

Review of Moth flies (Diptera, Psychodidae) of eastern Bohemia and western Moravia (Českomoravské meziohří / Czech-Moravian Intermountain), Czech Republic

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Abstract

The biodiversity of non-biting moth flies (Diptera, Psychodidae) from Českomoravské meziohří / Czech-Moravian Intermountain is presented. A total of 30 species have been recorded. Five species are critically endangered: *Philosepedon (Trichosepedon) balkanicum* Krek, 1971, *Saraiella rotunda* (Krek, 1970), *Szaboiella hibernica* (Tonnoir, 1940), *Tonnoiriella nigricauda* (Tonnoir, 1919) and *Ulomyia plumata* (Tonnoir, 1919); two species endangered: *Pneumia vittata* (Tonnoir, 1919) and *Ulomyia vaseki* Ježek, 2002; two species whose conservation status has unfortunately not yet been assessed: *Peripsychoda zbytky* Ježek, 2004 and *Clytocerus (Boreoclytocerus) splendidus* Ježek & Hájek, 2007. A good knowledge of biodiversity is the basic building block of many researches, classifications and, last but not least, knowledge of the ecology and biology of selected species. This knowledge can be used to protect endangered species and manage their habitats.

Key words: Psychodinae, biodiversity, faunistics, distribution, zoogeography, threatened species, conservation potential, Europe, Palearctic Region.

Introduction

Taxonomy is an essential tool for understanding biodiversity. It is also crucial for the protection of biodiversity and in solving many critical and current nature conservation problems (e.g. the spread of invasive and non-native species, the emergence and spread of new pathogens, the decline of insects, etc.) (e.g. McNeely 2002; Kociolek & Stoermer 2001; Schlick-Steiner et al. 2010). The aim of faunistic studies is to find out which and how many species live in individual biotopes of a given region. The resulting species lists are only meaningful if they are based on a correct, thorough and systematic knowledge of each group under consideration. When these conditions are met, they become the basic cognitive basis for various disciplines: from population genetics to systematics, zoogeography and ecology. The faunal composition, correctly positioned in its spatial and temporal dimension, provides a picture of regional biodiversity in relation to changes that have occurred over more or less long periods of time, which has recently been emphasized mainly because of global changes affecting biodiversity and the species composition of communities (Braioni 1994). Species distribution data are an important source of information for the implementation of several goals set by the International Convention on Biological Diversity (Girardello et al. 2018). However, the availability of these data varies considerably from a spatial, temporal, and often also a taxonomic perspective. This leads to gaps in biodiversity information in many regions (Amano et al. 2016).

The family Psychodidae (moth flies; Figure 1) is a cosmopolitan family of Nematocera with more than 3,000 described species (Pape et al. 2011), divided into six subfamilies, i.e. Bruchomyiinae, Horaiellinae, Phlebotominae, Psychodinae, Sycoracinae, and Trichomyiinae. The imagoes are small (1 – 5 mm) with

a body densely covered with hairs and scales. Moth flies are holometabolic insects whose life cycle takes place in aquatic, semi-aquatic or terrestrial ecosystems. Larvae develop in a wide range of microhabitats, from stagnant or flowing freshwater to damp soil around tree roots, decaying tree trunks, and domestic microhabitats such as bathroom and kitchen drains. Adults tend to rest in sheltered and relatively moist microhabitats, such as under the bark and in tree holes, on the undersides of leaves, in rock crevices, burrows, stables, caves and on the inside walls of buildings. Adults feed on plant material such as nectar, although females of some species and, in rare cases, some males, feed on blood obtained by biting vertebrates, including humans (e.g. Bejarano & Estrada 2016). Relatively well known in the Palearctic are the species of epidemiologically important groups – the subfamily Phlebotominae known as “sand flies”. However, almost all attention is paid to the adults – the blood-feeding (hematophagous) flies.



Figure 1. *Tinearia alternata* (Say, 1824) – adult. Photo by Rudolf Cáfal.

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In contrast to incomparable Prodrromus of moth flies of Slovakia (Oboňa & Ježek 2014) with a summary of all known localities including grid mapping codes in the sense of Ehrendorfer & Hamann (1965), the Czech Republic has only many scattered papers on Psychodidae in different journals (e.g. Ježek 2003, 2004, 2006; Ježek & Hájek 2007; Ježek et al. 2019; Ježek & Omelková 2012; Kroča & Ježek 2015, 2019, 2022; Omelková & Ježek 2012a,b,c, 2017) without finished prodrromus.

The aim of our study is to present published new and unpublished faunal data with the contribution of biodiversity research on moth flies (Diptera: Psychodidae) of the Českomoravské meziohoří / Czech-Moravian Intermountain and some adjacent localities (Czech Republic).

Materials and methods

Specimens were collected by the first author using sweep-netting (SW) from vegetation growing along the margins of lotic and lentic aquatic habitats and preserved in the field with 75% ethanol in 2006. In the laboratory, specimens were cleared in chloralphenol, treated in xylol and mounted in Canada balsam on glass slides. All material (113 slides) is deposited at the National Museum (Natural History Museum), Department of Entomology, Prague, Czech Republic. Slides are labelled with an inventory number (INS) for all Psychodidae and the catalogue number (Cat. No.) was not used here except for types and historical material deposited in the Diptera collection (NMPC), see Tkoč et al. (2014).

The map in the figure was created using public domain layers (OpenStreetMap standard – <https://www.openstreetmap.org>), Czech Republic Administrative

Districts (GADM – <https://www.diva-gis.org>) in QGIS software (version 3.22.4-Białowieża, QGIS code branch 3.22 release). The area of interest in the overview map in Figure 3 shows a polygon drawn by the outermost points (minimum bounding geometry, convex hull method).

Identification keys used: Vaillant (1971 – 1983), Szabó (1983), Withers (1989) and numerous unnamed original papers by various authors describing new species. The nomenclature is modified from Vaillant (1971 – 1983) and Wagner (1990, 2023), using the classifications of e.g. Ježek & van Harten (2005, 2009), Ježek (2007), Omelková & Ježek (2012a,b,c), Oboňa & Ježek (2014), Kvifte (2014), and Kroča & Ježek (2015, 2019, 2022).

Site 30 is not shown in Figure 3 as it is a remote site (see Figure 2) outside the area of interest. The faunal data from this site are not sufficient for publication in their own right, but they are valuable, and it would be inappropriate not to publish them. We have therefore decided to publish them as part of this study.

Graphs with polynomial trend line were created in Excel. Linear regression and non-parametric methods (Spearman's rho) were also used to search for possible relationships between elevation and species richness.

Abbreviations used:

ČMM = Českomoravské meziohoří / Czech-Moravian Intermountain; NM = Nature Monument = nature conservation area; NR = nature reserve. Threatened species: CR = critically endangered; EN = endangered; NS = species not assessed in Czech Red List (Ježek 2005).

List of all collecting areas

(See Figures 2 – 7)

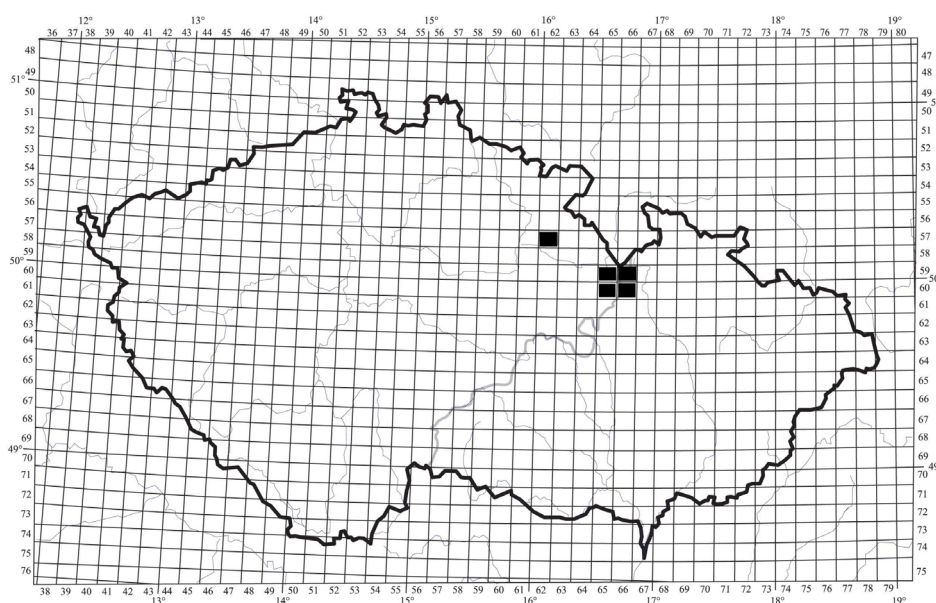


Figure 2. Map of faunistic squares of the Czech Republic. Created by Jozef Oboňa.

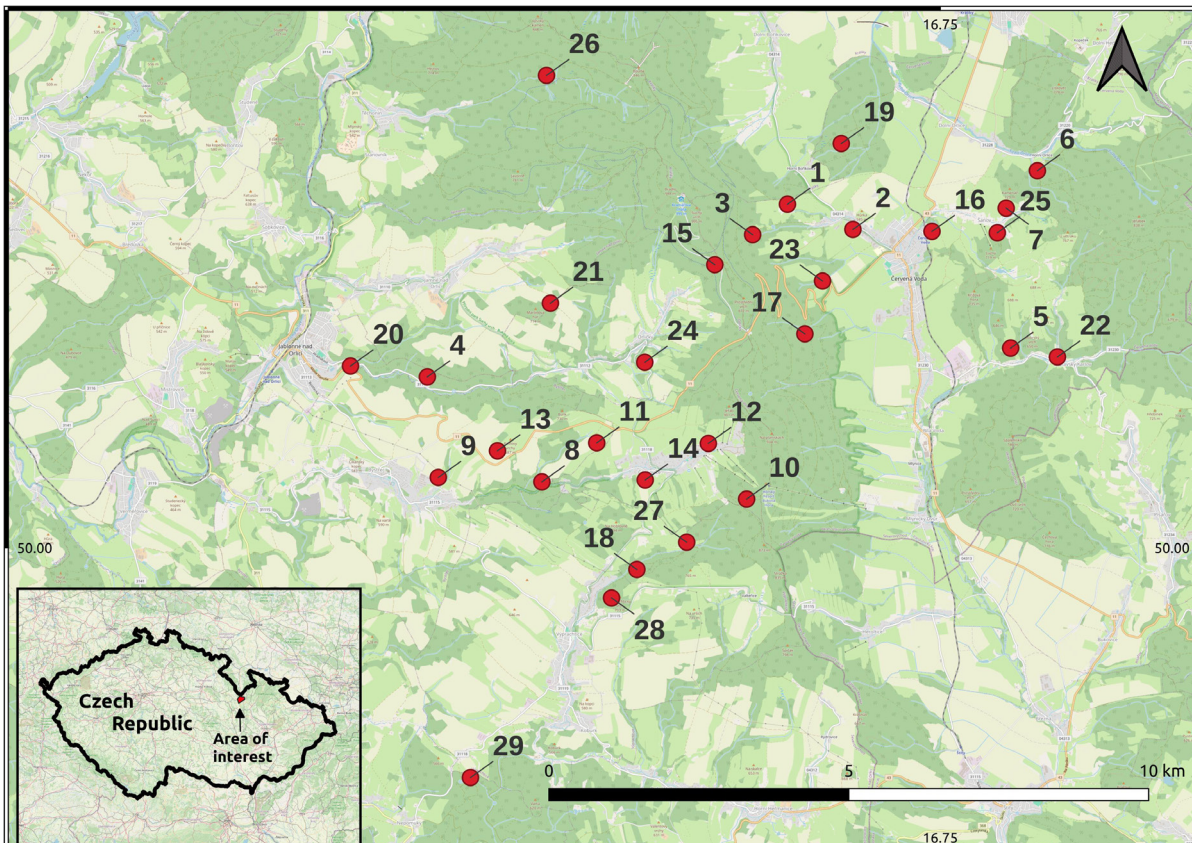


Figure 3. Map of the study area with sites 1 – 29. Prepared by Peter Manko.



Figure 4. View from the Mariánská hora Hills (church 502.8 m a.s.l.) between Horní Čermná and Horní Třeňovec over comb of Buková hora Hills (958.0 m a.s.l.). Photo by Věra Ježková.



Figure 5. Forest pond near Dolní Dobrouč (Letohrad environment). Photo by Věra Ježková.



Figure 6. Ford of forest tributary of Moravská Sázava river near Albrtechtice. Photo by Věra Ježková.



Figure 7. Characteristic landscape view of Českomoravské mezihoří - / Czech-Moravian Intermountain (eastern Bohemian part). Photo by Věra Ježková.

- 1. Among Horní Boříkovice, Hvězda Hills and Suchý vrch Hills** (995 m a.s.l.), wet ground, bogs, ČMM (Českomoravské meziohří intermountain area), 666 m a.s.l., 5966, 50°03'N 16°42'E. Veg.: *Salix*, *Betula*, *Alnus*, *Equisetum*, *Scirpus*, *Caltha*, *Sphagnum*, *Typha*, *Senecio*, *Lysimachia*.
- 2. Between Červená Voda** (western part) **and Suchý vrch Hills** (995 m a.s.l.), cowshed, small meadow brook, spring area, ČMM, 556.5 m a.s.l., 5966, 50°02'N 16°43'E. Veg.: *Salix*, *Sambucus*, *Fraxinus*, *Acer*, *Alnus*, *Equisetum*, *Cirsium*, *Impatiens*, *Scirpus*, *Urtica*, *Geranium*, *Petasites*.
- 3. Between Horní Boříkovice and Hvězda Hills** (843 m a.s.l.), edge of meadow swamp and forest, ČMM, 708 m a.s.l., 5966, 50°02'N 16°42'E. Veg.: *Alnus*, *Picea*, *Salix*, *Senecio*, *Vaccinium*, Marchantiopsida.
- 4. Between Jablonné nad Orlicí and Orličky**, small pond near Orličský potok brook, wet meadow, ČMM, 484.7 m a.s.l., 5965, 50°01'N 16°37'E. Veg.: *Alnus* (singly), *Picea*, *Fraxinus*, *Impatiens*, *Petasites*, *Scirpus*.
- 5. Between Moravský Karlov and Červená Voda**, Březná brook, swamps, ČMM, 540.9 m a.s.l., 5966, 50°01'N 16°45'E. Veg.: *Alnus*, *Frangula*, *Rubus*, *Scirpus*, *Caltha*, *Impatiens*, *Urtica*.
- 6. Between Šanov and Horní Orlice**, small forest brook, ČMM, 619 m a.s.l., 5966, 50°03'N 16°46'E. Veg.: *Picea*, *Sorbus*, *Rubus*, *Sphagnum*, *Equisetum*, *Viola*, *Senecio*, *Vaccinium*, Pteropsida, Musci, Marchantiopsida.
- 7. Between Šanov and Kamenáč Hills** (729.1 m), Alnetum, swamps, rills, ČMM, 625.5 m a.s.l., 5966, 50°03'N 16°45'E. Veg.: *Salix*, *Alnus*, *Petasites*, *Urtica*, *Caltha*, *Nasturtium*.
- 8. Bystřec** near Jablonné nad Orlicí, Čenkovička brook (NM), eastern forest edge, ČMM, 584.2 m a.s.l., 5965, 50°00'N 16°39'E. Veg.: *Alnus*, *Rubus*, *Petasites*, *Impatiens*, Pteropsida.
- 9. Bystříček** near Jablonné nad Orlicí, Čenkovička brook (NM), swamps in Alnetum, ČMM, 523.5 m a.s.l., 5965, 50°00'N 16°38'E. Veg.: *Alnus*, *Betula*, *Sorbus*, *Acer*, *Corylus*, *Caltha*, *Urtica*, *Phragmites*, *Impatiens*, *Petasites*, *Aegopodium*, Pteropsida.
- 10. Čenkovice, Buková hora Hills** (958 m a.s.l.), spring, ČMM, 925.2 m a.s.l., 5966, 50°00'N 16°42'E. Veg.: *Fagus*, *Alnus*, *Picea*, *Vaccinium*, Pteropsida.
- 11. Čenkovice, Bulík Hills** (729.1 m a.s.l.), tributary of Čenkovička brook (NM), spring area, forest glade, ČMM, 694.1 m a.s.l., 5965, 50°00'N 16°40'E. Veg.: *Prunus*, *Corylus*, *Picea*, *Alnus*, *Impatiens*, *Equisetum*, *Geranium*, Pteropsida.
- 12. Čenkovice, meanders of Čenkovička brook (NM)**, ČMM, 764.9 m a.s.l., 5966, 50°00'N 16°41'E. Veg.: *Alnus*, *Acer*, *Salix*, *Urtica*, *Cirsium*, *Filipendula*, *Epilobium*, *Nasturtium*.
- 13. Čenkovice, Pavlovy vrchy Hills** (686 m a.s.l.), ČMM, tributary of Čenkovička brook (NM), spring area, forest, 630.3 m a.s.l., 5965, 50°00'N 16°38'E. Veg.: *Picea*, *Acer*, *Alnus*, *Rubus*, *Juncus*, *Impatiens*, *Myosotis*, *Senecio*, *Petasites*, Pteropsida.
- 14. Čenkovice, pond and swamps**, ČMM, 676.8 m a.s.l., 5966, 50°00'N 16°40'E. Veg.: *Alnus*, *Juncus*, *Geranium*, *Rumex*, *Nasturtium*, *Myosotis*, *Hypericum*, *Urtica*, *Artemisia*, *Filipendula*.
- 15. Červená Voda, Hvězda Hills** (843 m a.s.l.), small polluted forest brook, ČMM, 760.1 m a.s.l., 5966, 50°02'N 16°41'E. Veg.: *Picea*, *Salix*, *Rubus*, *Stachys*, *Nasturtium*, *Petasites*, *Impatiens*, *Urtica*, *Senecio*, Pteropsida.
- 16. Červená Voda, railway station**, brook, ČMM, 553.2 m a.s.l., 5966, 50°02'N 16°44'E. Veg.: *Alnus*, *Fraxinus*, *Rubus*, *Filipendula*, *Caltha*, *Urtica*, *Petasites*, *Aegopodium*.
- 17. Červenovodské sedlo pass** (813.6 m a.s.l.) env. Červená Voda, Březná brook, forest, ČMM, 665.8 m a.s.l., 5966, 50°01'N 16°43'E. Veg.: *Picea*, *Fagus*, *Vaccinium*, *Myosotis*, *Urtica*, *Smilacina*, Pteropsida.
- 18. Hoblova**, between Čenkovice and Výprachtice, tributary (small brook) of Moravská Sázava river, forest edge, wet meadow, ČMM, 680 m a.s.l., 5966, 49°59'N 16°40'E. Veg.: *Picea*, *Filipendula*, *Impatiens*, *Urtica*, Pteropsida.
- 19. Horní Boříkovice** env. Králíky, gamekeeper's lodge, forest brook, ČMM, 553.9 m a.s.l., 5966, 50°03'N 16°43'E. Veg.: *Acer*, *Alnus*, *Picea*, *Caltha*, *Impatiens*, *Senecio*, *Oxalis*, *Petasites*, Pteropsida.
- 20. Jablonné nad Orlicí, Panská skála rock** (475 m a.s.l.), forest, tributary of Orličský potok brook, ČMM, 483.2 m a.s.l., 5965, 50°01'N 16°36'E. Veg.: *Picea*, *Sorbus*, *Corylus*, *Fagus*, *Rubus*, *Petasites*, *Impatiens*, Pteropsida.
- 21. Martinova hať Hills** (708.4 m a.s.l.), between Orličky and Jamné nad Orlicí, forest edge, spring area, ČMM, 624.7 m a.s.l., 5965, 50°02'N 16°39'E. Veg.: *Picea*, *Acer*, *Urtica*.
- 22. Moravský Karlov** env. Červená Voda, forest tributaries of Březná brook, ČMM, 557.7 m a.s.l., 5966, 50°01'N 16°46'E. Veg.: *Picea*, *Rubus*, *Petasites*, *Sphagnum*, *Impatiens*, Pteropsida.
- 23. Motyčkův žleb** NW of Červená Voda, small forest brook, ČMM, 595.6 m a.s.l., 5966, 50°02'N 16°43'E. Veg.: *Alnus*, *Acer*, *Populus*, *Sorbus*, *Salix*, *Picea*, *Rubus*, *Senecio*, *Filipendula*, Pteropsida.
- 24. Orličky** env. Jablonné nad Orlicí, cowshed, meadow swamps, rill, ČMM, 658 m a.s.l., 5966, 50°01'N 16°40'E. Veg.: *Fraxinus*, *Acer*, *Urtica*, *Caltha*, *Epilobium*, *Filipendula*, Pteropsida.
- 25. Šanov**, spring area near cowshed, ČMM, 609.6 m a.s.l., 5966, 50°02'N 16°45'E. Veg.: *Alnus*, *Salix*, *Urtica*, *Caltha*, *Scirpus*.
- 26. Uhlířský důl valley** near Bouda stronghold env. Těchonín, forest, small brooks and swamps, mass movement of stones, ČMM, 657.9 m a.s.l., 5966, 50°04'14.0"N 16°39'30.6"E. Veg.: *Picea*, *Fagus* and trivial plants of source areas and swamps.
- 27. Výprachtice, Palouky Hills** (700 m a.s.l.), small brook, forest edge, ČMM, 613 m a.s.l., 5966, 50°00'N 16°41'E. Veg.: *Picea*, *Salix*, *Alnus*, *Fagus*, *Filipendula*, *Scirpus*, *Cirsium*, *Urtica*, Pteropsida.
- 28. Výprachtice, slopes of Výprachtický vrch Hills** (641.9 m a.s.l.), muddy way near Moravská Sázava river, ČMM, 630 m a.s.l., 6066, 49°59'N 16°40'E. Veg.: *Fagus*, *Picea*, *Rubus*, *Luzula*, *Impatiens*, Pteropsida.

29. Výprachtice – Halda, gamekeeper's lodge, small forest pond, fountain, rill, ČMM, 575 m a.s.l., 6065, 49°57'N 16°38'E. Veg.: *Picea*, *Acer*, *Rubus*, *Impatiens*, Marchantiopsida, Musci.

30. Zbytka (NR) – wildlife reserve between Pohoří and České Meziříčí, a large complex of floodplains and fen meadows in the meander of Zlatý potok brook, 260 m a.s.l., 5762, 50°17'N 16°04'E. Veg.: *Quercus*, *Fraxinus*, *Populus*, *Alnus*, *Cornus*, *Rubus*, *Iris*, *Stachys*, *Leonurus*, *Lappa*, Daucaceae, Poaceae.

Results and Discussion

A total of 30 species of Psychodinae are recorded (see text below). From the Paramormiini a total of 5 species (2 Paramormiina and 3 Trichopsychodina), from the Psychodini 7 spp. and from the Pericomaini 18 spp. are recorded.

List of species

Psychodidae

Psychodinae

Paramormiini

Paramormiina

Peripsychoda auriculata (Haliday in Curtis, 1839)

Unpublished records: Bystřiček (9), ♂, 25.7.2006, J, SW, INS 15704; Červená Voda, railway station (16), ♂, 16.7.2006, J, SW, INS 15736; Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15729.

Comments: European and Transcaucasian species not yet recorded from Iberian Peninsula in contrast to Balkans, the Apennines and Siberia. Some distribution details are added by Ježek et al. (2020).

Peripsychoda zbytka Ježek, 2004

Published record: Zbytka (30): Ježek (2004), Ježek & Hájek (2007), Tkoč et al. (2014).

Degree of endangerment: Conservation status not assessed (NS), see Ježek & Hájek (2007).

Comments: Known only from the Central Europe (CZ – Bohemia).

Trichopsychodina

Philosepedon (Trichosepedon) balkanicum Krek, 1971

Unpublished record: Červenovodské sedlo pass (17), ♂, 16.7.2006, J, SW, INS 15721.

Degree of endangerment: Critically endangered (CR) – see Ježek (2005).

Comments: Recorded in the Balkans, Central Europe and the Caucasus in mountain slope spring areas and avalanche grooves. For more information on distribution see Ježek & Omelková (2012).

Threticus lucifugus (Walker, 1856)

Unpublished records: Among Horní Boříkovice, Hvězda Hills and Suchý vrch Hills (1), ♂, 17.8.2006, J, SW, INS 15752; Červená Voda, Hvězda Hills (15), ♂, 16.7.2006, J, SW, INS 15739; Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15738; Motyčkův žleb (23), ♂, 16.7.2006, J, SW, INS 15714.

Comments: European species, known from 11 countries (Ježek et al. 2019; Beuk 2021).

Trichopsychoda hirtella (Tonnoir, 1919)

Unpublished records: Bystřec (8), ♀, 25.7.2006, J, SW, INS 15670; Čenkovice, meanders of Čenkovička brook (NM) (12), ♀, 12.7.2006, J, SW, INS 15657.

Comments: European species, see Ježek et al. (2020) for details, penetrates to Transcaucasia, Abkhazia (Ježek et al. 2023a).

Psychodini

Chodopsycha lobata (Tonnoir, 1940)

Unpublished records: Between Šanov and Kamenáč Hills (7), ♀, 28.7.2006, J, SW, INS 15758; Moravský Karlov (22), ♀, 17.8.2006, J, SW, INS 15746; Výprachtice, Palouky Hills (27), ♀, 12.7.2006, J, SW, INS 15697; Výprachtice – Halda (29), ♀, 18.8.2006, J, SW, INS 15679.

Comments: European and Transcaucasian (Abkhazia, Georgia) species – Ježek et al. (2019, 2023a).

Logima satchelli (Quate, 1955)

Unpublished record: Červenovodské sedlo pass (17), ♀, 16.7.2006, J, SW, INS 15722.

Comments: Holarctic species, recorded in Europe, Armenia, Azerbaijan, Georgia (incl. Abkhazia), Canada and USA – Ježek et al. (2019, 2023a).

Logima zetterstedti Ježek, 1983

Unpublished records: Bystřec (8), ♂, 25.7.2006, J, SW, INS 15671; Čenkovice, meanders of Čenkovička brook (NM) (12), ♀, 12.7.2006, J, SW, INS 15656; Červenovodské sedlo pass (17), ♂, 16.7.2006, J, SW, INS 15723.

Comments: European (6 countries) and West Siberian species penetrates to Transcaucasia (Abkhazia), for details see Ježek et al. (2019, 2023a).

Psychoda phalaenoides (Linnaeus, 1758)

Unpublished records: Orličky (24), ♀, 25.7.2006, J, SW, INS 15681; Výprachtice – Halda (29), ♀, 18.8.2006, J, SW, INS 15680.

Comments: Holarctic species, known from 24 countries in Europe, penetrating into Azerbaijan and Georgia incl. Abkhazia – see Wagner (2023), Ježek et al. (2023a).

Psychodocha cinerea (Banks, 1894)

Unpublished record: Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15744.

Comments: Cosmopolitan species, published from Russia

(Siberia), penetrating to Armenia and Georgia (incl. Abkhazia), for details see Ježek & Yağci (2005), Ježek et al. (2023a,b).

***Psychodocha gemina* (Eaton, 1904)**

Unpublished records: Between Moravský Karlov and Červená voda (5), ♀, 17.8.2006, J, SW, INS 15726; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15703; Čenkovice, meanders of Čenkovička brook (NM) (12), ♀, 12.7.2006, J, SW, INS 15658; Hoblovna (18), ♀, 12.7.2006, J, SW, INS 15672; Motyčkův žleb (23), ♀, 16.7.2006, J, SW, INS 15713.

Comments: European species, known from 22 countries, also recorded in Azerbaijan, Georgia incl. Abkhazia – see in Ježek et al. (2019, 2023a).

***Tinearia alternata* (Say, 1824)**

Unpublished record: Between Moravský Karlov and Červená voda (5), ♀, 17.8.2006, J, SW, INS 15731.

Comments: Cosmopolitan species, newly recorded from Armenia, Azerbaijan and Georgia incl. Abkhazia, for details see Ježek & Yağci (2005) and Ježek et al. (2023a,b).

Pericomaini

***Berdeniella manicata* (Tonnoir, 1920)**

Unpublished records: Bystřec (8), ♂, 25.7.2006, J, SW, INS 15669; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15701; Jablonné nad Orlicí, Panská skála rock (20), ♂, 18.8.2006, J, SW, INS 15694.

Comments: European species, known from more than 10 countries, penetrates into Transcaucasia – Georgia incl. Abkhazia, see e.g. Wagner (2023) and Ježek et al. (2023a).

***Berdeniella unispinosa* (Tonnoir, 1919)**

Published record: Bystřec (8): Ježek & Hájek (2007).

Unpublished records: Bystřec (8), ♂, 25.7.2006, J, SW, INS 15661; Čenkovice, Bulík Hills (11), ♂, 25.7.2006, J, SW, INS 15659; Čenkovice, meanders of Čenkovička brook (NM) (12), ♂, 12.7.2006, J, SW, INS 15660; Čenkovice, Pavlovy vrchy Hills (13), ♂, 25.7.2006, J, SW, INS 15655; Čenkovice, pond and swamps (14), ♂, 18.8.2006, J, SW, INS 15654; Červená Voda, Hvězda Hills (15), ♂, 16.7.2006, J, SW, INS 15740; Červenovodské sedlo pass (17), ♂, 16.7.2006, J, SW, INS 15724; Motyčkův žleb (23), ♂, 16.7.2006, J, SW, INS 15715; Orličky (24), ♂, 25.7.2006, J, SW, INS 15688; Výprachtice, slopes of Výprachtický vrch Hills (28), ♂, 12.7.2006, J, SW, INS 15698.

Comments: Distributed in central zone of Europe from France to Poland and Slovakia, the southern border of the area lies in the Apennines and the Balkans – Ježek et al. (2019).

***Clytocerus (Boreoclytocerus) ocellaris* (Meigen, 1804)**

Published record: Bystřec (8): Ježek & Hájek (2007).

Unpublished records: Among Horní Boříkovice, Hvězda

Hills and Suchý vrch Hills (1), ♂, 17.8.2006, J, SW, INS 15754; Between Horní Boříkovice and Hvězda Hills (3), ♂, 24.8.2006, J, SW, INS 15711; Between Jablonné nad Orlicí and Orličky (4), ♂, 18.8.2006, J, SW, INS 15693; Between Šanov and Kamenáč Hills (7), ♂, 28.7.2006, J, SW, INS 15719; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15706; Čenkovice, Pavlovy vrchy Hills (13), ♂, 25.7.2006, J, SW, INS 15653; Červená Voda, railway station (16), ♂, 16.7.2006, J, SW, INS 15728; Martinova hať Hills (21), ♂, 25.7.2006, J, SW, INS 15685; Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15727; Orličky (24), ♂, 25.7.2006, J, SW, INS 15692.

Comments: Central and western European species, recorded in 20 countries (Ježek et al. 2019; Wagner 2023).

***Clytocerus (Boreoclytocerus) splendidus* Ježek & Hájek, 2007**

Published records: Zbytka (NR) (30): Ježek & Hájek (2007), Tkoč et al. (2014).

Degree of endangerment: Conservation status not assessed (NS), see Ježek & Hájek (2007).

Comments: So far known only from the Belgium, Czech Republic, Poland and Slovakia (Ježek et al. 2019).

***Pericoma (Pachypericoma) blandula* Eaton, 1893**

Unpublished record: Bystříček (9), ♂, 25.7.2006, J, SW, INS 15702.

Comments: Known from 31 European countries, also recorded in Transcaucasia, Armenia, Azerbaijan, Georgia incl. Abkhazia, Tunisia and Morocco (Ježek et al. 2019, 2023a).

***Pneumia mutua* (Eaton, 1893)**

Unpublished records: Between Červená Voda and Suchý vrch Hills (2), ♂, 16.7.2006, J, SW, INS 15734; Čenkovice, Buková hora Hills (10), ♂, 12.7.2006, J, SW, INS 15751; Čenkovice, meanders of Čenkovička brook (NM) (12), ♂, 12.7.2006, J, SW, INS 15665; Červená Voda, Hvězda Hills (15), ♂, 16.7.2006, J, SW, INS 15742; Červenovodské sedlo pass (17), ♂, 16.7.2006, J, SW, INS 15725; Hoblovna (18), ♂, 12.7.2006, J, SW, INS 15675; Martinova hať Hills (21), ♂, 25.7.2006, J, SW, INS 15686; Orličky (24), ♂, 25.7.2006, J, SW, INS 15687.

Comments: Distributed in the western and central European zone, penetrating into the Scandinavian bioregion (18 countries); for details see Ježek et al. (2019).

***Pneumia nubila* (Meigen, 1818)**

Unpublished record: Bystříček (9), ♂, 25.7.2006, J, SW, INS 15709.

Comments: Known from 29 European countries, penetrates into Transcaucasia (Armenia, Azerbaijan, Georgia incl. Abkhazia) – for details see Ježek et al. (2019, 2023a) and Wagner (2023).

***Pneumia trivialis* (Eaton, 1893)**

Published record: Bystřec (8): Ježek & Hájek (2007).

Unpublished records: Among Horní Boříkovice, Hvězda Hills and Suchý vrch Hills (1), ♂, 17.8.2006, J, SW, INS 15750; Between Horní Boříkovice and Hvězda Hills (3), ♂, 24.8.2006, J, SW, INS 15712; Between Jablonné nad Orlicí and Orličky (4), ♂, 18.8.2006, J, SW, INS 15690; Between Moravský Karlov and Červená Voda (5), ♂, 17.8.2006, J, SW, INS 15732; Between Šanov and Horní Orlice (6), ♂, 28.7.2006, J, SW, INS 15759; Between Šanov and Kamenáč Hills (7), ♂, 28.7.2006, J, SW, INS 15718; Bystřec (8), ♂, 25.7.2006, J, SW, INS 15668; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15699; Čenkovice, Bulík Hills (11), ♂, 25.7.2006, J, SW, INS 15667; Čenkovice, meanders of Čenkovička brook (NM) (12), ♂, 12.7.2006, J, SW, INS 15666; Čenkovice, Pavlovy vrchy Hills (13), ♂, 25.7.2006, J, SW, INS 15651; Čenkovice, pond and swamps (14), ♂, 18.8.2006, J, SW, INS 15650; Červená Voda, railway station (16), ♂, 16.7.2006, J, SW, INS 15737; Červenovodské sedlo pass (17), ♂, 16.7.2006, J, SW, INS 15717; Hoblovna (18), ♂, 12.7.2006, J, SW, INS 15673; Horní Boříkovice (19), ♂, 17.8.2006, J, SW, INS 15748; Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15749; Motyčkův žleb (23), ♂, 16.7.2006, J, SW, INS 15716; Orličky (24), ♂, 25.7.2006, J, SW, INS 15689; Šanov (25), ♂, 24.8.2006, J, SW, INS 15760; Výprachtice, Palouky Hills (27), ♂, 12.7.2006, J, SW, INS 15691; Výprachtice, slopes of Výprachtický vrch Hills (28), ♂, 12.7.2006, J, SW, INS 15700.

Comments: The number of 23 European countries was summarized in the last period by Ježek et al. (2019, 2023a), it also penetrates into Transcaucasia (Georgia incl. Abkhazia). For more information on the occurrence of this species, see also Wagner (2023).

***Pneumia vittata* (Tonnoir, 1919)**

= syn. *Pneumia crispus* (Freeman, 1953) as well as *Pneumia hungarica* (Szabó, 1960) – reclassified by Ježek et al. (2020)

Unpublished record: Výprachtice – Halda (29), ♂, 18.8.2006, J, SW, INS 15678.

Degree of endangerment: Endangered (EN) – see Ježek (2005).

Comments: Known from 16 European countries, detailed information has been published by Ježek et al. (2020) and Wagner (2023).

***Saraiella rotunda* (Krek, 1970)**

Unpublished records: Between Horní Boříkovice and Hvězda Hills (3), ♂, 24.8.2006, J, SW, INS 15710; Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15747; Šanov (25), ♂, 24.8.2006, J, SW, INS 15761.

Degree of endangerment: Critically endangered (CR) – see Ježek (2005).

Comments: Currently known to occur in 8 European countries and penetrating into Transcaucasia (Azerbaijan, Georgia incl. Abkhazia) – see Wagner (2023) and Ježek et al. (2020, 2021, 2023a).

***Szaboiella hibernica* (Tonnoir, 1940)**

Unpublished record: Hoblovna (18), ♂, 12.7.2006, J, SW,

INS 15674.

Degree of endangerment: Critically endangered (CR) – see Ježek (2005).

Comments: European species (11 countries) with a range that includes the Iberian Peninsula, the British Isles, the countries along Northern Sea and the Central European region, the Apennines and the Balkans, penetrating into Transcaucasia (Abkhazia). For some details see Ježek et al. (2021, 2023a).

***Tonnoiriella nigricauda* (Tonnoir, 1919)**

Unpublished records: Between Moravský Karlov and Červená Voda (5), ♂, 17.8.2006, J, SW, INS 15733; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15707.

Degree of endangerment: Critically endangered (CR) – see Ježek (2005).

Comments: European species known from 8 countries (Ježek et al. 2021; Wagner 2023).

***Tonnoiriella pulchra* (Eaton, 1893)**

Unpublished record: Among Horní Boříkovice, Hvězda Hills and Suchý vrch Hills (1), ♂, 17.8.2006, J, SW, INS 15753.

Comments: Known from Western, Southern and Central Europe (12 countries). Also recorded from North Africa (Algeria, Morocco). For details see Ježek et al. (2021) and Wagner (2023).

***Ulomyia annulata annulata* (Tonnoir, 1919)**

Unpublished records: Between Moravský Karlov and Červená Voda (5), ♂, 17.8.2006, J, SW, INS 15730; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15705.

Comments: Euro-West Siberian species, the distribution in Europe covers 7 countries (Ježek et al. 2019; Wagner 2023).

***Ulomyia cognata* (Eaton, 1893)**

Unpublished records: Among Horní Boříkovice, Hvězda Hills and Suchý vrch Hills (1), ♂, 17.8.2006, J, SW, INS 15755; Čenkovice, pond and swamps (14), ♂, 18.8.2006, J, SW, INS 15649; Jablonné nad Orlicí, Panská skála rock (20), ♂, 18.8.2006, J, SW, INS 15695; Moravský Karlov (22), ♂, 17.8.2006, J, SW, INS 15745.

Comments: European species (12 countries), also known from Armenia and Georgia. For a detailed distribution overview see Wagner (1923) and Ježek et al. (2019, 2021, 2023a).

***Ulomyia fuliginosa* (Meigen, 1804)**

Published record: Bystřec (8): Ježek & Hájek (2007).

Unpublished records: Among Horní Boříkovice, Hvězda and Suchý vrch Hills (1), ♂, 17.8.2006, J, SW, INS 15757; Between Červená Voda and Suchý vrch Hills (2), ♂, 16.7.2006, J, SW, INS 15735; Between Šanov and Kamenáč Hills (7), ♂, 28.7.2006, J, SW, INS 15720; Bystřec (8), ♂, 25.7.2006, J, SW, INS 15664; Bystříček (9), ♂, 25.7.2006, J, SW, INS 15708; Čenkovice, Bulík Hills (11), ♂, 25.7.2006, J, SW, INS 15663; Čenkovice, meanders of

Table 1. List of localities with recorded species (see Figure 2).

No.	Site	Recorded species
1	Among Horní Boříkovice, Hvězda Hills and Suchý vrch Hills	<i>lucifugus, ocellaris, trivialis, pulchra, cognata, fuliginosa</i>
2	Between Červená voda and Suchý vrch Hills	<i>mutua, fuliginosa</i>
3	Between Horní Boříkovice and Hvězda Hills	<i>ocellaris, trivialis, rotunda</i> (CR)
4	Between Jablonné nad Orlicí and Orličky	<i>ocellaris, trivialis</i>
5	Between Moravský Karlov and Červená Voda	<i>gemina, alternata, trivialis, nigricauda</i> (CR), <i>annulata</i>
6	Between Šanov and Horní Orlice	<i>trivialis</i>
7	Between Šanov and Kamenáč Hills	<i>lobata, ocellaris, trivialis, fuliginosa</i>
8	Bystřec	<i>hirtella, zetterstedti, manicata, unispinosa, ocellaris, trivialis, fuliginosa</i>
9	Bystříček	<i>auriculata, gemina, manicata, ocellaris, blandula, nubila, trivialis, nigricauda</i> (CR), <i>annulata, fuliginosa</i>
10	Čenkovice, Buková hora Hills	<i>mutua</i>
11	Čenkovice, Bulík Hills	<i>unispinosa, trivialis, fuliginosa</i>
12	Čenkovice, meanders of Čenkovička brook (NM)	<i>hirtella, zetterstedti, gemina, unispinosa, mutua, trivialis, fuliginosa</i>
13	Čenkovice, Pavlovy vrchy Hills	<i>unispinosa, ocellaris, trivialis</i>
14	Čenkovice, pond and swamps	<i>unispinosa, trivialis, cognata, fuliginosa</i>
15	Červená Voda, Hvězda Hills	<i>lucifugus, unispinosa, mutua, fuliginosa, vaseki</i> (EN)
16	Červená Voda, railway station	<i>auriculata, ocellaris, trivialis</i>
17	Červenovodské sedlo pass	<i>balkanicum</i> (CR), <i>satchelli, zetterstedti, unispinosa, mutua, trivialis</i>
18	Hoblovna	<i>gemina, mutua, hibernica</i> (CR), <i>fuliginosa, plumata</i> (CR)
19	Horní Boříkovice	<i>trivialis</i>
20	Jablonné nad Orlicí, Panská skála rock	<i>manicata, cognata, fuliginosa</i>
21	Martinova hať Hills	<i>manicata, cognata, fuliginosa</i>
22	Moravský Karlov	<i>auriculata, lucifugus, lobata, cinerea, ocellaris, trivialis, rotunda</i> (CR), <i>cognata</i>
23	Motyčkův žleb	<i>lucifugus, gemina, unispinosa, trivialis</i>
24	Orličky	<i>phalaenoides, unispinosa, ocellaris, mutua, trivialis, fuliginosa</i>
25	Šanov	<i>trivialis, rotunda</i> (CR), <i>fuliginosa</i>
26	Uhlířský důl valley	<i>vaseki</i> (EN)
27	Výprachtice, Palouky Hills	<i>lobata, trivialis</i>
28	Výprachtice, slopes of Výprachtický vrch Hills	<i>unispinosa, trivialis</i>
29	Výprachtice – Halda	<i>lobata, phalaenoides, vittata</i> (EN), <i>fuliginosa</i>
30	Zbytka (NR)	<i>zbytka</i> (NS), <i>splendidus</i> (NS)

Čenkovička brook (NM) (12), ♂, 12.7.2006, J, SW, INS 15662; Čenkovice, pond and swamps (14), ♂, 18.8.2006, J, SW, INS 15652; Červená Voda, Hvězda Hills (15), ♂, 16.7.2006, J, SW, INS 15743; Hoblovna (18), ♂, 12.7.2006, J, SW, INS 15676; Jablonné nad Orlicí, Panská skála rock (20), ♂, 18.8.2006, J, SW, INS 15696; Martinova hať Hills (21), ♂, 25.7.2006, J, SW, INS 15684; Orličky (24), ♂, 25.7.2006, J, SW, INS 15683; Šanov (25), ♂, 24.8.2006, J, SW, INS 15756; Výprachtice – Halda (29), ♂, 18.8.2006, J, SW, INS 15682.

Comments: Known in almost all of Europe (29 countries). Data from Eastern Europe are limited (only Lithuania). For a detailed distribution, see Wagner (2023) and Ježek et al. (2019, 2021).

Ulomyia plumata (Tonnoir, 1919)

Unpublished record: Hoblovna (18), ♂, 12.7.2006, J, SW, INS 15677.

Degree of endangerment: Critically endangered (CR) – see Ježek (2005).

Comments: Known from Albania, Belgium, the Czech Republic and France (Ježek et al. 2019).

Ulomyia vaseki Ježek, 2002

Published records: Uhlířský důl valley (26): Ježek (2002), Tkoč et al. (2014).

Unpublished record: Červená Voda, Hvězda Hills (15), ♂, 16.7.2006, J, SW, INS 15741.

Degree of endangerment: Endangered (EN) – see Ježek (2005).

Comments: Known only from the Czech Republic, Slovenia and Slovakia (Ježek 2002; Oboňa & Ježek 2014).

The detailed overview of all recorded species per site is summarized in Table 1. The highest biodiversity was recorded at the sites 9 (10 spp.), 22 (8), 8 (7), and 12 (7). Only one species was recorded at sites 6, 10 and 26.

In the present study, 30 species (5 from Paramormiini, 7 from Psychodini and 18 from Pericomaini) were recorded, which represents about 16.9% of all known moth flies (Diptera, Psychodidae – 178 species see appendix in Ježek et al. (2021)) known in the Czech Republic. In 11 localities (34%) species with the conservation status were recorded.

Analyses of possible relationships between elevation and the number of species found at the sampling site did not confirm a significant relationship between these parameters. Although the trend line in Figure 8 seems to indicate a trend in the number of species with altitude, only 3% (coefficient of determination $R^2 = 0.03$) of the variance in the dependent variable is explained by the model and, in fact, the statistical significance of this relationship is not confirmed by any method (regression or correlation analysis).

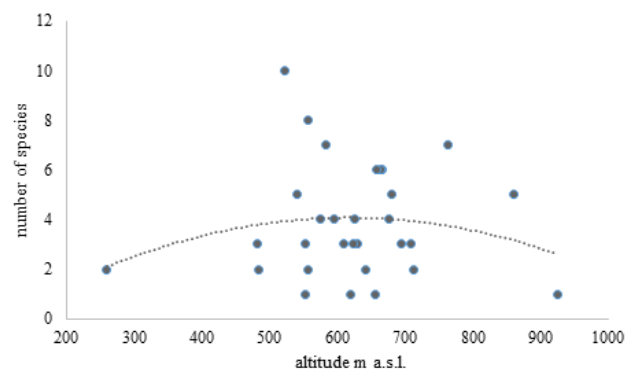


Figure 8. Relationship between altitude and the number of species of moth fly species, with polynomial trend line. Created by Jozef Oboňa.

A basic prerequisite for the understanding and protecting biodiversity is the establishment of a high-quality faunal and taxonomic base, which can then be used not only for zoogeographical but also for ecological research. Such knowledge can also be applied to the protection of endangered species and the management of their habitats.

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References

- Amano T, Lamming JDL, Sutherland WJ. 2016. Spatial gaps in global biodiversity information and the role of citizen science. *Bioscience* 66(5): 393–400.
- Bejarano EE, Estrada LG. 2016. Family Psychodidae. *Zootaxa* 4122(1): 187–238.
- Beuk P. 2021. *Threticus lucifugus*, een nieuwe motmug voor Nederland (Diptera: Psychodidae) (*Threticus lucifugus*, a new moth fly for the Netherlands (Diptera: Psychodidae)). *Entomologische berichten* 81(4): 174–175.
- Braioni MG. 1994. Faunistic research in a fluvial ecosystem study: the case of the River Adige. *Bollettino di zoologia* 61: 415–424.
- Ehrendorfer F, Hamann U. 1965. Vorschläge zu einer floristischen Kartierung von Mitteleuropa. *Berichte der Deutschen Botanischen Gesellschaft* 78: 35–50.
- Girardello M, Martellos S, Pardo A, Bertolino S. 2018. Gaps in biodiversity occurrence information may hamper the achievement of international biodiversity targets: insights from a cross-taxon analysis. *Environmental Conservation* 45(4): 370–377.
- Ježek J. 2002. The first account of Slovenian moth flies (Psychodidae, Diptera). *Časopis Národního muzea, Řada přírodovědná* 171(1–4): 89–116.

- Ježek J. 2003. New faunistic data and check list of non Phlebotomine moth flies (Diptera, Psychodidae) from the Czech and Slovak Republics. *Časopis Národního Muzea, Řada přírodovědná* 172(1–4): 113–128.
- Ježek J. 2004. New and interesting moth flies (Diptera, Psychodidae) from protected and underestimated natural areas of the Czech Republic. *Časopis Národního Muzea, Řada přírodovědná* 173(1–4): 121–132.
- Ježek J. 2005. Psychodidae (koutulovití). In: Farkač J, Král D, Škorpík M, eds. *Červený seznam ohrožených druhů České republiky, Bezobratlí*. Red list of threatened species in the Czech Republic, Invertebrates. Praha: Agentura ochrany přírody a krajiny ČR, p. 760.
- Ježek J. 2006. Psychodidae (Diptera) of the Jeseníky Protected Landscape Area and its environs with descriptions of two new *Berdeniella* species from the Czech Republic. *Acta Entomologica Musei Nationalis Pragae* 46: 151–192.
- Ježek J. 2007. New records of moth flies (Diptera, Psychodidae) from Poland with description of *Apsycha* gen. nov. *Acta Zoologica Universitatis Comenianae* 47(2): 145–160.
- Ježek J, Hájek J. 2007. Psychodidae (Diptera) of the Orlické hory Protected Landscape Area and neighbouring areas with descriptions of two new species from the Czech Republic. *Acta Entomologica Musei Nationalis Pragae* 47: 237–285.
- Ježek J, Manko P, Fedorčák J, Koco Š, Varga J, Shumka S, Oboňa J. 2023b. Psychodidae of Albania. *Redia* 106: 21–26.
- Ježek J, Manko P, Oboňa J. 2020. Synopsis of the Psychodidae (Diptera) fauna of Bulgaria. *Zootaxa* 4877(2): 201–240.
- Ježek J, Oboňa J, Grootaert P, Lock K, Manko P, Dekoninck W. 2020. Review of two Tonnoir moth fly species, overlooked for a century (Diptera: Psychodidae: Psychodinae). *Acta Entomologica Musei Nationalis Pragae* 60: 517–526.
- Ježek J, Oboňa J, Manko P, Trýzna M. 2021. Moth Flies (Diptera: Psychodidae) of the northern Hercynian mountains and adjacent localities (Czech Republic). *Acta Musei Silesiae, Scientiae Naturales* 70: 135–182.
- Ježek J, Oboňa J, Manko P. 2023a. Moth flies (Diptera: Psychodidae) of Abkhazia (western Caucasus, Georgia) with some additional faunistic data from Armenia, Georgia, and Russia. *Historia Naturalis Bulgarica* 45(4): 57–82.
- Ježek J, Oboňa J, Píkrýl I, Mikátová B. 2019. Moth flies (Diptera: Psychodidae) of the western Hercynian mountains, Sokolov open-cast coal mines and dumps (Czech Republic). *Acta Musei Silesiae, Scientiae Naturales* 67(3): 193–292.
- Ježek J, Omelková M. 2012. Moth flies (Diptera: Psychodidae) of the Bílé Karpaty Protected Landscape Area and Biosphere Reserve (Czech Republic). In: Malenovský I, Kment P, Konvička O. (eds.): Species inventories of selected insect groups in the Bílé Karpaty Protected Landscape Area and Biosphere Reserve (Czech Republic). *Acta Musei Moraviae, Scientiae biologicae (Brno)* 96(2): 763–802.
- Ježek J, van Harten A. 2005. Further new taxa and little known species of non-biting moth flies (Diptera, Psychodidae) from Yemen. *Acta Entomologica Musei Nationalis Pragae* 45: 199–220.
- Ježek J, van Harten A. 2009. Order Diptera, Family Psychodidae. Subfamily Psychodinae (non-biting moth flies). In: van Harten A, ed. *Arthropod Fauna of the United Arab Emirates, Vol. 2*. Abu Dhabi: Dar Al Ummah Printing, Publishing, Distribution and Advertising, pp. 686–711.
- Ježek J, Yağci Ş. 2005. Common non-biting moth flies (Insecta, Diptera, Psychodidae) new to the fauna of Turkey. *Acta Parasitologica Turcica* 29: 188–192.
- Kocielek JP, Stoermer EF. 2001. Taxonomy and ecology: a marriage of necessity. *Diatom Research* 16(2): 433–442.
- Kročá J, Ježek J. 2015. Moth flies (Psychodidae: Diptera) of the Moravskoslezské Beskydy Mts and Podbeskydská pahorkatina Upland (Czech Republic). *Acta Musei Silesiae, Scientiae Naturales* 64: 27–50.
- Kročá J, Ježek J. 2019. Moth flies (Psychodidae: Diptera) of the Moravskoslezské Beskydy Mts and Podbeskydská pahorkatina Upland (Czech Republic), II. *Acta Musei Silesiae, Scientiae Naturales* 68: 201–232.
- Kročá J, Ježek J. 2022. Moth flies (Psychodidae: Diptera) of the Moravskoslezské Beskydy Mts and Podbeskydská pahorkatina Upland (Czech Republic), III. *Acta Musei Silesiae, Scientiae Naturales* 71: 1–29.
- Kvifte GM. 2014. Nomenclature and taxonomy of *Telmatoscopus* Eaton and *Seoda* Enderlein; with a discussion of parameral evolution in Paramormiini and Pericomaini (Diptera: Psychodidae, Psychodinae). *Zootaxa* 3878(4): 390–400.
- McNeely JA. 2002. The role of taxonomy in conserving biodiversity. *Journal for Nature Conservation* 10(3): 145–153.
- Oboňa J, Ježek J. 2014. Prodrómus of moth flies (Diptera: Psychodidae) from Slovakia. *Acta Musei Silesiae, Scientiae Naturales* 63: 193–251.
- Omelková M, Ježek J. 2012a. Two new species of *Pneumia* Enderlein (Diptera, Psychodidae, Psychodinae) from the Palaearctic Region. *Zootaxa* 3180: 1–18.
- Omelková M, Ježek J. 2012b. A new species of the genus *Trichomyia* (Diptera: Psychodidae) and new faunistic data on non-phlebotomine moth flies from the Podýjí NP and its surroundings (Czech Republic). *Acta Entomologica Musei Nationalis Pragae* 52(2): 505–533.
- Omelková M, Ježek J. 2012c. Two new species of *Philosepedon* Eaton (Diptera, Psychodidae, Psychodinae) from Europe, with comments on subgeneric classification. *Zootaxa* 3275: 29–42.
- Omelková M, Ježek J. 2017. Two new species of *Jungiella* (Diptera: Psychodidae: Psychodinae) from the Palaearctic Region. *Zootaxa* 4250(6): 560–576.
- Pape T, Blagoderov V, Mostovski MB. 2011. Order Diptera Linnaeus, 1758. In: Zhang Z-Q. (ed.) *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa* 3148: 222–229.
- Schlick-Steiner BC, Steiner FM, Seifert B, Stauffer C, Christian E, Crozier RH. 2010. Integrative taxonomy: a multisource approach to exploring biodiversity. *Annual review of entomology* 55: 421–438.
- Szabó J. 1983. 10. család: Psychodidae – Lepkeszúnyogok. *Fauna Hungariae* 156: 1–78.
- Tkoč M, Pecharová M, Ježek J. 2014. Catalogue of the type specimens of Diptera deposited in the Department of Entomology, National Museum, Prague, Czech Republic. Moth flies (Psychodidae). *Acta Entomologica Musei Nationalis Pragae* 54(2): 789–837.
- Vaillant F. 1971–1983. Psychodidae–Psychodinae (not finished). In: Lindner E, ed. *Die Fliegen der palaearktischen Region*. Stuttgart: 287(1971): 1–48; 291(1972): 49–78; 292(1972): 79–108; 305(1974): 109–142; 310(1975): 143–182; 313(1977): 183–206; 317(1978): 207–238; 320(1979): 239–270; 326(1981): 271–310; 328(1983): 311–358.
- Wagner R. 1990. Family Psychodidae. In: Soós A, Papp L, eds. *Catalogue of Palaearctic Diptera. Vol. 2*. Budapest: Akadémiai Kiado, pp. 11–65.
- Wagner R. 2023. Fauna Europaea: Psychodidae. [Accessed 21 October 2023]. In: de Jong H, ed. *Fauna Europaea: Diptera Nematocera*, version 2018. Available on: <https://fauna-eu.org>.
- Withers P. 1989. Moth Flies. Diptera: Psychodidae. *Dipterists Digest* 4: 1–83.