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Notas / *Notes*

New faunistic records and host-parasite interactions of louse flies (Diptera: Hippoboscidae) from a community of birds collected by mist-netting in the Spanish Central System

Mikel A. González [1,*], Juan Carlos Hidalgo [2], Carlos Talabante [3] & Iván Bernal [4]

[1,*] Departamento de Ecología de Humedales, Estación Biológica de Doñana (EBD-CSIC), 41092 Sevilla, España.
[2,3,4] Grupo de anillamiento Álula, Madrid. 28410. España.
[3] Departamento de Ciencias de la Vida. Facultad de Ciencias, Universidad de Alcalá. Alcalá de Henares, Madrid. 28802. España.

* Correspondign author: mikel_alexander86@hotmail.com – https://orcid.org/0000-0002-5754-862X
[2] legardon@gmail.com – https://orcid.org/0000-0002-2768-6239
[3] carlos_talabante_ramirez@yahoo.es – https://orcid.org/0000-0002-7544-340X
[4] bernalsosa.ivan@gmail.com – https://orcid.org/0000-0002-5432-5041

ABSTRACT

Louse flies and keds (Diptera: Hippoboscidae) are permanent ectoparasites of birds and mammals, respectively. The abundance and species composition of the Spanish Hippoboscidae fauna is relatively little studied, with 20 species recorded so far. The aim of this pilot study is to provide new data on these ectoparasites from birds collected by mist-netting in two ringing stations in the Central System mountains in Madrid (Spain). Four polyxenous louse fly species, all of the subfamily Ornithomyinae, were obtained and identified from 13 avian hosts (Order: Passeriformes). They are, in decreasing order of abundance: *Ornithomya fringillina* (Curtis, 1936), *Ornithophila metallica* (Schiner, 1864), *Ornithomya avicularia* (Linnaeus, 1758), and *Ornithoica turdi* (Oliver in Latreille, 1811). The woodchat shrike *Lanius senator* Linnaeus, 1758 was the most common avian species parasitized by hippoboscids. New faunistic records and host-parasite interactions are provided for the first time in Spain.

Keywords. Diptera, Hippoboscidae, Spain, avian hosts, diversity.

RESUMEN

Nuevos datos faunísticos e interacciones de moscas piojo (Diptera: Hippoboscidae) parasitando aves capturadas con redes japonesas en el Sistema Central (España)

Las moscas piojo (Diptera: Hippoboscidae) son ectoparásitos permanentes de aves y mamíferos. La abundancia y composición faunística de los hipobóscidos de España está relativamente poco estudiada, con 20 especies registradas hasta el momento. El objetivo de este estudio es aportar datos nuevos sobre estos ectoparásitos a partir de hospedadores aviares recogidos con redes japonesas en dos estaciones de anillamiento del Sistema Central en Madrid (España). Se identificaron cuatro especies generalistas de moscas piojo de la subfamilia Ornithomyinae, obtenidas de 13 hospedadores aviares (Orden: Passeriformes). Estas especies son, en orden de abundancia decreciente: *Ornithomya fringillina* (Curtis, 1936), *Ornithophila metallica* (Schiner, 1864), *Ornithomya avicularia* (Linnaeus, 1758) y *Ornithoica turdi* (Oliver in Latreille, 1811). El alcaudón común *Lanius senator* Linnaeus, 1758 fue la especie de ave más comúnmente parasitada por hipobóscidos. Se proporcionan nuevos datos faunísticos e interacciones aves-parásito para España.

Palabras clave. Diptera, Hippoboscidae, España, hospedadores aviares, diversidad.

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Hippoboscids, also known as louse flies, flat flies or keds, are obligate ectoparasitic flies found on birds and mammals, with both sexes feeding strictly on blood; some species have occasionally been registered attacking humans (Hutson, 1984; Santolíková *et al.*, 2022). Flies of the family Hippoboscidae have been long overlooked by the scientific community, with few studies about their species composition and ecology. In addition to the physical damage caused by their bites, they are also vectors of several infectious agents, such as protozoa, bacteria, helminths, and possibly also viruses in animals, including humans (Bezerra-Santos & Otranto, 2020). There is accumulating evidence that these ectoparasites have major effects on many aspects of host behaviour and ecology, although some studies showed no such effects. Their host specificity varies widely, ranging from high to low, depending on hippoboscid species (Veiga *et al.*, 2019; Lehikoinen *et al.*, 2021; Santolíková *et al.*, 2022).

Around 31 hippoboscid species have been described in Europe and up to 20 species (distributed in 11 genera and three subfamilies) have been recorded from the Iberian Peninsula and the Balearic and Canary islands (Sánchez & Carles-Tolrá, 2007; Oboňa *et al.*, 2019a, 2022). The Spanish fauna of Hippoboscidae includes 15 species parasitizing mostly birds and 5 that feed primarily on mammals. The best-known species in Spain are the forest fly *Hippobosca equina* Linnaeus, 1758, a ked that feeds on horses and other large mammals, and among avian-feeding species, *Stenepteryx hirundinis* (Linnaeus, 1758) and *Pseudolynchia canariensis* (Macquart in Webb & Berthelot, 1839), that are most likely the two most prevalent species parasitizing swifts and pigeons, respectively (González, 2022). However, very scarce information is available from other avian hosts.

Bird ringing stations provide an excellent opportunity to study the fauna of Hippoboscidae parasitizing bird species. In fact, most data on the fauna of louse flies comes from bird-ringing surveys. In this pilot study, we recorded data on louse flies from avian hosts in one of the main mountain ranges in the Iberian Peninsula.

The study was carried out between the summer and autumn seasons of 2021 and 2022 at two ringing stations located in the Central System mountains in Madrid, Spain (Collado Cerrado, Canencia: 40º52' N, 03º45' W, and Arroyo de la Laguna, Somosierra: 41º09' N, 03º36' W, 1.480 and 1.530 m a.s.l., respectively). Birds were captured using mist nets and were placed individually in cotton bags to avoid mixing ectoparasites among birds. Louse flies were collected by hand from birds and stored in capped tubes containing 70% ethanol for further identification in the laboratory. Not all louse flies could be collected, as is common in similar studies (Oboňa *et al.*, 2019b). Louse fly specimens were identified to species level under a stereomicroscope following updated identification keys recently published for European Hippoboscidae (Oboňa *et al.*, 2022).

MATERIAL EXAMINED. New host-parasite interactions for Spain are denoted with an asterisk (*).

Ornithoica turdi (Olivier in Latreille, 1811).

1 ♂ ex European robin *Erithacus rubecula* (Linnaeus, 1758), 05.09.2021; 1 ♂ ex Melodious warbler *Hippolais polyglotta* (Vieillot, 1817)*, 27.08.2022; 1 ♀ ex Red-backed shrike *Lanius collurio* Linnaeus, 1758*, 30.07.2022.

Ornithomya avicularia (Linnaeus, 1758)

1 ♀ ex Whitethroat *Curruca communis* (Latham, 1787)*, 16.07.2022; 1 ♂ ex Barn swallow *Hirundo rustica* Linnaeus, 1758, 12.08.2021; 2 ♀♀ ex Blackbird *Turdus merula* Linnaeus, 1758, 28.06.2022.

Ornithomya fringillina (Curtis, 1836)

1 ♂, 1 ♀ ex Rock bunting *Emberiza cia* Linnaeus, 1766*, 28.08.2021, 24.07.2022; 1 ♀ ex Melodious warbler *Hippolais polyglota**, 24.07.2021; 5 ♀♀ ex Woodchat shrike *Lanius senator* Linnaeus, 1758*, 16.07.2022, 20.08.2022; 2 ♀♀ ex Dunnock *Prunella modularis* (Linnaeus, 1758)*, 28.08.2021, 24.07.2022; 1 ♀ ex Stonechat *Saxicola rubicula* (Linnaeus, 1766)*, 12.09.2021.

Ornithomyia sp. (specimen damaged)

1 ♀ Blackbird *Turdus merula* 26.06.2021.

Ornithophila metallica (Schiner, 1864)

1 ♀ ex Crested tit *Lophophanes cristatus* (Linnaeus, 1758)*, 24.07.2021; 2 ♂♂ ex Dunnock *Prunella modularis* Linnaeus, 1758*, 19.07.2021; 1 ♂ ex Western orphean warbler *Curruca hortensis* (J.F. Gmelin, 1789)*, 24.07.2021; 1 ♀ ex Blackbird *Turdus merula*, 12.08.2022; 1 ♀ ex Song thrush *Turdus viscivorus* Linnaeus, 1758*, 12.06.2022.

In total, four louse fly species, all of the subfamily Ornithomyinae, were identified (*Ornithomya fringillina*, n = 11; *Ornithophila metallica*, n = 6; *Ornithomya avicularia*, n = 4; and *Ornithoica turdi,* n = 3) (Fig. 1). They were parasitizing 13 avian host species between June and September, with higher collection numbers in July. The most parasitized avian species was the Woodchat shrike - *Lanius senator* (n = 5), followed by Dunnock- *Prunella modularis* (n = 4), Blackbird (n = 4), Melodious warbler- *Hippolais polyglotta* (n = 2) and the remaining nine hosts (n = 1).

Ornithomya fringillina and *O. metallica* were parasitized by five species each and *O. turdi* and *O. avicularia* by three each. *Ornithophila metallica* parasitized mostly sedentary or short distance facultative migrant bird species, except *Curruca hortensis* that winters in equatorial Africa, while the other parasitized species are long or short distance migrants, except *T. merula, E. cia* and *S. rubicula,* with a more sedentary character in the study area.

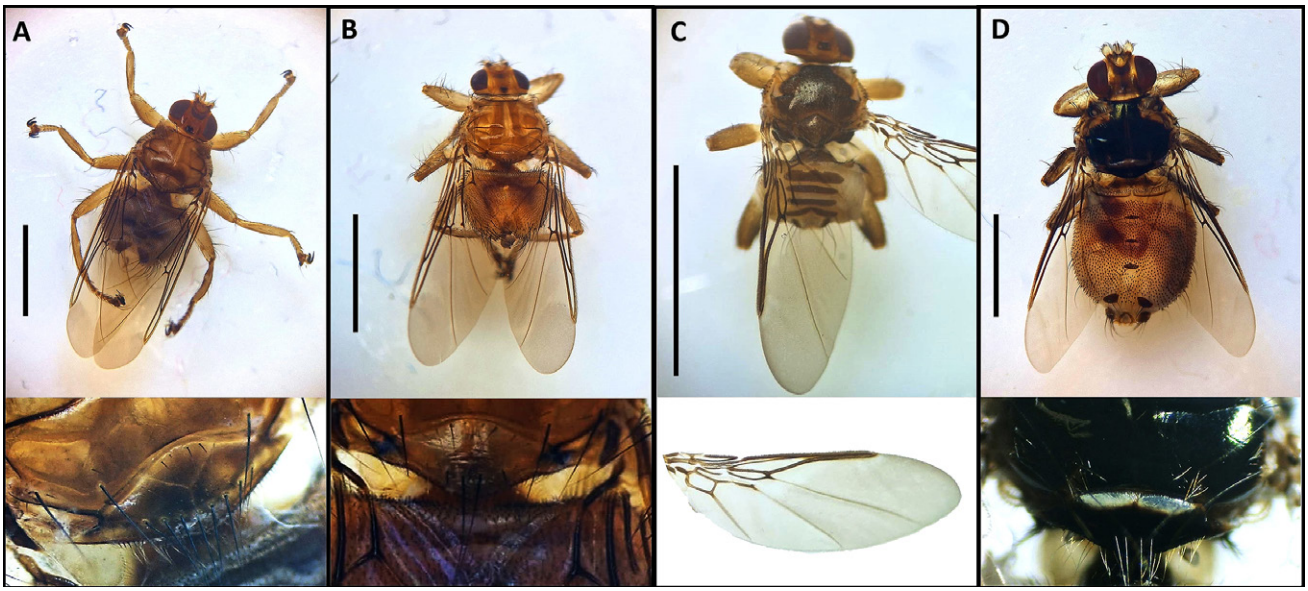

Fig. 1.– Louse flies (Diptera: Hippoboscidae) collected in this study in the Central System (Madrid, Spain). A) *Ornithomya avicularia* (dorsal view and scutellum). B) *Ornithomya fringillina* (dorsal view and scutellum). C) *Ornithoica turdi* (dorsal view and wing). D) *Ornithophila metallica* (dorsal view and scutellum). Scale bars: 2 mm.

Fig. 1.– Moscas piojo (Diptera: Hippoboscidae) recogidas en este estudio en el Sistema Central (Madrid, España). A) *Ornithomya avicularia* (vista dorsal y escutelo). B) *Ornithomya fringillina* (vista dorsal y escutelo). C) *Ornithoica turdi* (vista dorsal y ala). D) *Ornithophila metallica* (vista dorsal y escutelo). Escala: 2 mm.

The four louse flies collected are considered polyxenous species attacking multiple bird species (Droz & Haenni, 2011; Nartshuk & Matyukhin, 2019; Lehikoinen *et al.*, 2021). *Ornithomyia avicularia, O. fringillina* and *O. metallica* are common louse fly species reported across many European countries (Oboňa *et al.*, 2019a). These species have been classified as broad host range species preferring several avian hosts, although a notable pattern in their host preference, which was influenced not only by the host size but also by the habitat and host breeding strategy, has been recently attributed to *O. avicularia* and *O. fringillina* (Lehikoinen *et al.*, 2021). It is also interesting to note that the occurrence of the previous two species varies depending on the migratory status (Santolíková *et al.*, 2022). Despite the low numbers collected in the present study, our data agree with previous studies showing that *O. fringillina* is more common in long-distance migrants, whereas *O. metallica* seems to be harbored mostly by sedentary bird species. On the contrary, our study corroborates that the presence of *O. turdi* is restricted to Southern Europe regions (Oboňa *et al.*, 2019a), as they are widely distributed in Africa, but the number of records of this species is also increasing in Central Europe during the last years (Droz & Haenni, 2011).

The Spanish fauna of Hippoboscidae and their hosts was last reviewed by Cordero del Campillo *et al.* (1994), and since then very few studies have been published (*e.g.*, Carles-Tolrá, 1998, 2001); therefore, most records in our study represent new host-parasite interactions of the four louse fly species recorded in the country. The study of louse flies should be promoted in southern Europe, where there is a limited understanding of their distribution, bio-ecology and role as potential vectors of infectious diseases.

References

Bezerra-Santos, M.A. & Otranto, D. 2020. Keds, the enigmatic flies and their role as vectors of pathogens. *Acta Tropica*, 209: 105521. https://doi.org/10.1016/j.actatropica.2020.105521

Carles-Tolrá, M. 1998. Nuevos datos sobre los dípteros de España (Diptera: Scenopinidae, Xylomyidae, Lonchopteridae, Hippoboscidae, Nycteribiidae). *Boletín de la Asociación española de Entomología*, 22 (1-2): 75-79.

Carles-Tolrá, M. 2001. Nuevos datos sobre dípteros iberobaleares (Díptera: Orthorrhapha y Cyclorrhapha). *Boletín de la Asociación Española de Entomología,* 25 (1-2): 53-95.

Cordero del Campillo, M., Castañón, L. & Reguerafeo, A. 1994. *Índice-Catálogo de Zooparásitos Ibéricos*. 2ª Ed. Universidad de León, Secretariado de Publicaciones. León. 656 pp.

Droz, B. & Haenni, J.P. 2011. Une mouche pupipare nouvelle pour la faune de Suisse (Diptera, Hippoboscidae). *Entomo Helvetica*, 4: 59-63.

González, M.A. 2022. *Los insectos de importancia médico-veterinaria en el norte de España*. Castellón Digital SL. Valencia. 224 pp.

Hutson, A.M. 1984. Keds, flat-flies and bat-flies. Diptera, Hippoboscidae and Nycteribiidae. *Handbooks for the Identification of British Insects*, 10 (7): 1-40.

Lehikoinen, A., Pohjola, P., Valkama, J., Mutanen, M. & Pohjoismäki, J.L.O. 2021. Promiscuous specialists: host specificity patterns among generalist louse flies. *PLoS ONE*, 16 (5): e0247698. https://doi.org/10.1371/journal.pone.0247698

Nartshuk, E.P. & Matyukhin, A.V. 2019. The louse flies *Ornithophila metallica* (Schiner, 1864) and *O. gestroi* (Rondani, 1878) (Diptera, Hippoboscidae): distribution and association with birds in the Palaearctic. *Entomological Reviews*, 99: 504-507. https://doi.org/10.1134/S0013873819040092

Oboňa, J., Sychra, O., Greš, S., Heřma, P., Manko, P., Roháček, J., Šestáková, A., Šlapák, J. & Hromada, M. 2019a. A revised annotated checklist of louse flies (Diptera, Hippoboscidae) from Slovakia. *Zookeys*, 862: 129-152. https://doi.org/10.3897/zookeys.862.25992

Oboňa, J., Krišovský, P. & Hromada, M. 2019b. Short-term faunistic sampling of louse flies (Diptera: Hippoboscidae) from Drienovec Bird Ringing Station, Slovakia. *Biodiversity & Environment*, 11 (2): 4-9.

Oboňa, J., Fogašová, K., Fulín, M., Greš, S., Manko, P., Repaský, J., Roháček, J., Sychra, O. & Hromada, M. 2022. Updated taxonomic keys for European Hippoboscidae (Diptera), and expansion in Central Europe of the bird louse fly *Ornithomya comosa* (Austen, 1930) with the first record from Slovakia. *ZooKeys,* 1115: 81-101. https://doi.org/10.3897/zookeys.1115.80146

Sánchez, I. & Carles-Tolrá, M. 2007. Primera cita del género *Icosta* Speiser para la Península Ibérica (Diptera, Hippoboscidae). *Boletín de la Sociedad Entomológica Aragonesa*, 40: 226.

Santolíková, A., Brzonová, J., Cepicka, I. & Svobodová, M. 2022. Avian louse flies and their trypanosomes: new vectors, new lineages and host-parasite associations. *Microorganisms*, 10: 584. https://doi.org/10.3390/microorganisms10030584

Veiga, J., De Oña, P., Salazar, B. & Valera, F. 2019. Defining host range: host- parasite compatibility during the non-infective phase of the parasite also matters. *Parasitology*, 146 (2): 234-240. https://doi.org/10.1017/S0031182018001233