Acta Tropica 136 (2014) 101–103

Contents lists available at ScienceDirect

Acta Tropica

journal homepage: www.elsevier.com/locate/actatropica

Chewing lice (Phthiraptera) from *Calidris fuscicollis* (Aves: Scolopacidae) in Southern Brazil

Sâmara Nunes Gomes[a,*], Tatiana Cheuiche Pesenti[a], Maximiano Pinheiro Cirne[b], Gertrud Müller[a]

[a] Laboratório de Parasitologia de Animais Silvestres, Departamento de Microbiologia e Parasitologia (DEMP), Universidade Federal de Pelotas (UFPel), Brazil
[b] Laboratório de Biologia e Ecologia de Cordados, Centro de Ciências da Vida e da Saúde, Universidade Católica de Pelotas, Brazil

ARTICLE INFO

Article history:
Received 14 February 2014
Received in revised form 30 March 2014
Accepted 5 April 2014
Available online 15 April 2014

Keywords:
White-rumped sandpiper
Migratory birds
Ectoparasites
Actornithophilus
Carduiceps
Lunaceps

ABSTRACT

During April and September from 2010 to 2012, 80 birds of the species *Calidris fuscicollis* (white-rumped sandpiper) were collected for parasitological studies in the southern coast of Rio Grande do Sul, under ICMBIO license No. 26234-1. For ectoparasite collection, the birds were first submerged in water with detergent. The parasites found were fixed in 70% alcohol, cleared in 10% potassium hydroxide and mounted in Canada balsam. Of 80 birds examined, 79% were parasitized. *Actornithophilus umbrinus* (47.5%), *Actornithophilus lacustris* (37.5%), *Actornithophilus* spp. (13.75%), *Carduiceps zonarius* (26.25%), *Lunaceps incoenis* (27.5%), and *Lunaceps* spp. (16.25%) were the species found with their respective prevalence. We record for the first time parasitism by chewing lice in *Calidris fuscicollis*.

1. Introduction

In Brazil there are 26 species of birds in the Family Scolopacidae, 98% of them are migratory from the Northern Hemisphere (Sick, 1997). Birds of the genus *Calidris* belong to a group that reproduces in the Arctic and moves to the Southern Hemisphere during the winter where they form large mixed flocks in coastal areas (Novelli, 1997). In the State of Rio Grande do Sul, Brazil, these birds come in great numbers in late August and return between March and April (Sick, 1983). Despite the richness and diversity of species their ectoparasites are not well known; the few studies on chewing lice in this region were from captive birds or rehabilitation centers (Valim et al., 2005).

Among the diversity of parasites that can be found in wild birds, the chewing lice (Insecta: Phthiraptera) stand out, and together with the feather mites (Acari: Acaridida), are the most often found ectoparasites (Valim et al., 2005). The birds are parasitized by lice of two (Amblycera and Ischnocera) of the four sub-orders of Phthiraptera. Ischnocera live mainly in the feathers of their host and Amblycera live on the skin and body surface of the host; both showing high degree of specificity to a single species or a close group of hosts (Clay, 1950).

Palma (1999) recorded parasitism by *Actornithophilus umbrinus*, *Carduiceps zonarius*, and *Lunaceps* spp. in *Calidris acuminate*, and by *Lunaceps* spp. in *Calidris ruficollis* in New Zealand. Palma and Jensen (2005) reported the presence of *Actornithophilus umbrinus*, *Carduiceps meinertzhageni*, and *Lunaceps actophilus* in *Calidris alpina*; *Actornithophilus umbrinus*, *Austromenopon lutescens lutescens*, *Carduiceps zonarius*, and *Lunaceps drosti* in *Calidris canutus*; *Austromenopon lutescens lutescens*, *Carduiceps zonarius*, and *Lunaceps actophilus* in *Calidris alba*; *Actornithophilus umbrinus*, *A. lutescens erilis*, *Carduiceps meinertzhageni*, *L. nereis*, and *Saemundssonia tringae* in *Calidris maritima*, in the Faroe Islands, an island group situated between the Norwegian Sea and the North Atlantic Ocean. In South America, *Actornithophilus umbrinus*, *A. pediculoides*, and *Lunaceps incoenis* were identified by D'Amico et al. (2008) in *Calidris canutus rufa*. Dik et al. (2010) identified the Mallophaga *Actornithophilus umbrinus*, *A. lutescens*, *Carduiceps zonarius*, and *Lunaceps drosti* in *Calidris minuta*; *A. umbrinus*, *Austromenopon alpinum*, *C. meinertzhagani*, and *Lunaceps actophilus* in *Calidris alpina*; and *L. incoensis* in *Calidris temminckii*, in Turkey.

* Corresponding author. Tel.: +55 5191350993.
E-mail address: sng.bio@hotmail.com (S.N. Gomes).

http://dx.doi.org/10.1016/j.actatropica.2014.04.009
0001-706X/

Currently there are no reports in the literature of ectoparasites of *Calidris fuscicollis* (Vieillot, 1819). We aimed to identify the species of chewing lice found parasitizing the white-rumped sandpiper. This study was therefore of great importance for contributing to the biodiversity of lice species in wild birds.

2. Material and methods

Eighty birds were collected for parasitological studies, using a mist net (ICMBIO License No. 26234-1, the Brazilian Federal Agency of the Ministry of the Environment responsible for the establishment of Environmental Reserves), during their migratory period (April–September), from 2010 to 2012, in the southern coast of the State of Rio Grande do Sul, Brazil (32°15′32.57″S 52°14′00.04″O). The procedures for sedation and euthanasia were performed according to the Veterinary Medical Federal Council (2012). Each bird was packed in a plastic bag and carried to the Wild Life Parasitology Laboratory, Department of Microbiology and Parasitology of the Federal University of Pelotas. For collection of the ectoparasites, the birds were kept in water with a detergent solution for about 30 min for unfixing the parasites. The ectoparasites were fixed in 70% alcohol, clarified with 10% potassium hydroxide and mounted between a slide and a cover slip with Canada balsam. The identification of lice was performed according to specific bibliography (Timmermann, 1954; Clay, 1962; Gustafsson and Olsson, 2012). The parameters analyzed (prevalence, mean intensity, and mean abundance) were calculated according to Bush et al. (1997). The representative specimens were deposited on the parasitological collection of the Laboratory, DEMP/UFPel.

3. Results and discussion

A total of 359 specimens of lice were collected belonging to the families Menoponidae and Philopteridae, and classified into three genera and six species. Sixty-eight species belonging to the genera *Actornithophilus* (Ferris, 1916) and *Lunaceps* (Clay and Meinertzhagen, 1939) could not be identified due to morphological divergence among the individuals collected and published descriptions. It is likely that these species are new to science and therefore should be treated in more detailed descriptions. Seventy-nine percent of the 80 birds examined were parasitized; the Philopteridae (56%) was more prevalent than the Menoponidae (44%). Wheeler and Threlfaal (1986) stated that Phthiraptera that are more slender and elongated as those of belong to the Philopteridae, they are more agile and free to move around in the body of the host and thus flee from the beaks of birds. However, rounded forms with large heads, are representatives of the Menoponidae, which have slow movements, leaving them unprotected against grooming and preening.

Representatives of the Menoponidae are specialized to live on the skin of their hosts, where they feed on the desquamation, dermal secretions, or blood (Johnson & Clayton, 2003). Three species of this family are reported here for the first time in *Calidris fuscicollis* (*Actornithophilus umbrinus*, Burmeister, 1838; *A. lacustris* Clay, 1962, and *Actornithophilus* spp.). Taxonomic classification of *Actornithophilus* is based on Clay (1962), and the observation of the size, position and arrangement of bristles for correct identification is required.

The habits of Mallophaga belonging to the Philopteridae are very different from those of the Menoponidae, living in certain areas of the body of their hosts and feeding mainly on feathers (Johnson & Clayton, 2003). Three species from two different genera were identified in this host, also for the first time (*Carduiceps zonarius*, Nitzsch, 1866; *Lunaceps incoenis*, Kellogg & Chapman, 1899, and *Lunaceps* spp.).

Table 1
Chewing lice (Phthiraptera) from *Calidris fuscicollis* in Southern Brazil.

Specie	*P* %	MI ± SD	MA ± SD
A. umbrinus	47.5	2.65 ± 1.0	1.26 ± 1.2
A. lacustris	37.5	1.23 ± 0.4	0.46 ± 0.6
Actornithophilus sp.	13.75	1.27 ± 0.6	0.17 ± 0.4
Carduiceps zonarius	26.25	2.61 ± 2.5	0.68 ± 1.7
Lunaceps incoenis	27.5	2.59 ± 2.1	0.71 ± 1.5
Lunaceps sp.	16.25	4.15 ± 1.1	0.67 ± 3.3

P = prevalence; MI = mean intensity; MA = mean abundance; SD = standard deviation.

Lice of the genus *Lunaceps* are ectoparasites of shorebirds (Charadriiformes: Scolopacidae), and are notoriously difficult to identify morphologically, because they are very similar, differing only in color intensity and size, and with minimal differences in male genitalia and pre antennal area (Gustafsson and Olsson, 2012).

Species of the genus *Carduiceps* form a rather uniform group (Timmermann, 1954), that distinguishes them from other genera by the characters of the clypeal region and abdomen (Clay & Meinertzhagen, 1939).

Parameters of prevalence, mean intensity, and mean abundance of parasitism analyzed for each species are shown in Table 1.

According to Atkinson et al. (2008), some species of Mallophaga are less specific, however they occur in genera, families and even similar orders, which can be explained by the presence of *Actornithophilus umbrinus*, *Carduiceps zonarius*, and *Lunaceps incoenis* parasitizing *Calidris fuscicollis*, since it has already been reported in other species of the same genus.

There was an overlapping of different species and genera parasitizing the same host, although there is a possibility of competition between populations of two or more species of louse sharing the same host, it is more likely that the availability of resources will determine their survival and reproductive success (Marshall, 1981; Cicchino et al., 1998a,b). Nevertheless, competitive interactions among lice populations may result in exclusion of one in favor of another, or may lead to changes in density of infestation, especially among species of Menoponidae, due to their need for more varied diet (feathers, blood, skin secretions); this may explain the decrease in abundance of these species (Table 1).

Lice populations may be reduced in migratory birds more often than in resident birds because preening is required to maintain their plumage in ideal condition for a successful return (Clayton, 1991).

The study of lice contributes to elucidate phylogenetic relationships among members of the Class Aves because many genera of lice are restricted to certain orders of birds, and some species within certain genera may be restricted to only one species of host (Clayton, 1990).

4. Conclusion

In this study six species of Phthiraptera were identified for the first time in *Calidris fuscicollis*, the white-rumped sandpiper: *Actornithophilus umbrinus*, *A. lacustris*, *Actornithophilus* spp., *Carduiceps zonarius*, *Lunaceps incoenis*, and *Lunaceps* spp.

The Philopteridae were more prevalent (56%) than Menoponidae (44%). It should be further noted that *Actornithophilus umbrinus* was the most prevalent species in *Calidris fuscicollis* with 47.5%.

Acknowledgements

We thank to Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), a Brazilian Federal Agency for Support and Evaluation of Graduate Education, for the Doctoral and to Conselho Nacional de Desenvolvimento Científico e Tecnológico

(CNPq/Brasil), The National Council for Scientific and Technological Development for having supported this study in part.

References

Atkinson, C.T., Thomas, N.J., Hunter, D.B., 2008. Parasitic Diseases of Wild Birds. Wiley-Blackwell, Ames, Iowa, pp. 595.

Bush, A.O., et al., 1997. Parasitology meets ecology on terms: Margolis et al. revisited. J. Parasitol. 83, 575–583.

Cicchino, A.C., del Castro, C.D., 1998a. Amblycera. In: Morrone, J.J., Coscarón, S. (Eds.), Biodiversidad de artrópodos argentines. Ediciones Sur, La Plata, Buenos Aires, Argentina, pp. 84–104.

Cicchino, A.C., del Castro, C.D., 1998b. Ischnocera. In: Morrone, J.J., Coscarón, S. (Eds.), Biodiversidad de artrópodos argentines. Ediciones Sur, La Plata, Buenos Aires, Argentina, pp. 104–124.

Clay, T., Meinertzhagen, R., 1939. Three new genera of Mallophaga from Charadriiformes. J. Nat. History 11, 4–22.

Clay, T., 1962. A key to the species of *Actornithophilus ferris* with notes and descriptions of new species. Bull. Br. Mus. (Nat. History) Entomol. 11, 189–244.

Clayton, D.H., 1990. Mate choice in experimentally parasitized rock doves: Lousy Males Lose. Am. Zool. 30, 251–262.

D'Amico, V.L., Bertellotti, M.N., Baker, A.J., Tellino Junior, W.R., González, P.M., 2008. Migration strategies of wintering populations of red knots *Calidris canutus rufa* in south America: the role of parasite pressure. Ardeola 55, 193–202.

Dik, B., Sekercioglu, Ç.H., Kirpik, M.A., Inak, S., Uslu, U., 2010. Chewing lice (Phthiraptera) species found on Turkish Shorebirds (Charadriiformes). Kafkas Univ Vet Fak Derg 16, 867–874.

Gustafsson, D.R., Olsson, U., (Zootaxa) 2012. The "Very Thankless Task": Revision of *Lunaceps* Clay and Meinertzhagen, 1939 (Insecta: Phthiraptera: Ischnocera: Philopteridae), with Descriptions of Six New Species and One New Subspecies, 3377. Magnolia Press, Auckland, New Zealand, pp. 1–85.

Johnson, K.P., Clayton, D.H., 2003. Coevolutionary history of ecological replicates: comparing phylogenies of wing and body lice to columbiform hosts. In: Page, R.D.M. (Ed.), Tangled Trees: Phylogeny Cospeciation, and Coevolution. Univ. of Chicago Press, Chicago, pp. 262–286.

Marshall, A.G., 1981. The Ecology of Ectoparasitic Insects. Academic Press, New York, USA.

Novelli, R., 1997. Aves marinhas costeiras do Brasil: identificação e biologia. Cinco Continentes, Porto Alegre.

Palma, R.L., 1999. Amendments and additions to the 1982 list of chewing lice (Insecta: Phthiraptera) from birds in New Zealand. Notornis 46, 373–387.

Palma, R.L., Jensen, J.-K., 2005. Lice (Insecta: Phthiraptera) and Their Host Associations in the Faroe Islands, 29. Steenstrupia, Copenhagen, Denmark, pp. 49–73.

Sick, H., 1983. Migrações de aves na América do Sul Continental. IBDF, Brasília.

Sick, H., 1997. Ornitologia Brasileira. Nova Fronteira, Rio de Janeiro.

Timmermann, G., 1954. A revision of the genus *Carduiceps* Clay & Meinerthagen, 1939 (Mallophaga). Ann. Mag. Nat. History 12, 40–48.

Valim, M.P., Teixeira, R.H.F., Amorim, M., Serra-Freire, N.M., 2005. Malófagos (Phthiraptera) recolhidos de aves silvestres no Zoológico de São Paulo, SP, Brasil. Rev. Bras. Entomol. 49, 584–587.

Wheeler, T.A., Threlfall, W., 1986. Observations on the ectoparasites of some Newfoundland passerines (Aves: Passeriformes), Canada. J. Zool. 64, 630–636.