SAPIENZA
UNIVERSITÀ EDITRICE

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E-ISSN 2284-4880
ISSN 0429-288X

Fragmenta entomologica, 56 (2): 257–260 (2024)

Short scientific note
Submitted: September 1st, 2024 – *Accepted*: October 20th, 2024 – *Published*: December 10th, 2024
DOI: 10.13133/2284-4880/1678

Big-headed Lagoon Fly, *Eristalinus megacephalus*, found for the second time in Serbia, and new records of some rare Eristalini (Diptera: Syrphidae)

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Abstract
The second record of *Eristalinus megacephalus* (Rossi, 1794) in Serbia is presented. One female specimen was found on 28 Aug 2024, near the village of Kovilj, located in Autonomous Province of Vojvodina, in northern part of the country. The habitat where the species was recorded is shortly described, and the presence of this rare and unusual member of Serbian fauna is discussed. Additionally, data for seven rare species of the tribe Eristalini from Serbia are also presented.

Key words: Eristalinae, Eristalini, Mediterranean, pasture, Vojvodina.

Introduction

The Big-headed Lagoon Fly, *Eristalinus megacephalus* (Rossi, 1794) is a species of hoverfly (Syrphidae) that belongs to the subfamily Eristalinae, and the tribe Eristalini. It is one of the four species of the genus *Eristalinus* Rondani, 1845 that occur in Europe, along with *E. aeneus* (Scopoli, 1763), *E. sepulchralis* (Linnaeus, 1758), and *E. taeniops* (Wiedemann, 1818) (Speight 2020). *E. megacephalus* is easily distinguished from other European congeners, by a combination of characters: a punctate pattern on the eyes and the presence of light bands on the abdomen; characters are consistent in both sexes (Speight & Sarthou 2017). Pérez-Bañón et al. (2003) examined the phylogenetic relationships of the European *Eristalinus*, using a combination of molecular and morphological characters, concluding that *E. megacephalus* is closer to *E. taeniops* than to the remaining two European species, despite the different eye-mark pattern. Immature stages were described by Pérez-Bañón et al. (2003); the larvae are aquatic, recorded in running water contaminated by pig manure (Speight 2020). This species exhibits a very wide geographic distribution, from circum-Mediterranean areas (coastal parts of Europe, N Africa including Egypt, Anatolia, Middle East, islands of Crete, Corsica, Cyprus, Malta, and Sicily), then through the Afrotropical region to South Africa (Van Steenis et al. 2019; Speight 2020). In Asia, the species also shows a wide distribution, extending from Turkey, through Iraq, Iran, India, Nepal and elsewhere (Naderloo & Pashaei Rad 2014; Gözüaçık et al. 2018; Adlin-Prajula et al. 2023; Al-Farhani et al. 2024; Dyola et al. 2024). In Europe, it is restricted to the belt around the Mediterranean Sea (Speight 2020), and to our knowledge, there are no data from areas characterized by continental climate. With the recent recording of *Eristalinus taeniops* in Serbia (Vujić et al. 2021), all known European species of the genus *Eristalinus* have now been documented as part of Serbia's fauna.

Observation and discussion

On 28 Aug 2024, near the village of Kovilj (45.12.48.5N, 20.01.04.8E, 73 m a.s.l.), Bačka region, Autonomous Province of Vojvodina, Serbia, one female specimen of *Eristalinus megacephalus* was recorded by MŠ. The specimen was collected from flowers of a spiny restharrow, *Ononis spinosa* L., photographed, and then released. The habitat (Fig. 1 b) in which the species was found is a dry ruderal-pasture,

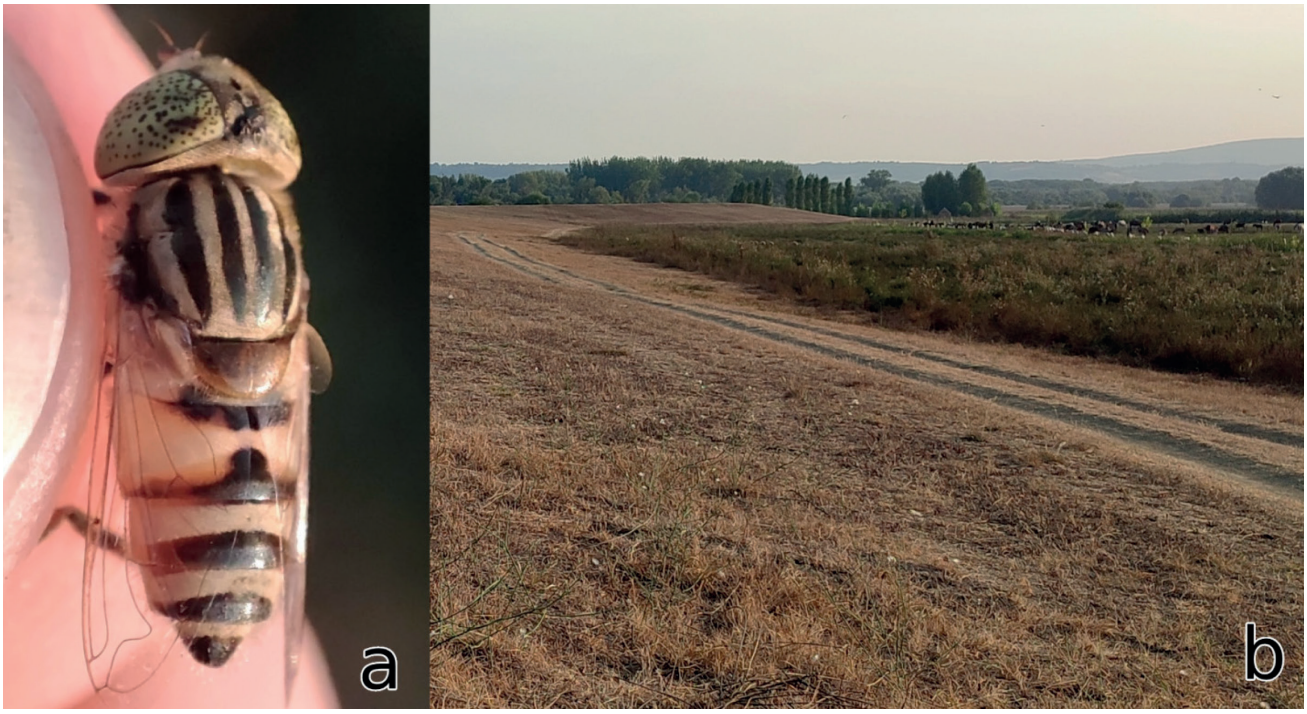

Fig 1 - The habitus and habitat of *Eristalinus megacephalus* (Rossi, 1794) of the here recorded Serbian ♀ specimen. a, habitus; b, habitat at Kovilj where specimen was recorded.

representing a leveled part close to the sandy and xeric embankment of the Danube River. The species was recorded in a habitat characterized by dry grasses and tall vegetation, which was currently dominated by still flowering yarrows *Achillea millefolium* L., spear thistles *Cirsium vulgare* (Savi) Ten., and *O. spinosa*. The immediate surroundings of the locality include wet pastures, agricultural fields, slow-flowing channels, and a natural alluvial forest interspersed with clonal poplar (*Populus* x *euramericana*) plantations. The Danube River flows approximately 5,000 meters to the west, with nearby access to open-water irrigation channels and oxbow lakes such as Šlajz, Bazen, Zanoga, Dunavac, and Tikvara.

The conditions at the locality and the timing of the species' discovery resemble the habitat characteristics described in the literature (Speight 2020). The site is xerothermic, characterized by high temperatures and extended drought periods. Only 50 m from the capture site is situated a slow-flowing channel that collects surface waters and manure from the nearby pasture, which supports cows, horses, donkeys, and, 800 m away, an extensive pig farm connected to another small channel. These settings could potentially support larval development and reproductive population of the species (Speight 2020).

Eristalinus megacephalus was mentioned for the first time in Serbia (as *Lathyrophthalmus quinquelineatus* Fabricius) in Šimić & Vujić (1987), but without further information. Dirickx (1998) found that the European specimens previously identified as *L. quinquelineatus* were, in fact, *E. megacephalus*. Later, Radenković (2008) managed to find only one specimen from the territory of Serbia, collected on 15 Oct 1983, from Ludaš Lake (N Serbia). The latter data was not published before, and the specimen was collected before Šimić & Vujić (1987) presented the first above cited record for AP Vojvodina referred to *L. quinquelineatus*; it is therefore possible that data refer to the same specimen, considering the geographical proximity of the Ludaš Lake and some close localities explored by Vujić & Šimić (1987), such as Krstur, Kanjiža, or Novi Kneževac. A year later, Nedeljković et al. (2009) present the same data as Radenković (2008), as the first one for the fauna of Serbia, the only incosistency regarding the name of the collector; Radenković (2008), in fact, cites A. Vujić as the collector, while Nedeljković et al. (2009) cite S. Šimić as being the collector. Vujić & Šimić (1987) did not discuss the significance of their first finding of this species, most likely because the species was already known in the borders of the former Yugoslavia at the time, from the territory of present-day Montenegro (Šimić 1987). Radenković (2008), discussing the presence of Mediterranean hoverfly species in the territory of Serbia, emphasizes that the explanation for their presence lies in fact that in Serbia exist similar conditions, on rocky fields or (as for AP Vojvodina) in dry steppe herbaceous formations. It is true that typical Mediterranean species of plants and animals occur in Serbia, either naturally or as recent introductions (e.g., Urošević et al. 2021; Simić & Zlatković 2022). However, we believe that the explanation for the presence of *E. megacephalus* should also be sought in the context of migrations from the Mediterranean re-

gion, and/or of short-term establishment of populations in continental climate conditions. It was assumed that some species of insects migrate from the Mediterranean to the territory of Serbia, without establishing populations due to some ecological restrictions, as already discussed in other recent cases (e.g. Šeat et al. 2019; Vujić et al. 2021). Nedeljković et al. (2009) did not discuss the presence of this species and did not express any opinion on the potential existence of a stable population. The time span between the two findings of *E. megacephalus* in Serbia is 41 years, which is quite a long period without data on this species, especially in the context of the relatively well-studied fauna of hoverflies in AP Vojvodina (Nedeljković et al. 2009). It is then necessary to carry out further research with the aim of determining the status of this species in Serbia, with special reference to examining the potential presence of a population surviving throughout the years. This would be of particular importance given the accelerated occurrence of climate change (Xu et al. 2018), and bearing in mind the increasing number of newly established populations of other Mediterranean or thermophilic species in Serbia (e.g. Stojanović et al. 2020; Šeat et al. 2020; Urošević et al. 2021).

New records of some rare Eristalini from Serbia

Subtribe Eristalina

Eristalis alpina (Panzer, 1798)

New records: 31 Jul 2020, Vlasina River (42.45.09.0N, 22.19.30.1E), Landscape of outstanding features "Vlasina", leg. M. Vujić; 27 Jul 2022, the village of Gornji Krivodol (43.06.48.8N, 22.57.25.0E), Stara planina Mt., leg. M. Vujić; 06 Jun 2022, the town of Bosilegrad, near to the village of Milevci (42.31.24.4N, 22.28.34.6E), leg. M. Vujić.

Notes: The species has been recorded in mountain habitats, always in the immediate vicinity of small watercourses. In Vlasina, it occurs on *Sphagnum* peatlands near the Vlasina River. It has been observed visiting the flowers of *Pastinaca sativa* L.

Eristalis intricaria (Linnaeus, 1758)

New records: 05 Aug 2012, the village of Zasavica (44.57.28.2N, 19.31.35.6E), Special nature reserve "Zasavica", leg. M. Šćiban; 29 Jun 2019, the valley of Stražilovo (45.10.18.1N, 19.54.29.2E), Fruška gora Mt., leg. M. Vujić; 19 Jul 2022, the village of Karajukića Bunari (43.04.42.1N, 20.05.56.3E), Pešter Plateau, leg. M. Vujić.

Notes: The species has been recorded in both lowland (Zasavica) and mountain habitats (Stražilovo and Karajukića Bunari), in open or semi-open areas, in the immediate vicinity of small watercourses. It has been observed visiting the flowers of white Apiaceae and *Filipendula ulmaria* (L.) Maxim.

Eristalis lineata (Harris, 1776)

New records: 31 Jul 2019, the village of Đerekare (42.59.06.5N, 20.07.02.0E), Pešter Plateau, leg. M. Vujić; 01 Aug 2019, the town of Sjenica (43.14.51.4N, 19.59.41.4E), leg. M. Vujić; 31 Jul 2020, Vlasina River (42.45.09.0N, 22.19.30.1E), Landscape of outstanding features "Vlasina", leg. M. Vujić; 10 Aug 2020, the village of Milošev Do (43.18.18.9N, 19.46.28.6E), Jadovnik Mt., leg. M. Vujić; 09 Sep 2020, the meadow at Bijela Voda, the village of Đerekare (42.58.49.6N, 20.06.19.8E), Pešter Plateau, leg. M. Vujić; 10 Sep 2020, the village of Dragojlovićе (43.14.33.4N, 20.04.10.5E), Pešter Plateau, leg. M. Vujić; 29 Jul 2021, the birch forest near Vlasina River dam (42.44.59.5N, 22.19.48.0E), Landscape of outstanding features "Vlasina", leg. M. Vujić; 19 Aug 2021, the village of Rastište (43.54.54.7N, 19.23.15.4E), Tara National Park, leg. M. Vujić; 19 Aug 2021, Sjenič viewpoint, the village of Rastište (43.55.06.6N, 19.19.16.0E), Tara National Park, leg. M. Vujić; 06 Jun 2022, the town of Bosilegrad, near to the village of Milevci (42.31.24.4N, 22.28.34.6E), leg. M. Vujić; 28 Jul 2022, the village of Sladaja (44.07.57.8N, 21.40.10.6E), Beljanica Mt., leg. M. Vujić; 27 Jun 2023, the village of Vlasina Rid (42.44.44.3N, 22.18.39.7E), Čemernik Mt., leg. M. Vujić.

Notes: The species has been recorded in moist mountain habitats, mostly open. It is often found on *Sphagnum* peatlands or visiting the flowers of tall herbaceous vegetation near bodies of water or streams. It has been observed visiting the flowers of *Knautia drymeia* Heuff., *Succisa pratensis* Moench, *Pastinaca sativa* L., and unidentified species of the Apiaceae family.

Subtribe Helophilina

Anasimyia contracta Claussen & Torp, 1980

New records: 26 Aug 2015, the village of Vrčin (44.40.19.7N, 20.37.16.5E), Belgrade, leg. M. Vujić; 08 Aug 2019, the village of Zasavica (44.56.27.4N, 19.31.37.4E), Special nature reserve "Zasavica", leg. M. Vujić.

Notes: Recorded near watercourses or surfaces The population in Vrčin most likely disappeared due to habitat destruction, as it has not been found since 2015, when the habitat itself was devastated. In Zasavica, it was found on the flowers of *Alisma plantago-aquatica* L., as well as in floating stands of *Nuphar lutea* Smith and *Nymphaea alba* L.

Lejops vittata (Meigen, 1822)

New records: 07 Jun 2022, the village of Kriva Feja (42.32.04.7N, 22.12.08.0E), Besna Kobila Mt., leg. M. Vujić.

Notes: One specimen was recorded near an ephemeral pond beside a mountain road. It was not observed visiting the flowers of any plants.

Mallota cimbiciformis (Fallén, 1817)

New records: 04 Jun 2022, Jakov Dol, the village of Topli Do (42.38.15.2N, 22.17.01.9E), Vardenik Mt., leg. M. Vujić.

Notes: One specimen was found on flowers of *Crataegus* sp., in an ancient beech forest.

Mallota fuciformis (Fabricius, 1794)
New records: 05 May 2023, the valley of Brnjička reka river, the village of Brnjica (44.38.32.7N, 21.45.28.8E), Đerdap National Park, leg. M. Vujić.

Notes: One specimen was found in a xerothermic *Quercus cerris* L. forest.

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