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Isophya sicula sp. n. (Orthoptera: Tettigonioidea), a new, morphologically cryptic bush-cricket species from the Eastern Carpathians (Romania) recognized from its peculiar male calling song

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Abstract

The morphology and pair-forming acoustic signals of *Isophya sicula* **sp. n.**, a new phaneropterine bush-cricket species from the Eastern Carpathians (Romania) is described. The species is morphologically similar to *I. posthumoidalis* and *I. camptoxypha*, but the male calling song differs clearly from the songs of those species. The male calling song is a long series of evenly repeated, very short syllables. Syllables are much shorter than in *I. camptoxypha*, and the song is composed from only one syllable type differently from *I. posthumoidalis*, where the male calling song is composed of two syllable types. Pair formation is achieved during an acoustic duet. The delay of female response (40–70 ms) is shorter than in *I. camptoxypha* and *I. posthumoidalis*. Basic descriptive statistics of sonometric and morphometric characters of the new species as well as SEM photos of the male stridulatory file and female stridulatory bristles are presented.

Key words: acoustic signal, stridulation, oscillogram, spectrogram, male-female duet, Isophya posthumoidalis, Isophya camptoxypha

Introduction

Isophya presently includes 90 species in one of the most species-rich genera of the bush-cricket subfamily Phaneropterinae (Eades & Otte 2010; Braun 2010). *Isophya* species are distributed in the Western Palaearctic with a diversity centre in Anatolia. Morphological uniformity often renders species-level taxonomy and identification difficult (Ramme 1951; Bei-Bienko 1954; Harz 1969). Unfortunately, males lack sclerotised internal genitalia, that are used successfully to differentiate species in other groups of Orthoptera. Interestingly, the amplitude modulation pattern of the male calling songs is rather diverse and generally provides us the most useful and reliable differential characters (e. g. Heller 1988; Orci *et al.* 2005; Chobanov 2009). Since the main function of acoustic communication in Orthoptera is to provide conspecific males and females to recognise and find each other, acoustic signals are important components of the species specific mate recognition system of these animals (e. g. Walker 1957; Spooner 1968; Paul 1976; Zhantiev & Dubrovin 1977; Helversen & Helversen 1983; Dobler *et al.* 1994; Orci 2007). Therefore, it is not only effective (see e. g. Walker 1964, Heller 1988, Ragge & Reynolds 1998, Kleukers et. al 2010) but also relevant to use acoustic signal characters when examining the species level taxonomy of these insects.

In the latest taxonomic review of the Western and Central European species of the genus, Heller *et al.* (2004) pointed to a number of problematic issues calling for further investigation. One of those issues is the interesting morphological variation observable in the case of *Isophya camptoxypha* (Fieber), especially in the Eastern part of its distribution range (Kenyeres & Bauer 2005; Iorgu *et al.* 2008) as it had already been noted by Kis (1960). Since information about the male calling songs of those eastern populations of *Isophya*

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