros (Sierra Morena, Jaén, Spain).

	N	Mean	SD	Min.	Max.
Call length (ms)	6	637.94	74.94	491.25	692.25
Beat-group number/call	6	3.83	0.41	3	4
Beat-group length (ms)	14	67.16	17.49	32.04	95.78
Interval I length (ms)	6	147.42	27.53	108.84	179.96
Interval II length (ms)	6	136.90	19.64	111.75	166.89
Interval III length (ms)	5	132.64	7.51	123.36	143.67
Beat number/beat-group	14	4.93	1.00	3	6
Beat interval length (ms)	55	17.11	1.59	14.51	23.22



Fig. 1. Sonogram of a typical 4-grouped male call of *Tyrrhenoleuctra* sp. in Río Despeñaperros (Sierra Morena, Jaén, Spain).

Male calls (Table 1; Fig. 1) had an average length of 637.94 ms and consisted typically of a 4-grouped call, except one of them that had only 3 groups. Each beat-group was formed by 3 to 6 beats, with very constant intervals of an average of 17.11 ms between them. Inter-group intervals were approximately constant, averaging 139.36 ms. Thus, the males of this population of *Tyrrhenoleuctra* presented a monophasic grouped call, representing an intermediate complexity model between those of the other Leuctrinae previously described: *Zea-leuctra* (with a monophasic call of single beats) and *Leuctra* (with a more complex diphasic call), and more similar to that described for the only Megaleuctrinae (genus *Megaleuctra*) studied (also a monophasic grouped call, but composed of a higher number of beat-groups and a lower number of beats per group) (Stewart and Sandberg, 2004). According to the relationships among the genera of Leuctridae suggested by Ricker and Ross (1969), *Tyrrhenoleuctra* represents a more basal position in comparison to *Leuctra*. Moreover, because *Leuctra* being a very speciose genus, with many of them coexisting, it is expected that vibrational calls may have developed more complex (diversified) patterns for

acting as a reproductive isolating mechanism. Therefore, our data support Stewart evolutionary paradigm (Stewart, 2001; Stewart and Sandberg, 2004) for the evolution of drumming in Leuctrinae, that seems to have evolved from ancestral monophasic calls to derived diphasic calls. Moreover, as drumming calls are potentially useful lines of evidence for resolving systematic questions and inferring phylogenies within the order (Zwick, 1973; Stewart and Zeigler 1984; Maketon and Stewart, 1984), the analyses of other populations of the genus *Tyrrhenoleuctra* could help resolve its systematic problems.

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