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Some Diptera records of National Nature Reserves Dreveník and Sivá Brada (Slovakia)

Paul L. Th. Beuk[1], Milan Barlog[2], Alexander Csanády[3], Kateřina Dvořáková[4], Libor Dvořák[4], Jean-Paul Haenni[5], Jan Ježek[6], Peter Manko[7], Laura Mlynárová[7], Branislav Tej[8] & Jozef Oboňa[7]

Abstract
This contribution fills the Diptera biodiversity knowledge gap of two National Nature Reserves in the east of Slovakia. In total, 53 flies species from 24 families were confirmed in NNR Dreveník and NNR Sivá Brada. Among them tree new records of Dolichopodidae for the fauna of Slovakia: *Campsicnemus magius* (Loew, 1845), *Chrysotus palustris* Verrall, 1876, Ephydridae: *Notiphila* (*Agrolimna*) *uliginosa* Haliday, 1839) as well as four valuable species known only from few records from Slovakia *Tachytrechus ocior* Loew, *Dixella obscura* (Loew, 1849), *Psilopa stackelbergi* Nartshuk, 1970, *Cnodacophora stylifera* (Loew, 1870). As an additional new record *Sybistroma discipes* (Germar, 1817) (Dolichopodidae) is added from Levoča town, near Röhrgrund pond. The knowledge of the biodiversity of protected areas is crucial for the appropriate management and protection of fauna in these rare areas.

Key words
flies, faunistics, interesting findings, first record, biodiversity, Central Europe

Introduction

The knowledge of biodiversity within an area is vital if we want to develop adequate conservation strategies. Nature Reserves are purposefully established, reserved and managed for purposes of conservation and to provide special opportunities for study or research, and therefore their biodiversity should be well known (e.g. Pino-Del-Carpio *et al.* 2014). A coherent first step to conserve biodiversity is to have the most accurate knowledge of the diversity that occurs in an area and assess its status (Maddock & Samways 2000). There are many such locations in the territory of Slovakia. The National Nature Reserve (NNR) Sivá Brada (Spišské Podhradie env.) protects landforms like Quaternary travertine hill and rare halophytic and xerophytic species of vegetation and the salt-marshes (e.g. Michaeli *et al.* 2017). The NNR Dreveník (Spišské Podhradie env.) is a travertine pile in the shape of a table mountain (e.g. Blaščáková *et al.* 2010). However, to our knowledge the Diptera biodiversity within these sites is known has not yet been assessed. The disparity observed in the vertebrate or

invertebrate species information constitutes an information gap that could (or should) be solved by scientists and managers alike (e.g. Pino-Del-Carpio *et al.* 2014).
Therefore, the main goal of this contribution is to at least partially fill the Diptera biodiversity knowledge gap in these areas.

Material and methods

Diptera were collected by J. Oboňa, M. Barlog, A. Csanády, L. Mlynárová, B. Tej and P. Manko in the growing season in 2022 (more precisely during the months of May and June) by sweep-netting in following sites:

Site 1. NNR Sivá Brada, dry hill with travertine springs (Fig 1), 490 m a.s.l., 49°00'25.9"N 20°43'23.6"E, mostly dry grasslands, 20.5.2022, leg. J. Oboňa et al.
Site 2. NNR Sivá Brada, wetland at the bottom of the hill (Fig. 2), 460 m a.s.l., 49°00'23.5"N 20°43'03.4"E, waterlogged soil with Juncaceae, 20.5.2022, leg. J. Oboňa et al.
Site 3. NNR Dreveník, Peklo (Fig. 3), 575 m a.s.l., 48°59'0.492"N 20°46'15.705"E, travertine rocks, 16.6.2022, leg. J. Oboňa et al.
Site 4. NNR Dreveník, Skalné mesto (Rock city), Kamenný raj (Stone paradise) (Fig. 4), 575 m a.s.l., 48°59'17.626"N 20°46'29.725"E, travertine rocks, 16.6.2022, leg. J. Oboňa et al.
Site 5. Levoča town, Röhrgrund pond, 571 m a.s.l., 49°03'13.5"N 20°35'03.2"E, vegetation near the mineral water spring (Fig. 5), 27.7.2021 leg. L. Mlynárová.



Figure 1. NNR Sivá Brada, dry hill with travertine springs (Photo P. Manko).



Figure 2. NNR Sivá Brada, wetland at the bottom of the hill (Photo M. Barlog).



Figure 3. NNR Dreveník, Peklo (Photo M. Barlog).



Figure 4. NNR Dreveník, Skalné mesto (Rock city), Kamenný raj (Stone paradise) (Photo M. Barlog).



Figure 5. Levoča town, Röhrgrund pond, vegetation near the mineral water spring (Photo L. Mlynárová).

The captured specimens were preserved in 75% ethanol in the field. In the laboratory P. L. Th. Beuk identified Dolichopodidae (d'Assis Fonseca 1978; Chandler & Negrobov 2008; Grichanov 2006, 2007; Meuffels & Grootaert 1990; Negrobov & Naglis 2016), Ephydridae (Collin 1966; Drake 2001, 2013; Stuke 2010; Zatwarnicki 2018; Zatwarnicki & Irwin 2018), Empididae (Chvála 2005, 2008; Syrovátka 1991, 2000), Hybotidae (Barták & Kubík 2009; Chvála 1983), Muscidae (Gregor *et al.* 2002), Rhagionidae: *Ptiolina* (Stubbs & Drake 2014) and Sphaeroceridae (Pitkin 1988). This material in alcohol is deposited in the collection of the Natuurhistorisch Museum Maastricht, Maastricht, the Netherlands. L. Dvořák identified Asilidae (Geller-Grimm 2003), Bibionidae (Haenni 1982), Clusiidae (Stackelberg 1970), Micropezidae (Roháček & Barták 1990), Opomyzidae (Drake 1993), Rhagionidae (except for *Ptiolina* identified by P. L. Th. Beuk and in the collection of Natuurhistorisch Museum Maastricht, Maastricht, the Netherlands) (Rozkošný & Spitzer 1965), Stratiomyidae (Rozkošný 1982–1983) and Ulidiidae (Richter 1970). This material is pinned and deposited in the private collection of L. Dvořák. K. Dvořáková identified Dryomyzidae (Ozerov 1987), Heleomyzidae (Papp 1981), Lauxaniidae (Semelbauer 2016) and Psilidae (Lauriaut & Claude 2022). This material is pinned and deposited in the private collection of K. Dvořáková. J. Oboňa identified Dixidae (Disney 1999), Limoniidae (Oosterbroek 2022; Podenas *et al.* 2010), Ptychopteridae (Zitek-Zwyrtek 1971) and Tipulidae (Oosterbroek 2022). This material in alcohol is deposited in the collection of the Laboratory and Museum of Evolutionary Ecology, Department of Ecology, University of Prešov (LMEE PO). J. Ježek identified Psychodidae (Ježek 1986; Jung 1956; Vaillant (1972–1983); Withers 1989). In spite of doubled specimens conserved by ethanol in a parallel collection, representative slides are labelled with the inventory slide number of the family Psychodidae (Inv. No.) and are included in the Diptera collection of the National Museum Prague collections (NMPC), see Tkoč *et al.* (2014). J-P. Haenni identified Scatopsidae (Cook 1974), and the material is deposited in the collection of Muséum d'histoire naturelle Neuchâtel (MHNN).

Results and Discussion

In total 53 species belonging to 24 Diptera families were recorded in NNR Sivá Brada (sites 1 and 2) and NNR Dreveník (Sites 3, 4). One additional sample from the site 5 is also added. Ten species belong to family Dolichopodidae, seven in Limoniidae, five in Ephydridae, four in Lauxaniidae, three in Psychodidae and Stratiomyidae, two in Empididae, Hybotidae, Opomyzidae, Rhagionidae

and Tipulidae. The remaining families' (Asilidae, Bibionidae, Clusiidae, Dixidae, Dryomyzidae, Heleomyzidae, Muscidae, Micropezidae, Psilidae, Ptychopteridae, Scatopsidae, Sphaeroceridae and Ulidiidae) were represented by only one species. A detailed faunistic review is presented below.

Diptera

Asilidae
Dioctria rufipes (De Geer, 1776)
Material examined: site 2, 1 ♀.

Bibionidae
Dilophus febrilis (Linnaeus, 1758)
Material examined: site 2, 1 ♀.

Clusiidae
Clusiodes albimanus (Meigen, 1830)
Material examined: site 3, 1 ♂.

Dixidae
Dixella obscura (Loew, 1849)
Material examined: site 2, 1 ♂, 1 ♀.
Note. Second record for Slovakia, this species was hitherto known only from Vyšný Sliač (Sikora *et al*. 2017).

Dolichopodidae
Campsicnemus curvipes (Fallén, 1823)
Material examined: site 4, 1 ♀.

Campsicnemus magius (Loew, 1845)
Material examined: Site 2, 1 ♂. (Fig. 6)
Note: Species known from Afro-tropical region, Austria, Belgium, Britain I., Bulgaria, Czech Republic, East Palaearctic, France, Germany, Hungary, Italy ? (doubtful), Near East, North Africa, Romania, Sicily, South European Russia, Spain, the Netherlands, Ukraine. Published records from the former Yugoslavia were not yet matched with present day territories (Pollet 2011). **First record for Slovakia** (Pollet & Suvák 2009).



Figure 6. *Campsicnemus magius* (Loew, 1845) (♂; Dolichopodidae) habitus.

Dolichopus claviger Stannius, 1831
Material examined: site 4, 1 ♀.

Hercostomus inornatus (Loew, 1857)
Material examined: site 4, 1 ♀.

Chrysotus palustris Verrall, 1876
Material examined: site 2, 7 ♂♂, 12 ♀♀.
Note: Species known from Austria, Belgium, Britain I., Croatia, Czech Republic, France, Germany, Norway, Sweden, the Netherlands (Pollet 2011). **First record for Slovakia** (Pollet & Suvák 2009).

Neurigona quadrifasciata (Fabricius, 1781)
Material examined: site 4, 1 ♂.

Sciapus platypterus (Fabricius, 1805)
Material examined: site 4, 1 ♀

Sybistroma discipes (Germar, 1817)
Material examined: site 5, 1 ♂.
Note: Species known from Austria, Belgium, Britain I., Czech Republic, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Near East, Poland, Romania, South European Russia, Sweden, Switzerland, the Netherlands, Central European Russia, East European Russia ?, North European Russia ?, Northwest European Russia ? (Pollet 2011). **First record for Slovakia** (Pollet & Suvák 2009).

Tachytrechus ocior Loew
Material examined: site 1, 2 ♂♂.
Note: Rare species, known from sea coasts and salt marshes. In Slovakia known only from Sitno and Lučenec (Olejníček 1984).

Xanthochlorus ornatus (Haliday, 1832)
Material examined: site 3, 3 ♂♂, 1 ♀, site 4, 2 ♂♂, 1 ♀.

Dryomyzidae
Dryomyza anilis Fallén, 1820
Material examined: site 4, 1 ♀

Ephydridae
Hydrellia griseola (Fallén, 1813)
Material examined: site 2, 2 ♂♂.

Notiphila (*Agrolimna*) *uliginosa* Haliday, 1839
Material examined: site 1, 1 ♂, 1 ♀.
Note: Species known from Austria, Britain I., Czech Republic, Denmark, East Palaearctic, Estonia, Finland, Germany, Ireland, Latvia, Lithuania, Nearctic region, Norway, Poland, Sweden, the Netherlands (Bystrowski 2011). **First record for Slovakia** (Kubátová-Hiršová 2009).

Psilopa stackelbergi Nartshuk, 1970
Material examined: site 2, 1 ♂.
Note: Second record for Slovakia, known only from Háj village env. (Zatwarnicki 2018).

Scatella paludum (Meigen, 1830)
Material examined: site 2, 4 ♂♂, 5 ♀♀, site 1, 1 ♂.

Scatella tenuicosta Collin, 1930
Material examined: site 2, 2 ♂♂, 3 ♀♀.

Empididae
Empis filata Loew, 1873
Material examined: site 2, 1 ♂.

Hilara gallica (Meigen, 1804)
Material examined: site 2, 1 ♂.

Heleomyzidae
Suillia pallida (Fallén, 1820)
Material examined: site 3, 1 ♀.

Hybotidae
Leptopeza flavipes (Meigen, 1820)
Material examined: site 4, 1 ♀.

Trichina bilobata Collin, 1926
Material examined: site 4, 1 ♀

Lauxaniidae
Meiosimyza decempunctata (Fallén, 1820)
Material examined: site 3, 1 ♂.

Meiosimyza rorida (Fallén, 1820)
Material examined: site 4, 2 ♀♀, site 3, 4 ♀♀.

Sapromyza sexpunctata Meigen, 1826
Material examined: site 3, 1 ♀.

Tricholauxania praeusta (Fallén, 1820)
Material examined: site 4, 1 ♀.

Limoniidae
Dicranomyia (*Dicranomyia*) *modesta* (Meigen, 1818)
Material examined: site 3, 2 ♂♂, site 4, 1 ♂.

Epiphragma (*Epiphragma*) *ocellare* (Linnaeus, 1760)
Material examined: site 3, 1 ♂, 1 ♀, site 4, 1 ♂.

Limonia hercegovinae (Strobl, 1898)
Material examined: site 4, 1 ♂, 2 ♀♀.

Limonia nubeculosa Meigen, 1804
Material examined: site 3, 2 ♂♂, 1 ♀.

Molophilus (*Molophilus*) *obscurus* (Meigen, 1818)
Material examined: site 2, 2 ♂♂, site 1, 1 ♂.

Ormosia (*Ormosia*) *hederae* (Curtis, 1835)
Material examined: site 2, 2 ♂♂.

Symplecta (*Psiloconopa*) *stictica stictica* (Meigen, 1818)
Material examined: site 2, 1 ♂.

Muscidae
Schoenomyza litorella (Fallén, 1823)
Material examined: site 2, 1 ♂, 2 ♀♀.

Micropezidae
Cnodacophora stylifera (Loew, 1870)
Material examined: site 2, 1 ♂.
Note: Very rare species known from several European countries only. The rarest species of the family in Slovakia which is associated with open marshland habitats (Roháček 2012). From Slovakia, this species was hitherto known from two localities in the Turčianská kotlina basin (Roháček & Barták 1990) and one locality in the Gemer area (Roháček 2012).

Opomyzidae
Opomyza florum (Fabricius, 1794)
Material examined: site 4, 1 ♀.

Opomyza germinationis (Linnaeus, 1758)
Material examined: site 4, 1 ♀

Psilidae
Psila fimetaria (Linnaeus, 1761)
Material examined: site 4, 1 ♂, 1 ♀, site 3, 1 ♂.

Psychodidae
Promormia silesiensis Ježek, 1983
Material examined: site 3, 9 ♂♂, site 4, 4 ♂♂; deposited in NMPC incl. doubled specimens (slides Inv. No. 31498 and 31500).

Promormia eatoni (Tonnoir, 1940)
Material examined: site 4, 1 ♂; deposited in NMPC (slide Inv. No. 31497).

Pneumia rivularis (Berdén, 1954)
Material examined: site 4, 4 ♂♂; deposited in NMPC incl. doubled specimens (slide Inv. No. 31499).

Ptychopteridae
Ptychoptera scutellaris Meigen, 1818
Material examined: site 2, 7 ♂♂, 1 ♀.

Rhagionidae
Ptiolina obscura (Fallén, 1814*)*
Material examined: site 4, 1 ♂.
Note: A rare species throughout Europe. Known from Slovakia only from few uncertain records published (e.g. Gaderská dolina valley, Stankovany village, etc.) by V. Straka since the first record (Straka 1984).

Rhagio maculatus (De Geer, 1776)
Material examined: site 3, 1 ♂.

Scatopsidae
Reichertella nigra (Meigen, 1804)
Material examined: site 2, 2 ♂♂, 1 ♀.

Sphaeroceridae
Pseudocollinella humida (Haliday, 1836)
Material examined: site 2, 1 ♀.

Stratiomyidae
Beris morrisii Dale, 1841
Material examined: site 4, 1 ♂, 1 ♀.

Nemotelus nigrinus Fallén, 1817
Material examined: site 1, 1 ♀.

Tipulidae
Tipula (*Acutipula*) *fulvipennis* De Geer, 1776
Material examined: site 1, 1 ♂.

Tipula (*Lunatipula*) *vernalis* Meigen, 1804
Material examined: site 1, 1 ♂.

Ulidiidae
Herina frondescentiae (Linnaeus, 1758)
Material examined: site 1, 2 ♀♀.

Conclusion

Eleven families of Diptera were recorded from NNR Sivá Brada (Asilidae, Bibionidae, Dixidae, Ephydridae, Empididae, Muscidae, Micropezidae, Ptychopteridae, Scatopsidae, Tipulidae, and Ulidiidae) with three new records for fauna of Slovakia (*Campsicnemus magius, Chrysotus palustris, Notiphila (Agrolimna) uliginosa*). Nine families of Diptera were recorded from NNR Dreveník (Clusiidae, Dryomyzidae, Heleomyzidae, Hybotidae, Lauxaniidae, Opomyzidae, Psilidae, Psychodidae, and Rhagionidae). Families present on both sites were Dolichopodidae, Limoniidae, and Stratiomyidae. In addition, *Sybistroma discipes* of the family Dolichopodidae is also newly recorded for Slovakia from Levoča town, Röhrgrund pond.

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Authors´ addresses:

1. Paul L. Th. Beuk, Natuurhistorisch Museum Maastricht, De Bosquetplein 7, NL–6211 KJ Maastricht, the Netherlands. E-mail: paul.beuk@maastricht.nl,

2. Milan Barlog, Slovak Paradise National Park Administration with headquarters in Spišská Nová Ves, Štefánikove nám. č. 9, SK–052 01 Spišská Nová Ves, Slovakia. E-mail: milan.barlog@npslovenskyraj.sk,

3. Alexander Csanády, Department of Biology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, SK–08116 Prešov, Slovakia. E-mail: alexander.csanady@unipo.sk,

4. Kateřina Dvořáková, Libor Dvořák, Tři Sekery 21, CZ–35301 Mariánské Lázně, Czech Republic. E-mails: lib.dvorak@seznam.cz, K.Marsova@seznam.cz,

5. Jean-Paul Haenni, Muséum d'histoire naturelle, Rue des Terreaux 14, CH–2000 Neuchâtel, Switzerland. E-mail: Jean-Paul.Haenni@unine.ch,

6. Jan Ježek, National Museum, Department of Entomology, Cirkusová 1740, CZ–19300 Prague 9 – Horní Počernice, Czech Republic. E-mail: jan.jezek@o2active.cz,

7. Peter Manko, Laura Mlynárová, Jozef Oboňa, Department of Ecology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, SK–08116 Prešov, Slovakia. E-mails: laura.mlynarova@smail.unipo.sk, peter.manko@unipo.sk, jozef.obona@unipo.sk,

8. Branislav Tej, Hervartov 141, SK–08622 Kľušov, Slovakia. E-mail: branislavtej@gmail.com.