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## The bush-cricket *Isophya kraussii* (Orthoptera: Phaneropteridae): bioacoustics, distribution and description of a new subspecies from Romania

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### Abstract

*Isophya kraussii* Brunner von Wattenwyl, 1878, one of the widest spread bush–crickets within this genus, is confirmed to be present east of the Carpathian Mountains. Based on acoustic analysis and morphological characters, the populations from NE Romania are considered to belong to a different subspecies, *I. kraussii moldavica* **ssp. n.** A map with distribution of both subspecies is presented.

**Key words:** bush-cricket, *Isophya kraussii*, distribution, acoustic analysis

### Introduction

After *Poecilimon*, *Isophya* is the second largest Phaneropteridae genus in Europe, comprising more than 45 species (we will treat Phaneropteridae as family, following Chobanov & Heller 2010). However, it is difficult regarding the identity of species, which have to be recognized mainly by oscillographic song analysis and by studying subtle morphological characters including shape of cerci, tegmina and ovipositor.

Described in 1878 by Brunner von Wattenwyl and synonymized with *Isophya camptoxypha* (Fieber) by same author (1891), *Isophya kraussii* was re–established by Heller (1988), based on different male song pattern and stridulatory organ. Its song has been characterized by many authors (a detailed review of papers in Ragge & Reynolds 1998) and was later compared with that of the other Central European species (Heller *et al.* 2004). The bush–cricket *Isophya kraussii* has one of the largest distribution areas known within this genus: Central Europe, reaching its easternmost limit in NE Romania.

In the past years, during several expeditions in the surroundings of Suceava (NE Romania), many individuals of *Isophya* were collected in order to determine if *Isophya kraussii* is present in Romania, as stated by Kis (1960), Kis & Vasiliu (1970) under the name *Isophya pyrenaea*. With the first songs recorded, we were able to determine that the species is clearly *Isophya kraussii*, and even more: the populations from NE Romania form a new subspecies.

### Material and methods

Males from Romanian populations were transported in aerated containers and audio-recorded in the laboratory, using an Edirol R–09HR digital recorder, having the microphone frequency response of 0.02–40 kHz and sampling rate of 96 kHz. Songs of specimens from Central Europe have been recorded in laboratory, with a Racal tape recorder, Brüel & Kjaer 1/2" and 1/4" external microphones, and digitized using sampling rates of 125–250 kHz. Oscillographic and spectrographic analysis of sound was realized with software Audacity 2.

Song terminology: syllable—the sound produced by one complete up (opening) and down (closing) stroke of the forewings; impulse—the highly damped sound impulse arising as the impact of one tooth of the stridulatory file; after–click—click produced with considerable delay after the main impulse group. We used the abbreviations: