Annals of Parasitology 2022, 68(1), 185–189
doi: 10.17420/ap6801.423

Short note

Low prevalence of chewing lice (Phthiraptera) in wintering populations of the reed bunting *Emberiza schoeniclus* (Aves: Passeriformes: Emberizidae) in the Iberian Peninsula

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ABSTRACT. The reed bunting is a passerine bird of the Palearctic region, some subspecies suffer a decline in their populations. Four species of lice have been cited in reed bunting, but lice studies have not been carried out in the Iberian Peninsula. Between 2018 and 2020 a wintering population of the reed bunting is sampled in the center of the Iberian Peninsula through mist nets. Lice were collected directly from birds by a visual body examination. Of the 208 reed buntings sampled, only four individuals were parasitized. We find two species: *Menacanthus chrysophaeus*, which is the first record in Iberian lice, and *Brueelia blagovescenskyi*. Lice are not associated with the sex or age of the birds. The prevalence obtained is low compared to other European populations. This difference can be explained by the phenology of the subspecies, the migratory populations have a lower load of lice than sedentary populations.

Keywords: Amblycera, birds, Ischnocera, migratory, sedentary

Introduction

Chewing lice are divided into three large suborders: Amblycera, Ischnocera and Rhynchophthirina [1]. They are obligate ectoparasites of birds and mammals, therefore their hosts condition their geographical distribution [2]. Ectoparasites can produce diseases or physical harm to their host, causing a deterioration in the bird population´s health status [3]. Some lice, are vectors for avian cholera, fungi and filarial worms or can cause skin irritation and suck blood [2,4].

According to Martín-Mateo [2,5] in Spain, 79 species of Amblycera and 179 species of Ischnocera have been cited, being absent the suborder Rhynchopthirina. Moreover, there are 572 species of sedentary and migratory birds, both wintering and summering [6]. Although the genus *Emberiza* is one of the most representative genera in Iberian passerine birds, Martín-Mateo [2,5] only recorded four lice species: *Menacanthus alaudae* (Nitzsch [in Giebel], 1866) and *Ricinus fringillae* (De Geer, 1778) in yellowhammer *Emberiza citrinella, Brueelia blagovescenskyi* (Balát, 1955) in rock bunting *Emberiza cia* and *Brueelia delicata* (Nitzsch [in Giebel], 1866) in ortolan bunting *Emberiza hortulana*. Currently chewing lice have not yet been reported in reed bunting *Emberiza schoeniclus* in the Iberian Peninsula.

The reed bunting is distributed in the Palearctic region, from south-western Europe to Central Asia [7]. Buntings inhabits wetland where the common reed *Phragmites australis* is predominates [7]. In the Iberian Peninsula there are three subspecies: *E. s. schoeniclus* present only in migratory passage and wintering, *E. . lusitanica* iberian endemism, sedentary in the north-western of the peninsula and *E. s. witherbyi* sedentary in the center and east of the peninsula and Balearic Islands [8].

According to the literature analyzed, there are four species of chewing lice present in the reed bunting [1,9]. From Amblycera, the genus *Menacanthus* (Neuman, 1912) has been cited in reed bunting collected in the United Kingdom (UK) [10], Faroe Islands [11], Hungary [12], Turkey [9] and Greece [13]. In the latter two cases, the species was identified as *Menacanthus chrysophaeus* (Kellogg, 1896). *Ricinus fringillae* (De Geer, 1778) has been cited in reed bunting in the UK [10] and Hungary [12]. Within the Ischnocera suborder, *Brueelia blagovescenskyi* (Balat, 1955) has been cited in reed bunting in the UK [10], Faroe Islands [11] and Czech Republic [14]; and *Philopterus residuus (*Zlotorzycka, 1964) (syn: *Philopterus citrinealle*) in the UK [10] and central eastern European [15].

The absence of chewing lice studies in the reed bunting on the Iberian Peninsula encourages us to carry out this study. The aims are to know the lice present and to include information on their prevalence.

Materials and Methods

The study was conducted in the Special Protected Area for Birds (SPAB) called “Cortados y cantiles de los ríos Manzanares y Jarama”, Madrid, Spain (40°11’00”N 3°34’43.5”W). The landscape is quite heterogeneous, highlighting cornfields, reed beds and horticultural crops, indicating the strong anthropic pressure [16].

Buntings were captured from 2018 to 2020 over the period from October to February using mist nets and the birds were handled according to Pinilla [17]. All buntings were placed individually in single-use cotton bags to avoid mixing lice among birds. Lice were collected directly from the bunting feathers following Martín-Mateo [18]. The collected lice specimens were stored in capped tubes containing 1.5 ml of 70% ethanol until their identification. All the lice collected from an individual bird were placed in a single tube. The louse specimens were cleaned in 10% KOH, mounted in Canada balsam on slides, and identified to species under a light-microscope [19]. For each identified specimen we recorded the taxon, collection date and site, collector and person who identified it. To avoid biases in these determinations, all specimens were identified and classified by the same researchers (B. Dik and I. Bernal). The lice samples were deposited in Selçuk University Veterinary Faculty Department of Parasitology in Turkey. Nomenclature of lice follows Balát [20], Price [21] and Martín-Mateo [5].

Reed bunting were dated and sexed according to Svensson [22] and Shirihai and Svensson [8]. Two age groups were differentiated: juvenile birds (in their first calendar year), with characteristics of birds born within the first calendar year, and adult birds, without young characteristics. Adults birds are over one year old [8,22].

In order to analyse the association between the qualitative variables (age, sex and parasitized) in our population of reed bunting and the difference in the prevalence of lice between our population of buntings and the other populations. We first constructed the corresponding contingency tables to show the relationship between the variables, the significance of the association was then examined through the Fisher´s exact test, due to sample sizes being small and the data being unevenly distributed among the table cells. The statistical analysis was performed through the R v. 4.0.5 software (23).

Results

Out of 208 individual reed buntings captured, four birds were infested with chewing lice (prevalence=1.92%). Two species of lice were identified.

Amblycera, Menoponidae

Menacanthus chrysophaeus (Kellogg, 1896): 1♀ (Fig. 1) ex *Emberiza schoeniclus* (first calendar female), 31.XII.2018; 1♀ ex *Emberiza schoeniclus* (adult female), 28.XII.2019.

Prevalence: 0.96% (n=2); locality on the body area: back feathers.

Ischnocera, Philopteridae

Brueelia blagovescenskyi (Balát, 1955): 1♀ (Fig. 2) ex *Emberiza schoeniclus* (adult female), 23.II.2019; 2 nymphs, ex *Emberiza schoeniclus* (first calendar male), 11.XII.2019.

Prevalence: 0.96% (n=2); locality on the body area: flanks and nape feathers.

The lice were found in three first calendar year

Figure 1. *Menacanthus chrysophaeus*, female (original)

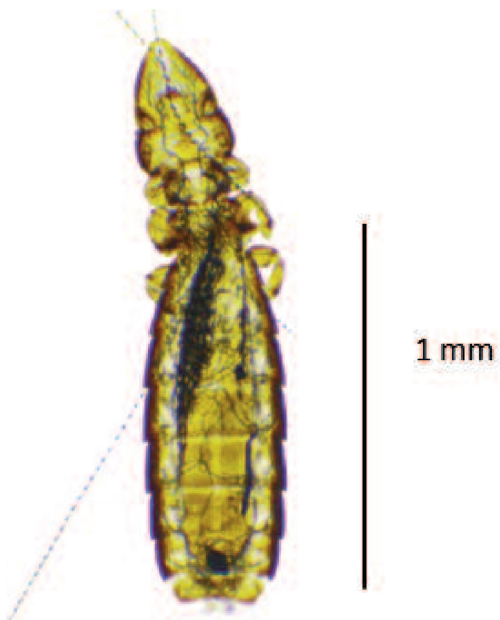

Figure 2. *Brueelia blagovescenskyi*, female (original)

buntings (n=176, prevalence=1.70%) and an adult (n=32, prevalence=3.12%). The application of Fisher´s exact test pointed out a non-significant *P*-value (odds ratio=0.539, N=208, *P*-value=0.490 NS). On the other hand, out of those four parasitized buntings, three were females (n=127, prevalence =2.36%) and one was a male (n=75, prevalence =1.33%). The application of Fisher´s exact test pointed out a non-significant *P*-value (odds ratio=0.560, N=202, *P*-value=1 NS).

Discussion

Two chewing lice species belonging to two genera (*Menacanthus* and *Brueelia*) were collected from the reed bunting.

Menacanthus chrysophaeus is the first record in Iberian wildlife, although was previously recorded in reed bunting in Turkey [9] and Greece [13]. It was also, recorded in the Palearctic region in black-faced bunting *Emberiza spodocephala* [1]. However, *M. chrysophaeus* has been recorded in the Nearctic region in several species of the genera *Melospiza*, *Passerculus*, *Passerella* and *Spizella* [1]. All these genera belong to the Emberizidae family too. *M. chrysophaeus* has a higher distribution in the North American region than in the Eurasian [1]. This may be because the Emberizidae family has a greater number of species in the Nearctic region than those mentioned in Europe [8]. In addition, the number of *Emberiza* species in Asia is higher than in Europe [8], which may indicate a possible speciation point of the genus. This greater diversity of Emberizidae species in the Nearctic and in the Eastern Palearctic, has been able to lead to greater availability of hosts related to the ecological requirements of *M. chrysophaeus* in contrast to the European populations of *Emberiza* [1].

Brueelia blagovescenskyi is the first report from reed bunting in the Iberian Peninsula, previously registered in the rock bunting in the province of Granada (Spain) [2]. Also, it was recorded in the Palearctic region in the same host and in the black-faced bunting [1]. Conversely, *B. blagovescenskyi* currently has a distribution restricted to the Palearctic region and to hosting the genus *Emberiza*.

The total prevalence of the lice obtained in our study is lower than that obtained by Fowler and Williams [10] in UK, where these authors obtained a prevalence of 26.3% in 324 reed bunting (Fisher´s exact test pointed out a significant *P*-value: odds ratio=18.07, N=532, *P*-value=4.654e-16 (<0.001)). In addition, the same authors described four species of lice. However, the individual prevalence of lice detected in our study is similar to those in the UK, *M. chrysophaeus* (0.31%) and *B. blagovescenskyi* (1.23%). Although the fact that the British populations had a high prevalence of *R. fringillae* (4.63%) and *P. residuus* (22.5%), we could not detect these lice species in this study. These differences in prevalence and richness of lice in reed bunting can be explained by the different method used in each study or the different phenology of the subspecies.

Fowler and Williams [10], used a version of the

"*Fair Isle*" apparatus. This method almost allows the total collection of ectoparasites present in the body area of the bird [24]. Perhaps, the methodology used in our study may not detect a some of the parasitized bird with a very low number of lice or in nymphal stages [25]. However, our method (visual examination) offers an economical, fast and less invasive sampling for the reed bunting [25,26]. According to Koop and Clayton [26] there is no difference among using an insecticide method (dust-ruffling) and a visual examination in european starlings *Sturnus vulgaris* and other similar-sized passerines. Therefore, we do not believe that the sampling method is the main cause of the large difference in the amount of lice present in our populations of reed bunting and those of the UK.

On the other hand, it is important to consider the phenology of the nominate subspecies of reed bunting. Most of present in the British Isles are sedentary, while those in our study are migratory (wintering) from central and northern Europe [8]. Island bird populations may suffer from the "parasite island syndrome", this theory is based on the influence and pressure of territorial isolation on the appearance of parasitic infestations [27]. According to Literák et al. [28] the sedentary populations of the Azores Islands blackcaps *Sylvia atricapilla* have a higher prevalence of chewing lice than the continental blackcaps. Therefore, these island's pressures may be influencing the high load lice in the sedentary populations of reed bunting in the British Isles.

Sychra et al. [29] obtained in the Czech Republic, significantly result in sedentary birds having a higher prevalence of lice than migratory birds. Migration itself causes birds in poor condition cannot reach wintering areas, only those in good health contidition will arrive, this allows the control of lice [1,29]. According to Galván et al. [30], migratory birds have a larger uropygial gland than sedentary. This gland secretes lipids that act as insecticide against lice, this action has a positive correlation with the size of the gland [31]. Therefore, if we stick to the phenology of the nominate subspecies (wintering), the iberian reed bunting should have a larger uropygial gland than those of the UK (sedentary).

Two sedentary subspecies of reed bunting are in decline in the Iberian Peninsula, *E. s. lusitanica* and *E. s. witherbyi* as a result of the intensification of agriculture and habitat fragmentation [32]. No parasite studies have been conducted. Therefore, it would be interesting to know if these two Iberian subspecies of the reed bunting have a higher amount of parasites rate than the nominate subspecies.

Acknowledgements

The authors would like to express their acknowledgments to the Department of Biology of the Autónoma University of Madrid and ringing birds group Álula.

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Received 07 September 2021
Accepted 10 November 2021