

Contribution to the fauna of chewing lice (Insecta: Phthiraptera) in wild birds of Spain, with new records and new host-lice associations

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Abstract. This manuscript presents new information on 14 species of chewing lice (Phthiraptera) for the Spanish fauna. 9 species and 2 genera are new records for Spain. In addition, 12 host-lice associations not registered to date in Spain and 2 new associations for the first time worldwide are added, these are *Laemobothrion (L.) tinnunculi* from *Falco naumanni* and *Ricinus meinertzhageni* from *Anthus campestris*.

Keywords: Birds; Mallophaga; ectoparasite; Iberian Peninsula.

Contribuție la studiul faunei păduchilor malofagi (Insecta: Phthiraptera) la păsările sălbatice din Spania, cu noi înregistrări și noi asociații gazdă-păduchi.

Rezumat. Acest manuscris prezintă informații noi despre 14 specii de păduchi malofagi (Phthiraptera) pentru fauna spaniolă. Nouă specii și 2 genuri sunt noi semnalări pentru Spania. În plus, se adaugă 12 asociații gazdă-păduchi neînregistrate până în prezent în Spania și 2 asociații noi pentru prima dată la nivel mondial, acestea sunt *Laemobothrion (L.) tinnunculi* de la *Falco naumanni* și *Ricinus meinertzhageni* de la *Anthus campestris*.

Cuvinte cheie: păsări; Mallophaga; ectoparazit; Peninsula Iberică.

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Introduction

Chewing lice (Insecta: Phthiraptera) are permanent ectoparasites occurring on both birds and mammals. There are approximately five thousand described species of lice

worldwide, and more half of which are known from birds (Price et al., 2003).

In Spain, there are approximately about quarter thousand species of chewing lice, being 30% species of Amblycera and 70% species of

Ischnocera (Martín-Mateo, 2002; Martín-Mateo, 2009). Moreover, there are 638 species of sedentary and migratory birds in Spain, both wintering and summering (Roucco et al., 2022). Most species of chewing lice from Spain have been cited by Cordero del Campillo (1994) and later Martín-Mateo (2002, 2009). Currently, there are few studies of lice in the Iberian Peninsula, so there are still many species to mention and associations to register. Therefore, this article presents new records and new host associations to chewing lice fauna in Spain with the aim of contributing to the knowledge of lice in the Iberian Peninsula.

Materials and methods

Chewing lice were collected directly from the bird feathers and body in scientific bird ringing sessions or in dead birds found in the field or on the road, from 2017 to 2022, following the method visual examination of Martín-Mateo (1994) and Clayton and Drown (2001).

Lice were stored in capped tubes containing 70% ethanol until their identification and were cleaned in 10% KOH, mounted in DMHF on slides, and identified to species level under a light-microscope and stereo-microscope (Martín-Mateo, 1994). The lice species were identified according to Giebel (1874), Piaget (1880), Blagoveshtchensky (1940), Guimaraes (1947), Eichler (1951), Rheinwald (1968), Złotorzycka (1977), Tendeiro (1994), Martín-Mateo (2002, 2009), Gustafsson et al. (2018, 2019) and Shimada & Yoshizawa (2020). To avoid biases in these determinations, all specimens were identified and classified by the same researchers (C. Talabante & I. Bernal) and deposited in the authors' collections.

Results

Below are the new additions to the fauna of chewing lice (Amblycera & Ischnocera) in wild birds from Spain.

***Brueelia jacobi* Eichler, 1951c ***

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Brueelia*.

This species is a new record in Spain. Locality: Robregordo, Madrid: 4♂, 10♀, June 26th, 2021 (Figure 1).

Local host: Common blackbird *Turdus merula* Linnaeus, 1758 (Passeriformes: Turdidae).

Know hosts: It only parasitizes the type host, Common blackbird (Gustafsson and Bush, 2017).

* For the determination of these specimens we have followed Eichler 1951 and Złotorzycka (1977). Nevertheless the identification is tentative and pending a redescription of the species.

***Brueelia matvejevi* Balát, 1981b**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Brueelia*.

This species is a new record in Spain. Locality: Canencia, Madrid. 3♂, 4♀, June 14th, 2021.

Local host: Mistle thrush *Turdus viscivorus* Linnaeus, 1758 (Passeriformes: Turdidae).

Know hosts: It only parasitizes the type host, Mistle thrush (Gustafsson and Bush, 2017).

***Coloceras piageti* Johnston & Harrison, 1912b**

Suborder: Ischnocera; Family: Gonioididae;
Genus: *Coloceras*.

This species is reported for the first time on Eurasian collared dove in Spain. Locality: Llanos del Caudillo, Ciudad Real. 1♀, January 20th, 2020.

Local host: Eurasian collared dove *Streptopelia decaocto* Frivaldszky, 1838 (Columbiformes: Columbidae).

Know host: It has been cited in various species of pigeons and doves, Rock pigeon *Columba livia* Gmelin, 1789; Sunda collared dove *Streptopelia bitorquata* Temminck, 1809; Spotted dove *Streptopelia chinensis* Scopoli, 1768; Eurasian collared dove *Streptopelia decaocto* Frivaldszky, 1838 and European turtle dove *Streptopelia turtur* Linnaeus, 1758. In Spain it has only been cited on Rock pigeon and European turtle dove (Price et al., 2003; Martín-Mateo, 2009).

***Columbicola bacillus* Giebel, 1866**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Columbicola*.

This species is reported for the first time on Eurasian collared dove in Spain. Locality: Llanos del Caudillo, Ciudad Real. 1♂, January 20th, 2020.

Local host: Eurasian collared dove *Streptopelia decaocto* Frivaldszky, 1838 (Columbiformes: Columbidae).

Know host: It has been cited in various species of doves, Rock pigeon *Columba livia* Gmelin, 1789; Eurasian collared dove *Streptopelia decaocto* Frivaldszky, 1838; Mourning collared dove *Streptopelia decipiens* Hartlaub & Finsch, 1870; African collared dove *Streptopelia roseogrisea* Sundevall, 1857; Red-eyed dove *Streptopelia semitorquata* Rüppell, 1837; Laughing dove *Streptopelia senegalensis* Linnaeus, 1766; Red collared dove *Streptopelia tranquebarica* Hermann, 1804 and European turtle dove *Streptopelia turtur* Linnaeus, 1758. In Spain, only has been cited in European turtle dove (Price et al., 2003; Martín-Mateo, 2009).

***Columbicola columbae* Linnaeus, 1758**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Columbicola*.

This species is reported for the first time on Stock dove in Spain. Locality: Aranjuez, Madrid. 1♂, January 20th, 2020.

Local host: Stock dove *Columba oenas* (Columbiformes: Columbidae).

Know host: It has been cited in species of the same genus, Pale-backed pigeon *Columba eversmanni* Bonaparte, 1856; Speckled pigeon *Columba guinea* Linnaeus, 1758; Rock pigeon *Columba livia* Gmelin, 1789 and Stock dove *Columba oenas* Linnaeus, 1758. In Spain, only had been cited in Rock pigeon (Price et al., 2003; Martín-Mateo, 2009).

***Cuculoecus latifrons* Denny, 1842**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Cuculoecus*

This species and the genus are new records in Spain. Locality: Braojos, Madrid. 3♂ 2♀, January 26th, 2019.

Local host: Common cuckoo *Cuculus canorus* Linnaeus, 1758 (Cuculiformes: Cuculidae).

Know host: This species has been cited in Yellow-billed cuckoo *Coccyzus americanus* Linnaeus, 1758; Common cuckoo *Cuculus canorus* Linnaeus, 1758 and Himalayan cuckoo *Cuculus saturatus* Blyth, 1843 (Price et al., 2003).

***Laemobothrion (Laemobothrion) tinnunculi* Linnaeus, 1758**

Suborder: Amblycera; Family:
Laemobothriidae; Genus: *Laemobothrion*

New host association. Our data is the first documented record of this species on Lesser kestrel in worldwide. Locality: Uceda, Guadalajara. 1♂, August 1st 2021.

Local host: Lesser kestrel *Falco naumanni* (Falconiformes: Falconidae).

Know host: This species is considered exclusive to species of the genus *Falco* Linnaeus, 1758. *Laemobothrion (L) tinnunculi* has been cited in Grey kestrel *Falco ardosiaceus* Vieillot, 1823; Lanner falcon *Falco biarmicus* Temminck, 1825; Nankeen kestrel *Falco cenchroides* Vigors & Horsfield, 1827; Merin *Falco columbarius* Linnaeus 1758; Eleonora's falcon *Falco eleonora* Gene, 1839; Aplomado falcon *Falco femoralis* Temminck, 1822; Laggar falcon *Falco jugger* J.E. Gray, 1834; Australian hobby *Falco longipennis* Swainson, 1838; Prairie falcon *Falco mexicanus* Schlegel, 1850; Peregrine falcon *Falco peregrinus* Tunstall, 1771; Bat falcon *Falco ruficularis* Daudin, 1800; Greater kestrel *Falco rupicoloides* Smith, 1829; Oriental hobby *Falco severus* Horsfield, 1821; American kestrel *Falco sparverius* Linnaeus, 1758; Eurasian hobby *Falco subbuteo* Linnaeus, 1758 and Common kestrel *Falco tinnunculus* Linnaeus, 1758. In Spain it has been cited in *Gypaetus barbatus* Linnaeus, 1758; Little owl *Athene noctua* and Common buzzard *Buteo buteo* Linnaeus, 1758, for accidental infestations (Martín-Mateo, 2002; Price et al., 2003).

***Myrsidea rustica* Giebel, 1874**

Suborder: Amblycera; Family: Menoponidae;
Genus: *Myrsidea*.

This species is reported for the first time on Common house martin in Spain. Locality: Torremocha de Jiloca, Teruel. 1♂, May 6th, 2022.

Local host: Common house martin *Delichon urbicum* Linnaeus, 1758 (Passeriformes: Hirundinidae).

Known host: This species has been cited in Lesser striped swallow *Cecropis abyssinica* Guerin-Meneville, 1843; Common house martin *Delichon urbicum* Linnaeus, 1758; Barn swallow *Hirundo rustica* Linnaeus, 1758, South African cliff swallow *Hirundo spilodera* Sundevall, 1850, Pacific swallow *Hirundo tahitica* Gmelin, 1789 and Sand martin *Riparia riparia* Linnaeus, 1758. In Spain only has been cited in Barn swallow (Martín-Mateo, 2002; Price et al., 2003; Sychra et al., 2014).

***Paragoniocotes fulvofasciatus* Picaglia, 1885**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Paragoniocotes*.

This species and the genus are new records in Spain. Locality: Madrid. 3♂, May 19th, 2019 (Figure 2.a).

Local host: Monk parakeet *Miyopsitta monachus* Boddaert, 1783 (Psittaciformes: Psittacidae) wild bird.

Known host: It only parasitizes the type host, Monk parakeet (Price et al., 2003).

***Penenirmus longuliceps* Blagoveshtchensky, 1940 ***

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Penenirmus*.

This species is new record in Spain. Locality: Ciempozuelos, Madrid. 1♀, February 4th, 2019 (Figure 2.b).

Local host: Cetti's warbler *Cettia cetti* Temminck, 1820 (Passeriformes: Cettiidae).

Known host: It has been cited in Cetti's warbler *Cettia cetti* Temminck, 1820; Greater yellowthroat *Chrysophlegma flavinucha* Gould, 1834 and Eurasian wren *Troglodytes troglodytes* Linnaeus, 1758 (Price et al., 2003).

* For the determination of these specimens we have followed Blagoveshtchensky 1940. Nevertheless the identification is tentative and pending a redescription of the species.

***Philopterus curvirostrae* Schrank, 1776**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Philopterus*.

This species is new record in Spain. Locality: La Granja, Segovia. 1♀, April 13th, 2020.

Local host: Red crossbill *Loxia curvirostra* Linnaeus, 1758 (Passeriformes: Fringillidae).

Known host: This species only parasitizes the type host, Red crossbill (Price et al., 2003).

***Ricinus meinertzhageni* Rheinwald, 1968**

Suborder: Amblycera; Family: Ricinidae; Genus: *Ricinus*.

New host association. Our data is the first documented record of this species on Tawny pipit in worldwide. Locality: Maranchón, Guadalajara. 1♂ 4♀, May 21th 2017 (Figure 3).

Local host: Tawny pipit *Anthus campestris* (Passeriformes: Motacillidae).

Known host: It parasitizes species of the genus *Anthus* Bechstein, 1805, in Blyth's pipit *Anthus godlewskii* Taczanowski, 1876; Plain-backed pipit *Anthus leucophrys* Vieillot, 1818; Australasian pipit *Anthus novaeseelandiae* Gmelin, 1789; Long-billed pipit *Anthus similis* Jerdon, 1840 and Buffy pipit *Anthus vaalensis* Shelley, 1900; also in Rosy-throated longclaw *Macronyx ameliae* de Tarragón, 1845; Grimwood's longclaw *Macronyx grimwoodi* Benson, 1955 and Sharpe's pipit *Macronyx sharpei* Jackson, 1904 (Price et al., 2003).

***Saemundssonina (Saemundssonina) lobaticeps*
Giebel, 1874**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Saemundssonina*

This species is new record in Spain. Locality:
Salinas de la Tapa, Cádiz. 1♂, August, 26th,
2022.

Local host: Black tern *Chlidonias niger* Linnaeus,
1758 (Charadriiformes: Laridae).

Know host: It parasitizes different species of
terns, Whiskered tern *Chlidonias hybrida* Pallas,
1811; White-winged tern *Chlidonias leucoptera*
Temminck, 1815 and Black tern *Chlidonias niger*
Linnaeus, 1758 (Price et al., 2003).

***Strigiphilus tuleskovi* Balát, 1958**

Suborder: Ischnocera; Family: Philopteridae;
Genus: *Strigiphilus*.

This species is a new record in Spain. Locality:
Robregordo, Madrid. 1♂, 3♀, August 16th, 2020
(Figure 4).

Local host: Eurasian scops-owl *Otus scops*
(Strigiformes: Strigidae).

Know host: It has been cited in several species
of the genus *Otus*, African scops owl *Otus
senegalensis senegalensis* Swainson, 1837 and
Otus senegalensis hendersoni Cassin, 1852;
Oriental scops owl *Otus sunia japonicus*
Temminck & Schlegel, 1844 and *Otus sunia
stictonotus* Sharpe, 1875 and Eurasian scops
owl *Otus scops* Linnaeus, 1758 (Price et al.,
2003; Shimada and Yoshizawa, 2020).

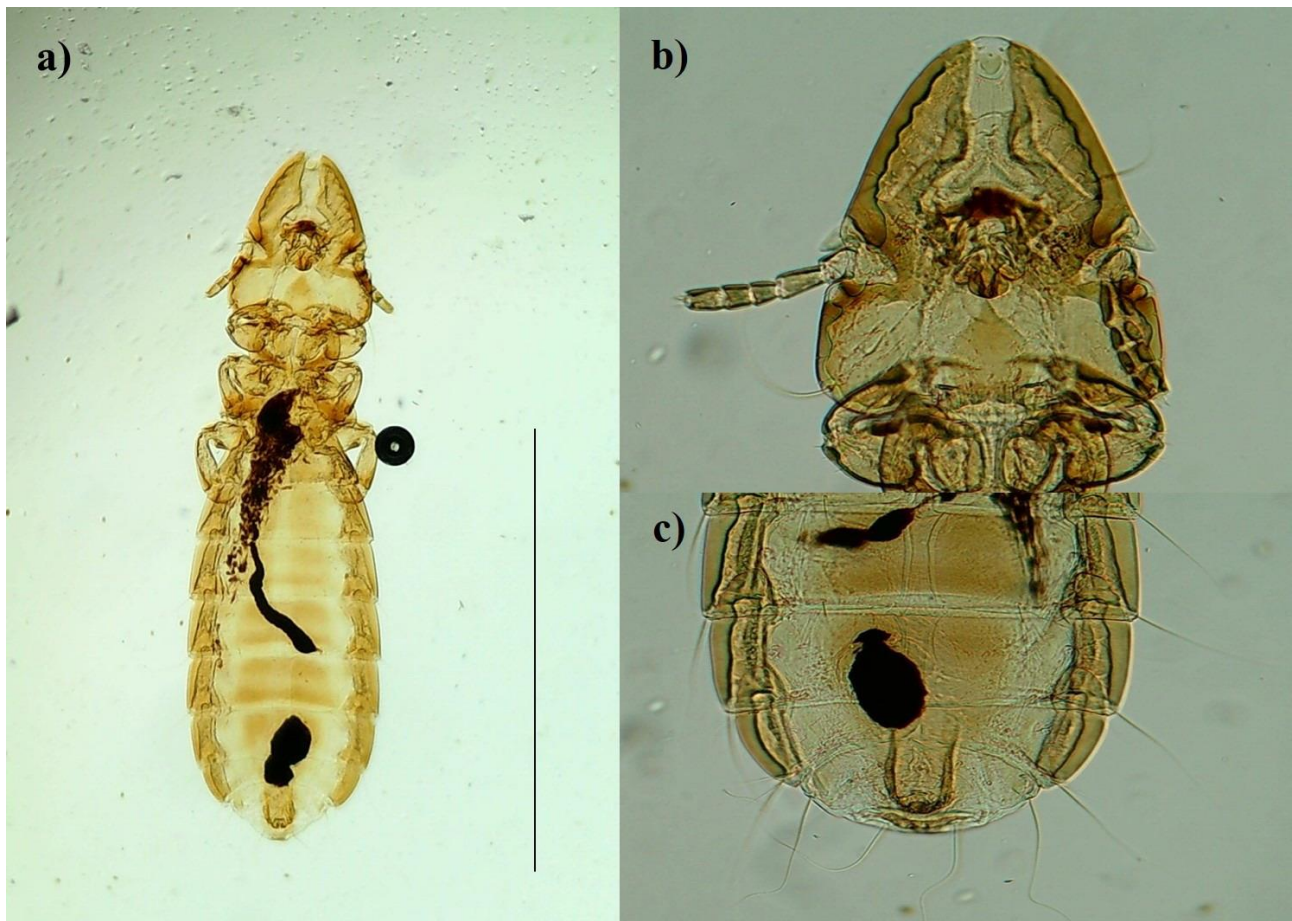


Figure 1. a) *Brueelia jacobi*, male. b) view of head. c) view of terminal segments and genitalia. Unit scale: 1 mm.

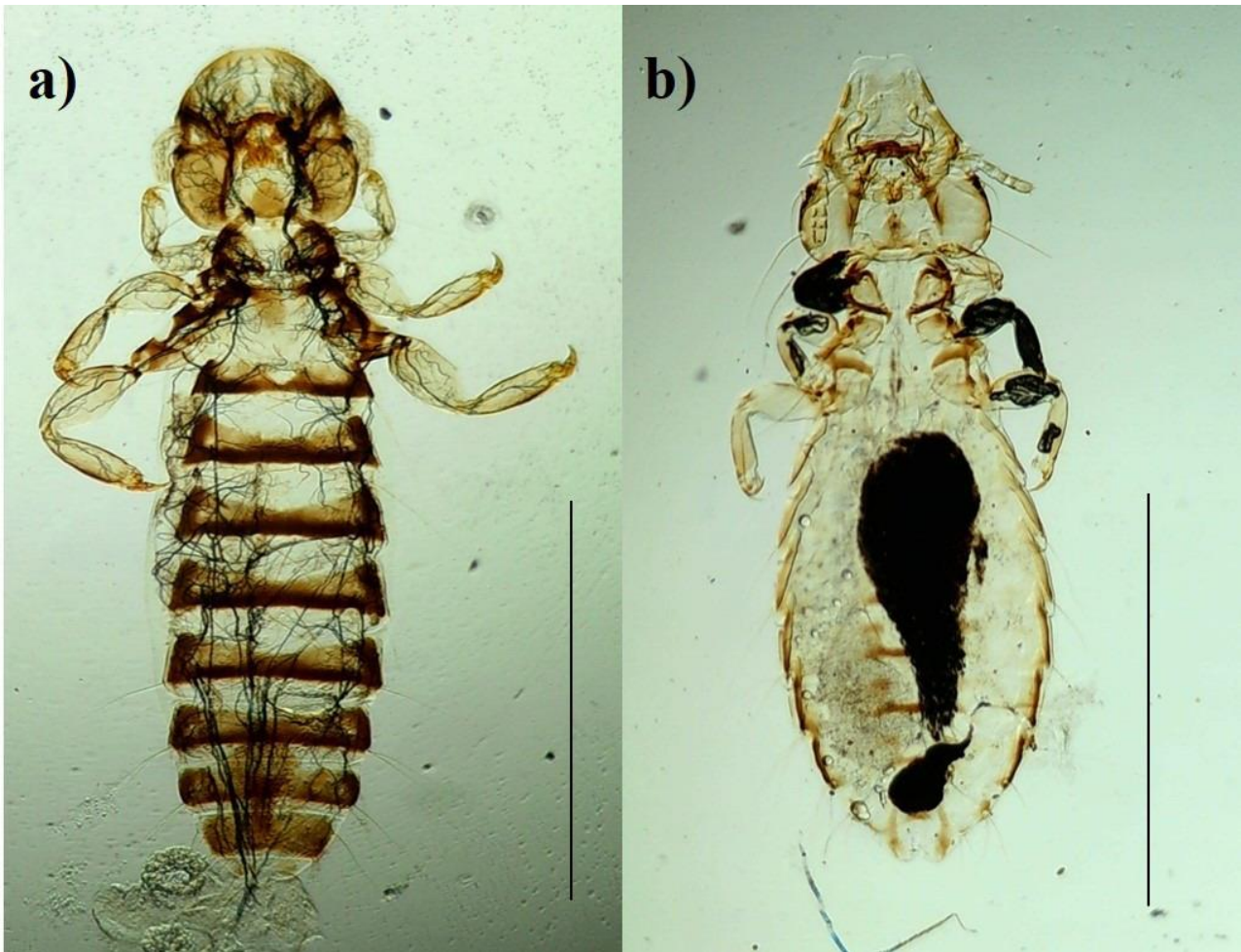


Figure 2. a) *Paragoniocotes fulvofasciatus*, female. b) *Penenirmus longuliceps*, female. Unit scale: 1 mm.

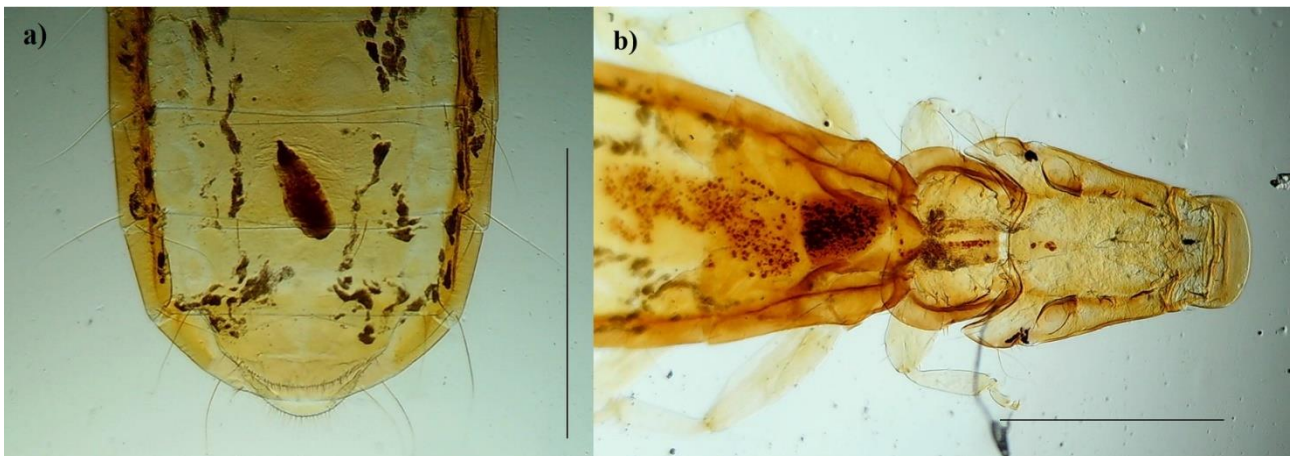


Figure 3. *Ricinus meinertzahageni*, female. a) view of terminal segments. c) view of head. Unit scale: 1 mm.

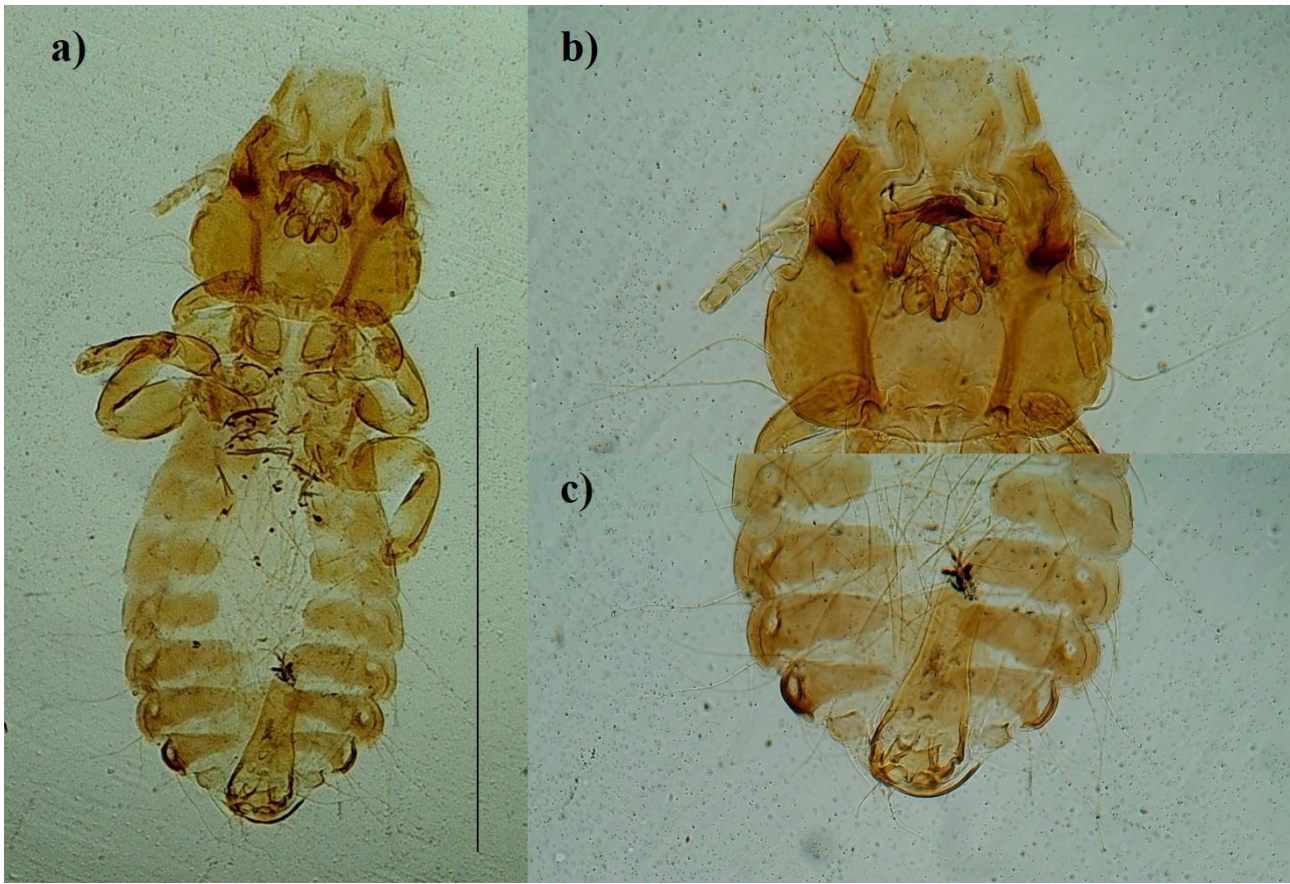


Figure 4. a) *Stigiphilus tuleskovi*, male. b) view of head. c) view of terminal segments and genitalia. Unit scale: 1 mm.

Discussions

In this study we provide new information about 14 Phthiraptera taxa for the Spanish fauna. 9 new record of chewing lice for Spain (8 Ischnocera and 1 Amblycera) are also collected. Finally, 12 louse-host associations not registered to date in Spanish fauna and 2 not registered in the world are added (table 1).

In the suborder Amblycera, we must highlight two new parasite-host associations found, *L. (L.) tinnunculi* in *F. naumanni* and *R. meinertzhageni* in *A. campestris*. Both increase the number of hosts that can be parasitized by these lice.

Laemobothrion (L.) tinnunculi is found all over the world, since it parasitizes species of the genus *Falco* (Price et al., 2003). *Ricinus meinertzhageni* corresponds to the first record in Europe (Mey, 2022). This species exclusively parasitizing several pipit species (mainly genus *Anthus*) of African distribution. In our study *Ri.*

meinertzhageni has been found in a Tawny pipit (*Anthus campestris*) specimen. According Voelker (1999) *Anthus campestris* is phylogenetically related to various species of African pipits. The record of *Ri. meinertzhageni* in Tawny pipit may further suggests its phylogenetic relationship to other African pipits due to coevolutionary processes.

As for the suborder Ischnocera, the geographical distribution of *B. jacobi*, *B. matvejevi*, *Pa. fulvofasciatus* and *Ph. curvirostra* in their type hosts is extended. In Europa, *B. jacobi* has only been reported in Germany, while *B. matvejevi* has only been detected in Montenegro and Czechia (Gustafsson et al. 2019; Mey, 2022). The taxonomic authenticity of *B. jacobi* is under review, so the data presented in this study represent a record of the taxon based on currently existing information on its identification. In this case, redescription of the *B. jacobi* is considered necessary in order to better define its area of distribution in its hosts.

Table 1. Summary of species of chewing lice associated with birds in Spain collected between 2017 – 2022.

Chewing lice	Bird host	Comment
Amblycera		
Laemobothriidae		
<i>Laemobothrion (Laemobothrion) trinnuncli</i>	<i>Falco naumanni</i>	□
Menoponidae		
<i>Myrsidea rustica</i>	<i>Delichon urbicum</i>	Δ
Ricinidae		
<i>Ricinus meinertzahageni</i>	<i>Anthus campestris</i>	○, □
Ischnocera		
Philopteridae		
<i>Brueelia jacobi</i>	<i>Turdus merula</i>	○, Δ
<i>Brueelia matvejevi</i>	<i>Turdus viscivorus</i>	○, Δ
<i>Coloceras piageti</i>	<i>Streptopelia decaocto</i>	Δ
<i>Columbicola bacillus</i>	<i>Streptopelia decaocto</i>	Δ
<i>Columbicola columbae</i>	<i>Columba oenas</i>	Δ
<i>Cuculoecus latifrons</i>	<i>Cuculus canorus</i>	○, Δ
<i>Paragoniocotes fulvofasciatus</i>	<i>Myiopsitta monachus</i>	○, Δ
<i>Penenirmus longuliceps</i>	<i>Cettia cetti</i>	○, Δ
<i>Philopterus curvirostrae</i>	<i>Loxia curvirostra</i>	○, Δ
<i>Saemundssonina (Saemundssonina) lobaticeps</i>	<i>Chlidonias niger</i>	○, Δ
<i>Strigiphilus tuleskovi</i>	<i>Otus scops</i>	○, Δ

○ First record in Spain

Δ New host-lice association in Spain

□ New host-lice association in worldwide

Our record of the introduced South American louse *Pa. fulvofasciatus* in Spain corresponds to the second citation of this species for Europe, previously has been cited in Italy (Mori et al., 2015). On the other hand, *St. tuleskovi* had only previously been cited in Bulgaria (Balát, 1958). *Pe. longuliceps* had only previously been reported in Greece (Diakou et al., 2017). The taxonomic determination of *Pe. longuliceps* is debated in our study, so a redescription of *Pe. longuliceps* with a larger number of specimens would be necessary.

In conclusion, 9 species of chewing lice are recorded for the first time in Spanish fauna, *B. jacobi*, *B. matvejevi*, *Cu. latifrons*, *Pa. fulvofasciatus*, *Pe. longuliceps*, *Ph. curvirostrae*, *R. meinertzahageni*, *Sa. (S.) lobaticeps* and *St. tuleskovi*. Despite our contributions, more research is required to complete the Phthiraptera Iberian fauna.

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Laemmobothrion (Laemmobothrion) tinnunculi. We also appreciate the comments provided by Daniel R. Gustafsson and an Anonymous reviewer, which have helped to improve this study.

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