



# The genus *Merodon* (Diptera, Syrphidae) of the Landscape of Outstanding Features “The Valley of Pčinja”

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## Mini Review

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## Abstract

With about 250 species the genus *Merodon* Meigen, 1803 (Diptera, Syrphidae, Merodontini) is the largest within the family in Europe. A total of 32 *Merodon* species have been recorded in Serbia, of which almost half (13 species) occurs in the Landscape of Outstanding Features “the valley of Pčinja”. Among the identified taxa there are one endangered species: *M. testaceus* Sack, 1913, and one vulnerable species: *M. euri* Vujić & Radenković, 2018, base of the criteria of the IUCN Red List of European Hoverflies. The data of distribution of above mentioned 13 *Merodon* species both in Europe and in Serbia is given and discussed.

**Keywords:** Distribution; Hoverfly; *Merodon*; Pčinja

## Introduction

The phytophagous hoverfly genus *Merodon* Meigen, 1803 (Diptera, Syrphidae, Merodontini) is the most numerous within the family in Europe with more than 200 described and about 30 still undescribed species [1,2]. It is distributed across the Palaearctic and Afrotropical regions [1], with the exception of *M. equestris* (Fabricius, 1794) introduced in the Nearctic Region and New Zealand [3]. The highest species diversity has been recorded in the northern and eastern parts of the Mediterranean Basin, probably thanks to the high diversity of geophytes hosting their larvae in these areas [4-7].

The Landscape of Outstanding Features “the valley of Pčinja” is located in southeastern Serbia. It comprises the foothills of the Kozjak Mountain and Starac Mountain, which are separated by the river Pčinja. The specificity of the biotope of the valley of Pčinja River lies in the fact that this area is located at the border of the continental and Mediterranean climate, and with the combination of the characteristics of two climate types results in high diversity of flora and fauna [8].

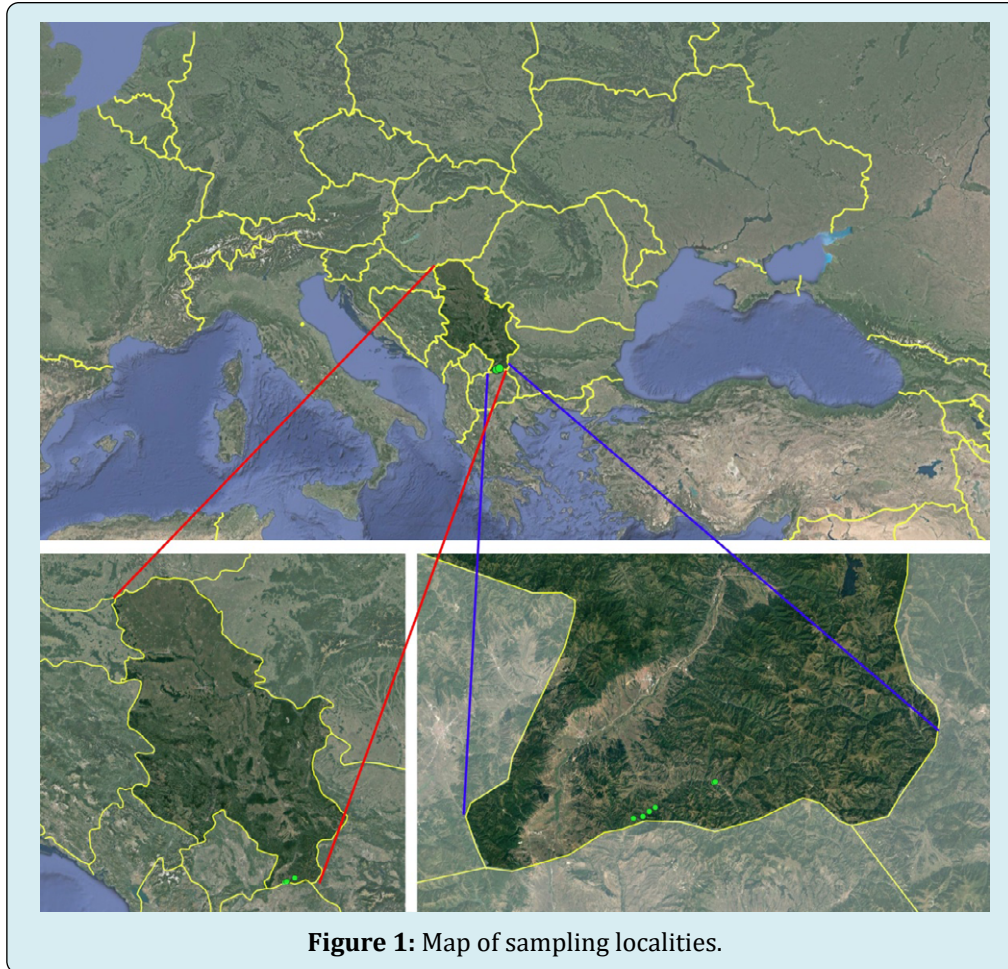
Despite its relatively small area (2606 ha), the valley

of Pčinja River has a specific flora and fauna structure. The ornithofauna and the herpetofauna Puzović et al. [9-17] are relatively well studied in this area, while many of insect groups are as well researched in detail, such as: diurnal and nocturnal butterflies [18-22], true bugs [23], orders Raphidioptera and Neuroptera [24], as well as grasshoppers, bush crickets and crickets [25]. The complete checklist of hoverflies for this area is not yet given.

The collecting of hoverflies in Serbia started in the mid-20th century, which is still going on today. Based on Vujić A. et al. [26] the fauna of hoverflies in Serbia consists of 412 species and subspecies from 83 genera, while more recently Vujić M. et al. [27] registered six additional species, which raised the final number to 418 species. Among them there are 32 species of the genus *Merodon*, from which 13 are present also in the LOF “the valley of Pčinja”. Within this paper, an analysis of their European and local distribution is given.

## Material and Methods

Species of the genus *Merodon* in the LOF “the valley of Pčinja” were registered on the following localities (Figure 1).



**Figure 1:** Map of sampling localities.

(1) Donja Trnica (42.38396N 22.05246E, 622 m a.s.l.); (2) Monastery (42.328785N 21.898E, 486 m a.s.l.); (3) Pčinja valley (42.325833N 21.87777E, 730 m a.s.l.); (4) Trgovište (42.38264N 22.0501E, 586 m a.s.l.); (5) Vogance (42.3429519N 21.9244209E, 475 m a.s.l.) (Figure 2A); (6) Vogance, near the river (42.336545N 21.911565E, 464 m a.s.l.); (7) Vražji kamen (42.383772N 22.052763E, 613 m a.s.l.) (Figure 2B).

## Results

### *Merodon aberrans* Egger, 1860

Occurrence: locality (5). Distribution: in Europe this species is widely distributed in the mountains of Central and southern Europe; in Serbia is widespread.

### *Merodon analis* Meigen, 1822

Occurrence: locality (2). Distribution: in Europe occurs from western to central Europe, until the Balkan Peninsula; it is present on most of the mountains throughout Serbia.

### *Merodon avidus* (Rossi, 1790)

Occurrence: localities (4), (5), (6), (7). Distribution: this species is distributed in the Mediterranean zone of Europe; in Serbia is widespread.

### *Merodon aureus* Fabricius, 1805

Occurrence: localities (5), (7). Distribution: it is known from the high European mountains; as well as of Serbia.

### *Merodon bessarubicus* Paramonov, 1924

Occurrence: locality (5). Distribution: this species is distributed on the Balkan Peninsula; it is recorded only on few mountains in southern Serbia.

### *Merodon clavipes* (Fabricius, 1781)

Occurrence: locality (4). Distribution: this species is distributed in central and southern Europe; it is present on few mountains of Serbia, mostly in eastern and southern parts.

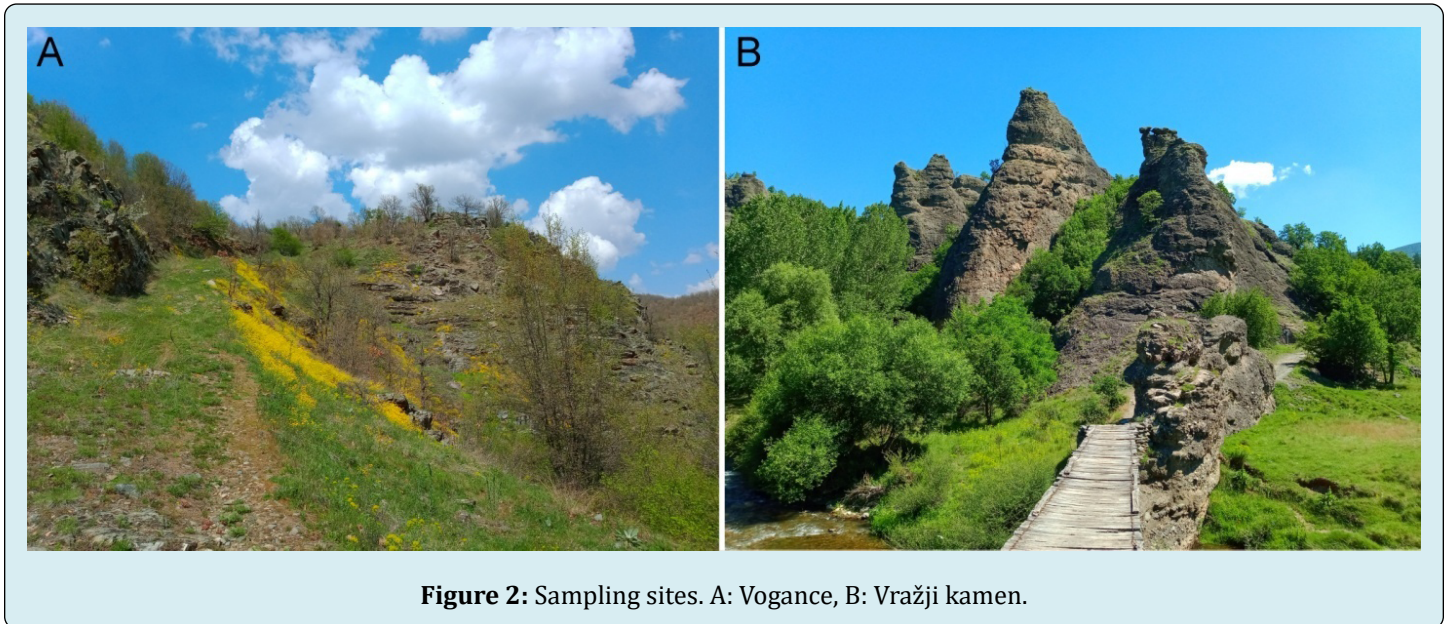


***Merodon constans* (Rossi, 1794)**

Occurrence: locality (2). Distribution: in Europe is distributed on Apennine and Balkan Peninsulas; in Serbia it is registered only on three mountains in central and southern parts.

***Merodon erivanicus* Paramonov, 1925**

Occurrence: locality (5). Distribution: this species is distributed only on Balkan Peninsula; in Serbia it is collected only on few mountains in eastern and southern parts.



**Figure 2:** Sampling sites. A: Vogance, B: Vražji kamen.

***Merodon euri* Vujić & Radenković, 2018**

Occurrence: locality (5). Distribution: it is known from the eastern to the southern parts of the Balkan Peninsula; in Serbia the only locality where is registered is the valley of the Pčinja river.

***Merodon moenium* Wiedemann in Meigen, 1822**

Occurrence: localities (4), (5), (7). Distribution: this species is widespread in Europe; as well as in Serbia.

***Merodon natans* (Fabricius, 1794)**

Occurrence: localities (1), (5), (7). Distribution: this species is mainly distributed in southern Europe; in Serbia the only locality where is registered is the valley of the Pčinja river.

***Merodon obscuritarsis* Strobl, 1909**

Occurrence: localities (4), (5), (7). Distribution: it is distributed mainly in the Mediterranean region in Europe; it is present on few mountains across Serbia.

***Merodon testaceus* Sack, 1913**

Occurrence: locality (3). Distribution: this species occurs in the southeastern Mediterranean; in Serbia the only locality

where is registered is the valley of the Pčinja river.

**Discussion**

The regions with the highest diversity of *Merodon* taxa, such as the Mediterranean Basin, are rich in species of geophytes, as the bulbs and other underground storage organs of these plants, which represent a food sources for *Merodon* larvae [4,5].

Species of genus *Merodon* in Europe are mainly distributed on the Greek islands and on high mountains of the three Mediterranean peninsulas (Iberian, Apennine and Balkan), which represents the main refugial centres of Mediterranean species [28]. Based on that this area is considered the richest in the number of *Merodon* species in Europe [29-31]. Among them, the Balkan Peninsula stands out as an important part of the areal for several species groups within the mentioned genus, such as: *constans* [32], *aberrans* [33], *tarsatus* [34], *natans* [35], *aureus* [36,37] and *avidus* [38]. For example, the *Merodon constans* species group is most diverse on the Balkan Peninsula. One member, *M. analis*, is a continental species, while the other, *M. constans*, is a sub-Mediterranean species, distributed closer to the Mediterranean coast. Regardless of such a clearly defined different types of distribution of this two species, they detected in sympatry only in South Serbia, exactly in the valley of Pčinja river [32]. Additionally, in Serbia, the distribution of 3 *Merodon* species is related only

to Pčinja valley.

The LOF “the valley of Pčinja” is positioned in the heart of the Balkan Peninsula, which region has long ago been recognized as a species, and specifically, hoverfly hotspot, owing to its geographical position, climatic conditions and rich and complex geological history [39]. Because of all the above, this area represents a very important cube in the distribution of a large number of organisms as well as for some rare and endangered/vulnerable species at the level of Europe [32].

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