

New host-parasite association of hippoboscids flies with birds from Slovakia

Peter Krišovský, Stanislav Greš, Martin Hromada,
Laura Mlynárová, Jozef Oboňa

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Abstract: We present a summarization of an overview of hippoboscids flies parasitizing bird hosts in Slovakia. Six new host associations are presented in this paper: *Lipoptena fortisetosa* Maa, 1965 collected on *Certhia familiaris* Linnaeus, 1758 and *Sylvia atricapilla* (Linnaeus, 1758), *Ornithomya biloba* Dufour, 1827 collected on *S. atricapilla*, *Ornithomya chloropus* (Bergroth, 1901) collected on *Anthus trivialis* (Linnaeus, 1758), and *Ornithomya fringillina* Curtis, 1836 collected on *Phylloscopus collybita* (Vieillot, 1817) and *A. trivialis* are recorded for the first time from Slovakia.

Key words: Hippoboscidae, louse flies, ectoparasites, birds, host-parasite associations

Introduction

The hippoboscids (Insecta: Diptera: Hippoboscidae) are specific ectoparasites of birds and mammals with highly interesting biology and ecology (e.g. González et al. 2023; Peña-Espinoza et al. 2023; Rekecki & Rajkovic 2023; Yatsuk et al. 2023).

The hippoboscids are divided into the subfamilies Lipopteninae (tribe Lipoptenini, parasitising exclusively mammals), Ornithomyinae (tribes Olfersiini and Ornithomyini composed of species that mostly parasitise birds) and Hippoboscinae (tribe Hippoboscini with all species in Europe affecting mammals) (Dick 2018; Reeves and Lloyd 2019; Oboňa et al. 2023). They play important roles in ecosystem functioning and can also serve as indicators of biodiversity and ecosystem health, which makes them an important group to study in the context of conservation (Hudson et al. 2006; Frainer et al. 2018).

These bloodsucking insects are also important from a public health perspective, as they can serve as vectors of various endoparasitic diseases (e.g., Baker 1967; Sychra et al. 2020; Werszko et al. 2020; Attia and Salem 2022, Mašlanko et al. 2022, Čisovská Bazsalovicsová et al. 2023, Tiawsirisup et al. 2023).

The continuous bird ringing provides an excellent opportunity to study hematophagous ectoparasites feeding on birds (e.g. Oboňa et al. 2019b, 2021). In this paper, we are expanding the knowledge known up to now of hippoboscids parasitizing on birds in Slovakia.

Material and methods

The hippoboscids flies were collected at various sites (see Study sites). Collected hippoboscids were placed in the eppendorf tubes, fixed in ethanol (96%) and subsequently identified in the laboratory using a determination key by Oboňa et al. (2022). The prevalence was calculated using Reiczigel et al. (2019).

Study sites:

Sabinov 49.10519, 21.09694

Drienovec (the Drienovec bird Ringing Station) 48.6151, 20.9152

Perín 48.53775, 21.14222

Uzovský Šalgov 49.0930, 21.0667

Results and Discussion

New host-parasite interactions

Lipoptena fortisetosa Maa, 1965

Material examined: Drienovec: 1 ind., 8.9.2023, collected on Eurasian Treecreeper *Certhia familiaris* Linnaeus, 1758 (ring code: T113890); Perín: 1 ind., 26.8.2023, collected on Eurasian Blackcap *Sylvia atricapilla* (Linnaeus, 1758).

Note: Both parasites settle on the host, losing their wings. Birds are accidental hosts for *Lipoptena* species (Oboňa et al. 2021), as they cannot reproduce after feeding on birds. For this reason, this is even considered an ecological trap (Robertson & Hutto 2006; Kaunisto et al. 2009; Mašlanko et al. 2020).



Fig. 1: The eurasian blackcap *Sylvia atricapilla* (Linnaeus, 1758) (photo S. Greš).

Ornithomya biloba Dufour, 1827

Material examined: Perín: 1 ind., 26.8.2023, collected on Eurasian Blackcap *Sylvia atricapilla* (Linnaeus, 1758).

Note: It is most likely just a random jump in net of the parasite from the primary host *Hirundo rustica* Linnaeus, 1758.

Ornithomya chloropus (Bergroth, 1901)

Material examined: Drienovec: 1 ind., 17.9.2023, collected on Tree Pipit *Anthus trivialis* (Linnaeus, 1758) (S676041).

Note: *A. trivialis* is here recorded as the new host of *O. chloropus* in Slovakia.



Fig. 2: The tree pipit *Anthus trivialis* (Linnaeus, 1758) (photo S. Greš).

***Ornithomya fringillina* Curtis, 1836**

Material examined: Drienovec: 1 ind., 5.9.2023, collected on Common Chiffchaff *Phylloscopus collybita* (Vieillot, 1817) (T113856); 1 ind., 6.9.2023, collected on Tree Pipit *Anthus trivialis* (Linnaeus, 1758) (S671727).

Note. *Ph. collybita* and *A. trivialis* are here recorded as new hosts of *O. fringillina* in Slovakia.

Additional material

***Crataerina pallida* (Olivier in Latreille, 1811)**

Material examined: Sabinov: 1 ind., 26.5.2023, *Apus apus* (Linnaeus, 1758).

***Lipoptena fortisetosa* Maa, 1965**

Material examined: Sabinov: 1 ind., 13.10.2023, *Parus major* Linnaeus, 1758 (P146611). Drienovec: 1 ind., 7.10.2023, *Prunella modularis* (Linnaeus, 1758).

***Ornithomya avicularia* (Linnaeus, 1758)**

Material examined: Drienovec: 1 ind., 5.9.2023, *Anthus trivialis* (Linnaeus, 1758) (S6714633). Uzovský Šalgov: 1 ind., 16.7.2023, *Hirundo rustica* Linnaeus, 1758 (U102765); 2 ind., 19.7.2023, *Acrocephalus arundinaceus* (Linnaeus, 1758) (N24938); 1 ind., 8.8.2023, *Hirundo rustica* Linnaeus, 1758 (U106398); 2 ind., 10.8.2023, *Turdus merula* Linnaeus, 1758 (L429851); 1 ind., 22.8.2023, *Hirundo rustica* Linnaeus, 1758 (U98682).

***Ornithomya biloba* Dufour, 1827**

Material examined: Drienovec: 1 ind., 5.9.2023, *Hirundo rustica* Linnaeus, 1758 (U84494); 1 ind., 9.9.2023, *Parus major* Linnaeus, 1758 (P147195); 2 ind., 13.9.2023, *Hirundo rustica* Linnaeus, 1758 (U84450). Uzovský Šalgov: 1 ind., 10.8.2023, *Hirundo rustica* Linnaeus, 1758 (U106560); 1 ind., 11.8.2023, *Hirundo rustica* Linnaeus, 1758 (U102993); 1 ind., 11.8.2023, *Hirundo rustica* Linnaeus, 1758 (U106222); 1 ind., 20.8.2023, *Hirundo rustica* Linnaeus, 1758 (U106924); 1 ind., 20.8.2023, *Hirundo rustica* Linnaeus, 1758 (U106920); 1 ind., 27.8.2023, *Hirundo rustica* Linnaeus, 1758.

***Ornithomya fringillina* Curtis, 1836**

Material examined: Drienovec: 2 ind., 6.9.2023, *Lanius collurio* Linnaeus, 1758 (N28115); 1 ind., 6.9.2023, *Anthus trivialis* (Linnaeus, 1758) (S671727); 1 ind., 13.9.2023, *Curruca curruca* (Linnaeus, 1758) (S673419); 1 ind., 8.9.2023, human. Uzovský Šalgov: 1 ind., 17.8.2023, *Acrocephalus arundinaceus* (Linnaeus, 1758) (N24939).

Note: The record from human is most likely just a random jump of the parasite from the primary birds host.

In the present paper, 4 interactions were recorded between *L. fortisetosa* and birds host. All host-parasite interactions of hippoboscid flies with birds from Slovakia are summarized in Tab. 1. We also recorded 4 interactions between *O. biloba* and birds host. In 10 cases, hosts were infested by solitary louse flies. Two louse fly individuals on a single host were found in one case. The prevalence of *O. biloba* in *H. rustica* is from 1.4% to 7.1%. The prevalence of *O. biloba* in *S. atricapilla* is 2.4%.

A total of 4 interactions between *O. avicularia* and birds host were recorded. In 5 cases, hosts were infested by solitary louse flies. Two louse fly individuals on a single host were found in two cases. The prevalence of *O. avicularia* in *H. rustica* is from 0.7% to 4.1%. The prevalence of *O. avicularia* in *T. merula* is 100%.

A total of 6 interactions between *O. fringillina* and birds host were examined. In 6 cases, hosts were infested by solitary louse flies. Two louse fly individuals on a single host were found in one case. The prevalence of *O. fringillina* in *A. arundinaceus* and *C. curruca* is 100%, in *L. collurio* 50%, in *A. trivialis* 11% and *Ph. collybita* 12.5%.

Tab. 1: Systematic overview of updated bird host-parasite associations recorded for Slovakian Hippoboscidae.

Parasite species	Host birds order	Host birds family	Host species
<i>Hippobosca equina</i>	Accipitriformes	Accipitridae	<i>Accipiter gentilis</i>
<i>Lipoptena cervi</i>	Passeriformes	Turdidae	<i>Turdus philomelos</i>
<i>Lipoptena fortisetosa</i>	Passeriformes	Certhiidae	<i>Certhia familiaris</i>
		Hirundinidae	<i>Delichon urbicum, Hirundo rustica</i>
		Muscicapidae	<i>Erithacus rubecula</i>
		Paridae	<i>Cyanistes caeruleus, Parus major</i>
		Phylloscopidae	<i>Phylloscopus collybita</i>
		Sylviidae	<i>Sylvia atricapilla</i>
<i>Crataerina pallida</i>	Apodiformes	Apodidae	<i>Apus apus</i>
<i>Icosta ardeae</i>	Passeriformes	Hirundinidae	<i>Ardea purpurea</i>
	Pelecaniformes	Ardeidae	<i>Ixobrychus minutus</i>
<i>Icosta minor</i>	Passeriformes	Passeridae	<i>Passer montanus</i>
<i>Ornithoica turdi</i>	Passeriformes	Emberizidae	<i>Emberiza citrinella</i>
		Fringillidae	<i>Fringilla coelebs</i>
		Laniidae	<i>Lanius collurio</i>
		Sittidae	<i>Sitta europaea</i>
<i>Ornithophila metallica</i>	Passeriformes	Muscicapidae	<i>Saxicola rubetra</i>
<i>Pseudolychnia canariensis</i>	Accipitriformes	Pandionidae	<i>Pandion haliaetus</i>
<i>Stenopteryx hirundinis</i>	Passeriformes	Hirundinidae	<i>Delichon urbicum, Hirundo rustica</i>
<i>Ornithomya avicularia</i>	Accipitriformes	Accipitridae	<i>Accipiter gentilis, Aquila pomarina, Circus pygargus, Pernis apivorus</i>
	Anseriformes	Anatidae	<i>Anser anser</i>
	Falconiformes	Falconidae	<i>Falco tinnunculus</i>
	Passeriformes	Acrocephalidae	<i>Acrocephalus arundinaceus, A. melanopogon, A. scirpaceus</i>
		Corvidae	<i>Pica pica</i>
		Emberizidae	<i>Emberiza cia, E. schoenichus</i>
		Fringillidae	<i>Chloris chloris, Coccythraustes coccythraustes, Fringilla coelebs, Pyrrhula pyrrhula</i>
		Hirundinidae	<i>Hirundo rustica</i>
		Laniidae	<i>Lanius collurio, L. excubitor</i>
		Locustellidae	<i>Locustella luscinioides</i>

		Motacillidae	<i>Anthus trivialis</i> , <i>Motacilla alba</i>
		Muscicapidae	<i>Erithacus rubecula</i> , <i>Ficedula albicollis</i> , <i>Phoenicurus ochruros</i> , <i>Saxicola rubetra</i>
		Oriolidae	<i>Oriolus oriolus</i>
		Paradoxornithidae	<i>Panurus biarmicus</i>
		Passeridae	<i>Passer domesticus</i> , <i>Poecile montanus</i>
		Prunellidae	<i>Prunella modularis</i>
		Sturnidae	<i>Sturnus vulgaris</i>
		Sylviidae	<i>Curruca communis</i>
		Turdidae	<i>Monticola saxatilis</i> , <i>Turdus merula</i> , <i>T. pilaris</i>
	Strigiformes	Strigidae	<i>Strix aluco</i>
<i>Ornithomya biloba</i>	Passeriformes	Acrocephalidae	<i>Acrocephalus arundinaceus</i>
		Hirundinidae	<i>Hirundo rustica</i> , <i>Riparia riparia</i>
		Sylviidae	<i>Sylvia atricapilla</i>
<i>Ornithomya chloropus</i>	Passeriformes	Motacillidae	<i>Anthus trivialis</i>
		Sylviidae	<i>Regulus regulus</i>
<i>Ornithomya comosa</i>	Passeriformes	Hirundinidae	<i>Riparia riparia</i>
<i>Ornithomya fringillina</i>	Passeriformes	Acrocephalidae	<i>Acrocephalus arundinaceus</i> , <i>A. schoenobaenus</i>
		Paridae	<i>Cyanistes caeruleus</i>
		Hirundinidae	<i>Hirundo rustica</i> , <i>Riparia riparia</i>
		Laniidae	<i>Lanius collurio</i>
		Motacillidae	<i>Anthus trivialis</i>
		Muscicapidae	<i>Erithacus rubecula</i>
		Phylloscopidae	<i>Phylloscopus collybita</i>
		Sittidae	<i>Sitta europaea</i>
		Sylviidae	<i>Curruca communis</i> , <i>C. curruca</i> , <i>Sylvia atricapilla</i>
		Troglodytidae	<i>Troglodytes troglodytes</i>
	Pelecaniformes	Ardeidae	<i>Ardea purpurea</i>

* Follow Oboňa et al. (2019a) which summarized earlier published records, supplemented with new data from Oboňa et al. (2019b, 2021, 2022), Mlynárová et al. (2024).

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Author's addresses: Peter Krišovský, Department of Ecology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, SK – 08 116 Prešov, Slovakia; Východoslovenské múzeum v Košiciach, Nám. Maratónu mieru 2, SK – 040 01 Košice, Slovakia, email: peter.krisovsky@vsmuzeum.sk

Stanislav Greš, 17. novembra 24, SK – 083 01 Sabinov, Slovakia, email: 4sterix47@gmail.com

Martin Hromada, Department of Ecology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, SK – 08 116 Prešov, Slovakia, email: hromada.martin@gmail.com

Laura Mlynárová, Department of Ecology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, SK – 08 116 Prešov, Slovakia, email: laura.mlynarova@smail.unipo.sk

Jozef Oboňa, Department of Ecology, Faculty of Humanities and Natural Sciences, University of Prešov, 17. novembra 1, SK – 08 116 Prešov, Slovakia, email: obonaj@centrum.sk