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Description and bioacoustics of a new species of the genus *Isophya* (Orthoptera: Tetigoniidae: Phaneropterinae) from Turkey

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Abstract

A new species for the genus *Isophya, I. bumerangoides*, is described from the Northeastern Black Sea Region of Turkey. The new species differs from closely related species in some aspects of morphology, mainly in male and female genitalia. Illustrations of external morphological characters and male and female songs are provided. Additional data on male calling song and female song of closely related bush-cricket *Isophya rizeensis* Sevgili, 2003 are also given. Scanning Electron Microscope images of stridulatory file of the other related species *I. redtenbacheri* Adelung, 1907 are provided. *I. bumerangoides* clearly belongs to *I. amplipennis* group. Our bioacoustic results suggest that within the genus *Isophya*, changes in calling song seem to appear more slowly than those in external morphological characters as in most tettigoniid.

Key words: *Isophya bumerangoides*, Orthoptera, bush-cricket, Tettigoniidae, Phaneropterinae, bioacoustics, new species, Turkey

Introduction

The genus *Isophya* Brunner von Wattenwyl, 1878 is the second largest genus of the bush-crickets after *Poecilimon* with presently around 90 described species (Eades *et al.* 2011, OSF, version 2.0/4.1) and within the genus continuously new species are described (e.g. Sevgili & Heller, 2003; Sevgili *et al.* 2006; Ünal 2003). It distributed from the Black Sea Basin to Anatolia, Balkans and Caucasus (Bei-Bienko, 1954; Harz, 1969; Sevgili, 2004). Most species of the genus are endemic, and mostly found in the Northern Anatolia, where it is basically localized in North and Middle regions and species diversity decreases from northern parts to the southern. Forexample, there is only one endemic species, *I. sikorai*, in the Southeast Anatolia. The southern distribution of the genus are extended to Cyprus, represented by *I. mavromoustakisi*, Jordan and Israel represented by *I. savignyi* (Sevgili, 2004).

Identification of the many species is very difficult when only morphological data are used. The genus is morphologically quite uniform and the relationships between many species are unknown. But, there are 6 species groups recognized and the phylogenetic hypotheses have been proposed for Anatolian species by Sevgili (2004). In recent years, bioacoustics (Heller *et al.* 2004, Sevgili, 2003, Sevgili *et al.* 2006; Orci *et al.* 2005), cytogenetic (Warchalowska-sliwa *et al.* 2008) and molecular (e.g. Grzywacz *et al.* 2011) studies have been conducted but the phylogenetic relationships within this large genus are still poorly understood.

All known *Isophya* species produce species-specific songs which is the most important tool for the identification and separation of new species. The determination of species belonging to the *Isophya* is mainly based on small differences in some morphological structures. Therefore, examination of the bioacoustic signals that are used for the mate finding or generating attractive behaviour for the males and females can be very useful to deal with such identification problems. This is because songs of closely related species may show specifically divergent characters in one or more parameters which may be used for discrimination of species (e. g. Zhantiev & Dubrovin, 1977; Zhantiev & Korsunovskaya, 1986; Heller, 1988, 1990, 2006; Heller *et al.* 2004; Sevgili *et al.* 2006; Orci *et al.*

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