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Recent records of *Mesembrius peregrinus* (Diptera: Syrphidae) from the Czech Republic

Nové záznamy pestřenky *Mesembrius peregrinus* (Diptera: Syrphidae) z České republiky

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Diptera, Syrphidae, endangered species, hoverfly, *Mesembrius*, reed bed, wetland

Abstract. The hover fly *Mesembrius peregrinus* (Loew, 1846) is the only European member of the genus *Mesembrius* Rondani, 1857. This species seems to be rather thermophilic in the Czech Republic and it mainly inhabits reed beds and margins of lakes and ponds with well-developed littoral vegetation. In the Czech Republic, there are only very few historical records of *M. peregrinus* and only a single locality with recent records of *M. peregrinus* (south Moravia, Lednice). The species is therefore considered as a critically endangered species in the national red list. Here, we present further recent faunistic records of the species from three additional localities in Moravia, Czech Republic. The ecology and overall distribution of the species are briefly discussed.

INTRODUCTION

Common reed (*Phragmites australis*) is a dominant plant species across European wetlands and littorals of ponds and lakes. The habitats formed by reed vegetation are commonly known as reed beds. Reed beds are inhabited by specific invertebrate communities (Valkama et al. 2008) and they are currently recognised as important but underestimated habitats of many endangered insect species (Heneberg et al. 2014, Bogusch et al. 2015, Bogusch et al. 2020). Several species of hover flies (Diptera: Syrphidae), e.g. *Lejops vittatus* (Meigen, 1822), *Pseudodoros nigricollis* Becker, 1903, *Tropidia scita* (Harris, 1776), *Anasimyia* spp., *Parhelophilus* spp., are known to be associated predominantly with reed beds, and many of them are of conservation concern (Speight 2020, Vujić et al. 2022).

Hover flies of the genus *Mesembrius* Rondani, 1857 are widespread across the Old World with their center of the diversity in the tropical regions of Asia and Africa (Jordaens et al. 2021). *Mesembrius peregrinus* (Loew, 1846) is the only species of the genus *Mesembrius* that occurs in Europe. Its European range is restricted to reed beds, wetlands and ponds of southern, south-eastern, and parts of central Europe (Speight 2020, Vujić et al. 2022).

Although entomologists in the Czech Republic quite commonly visit appropriate habitats for *M. peregrinus*, until now, this species has only very infrequently been recorded in the country. Unrevised historical records from Moravia (eastern region of the Czech Republic) have been provided by Kempný (1953) who mentions 1 ♀ (28.viii.1951) and 3 ♂♂ (16.vi.1953)

of *M. peregrinus* from the town of Jistebník (faunistic grid 6274). This site is located in the Poodří Protected landscape area. Even though the reed beds in Poodří are well known to the naturalists in the Czech Republic, no further records of the species were published from the area and no specimen has been found in any museum collection. In Bohemia (western region of the Czech Republic), there is only one old and doubtful record of *M. peregrinus* by Vimmer (1912) who mentions this species from Milešovka hill (faunistic grid 5449). Milešovka hill is also a well-known natural site, frequently visited by entomologists, however no further records, and no appropriate reed bed habitats, are known from this locality.

A more recent record of *M. peregrinus* is known from Mlýnský rybník pond (48°46′48.0″N 16°48′36.0″E, faunistic grid 7266) near the towns of Lednice and Hlohovec in southern Moravia (Láska & Mazánek 1998, Grim 2006, T. Grim, pers. comm.). Only two specimens of *M. peregrinus* have been recorded at the locality so far, both were extracted from food samples of reed warblers (*Acrocephalus scirpaceus*) collected from May to mid-July in the years 1994, 1996, and 1997 (Grim 2006). However, no recent records collected directly by humans are known. *Mesembrius peregrinus* is therefore considered as critically endangered (CR) in the national Red list of the Czech Republic (Mazánek & Barták 2005). Similarly, *M. peregrinus* is considered as critically endangered in Germany (Ssymank et al. 2011), where, however, it was recently recorded in northern Germany, on the Elbe river (Stuke et al. 2020). On the other hand, it has been reported as common species in Hungary (Tóth 2011) and recent records are known from Pannonian parts of Slovakia (Parížske močiare National Nature Reserve, 47°51′28.5″N 18°30′31.7″E, L. Mazánek, unpublished data, but its occurrence was not confirmed there by Králiková 2004). At the European level, the species is not considered as endangered (Vujić et al. 2022).

MATERIAL AND METHODS

An extensive field survey was performed on several localities with appropriate habitats across the Czech Republic (ponds and lakes with well-developed littoral vegetation containing a high proportion of common reed). Among others, all the localities with historical records of *M. peregrinus* were visited by the first author (Milešovka hill in May 2018, Mlýnský rybník in May 2016 and May 2022, Poodří in August 2021). Hover flies were collected from the vegetation using entomological nets, supplemented by yellow pan traps at some localities. All collected specimens were pinned. A male and a female were photographed using a Canon EOS 70d digital camera with Canon EF-S 60mm f/2.8 lens. Images were stacked with Zerene Stacker, method "P-Max".

The habitus of *M. peregrinus* is shown in Fig. 1. At first glance, it may resemble a member of one of the far more common hover fly genera such as *Helophilus* Meigen, 1822, *Parhelophilus* Girschner, 1897, or *Anasimyia* Schiner, 1864. However, *M. peregrinus* can be reliably distinguished from any other species of European hover flies by the following combination of characters: (1) vein R4+5 strongly sinuate, (2) femur 3 without tooth or triangular plate, (3) wing cell R1 open, (4) eyes bare, (5) antennae black, (6) face uniformly haired (without median bare stripe), (7) eyes holoptic in males, meeting in a single point on frons, and (8) basoventral area of the hind basitarsus with globuliferous pile (van Veen 2004).

RESULTS

The attempts to confirmation the occurrence of *Mesembrius peregrinus* in Milešovka hill, Poodří, and Mlýnský rybník were not successful. However, during years 2020, 2021, and 2022, *M. peregrinus* was found at another three localities in Moravia (eastern part of the Czech Republic). In total, 4 ♂♂ and 7 ♀♀ were examined. All records of *M. peregrinus* from the Czech Republic known to the authors (the recent ones as well as the historical ones) are figured on the map (Fig. 2). Detailed information on recent records is provided here:



Fig. 1. Male (left) and female (right) of *Mesembrius peregrinus* (Loew, 1846). Photographs: J. Hadrava & P. Sípek.
Obr. 1. Samec (vlevo) a samice (vpravo) *Mesembrius peregrinus* (Loew, 1846). Fotografie: J. Hadrava & P. Šípek.

Locality n. 1: Czech Republic: Moravia bor., Nature park Sovinecko, Dlouhá Loučka, Valšův Důl, Valšovský rybník (6169), 49°50′09.708″N 17°12′54.331″E, 300 m a.s.l., 23.viii.2020, 2 ♀♀ (individually), M. Král lgt. and det. **Habitat description.** Pond margin with dense herb vegetation (up to 0.9 m height) and sparse occurrence of alder (*Alnus glutinosa*) up to 2 m height. The littoral vegetation of the pond contains mainly broadleaf cattail (*Typha latifolia*) and common reed (*Phragmites australis*). **Notes.** During warm and sunny weather, two females were collected after they flew in and settled on a leaf of *Calystegia sepium*.

Locality n. 2: Czech Republic: Moravia mer., Mutěnice, rybník Josef (7068), 48°54′20.866″N 17°03′30.725″E, 170 m a.s.l., 30.v.2021, 1 ♀ (individually), 1 ♂, 1 ♀ (yellow pan trap), 31.v.2021, 3 ♀♀ (individually), J. Hadrava lgt. and det. **Habitat description.** Ecotone between an old-growth deciduous forest and a pond with well-developed littoral vegetation formed predominantly of common reed (*Phragmites australis*). **Notes.** During rather hot and sunny weather, four females were collected after they flew from the reed bed and rested on sunlit leaves near the ground (ca 0.3 m height). Two additional specimens were collected using yellow pan traps exposed for 24 hours on a nearby causeway between the ponds. A leg of one specimen was removed and stored in 96% ethanol in a freezer (-20 °C) for later extraction of DNA.

Locality n. 3: Czech Republic: Moravia mer., Lednice, Castle park (7166), 48°48′20.709″N 16°48′21.321″E, 160 m a.s.l., 12.v.2022, 3 ♂♂, 1 ♀ (individually), L. Mazánek lgt. and det. **Habitat description.** Small island in a Zámecký rybník pond within Lednice Castle park. All specimens were collected on flowers of the exotic shrub *Photinia villosa* (Rosaceae), between old-growth oak trees and dense grass/herbaceous vegetation. **Notes.** The locality is close to the Mlýnský rybník (ca 2.5 km northward), where *M. peregrinus* was reported by Grim (2006).

Nevertheless, these habitat conditions on these two sites are slightly different and the two sites are separated by an area of unsuitable habitat (crop fields and a town). Only to the east, there is a tributary channel of the Dyje river which could serve as a corridor connecting the two sites. We conclude that the species is probably widespread in water bodies around Lednice town.

DISCUSSION

We confirmed the occurrence of *M. peregrinus* in the Czech Republic, and provide the only recent records of the species that were collected by a human (not a warbler). *Mesembrius peregrinus* seems to be widespread yet rare in Moravia. Together with recent record from northern Germany (Stuke et al. 2020), the recent record from Sovinecko Nature Park is one of the northernmost records for the species. In Bohemia, the species remains unknown and it seems unlikely that it persists on Milešovka hill, where it was recorded by Vimmer (1912).

The lack of historical records of *M. peregrinus* in the Czech Republic is striking. It is unlikely that this species was merely overlooked in the past: *Mesembrius peregrinus* is conspicuous and easily recognisable species occurring at localities that are frequently visited by entomologists. Also in historical museum collections, we did not find any specimens of *M. peregrinus*, even though there is a plenty of material of other species of hover flies from various localities including Milešovka hill and its surroundings, Poodří, or Lednice surroundings. Based on our recent experiences, we presume that the species could be locally quite abundant, and it can be frequently observed basking in easily reachable spots outside the reed bed (e.g. on vegetation close to the pathway around the pond). This also supports the suggestion that the species is unlikely to have been overlooked in the past.

Therefore, we suggest that the species might be expanding recently. As the species is rather thermophilic and it reaches northernmost limit of its range in the Czech Republic and Germany, we assume that the global warming could have a positive effect on the population of this endangered species. Similarly, several other thermophilic and previously rare species such as *Mantis religiosa* (Linnaeus, 1758), *Xylocopa violacea* (Linnaeus, 1758), *Iphiclides podalirius* (Linnaeus, 1758), and the hover fly species *Volucella zonaria* (Poda, 1761) have been expanding recently in northern Moravia (Král 2015). Consistently, in the GBIF database, there have been fairly numerous records of *M. peregrinus* in similar latitudes of Germany and Ukraine in recent years. On the other hand, the record by Kempný (1953) suggests that the species occurred in the past at its present northern limit. More observations of *M. peregrinus* are needed to get understand the population trends and area dynamics of the species. Thus, we request the entomological community to search for the species.

In neighbouring Hungary and south Slovakia, *M. peregrinus* widely co-occurs with *Lejops vittatus* (Meigen, 1822), which is another rare species associated with reed beds (Králiková 2004, Tóth 2011, L. Mazánek, unpublished data). *Lejops vittatus* is thus assumed to have habitat requirements similar to *M. peregrinus* (Speight 2020). Like *M. peregrinus*, *L. vittatus* is also listed as a critically endangered species in the national Red list of the Czech Republic (Mazánek & Barták 2005). However, unlike the apparently expanding *M. peregrinus*, no recent expansion of *L. vittatus* has been detected in the Czech Republic. During our field survey across the reed beds of the Czech Republic, we did not record any specimen of *L. vittatus*. Consistently with our finding, the European Red list of hover flies assessed *M. peregrinus* as least concern (LC) and *L. vittatus* as vulnerable (VU) at the European level (Vujić et al. 2022). More research is

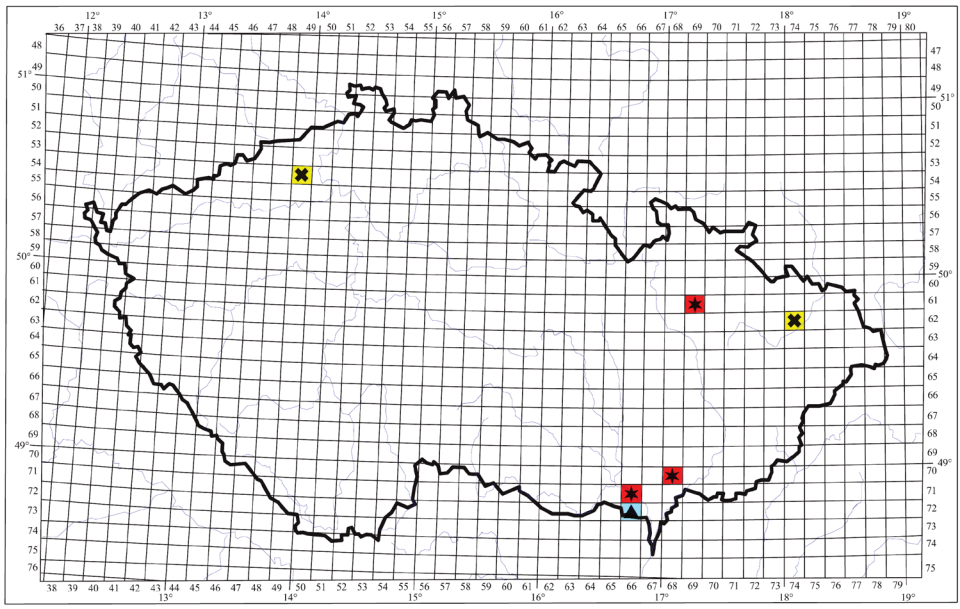


Fig. 2. Distribution of *Mesembrius peregrinus* (Loew, 1846) in the Czech Republic. Stars on red background indicate recent records presented here for the first time (2020–2022), triangle on blue background indicates older records (1990s), and crosses on yellow background indicate historical records from literature (1950s and older). The map grid follows the standard scheme used for the insect distribution monitoring in the Czech Republic, the map base was provided by the Czech Entomological Society (https://www.entospol.cz/sit-mapovych-ctvercu/).
Obr. 2. Rozšíření *Mesembrius peregrinus* (Loew, 1846) v České republice. Hvězdičky na červeném pozadí značí současný nález prezentovaný poprvé v této práci (2020–2022), trojúhelník na modrém pozadí značí starší záznam (90. léta) a křížky na žlutém pozadí značí historické nálezy přejaté z literatury (50. léta a starší). Čtvercová síť odpovídá faunistickým čtvercům standardně používaným pro síťové mapování rozšíření hmyzu v České republice, mapový podklad byl přejat od České společnosti entomologické (https://www.entospol.cz/sit-mapovych-ctvercu/).

needed to understand the differences in population dynamics of these two species.

Even though *M. peregrinus* is considered as critically endangered (CR) in the national Red list of the Czech Republic (Mazánek & Barták 2005), only one out of the three localities with recent records of the species is legally protected under national law (the ponds in the surroundings of Lednice are protected as the Lednické rybníky National Nature Reserve). However, the locality near Dlouhá Loučka is part of a Natural park (Přírodní Park Sovinecko) and the locality near Mutěnice is protected under the European Union legislation, Natura 2000 ("Evropsky významná lokalita Hodonínská Doubrava").

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SOUHRN

Mesembrius peregrinus (Loew, 1846) je vzácný druh pestřenky vázaný na rákosiny a rákosím zarostlé okraje rybníků či jezer. Jedná se o jediného evropského zástupce rodu *Mesembrius* Rondani, 1857, rozšířeného zejména v tropických oblastech Starého světa. Z území České republiky bylo dosud známo pouze velmi málo záznamů tohoto druhu, konkrétně šlo o více než sto let starý záznam z Milešovky (CHKO České středohoří), několik záznamů z počátku 50. let 20. stol. z obce Jistebník (CHKO Poodří) a dva záznamy z Mlýnského rybníka u obce Lednice na jižní Moravě.

V tomto článku představujeme recentní nálezy jedenácti jedinců tohoto druhu, odchycených v letech 2020 až 2022 na třech lokalitách na Moravě: v Dlouhé Loučce v přírodním parku Sovinecko (Valšovský rybník), u Mutěnic na Hodonínsku (rybník Josef) a v zámeckém parku v Lednici na jižní Moravě (Zámecký rybník). Vzhledem k nápadnosti tohoto druhu a k probádanosti lokalit s vhodným habitatem nepovažujeme za pravděpodobné, že by tento druh byl v naší přírodě pouze přehlížen, spíše se domníváme, že se tento kriticky ohrožený druh vzmáhá a úspěšně kolonizuje nové lokality s vyhovujícími habitaty, možná v důsledku globálního oteplování. Jeho populační dynamiku však dosud známe jen špatně a pro lepší pochopení jeho areálové dynamiky by bylo zapotřebí věnovat více úsilí mapování jeho výskytu a populačních trendů.



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