Bird Study

ISSN: 0006-3657 (Print) 1944-6705 (Online) Journal homepage: https://www.tandfonline.com/loi/tbis20

Prevalence of ectoparasite arthropods in Dupont's Lark *Chersophilus duponti* – a seriously threatened passerine

Carlos Talabante Ramírez, Alejandro Aparicio Valenciano, Juan Luis Aguirre Martínez & Manuel Peinado Lorca

To cite this article: Carlos Talabante Ramírez, Alejandro Aparicio Valenciano, Juan Luis Aguirre Martínez & Manuel Peinado Lorca (2019): Prevalence of ectoparasite arthropods in Dupont's Lark *Chersophilus duponti* – a seriously threatened passerine, Bird Study, DOI: 10.1080/00063657.2019.1578728

To link to this article: https://doi.org/10.1080/00063657.2019.1578728

Published online: 14 Mar 2019.

Submit your article to this journal

Article views: 2

View Crossmark data

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=tbis20

BIRD STUDY
https://doi.org/10.1080/00063657.2019.1578728

SHORT REPORT

Prevalence of ectoparasite arthropods in Dupont's Lark *Chersophilus duponti* – a seriously threatened passerine

Carlos Talabante Ramírez, Alejandro Aparicio Valenciano, Juan Luis Aguirre Martínez and Manuel Peinado Lorca

Cátedra de Medio Ambiente, Departamento de Ciencias de la Vida, Facultad de Ciencias, University of Alcalá, Alcalá de Henares 28071, Spain

ABSTRACT
A full survey of the ectoparasites of 77 individual Dupont's Larks *Chersophilus duponti*, from the Iberian High Plateau, detected three species of chewing lice, one of louse flies, and one identified species of mite.

ARTICLE HISTORY
Received 31 October 2018
Accepted 1 February 2019

Host-parasite interactions are one of the most widespread relationships that exist in nature (Price 1980). The prevalence of a particular population found to be affected by a parasite has impacts on the physical, physiological and even immunological state of the host (Owen *et al.* 2010, Doña *et al.* 2018). Parasite prevalence on a bird is conditioned by host factors such as age, sex, sociability, mobility and reproductive state (Hamstra & Badyaev 2009). Knowledge of the ectoparasites of European larks *Alaudidae* is scarce and even lacking in the case of many species (Suárez *et al.* 2009). Currently, while there is much information on the blood parasites of Dupont's Lark, *Chersophilus duponti* (Vögeli *et al.* 2011), data regarding the diversity of its ectoparasites are limited (Talabante 2017).

The Dupont's Lark is a seriously endangered passerine whose distribution is today restricted to a few Spanish and North African regions. As several aspects of its ecology and biology remain poorly understood, studies on its ectoparasites could provide useful information on parasite transmission and the connectivity sustained by its populations (Talabante 2017). Besides extending basic knowledge of this species, this type of information could also help improve conservation strategies targeted at improving population connectivity and habitat. In the present study, we describe the community of ectoparasite arthropods present on Dupont's Lark in one of its main European distribution areas (Suárez 2010).

The study was conducted in the Special Protected Area for Birds (SPAB) called Parameras y Lagunas del Señorío de Molina, Guadalajara, Spain (41°00′ N 1°48′ W) hereafter designated Molina. Human degradation of these woodlands has led to the spread of a spiny, cushioned scrub dominated by *Genista pumila* and thyme *Thymus sp.* (Aguirre *et al.* 2017). The study area of some 5000 ha and mean altitude 1180 m above sea level is home to one of the larger European Dupont's Lark populations, including more than 200 males (Suárez 2010).

Larks were captured from 2010 to 2017 over the periods April to July using clap-nets baited with *Tenebrionidae* larvae. We used song and call playback to attract the larks to clap-nets. Each bird was ringed with an individually numbered colour-coded ring to avoid resampling the same birds. All larks were placed individually in single-use cotton bags to avoid mixing ectoparasites among birds. For each captured lark, wing, tarsus and head measurements were made according to the methods given by Bairlein (1995). Body fat and muscle deposit were assessed according to the methods given in Bairlein (1995). Both biometric and fat and muscular deposit measurements were later correlated with parasite load in each bird.

Chewing lice were collected directly from the larks' feathers following the method of Clayton & Drown (2001), which involves meticulously searching among the feathers as different parasite species show a preference for given host body regions to avoid interspecies competition. Feather mite occurrence was assessed by exposing the lark's wing against the sunlight following the methods of Jovani & Serrano (2004). Feather mites were not collected for further specific study.

The collected specimens were stored in capped tubes containing 1.5 mL of 70% ethanol until analysis. All the parasites collected from an individual bird were placed in a single tube. Each tube was labelled with the number of

CONTACT Carlos Talabante Ramírez carlos_talabante_ramirez@yahoo.es
© 2019 British Trust for Ornithology

specimens collected, the body sites where they were collected, the date, capture site and host age and sex. Parasites were examined visually with a stereoscope. Smaller specimens were examined under a light microscope. 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 researcher (C. Talabante). Nomenclature follows Martín Mateo (2002, 2009) and Carles-Tolrá Hjorth-Andersen (2002).

We estimated prevalences as the proportions of larks infected by at least one parasite taxon (Clayton & Drown 2001). After confirming the normal distribution of data, the parametric Student *t*-test was used to determine the distribution of sample variances. All statistical tests were performed using SPSS v22.0 software (IBM, Somers, NY, US). Significance was set at $P < 0.05$.

Of 77 individual Dupont's Larks captured, 46 (59.74%) were parasitized by at least one ectoparasite taxon while no parasites were collected from the remaining 31 larks. Three orders of parasite were identified: *Phthiraptera, Diptera* and *Acarina*. The prevalence of the different parasites found on the larks is provided in Table 1.

Among the *Phthiraptera*, two families of chewing lice were identified (*Philopteridae* and *Menoponidae*). Within the *Philopteridae* family, specimens of the genera *Philopterus* and *Brueelia* were collected. Only one genus, *Menacanthus*, was found in the family *Menoponidae*. We also collected a class of louse fly (*Diptera: Hippoboscidae*) identified as *Ornithophila metallica*. Finally, mites (*Acari: Astigmata*) were detected mainly among the birds' primary feathers and in smaller measure on their secondary feathers (Table 1). In 93.47% of the parasitized larks, only one parasite species was found while 6.52% had two. Mites were the most frequent parasite detected, being in 33 of the birds examined (71.73% of parasitized birds). There were no significant differences in the biometrics or body condition scores of parasitized and non-parasitized birds (Table 2).

The results of our survey indicate that several species of arthropod ectoparasites depend on the Dupont's Lark.

Table 2. Biometrics and body condition according to whether the birds were parasitized or not. There were no significant differences between parasitized and non-parasitized birds; all $P > 0.05$). All birds were adult males.

Trait	Parasitized	*N*	Mean ± se	Student's *t* (df)
Body condition (fat + muscle scores)	Yes	46	2.130 ± 0.1881	0.518 (45)
	No	31	2.000 ± 0.2365	
Wing length (mm)	Yes	46	99.783 ± 0.4137	0.105 (45)
	No	31	100.919 ± 0.6451	
Tarsus length (mm)	Yes	46	23.728 ± 0.1556	0.545 (45)
	No	31	23.977 ± 0.1872	
Head length (mm)	Yes	46	44.096 ± 0.2070	0.931 (45)
	No	31	44.716 ± 0.2535	

Among the diversity of *Mallophaga* detected, *Brueelia* was clearly dominant. *Brueelia* is a highly diversified genus that mainly appears in passerines (Martín Mateo 2009). The presence of *Brueelia parviguttata* has been described in the Crested Lark *Galerida cristata* (Soler-Cruz *et al.* 1979). However, our specimens differed from *B. parviguttata* in several characters. In effect, we are currently exploring the possibility that this is a new, unidentified louse species.

In the case of *Philopterus*, our data are the first European record of the genus as a parasite of the family *Alaudidae*. This species also seems as yet undescribed, which indicates another new parasite species associated with Dupont's Lark. *Menacanthus alaudae* was the only *Amblycera* identified in our study. Soler Cruz & Guevara Benítez (1981) cited *Menacanthus alaudae* in Crested Lark, which is the only reference to the genus in Iberian *Alaudidae*. Our detection of *M. alaudae* increases the number of passerines hosts of this species in the European fauna.

The scarce diversity of louse flies noted here is consistent with observations in other birds (Tella *et al.* 1998). Louse flies usually flee from their hosts when these are in danger, so capturing the larks could mean that the sample observed was much reduced. Nevertheless, the capture method used in our study has been reported useful for diversity studies considering this ectoparasite (Tella *et al.* 1998). The only species recorded here has been cited exclusively for groups of passerines and woodpeckers (Carles-Tolrá Hjorth-Andersen 2002).

Table 1. Diversity of arthropods detected on the feathers of Dupont's Larks captured at Molina, Guadalajara, Spain. [1] For *Astigmata* and *Acari*, lower taxonomic levels could not be assigned.

Order (Suborder)	Family	Genus or species	Prevalence (%)	Body area
Diptera	*Hippoboscidae*	*Ornithophila metallica*	1.29	Back feathers
Phthiraptera (Ischnocera)	*Philopteridae*	*Philopterus* sp.	1.29	Back feathers
		Brueelia sp.	16.88	Back and nape feathers
Phthiraptera (Amblycera)	*Menoponidae*	*Menacanthus alaudae.*	1.29	Back feathers
Acarina	*Astigmata*[1]	*Acari*[1]	42.85	Primary and secondary feathers

Feather mites have been typically considered parasites of birds, though studies have suggested they establish mutualistic relationships with their hosts (Blanco *et al.* 2001, Galván *et al.* 2012). Reports exist that feather mites are less common in birds from drier than more humid climates (Dubinin 1951). Feather mites essentially feed on fungal spores and bacteria, and these proliferate more in humid environments (Jovani *et al.* 2001, Carrillo *et al.* 2007). This could explain the scarce prevalence of mites in the Dupont's Lark (<50%), which especially appear in steppe environments of marked water deficit (Aguirre *et al.* 2017). However, Díaz-Real *et al.* (2014) found a high prevalence of feather mites in a sample of larks from several places in their range. This could be a matter of population differences.

Moreover, feather mites also feed on lipids produced by the uropygial glands of birds. Galván & Sanz (2006) found that larger uropygial glands in birds tended to be associated with larger numbers of mites on their feathers. After noting that these glands were larger in migratory birds, Galván *et al.* (2008) were able to link feather mite loads to the migration habits of each bird species. Thus, non-migratory birds have fewer feather mites as their uropygial gland is small. Adult Dupont´s Larks are sedentary for most of the year so the low mite loads obtained in our study are in line with observations in other species (Berthold 2001). The restricted movement of Dupont's Lark could influence the evolution of endemism within the parasite fauna and could provide useful direction for future studies.

Besides providing new insight into the ectoparasites associated with this seriously threatened passerine, our data open several interesting lines of investigation into host-parasite relationships that will help us understand the biology of Dupont's Lark and to design conservation and management strategies that are more adapted to its ecology.

Acknowledgements

The authors wish to thank Anna Burton by checking the translate. This work was supported from the agreement between the University of Alcalá and Gas Natural Fenosa Renovables, S.L. This study is part of the PhD 'Contribución al conocimiento de la biología de la alondra ricotí *Chersophilus duponti* en su área de distribución ibérica' (Talabante 2017; University of Alcalá).

References

Aguirre, J.L., Talabante, C., Aparicio, A. & Peinado, M. 2017. Phytosociological, structural and conservation analysis of the habitats of Dupont´s lark in Europe: A phytosociological survey applied to the conservation of an endangered species. *Plant Biosyst.* **152**: 1–18.

Bairlein F. 1995. *Manual of Field Methods of the ESF European-African Songbird Migration Project*. Wilhemshaven.

Berthold, P. 2001. *Birds Migration*: *A General Survey*. New York: Oxford University Press.

Blanco, G., Tella, J.L., Potti J. & Baz, A. 2001. Feather mites on birds: costs of parasitism or conditional outcomes? *J. Avian Biol.* **32**: 271–274.

Carles-Tolrá Hjorth-Andersen, M. 2002. Catálogo de los Dípteros de España, Portugal y Andorra (Insecta). *Monografías S.E.A.* **8**: 1–323.

Carrillo, C., Valera, F., Barbosa, A. & Moreno, E. 2007. Thriving in an arid environment: high prevalence of avian lice in low humidity conditions. *Ecoscience* **14**: 241–249.

Clayton, D.H. & Drown, D.M. 2001. Critical evaluation of five methods for quantifying chewing lice. *J. Parasitol.* **87** (6): 1291–1300.

Díaz-Real, J., Serrano, D., Pérez-Tris, J., Fernández-González, S., Bermejo, A., Calleja, J.A., De la Puente, J., De Palacio, D., Martínez, J.L., Moreno-Opo, R., Ponce, C., Frías, O., Tella, J.L., Møller, A.P., Figuerola, J., Pap, P.L., Kovács, I., Vágási, C.I., Meléndez, L., Blanco, G., Aguilera, E., Senar, J.C., Galván, I., Atiénzar, F., Barba, E., Cantó, J.L., Cortés, V., Monrós, J.S., Piculo, R., Vögeli, M., Borràs, A., Navarro, C., Mestre, A. & Jovani, R. 2014. Repeatibility of feather mite prevalence and intensity in passerine birds. *PLoS One* **9**: e107341.

Doña, J., Proctor, H., Serrano, D., Johnson, K.P., Oddy-van Oploo, A., Huguet-Tapia, J.C., Ascunce, M.S. & Jovani, R. 2018. Feather mites play a role in cleaning host feathers: new insights from DNA metabarcoding and microscopy. *Mol. Ecol.* doi:10.1111/mec. 14581.

Dubinin, V.B. 1951. Feathers mites (*Analgesoidea*). Part I. Introduction to their study. *Fauna USSR* **6**: 1–363.

Galván, I. & Sanz, J.J. 2006. Feather mite abundance increases with uropygial gland size and plumage yellowness in great tits *Parus major*. *Ibis* **148**: 687–697.

Galván, I., Barba, E., Piculo, R., Cantó, J.L., Cortés, V., Monrós, J.S., Atiénzar, F. & Proctor, H. 2008. Feather mites and birds: an interaction mediated by uropygial gland size? *J. Evol. Biol.* **21**: 133–144.

Galván, I., Aguilera, E., Atiénzar, F., Barba, E., Blanco, G., Cantó, J.L., Cortés, V., Frías, O., Kovács, I., Meléndez, L., Møller, A.P., Monrós, J.S., Pap, P.L., Piculo, R., Senar, J.C., Serrano, D., Tella, J.L., Vágasi, C.I., Vögeli, M. & Jovani, R. 2012. Feather mites (*Acari: Astigmata*) and body condition of their avian hosts: a large correlative study. *J. Avian Biol* **43**: 273–279.

Hamstra, T.L. & Badyaev, A.V. 2009. Comprehensive investigation of ectoparasite community and abundance across life history stages of avian host. *J. Zool.* **278**: 91–99.

Jovani, R., Tella, J.L., Forero, M.G., Bertellotti, M., Blanco, G., Ceballos, O. & Donázar, J.A. 2001. Apparent absence of blood parasites in the Patagonian seabird community: is it related to the marine environment? *Waterbirds* **24**:430–433.

Jovani, R. & Serrano, D. 2004. Fine-tuned distribution of feather mites (Astigmata) on the wing of birds: the case of blackcaps *Sylvia atricapilla*. *J. Avian Biol* **35**: 16–20.

Martín Mateo, M.P. 2002. Mallophaga, Amblycera. In Ramos, M.A. (ed) *Fauna Ibérica*, Vol. 20: 187. Museo Nacional de Ciencias Naturales. CSIC, Madrid.

Martín Mateo, M.P. 2009. Phthiraptera, Ischnocera. In Ramos, M.A. (ed) *Fauna Ibérica*, Vol. 32: 363. Museo Nacional de Ciencias Naturales. CSIC, Madrid.

Owen, J.P., Nelson, A.C. & Clayton, D.H. 2010. Ecological immunology of bird-ectoparasite systems. *Trends Parasitol.* **26**: 530–539.

Price, P.W. 1980. *Evolutionary Biology of Parasites*. Princeton University Press, Princeton.

Soler Cruz, D., Martin Mateo, M.P. & Morillas Márquez, F. 1979. *Brueelia parviguttata* (Blagoveshchensky, 1940) (*Mallophaga*) parásito de *Galerida cristata*. *Revista Ibérica de Parasitología* **39**: 165–173.

Soler Cruz, M.D. & Guevara Benítez, D.C. 1981. *Menacanthus alaudae* (Schrank, 1776) (*Mallophaga*) parásito de *Galerida cristata*. *Revista Ibérica de Parasitología* **41**: 93–100.

Suárez, F. 2010. *La alondra ricotí* (*Chersophilus duponti*). Dirección General para la Biodiversidad. Ministerio de Medio Ambiente y Medio Rural y Marino. Madrid.

Suárez, F., Hervás, I. & Herranz, J. 2009. *Las alondras de la España peninsular*. Dirección General para la Biodiversidad. Ministerio de Medio Ambiente y Medio Rural y Marino. Madrid.

Talabante, C. 2017. Contribución al conocimiento de la biología de la alondra ricotí (Chersophilus duponti) en su área de distribución ibérica. PhD Thesis, University of Alcalá.

Tella, J.L., Gajón, A., Gortázar, C. & Osácar, J.J. 1998. High host specificity of *Crataerina melbae* (*Diptera: Hippoboscidae*) in a mixed colony of birds. *J. Parasitol.* **84**: 198–200.

Vögeli, M., Lemus, J.A., Serrano, D., Blanco, G. & Tella, J.L. 2011. An island paradigm on the mainland: host population fragmentation impairs the community of avian pathogens. *Proc. R. Soc. Biol. Sci.* **278**: 2668–2676.