*Short Communication*

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# First Records of *Hierodula transcaucasica* Brunner von Wattenwyl, 1878 (Mantodea: Mantidae) in the Balkan Peninsula

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**Abstract:** *Hierodula transcaucasica* Brunner von Wattenwyl, 1878 is a mantid native to the Caucasus, southern and western Asia. We present the first records of the species for the Balkans represented by finding it in Northern Greece in two localities (Thasos in 2015 and Charopo in 2017) and in Bulgaria in 2017. These recent findings implicate the potential of the species to colonize larger areas of the Balkan Peninsula. The adaptability of *H. transcaucasica* to various environments and ecological corridors may facilitate the spread of this species in the Balkans and other Euro-Mediterranean countries. The key to the species of the subfamily Mantinae of the Mediterranean Basin is provided.

**Key words:** mantid species, expansion, Balkan Peninsula, Europe.

## Introduction

*Hierodula transcaucasica* Brunner von Wattenwyl, 1878 is a large mantis with mainly Asiatic distribution. The geographic range of *H. transcaucasica* includes Afghanistan, Armenia, Georgia, Turkey, Iran (the type locality) and Central Asia (Battiston & Massa 2008, Ehrmann 2011, Ehrmann & Borer 2015, Mirzaee & Pashaie Rad 2017). North of the Caucasus, the species is present along the Black Sea coast from Sochi to Novorossiysk and on the Crimean Peninsula (Pushkar & Kavurka 2016). The species was recorded for the first time in the Crimea a hundred years ago (Werner 1916). It has never been reported from the Balkans. Harz & Kaltenbach (1975), in their overview of the European mantids, cited it for Western and Central Asia, the Caucasus and the Crimea. Caesar et al. (2015) included Turkey in its distribution but did not mention precise locality records. It was not cited in the recent editions of the Red Data Books of either Ukraine (Pushkar 2009) or Moldova (Duca et al. 2015). Currently, the species is common along all the Crimean coast and new findings have been documented in Kherson area: Askania Nova (46°29'13.4"N 33°58'09.4"E) and Heniches'ka Hirka (46°06'28.9"N 34°49'27.7"E) by Pushkar & Kavurka (2016); the latter authors hypothesize a recent expansion of this species northwards in the Ukraine and in the Crimea.

## Materials and Methods

Data on the presence of *H. transcaucasica* were collected during field surveys. The standard collecting methods were used, including visual observations, sweeping plants by a net as well as by shaking insects down from trees and shrubs onto a 1 × 1 m beating sheet. The specimen from Charopo (see below) was collected during the faunistic survey tar-

geted on ladybird beetles (Coccinellidae) conducted in western Bulgaria and northern Greece between 14 and 19 June 2017 (for the locations surveyed see Ceryngier & Romanowski 2017).

## Results

We collected the following specimens from the Balkan Peninsula and the adjacent islands:

1. Greece, Thasos Island, 1.5 km N of Prinos Village (40°45'15.82"N; 24°34'39.47"E), 26.VIII.2015, leg. G. Hristov, 1 male. Collection of Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (IBER-BAS) in Sofia.

2. Greece, Charopo (41º15′N; 23º22′E), 19.VII.2017 leg. J. Romanowski, 1 male nymph, reared till the adult stage (Fig. 1). Entomological Collection of the Faculty of Biology and Environmental Sciences, Cardinal Stefan Wyszyński University in Warsaw (UKSW).

3. Bulgaria, Thracian Lowland, Glavnitsa Village, S of Pazardzhik town (42°09'36.73"N; 24°18'41.23"E), 208 m, 14.XI.2017, leg J. Vasilev, 1 female. IBER-BAS in Sofia.

4. Bulgaria, Thracian Lowland, Pazardzhik town (42°11'49.67"N; 24°20'04.82"E), 212 m, 16.XI.2017, leg J. Vasilev, 1 female. IBER-BAS in Sofia.

## Discussion

The specimens of *H. transcaucasica* recorded from Greece and Bulgaria, even if the existence of established populations and their origin have not been verified, are the first evidence for the presence and the potential to spread of this species to the Balkan Peninsula.

The expansion and population increase of H. transcaucasica was earlier indicated by Pushkar & Kavurka (2016), who reported many new findings in south Ukraine and anticipated the further spread north of this species due to climate warming and deforestation of steppe landscape. This expansion is confirmed by the recent record of the species at the village of Respublikanets (47°00'10.9"N 33°38'59.4"E), approximately 115 km north of the Crimea in September 2017 (Michail Mulienko, unpublished). The potential for spreading of *H. transcaucasica* in the Aegean area was earlier indicated by Battiston et al. (2017) in the review of the recent expansion of the closely related *Sphodromantis viridis* (Forskål, 1775) *to* the Mediterranean islands. The spreading of *H. transcaucasica* in Greece is confirmed by recent amateur observations (iNaturalist.org 2018) (Fig. 2). All these records have been erroneously identified as *Sphodromantis viridis* but, from the pictures included, it is clear by the shape of the pronotum and fore legs patterns that they are *H. transcaucasica*. Despite the taxonomical uncertainty with *H. tenuidentata* (see Ehrmann & Borer 2015) and the variability in the femoral spines of our specimens, in absence of a detailed revision of this problem and based on the geographical continuity, we identify all the specimens reported here as belonging to *H. transcaucasica.*

**Fig. 1.** The male individual of *Hierodula transcaucasica* from Charopo (Greece) reared in laboratory conditions. Photo by J. Romanowski.

Since only a limited number of individuals of *H. transcaucasica* have been found in the Balkan area (Fig. 2), we do not consider their presence as a massive invasion yet. However, due to the simultaneous spread of the species in the Balkans and Ukraine, the presence of already well settled populations can be supposed. Because of the geographical position of the Balkans and in particular of the Greek islands in the Mediterranean basin, crucial hubs for many European commercial routes, it is extremely important to monitor the possible expansion of this species in other western localities (e.g. Italy, see Cianferoni et al. 2018). The characteristic feature of *H. transcaucasica* ecology, i.e. its preference for tree tops and its adaptability to continental climate, may facilitate the establishment of an ecological niche of this species in the Balkans and its spread in Europe. Because of the problematic identification of some specimens (see e.g. van der Heyden 2018), to promote the proper

**Fig. 2.** Distribution of *Hierodula transcaucasica* observations in the Balkan area recorded in this paper: direct observations (star), records from scientific literature (black circles) and citizen science based observations (empty circles). Elaboration by Rachele Amerini.

identification of mantids observed, in particular for citizen-science monitoring projects, we provide a key to the species of the subfamily Mantinae of the Mediterranean Basin.

## Key to the species of the subfamily Mantinae of the Mediterranean Basin

1a. Presence of an evident dark spot or a dark ringed white spot on the inner side of the fore coxae, well visible even in the last juvenile stages. Pronotum long, with sub-parallel edges in the metazona. Stigma of the same colour as the tegminae.....***Mantis religiosa* (L., 1758)**

1b. Absence of any evident dark or white spot on the fore coxae. Pronotum more or less elongated but with curved or divergent edges. Stigma on the tegminae whitish.....2.

2a. Pronotoum moderately long and thin but with evident narrowing before the large supracoxal dilatation. Inner side of the fore coxae spotted with 3-4 large yellowish spots at the base of the marginal spines.....***Sphodromantis viridis* (Forskål, 1775)**

2b. Pronotum short with expanded edges and a general shape rounded or ovoidal, without any evident narrowing before the supracoxal dilatation. Inner side of the fore coxae without large yellowish spots at the base of the marginal spines.....***Hierodula transcaucasica* Brunner von Wattenwyl, 1878**

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