

# SHORT-TERM FAUNISTIC SAMPLING OF LOUSE FLIES (DIPTERA: HIPPOBOSCIDAE) FROM DRIENOVEC BIRD RINGING STATION, SLOVAKIA

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## ABSTRACT

We present a pilot study on hippoboscid flies parasitizing bird host at the Drienovec Bird Ringing Station, Slovakia. The louse flies were collected during August and October 2019. Three species of parasites and their host associations are discussed in this paper. The host-parasite association of a louse fly *Ornithomya fringillina* Curtis, 1836 collected on *Lanius collurio* Linnaeus, 1758 is recorded for the first time. Two new host-parasite associations are reported from Slovakia for the first time: *Ornithomya avicularia* (Linnaeus, 1758) on *Pyrrhula pyrrhula* (Linnaeus, 1758) and *Ornithomya fringillina* Curtis, 1836 on *Parus major* Linnaeus, 1758.

## KEY WORDS

hippoboscid, ectoparasites, birds, host-parasite associations

## INTRODUCTION

The louse flies (Insecta: Diptera: Hippoboscidae) are specific ectoparasites of birds and mammals with highly interesting biology and ecology. Moreover, these blood-sucking insects are important from an epidemiological point of view, as they are vectors of several endoparasitic diseases in animals and humans such as malaria, sleeping sickness, haemoproteus infections, and perhaps filarial onchocerciasis (BAKER 1967). 30 species of hippoboscids are known in Europe, of which 19 occur in Slovakia (PETERSEN 2004, PAPE et al. 2015, OBOŇA et al. 2019). At the Bird Ringing Station Drienovec (Košice district, south-eastern Slovakia), the only long-term ringing facility in Slovakia (OLEKŠAK et al. 2007), three species of louse flies have been recorded until now: *Hippobosca equina* Linnaeus, 1758, *Lipoptena cervi* (Linnaeus, 1758) (both of the them collected on humans) and *Ornithomya avicularia* (Linnaeus, 1758) collected on *Prunella modularis* (Linnaeus, 1758) (OBOŇA et al. 2019).

The continuous bird ringing provides an excellent opportunity to study hematophagous *ectoparasites* feeding on migratory birds. In this paper, we provide a pilot study of louse flies parasitizing on birds in Slovakia during autumn migration.

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## MATERIAL AND METHODS

The louse flies were collected by net during a short-term faunistic sampling at the Drienovec Bird Ringing Station in August (7 mist-netting days) and October 2019 (7 mist-nettings days). Of the 2 427 birds, belonging to 55 species and orders Passeriformes (50 species), Piciformes (3), Columbiformes (1) and Coraciiformes (1), 31 birds were positive for louse-flies (however, not all of the louse-flies found were managed to be collected (see text below)). The louse flies specimens were collected by hand on birds caught in the nets by PK. Birds were mist-netted in standardised way (for more information see OLEKŠAK et. al. 2007).

Collected hippoboscids were placed in the eppendorf tubes, fixed in ethanol (96 %) and subsequently identified in the laboratory (JO) using determination key by POVOLNÝ & ROSICKÝ (1955), THEODOR & OLDROYD (1964) and PETERSEN et al. (2007). We focused on the primary hosts (see OBOŇA et al. 2019); a full host account is given after MAA (1969a).

Descriptive statistics were computed using Quantitative Parasitology on the Web, while confidence intervals (CI) were calculated according to Sterne (RÓZSA et al. 2000, REICZIGEL et al. 2019).

## RESULTS AND DISCUSSION

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

**Material examined:** 1 ♀. (Figure 2) 12.10.2019 collected on *Pyrrhula pyrrhula* (Linnaeus, 1758).

**Notes:** Of the 19 mist-netted individuals of Eurasian bull finch *P. pyrrhula*, a single bird was positive for louse-flies (prevalence = 5.3%; CI (Stearns) = 0.3 – 25.7), with a single specimen recorded.

*O. avicularia* represents a frequent louse fly species in Central Europe, widespread in the Palaearctic region (KRIŠTOFÍK 1998). The host-parasite association of *O. avicularia* and *P. pyrrhula* is reported for the first time in Slovakia; similar association was, for instance, reported in Germany (WALTER et al. 1990).

### *Ornithomya biloba* Dufour, 1827

**Material examined:** 1 ♀, 19.8.2019, 1 ex., 15.8.2019 (Fig. 1 right), 1 ♀, 16.8.2019 all collected on *Hirundo rustica* Linnaeus, 1758.

**Notes:** Of the 18 caught individuals of Barn swallows *H. rustica*, three individuals were positive for louse-flies (prevalence = 5.6%, CI (Sterne) = 0.3 – 27.1), all of them were infested with a single fly specimen.

*O. biloba* represents a common louse-flies species in Europe; however, the extent of its distribution range is still not fully known. *O. biloba* is ectoparasite of bird species belonging mainly to family Hirundinidae (e.g. KRIŠTOFÍK 1998). So far, it has been recorded only on two bird species in Slovakia (*Hirundo rustica* and *Riparia riparia* (Linnaeus, 1758)) (OBOŇA et al. 2019). *O. biloba* was occasionally found to parasitize on bird species from phylogenetically distant families Accipitridae, Strigidae and Apodidae (Maa 1969).

***Ornithomya fringillina* Curtis, 1836**

(Fig. 1 left)

**Material examined:** 1 ♀, 14.8.2019 collected on Red-backed shrike *Lanius collurio* Linnaeus, 1758, 1 ♀, 9.10.2019 collected on Great tits *Parus major* Linnaeus, 1758, and 1 ♀, 14.10.2019 collected on Eurasian blue tit *Cyanistes caeruleus* Linnaeus, 1758.

**Notes:** Of the 25 caught individuals of *L. collurio*, all birds were positive for louse-flies (prevalence 100%, CI = 88.6 – 100). One to four *O. fringillina* flies were recorded on each shrike; younger birds were usually characterized by the presence of more flies (observation KRIŠOVSKÝ). However, we managed to collect only a single *O. fringillina* specimen for identification. Thus, the specific identity of other flies is questionable. We assume other hippoboscids could be present on the mist-netted shrikes.

Of the 218 caught individuals of *Parus major*, a single bird was positive for louse-flies (prevalence = 0.5, CI = 0 – 2.6), with a single *O. fringillina* fly present. Of the 617 caught individuals of *Cyanistes caeruleus*, a single bird was positive for louse-flies (prevalence = 0.2; CI = 0 – 0.9), with a single specimen of *O. fringillina* recorded.

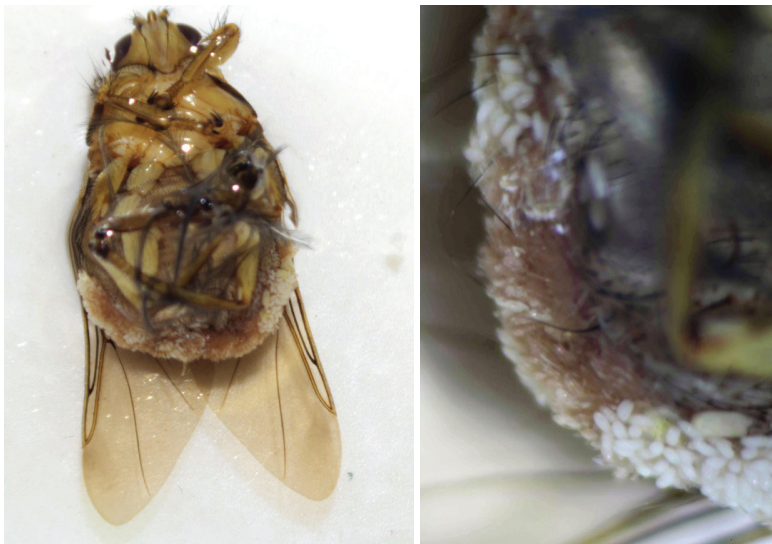
*O. fringillina* represents a Palaearctic species, parasitizing mainly on Passeriformes (KRIŠTOFÍK 1998). MAA (1969) recorded totally 21 host bird genera of 11 families (namely: Accipitridae, Strigidae, Hirundinidae, Muscicapidae, Prunellidae, Motacillidae, Certhiidae, Sittidae, Paridae, Fringillidae and Ploceidae). In Slovakia, (see OBOŇA et al. 2019) *O. fringillina* has been found so far on eight birds species (*Acrocephalus arundinaceus* (Linnaeus, 1758), *Acrocephalus schoenobaenus* (Linnaeus, 1758), *Cyanistes caeruleus* Linnaeus, 1758, *Riparia riparia* (Linnaeus, 1758), *Sitta europaea* Linnaeus, 1758, *Sylvia atricapilla* (Linnaeus, 1758), *Troglodytes troglodytes* (Linnaeus, 1758), *Ardea purpurea* Linnaeus, 1766). The host-parasite association of *O. fringillina* with *P. major* is reported for the first time in Slovakia; similar association was, for instance, reported in Czech Republic (SYCHRA et al. 2008).

As far as we know, the louse fly *O. fringillina* collected on *L. collurio* is reported for the first time to occur in the territory of Slovakia. There are most likely no other records on this association known in the world.



**Figure 1.** Photos of specimens of *Ornithomya biloba* Dufour, 1827 (right) and *Ornithomya fringillina* Curtis, 1836 (left).

In Slovakia and Czech Republic, Red-backed Shrike *L. collurio* was known to be parasitized by only one louse-fly species, *Ornithomyia avicularia* Linnaeus, 1758. World widely, the family of true shrikes (Passeriformes: Laniidae) is parasitized by 17 louse fly species belonging to genera *Ornithoica* Rondani, 1878 (eight flies species), *Ornithophila* Rondani, 1879 (one species), *Ornithomyia* Latreille, 1802 (three species), *Ornithoctona* Speiser, 1902 (two species) and *Icosta* Speiser, 1905 (three species) (MAA1969). In the above references *O. fringillina* is not mentioned as a parasite of any shrike. Several years later, DOSZHANOV (1970, 2003) reported *O. fringillina* to occur on *Lanius isabellinus* Hemprich & Ehrenberg, 1833 in Kazakhstan. Our record of *L. collurio* as a host of *O. fringillina* can be considered as a new parasite-host association.



**Figure 2.** Specimen of *Ornithomya avicularia* (Linnaeus, 1758) infested with epidermoptid mites; ventral side and detail of fly ectoparasites.

Interestingly, during our study, we coincidentally stumbled upon the hyperparasitism of avian ectoparasitic hippoboscid fly (see Fig. 2). *O. avicularia*, collected on *P. pyrrhulawas* heavily parasitized with currently undetermined mites. We assume they could represent some epidermastid mites of genera *Myialges*, *Microlichus* or *Strelkovicarus* (see HUTSON 1984 or GOATER et al. 2018) occurrence of which, is scarcely known in western Palearctic.

Our short-term, non-extensive pilot study suggests promising prospect for further expanding knowledge of louse fly alpha diversity in Slovakia as well as in Europe. It is important to note that the work at the bird ringing station is extremely demanding and for that reason, the collection of ectoparasites represents just a side result at present. The main activity of the ringers, who partially helped us to collect the louse flies in this study, is bird ringing. For a further research, a person focused primarily on ectoparasite sampling will be needed. Moreover, hand collecting of parasites is not very effective. There are several different, much more effective methods for collecting the louse flies on their hosts (see SOUTHWOOD & HENDERSON 2009). One of them is, for instance is fumigation chamber method (CLAYTON & WALTHER 1997).

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