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A SURVEY ON ECTO- AND ENDOPARASITES IN SOME MIGRATORY BIRDS IN THE DANUBE DELTA, ROMANIA

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Abstract

Migratory birds are important carriers and reservoirs for a variety of pathogens, with a great potential of their spreading. The Danube Delta Biosphere Reserve is one of the most important migration stopover for a great diversity of migratory birds where they feed and recover the energy supplies towards the African wintering grounds. Knowledge about the circulation of pathogens, parasites included, in different areas and different bird gatherings contributes to a better understanding of the epidemiology of some parasitic diseases which are responsible for changing in host population dynamics and the potential risks for vector-borne diseases, including zoonoses. Therefore, the present study aimed to investigate the occurrence of ecto- and endoparasites in some migratory birds at the hotstop in the Danube Delta (Southeastern Romania). For this, a total number of 260 birds (Passeriformes and Pelecaniformes), belonging to five families (Sylviidae, Turdidae, Laniidae, Paridae, Ardeidae) and 12 species were investigated, during of a ringing session, in August 2016. All birds were examined for external parasites. Additional, 23 birds were also subjected for endoparasite infections using flotation method and microscopic examination. Overall, out of the total birds 22.30% (58/260) were found positive for ectoparasites (feather mites, chewing lice), while 12 of the 23 investigated (52.17%) were positive for internal parasites. As ectoparasites, were detected feather mites in 21.53% (56/260), belonging to Trouessartiidae and Proctophyllodidae families; chweing lice in 0.38% (1/260), belonging to the genus Menachantus (Phtiraptera), and fowl mite Ornithonyssus spp. (Mesostigmata) (0.38%; 1/260). The most common endoparasite infection was with coccidia (Apicomplexa) (39.13%; 9/23), represented by Eimeria spp. and Isospora spp. The prevalence of internal and external parasites found in the present study highlight the need for further investigation of parasitofauna in wildbirds considering the fact that, parasites might have a negative effects on population dynamics of birds.

Key words*: parasites, migratory birds, Passeriformes, Danube Delta, Romania.*

INTRODUCTION

The Danube Delta Biosphere Reserve (DDBR) is one of the most important migration stopover for a great diversity of migratory birds (more than 250 different species) where they feed and recover the energy supplies towards the African wintering grounds. Around 900 million birds fly annually in this place during the two migratory sessions (spring and autumn) (Zehtindjiev and Liechti 2003).

The Danube Delta has a greater diversity of habitats and food resources than other passage areas from Europe, and for this reason, migratory birds make a longer stopover in the Danube Delta wetlands (Ion, 2009).

Migratory birds are important carriers and reservoirs for a variety of pathogens, with a great potential of their spreading, including pathogens with zoonotic risk. In Europe, different migratory bird species migrate to survive seasonal climate changes (Hahn et al., 2009).

This migration provides the right path for circulations of different pathogens, including parasites (Fuller et al., 2012).

Among bird ectoparasites, feather mites (Acari: Astigmata) are the most diverse arthropods found on different orders of birds; they are living permanently on the feathers of birds (Proctor, 2003; Clayton et al., 2010).

Other parasites, suchs as insects, chewing lice (Phthiraptera: Ischnocera, Amblycera) are also permanent ectoparasites of different domestic and wild birds species, that feed on feathers and skin scales. They can deteriorate the quality of the plumage, provoke small holes on

feathers increasing the feather brakes and chronic dermatosis (Vas et al., 2008; Mitrea, 2011).

Different endoparasitic species such as, protozoan, nematodes, cestodes can cause clinical diseases and mortality in wild birds (Rossi et al., 1977; Schoenaer et al., 2012).

Even though, not all parasites shows lethal effects, some parasite emergence can change host population dynamics and modify coevolution relationships between hosts and their parasites (Best et al. 2010).

Improving the knowledge of ocurrence and circulation of parasites in migratory birds can contribute to a better understand of the distribution and epidemiology of some diseases and the role of birds as carriers and spreading of some vector-born pathogens. Little information is available on parasite species encountered in migratory birds in the Danube Delta Bosphere Reserve. Therefore, the present study aimed to investigate the presence of ecto- and endoparasites in some migratory birds at the hotstop in the Danube Delta.

MATERIALS AND METHODS

Animals and study area

The study was carried out in the Danube Delta Biosphere Reserve, near Maliuc village (45° 10′ 31.02″ N, 29° 4′ 35.72″ E). DDBR (added in 1991 on UNESCO World Natural Heritage list), has a significant ecological diversity (30 types of ecosystems) and the existence of many areas where human impact is still absent (Goriup et al., 2007).

The study was performed in August 2016, during a ringing session, within an ornithological camp. A total of 260 birds were parasitological investigated; the birds were captured using the ornithological mist-nets and ringing. Nests were arranged in reed bands and were checked at every 30 minutes. All birds were extracted and identified by species (and whenever possible aged) and ringed with individually numbered metal rings. All the birds have been subjected for parasitological investigations, as follows:

(i) for ectoparasites, prior to their release, birds were carefully inspected for the presence of ectoparasites; when were present, they were collected from the body of birds with a fine forceps and preserved in absolute ethanol for later examination using a separate vial for each bird. Additional, when feather mites were observed, one feather were collected and preserved in separate vial, for further mite identification. The ectoparasites collected were identified under microscopic examination to genus and/or species level, based on morphological features (Mironov, 2012; Mironov and González-Acuña, 2013).

(ii) for endoparasites, fecal samples were collected only if there were present in the bag where the bird was kept; samples were placed in tubes and stored at 4°C and transported to the laboratory and examined in the next two days, by the flotation method (saline solution), for detection of protozoan oocysts and worm eggs (Ionita and Mitrea, 2013).

RESULTS AND DISCUSSIONS

During the ringing session performed in August 2016, in the DDR, a total number of 354 birds were ringed and 260 of them were investigated for external parasites; out of these, from 23 birds, faecal sample were also collected for parasitological examination.

Overall, the total number of 260 birds captured and direct examined during the ringing session belonged to 12 species and four families of Passerines: Sylviidae (seven species), Laniidae (one species), Turdidae (one species), Paridae (two species), and one family of Pelecaniformes: Ardeidae (one species), (Table 1).

Out of the total examined birds, 22.30% (58/260) were found positive for ectoparasites. Of the ectoparasites, were detected as follows: feather mites, in 21.53% (56/260), belonging to *Trouessartiidae* (Fig. 1. A, B) and *Proctophylloidae* families (Fig. 2); chweing lice, in 0.38% (1/260), belonging to the genus *Menachantus* (Phtiraptera) (Fig. 3), and fowl mite, *Ornithonyssus* spp. (Mesostigmata) (0.38%; 1/260).

Of the 23 birds from which fecal samples were collected and coproparasitological investigated, 12 (52.17%) of them were found positive for internal parasites. The endoparasites found in the feces of wild birds in the present study, belonged to protozoa, nematodes and cestodes.

The most common endoparasite infection were represented by protozan coccidia, *Eimeria* spp. and *Isospora* spp. 39.13% (9/23) (Fig. 4. A, B). However, even though some eggs have been identified to major groups (coccidia, cestodes, nematodes), they could not be precisely identified to species leavel.

In table 1 are detailed the recorded parasitological data.

Table 1. Birds classification and the number of positive for ecto- and/or endoparasites of some wild birds in the Danube Delta Biosphere Reserve

Nr. crt.	Birds species	Family/ migrating statues/ type of diet	No. of positive birds with ectoparasites				No. of positive birds with endoparasites			
			Total	Feather mites	Chew-ing lices	Fowl mite	Total	Eimeria/ Isospora spp.	Cesto-des	Nema-tode
1.	*Acrocephalus arundinaceus*	Sylviidae/ migratory/ insectivorous	16	16	0	1	3	3	0	0
2.	*Acrocephalus schoenobaenus*		0	0	0	0	0	1	0	0
3.	*Acrocephalus melanopogon*		1	1	0	0	0	0	0	0
4.	*Acrocephalus palustris*		0	0	0	0	1	0	0	1
5.	*Acrocephalus scirpaceus*		27	27	0	0	6	4	1	0
6.	*Ixobrychus minutus*	Ardeidae/ migratory/ carnivorous	0	0	0	0	0	0	0	0
7.	*Luscinia luscinia*	Turdidae/ migratory/ insectivorous	2	2	0	0	1	0	0	1
8.	*Locustella luscinioides*	Sylviidae/ Migratory/ insectivorous	3	3	0	0	0	0	0	0
9.	*Lanius collurio*	Laniidae/ migratory/ insectivorous	1	0	1	0	1	1	0	0
10.	*Parus major*	Paridae/ partial migratory/ insectivorous	2	2	0	0	0	0	0	0
11.	*Parus caeruleus*		6	6	0	0	0	0	0	0
12.	*Sylvia borin*	Sylviidae/ migratory/ insectivorous	1	1	0	0	0	0	0	0
13.	**Total (n)**		**58**	**56**	**1**	**1**	**12**	**9**	**1**	**2**
14.	**Prevalence (%)**		**22.30**	**21.53**	**0.38**	**0.38**	**52.17**	**39.13**	**4.34**	**8.69**

Fig. 1. *Trouessartia* spp.: A) dorsal view of male; B) dorsal view of female

Fig. 2. *Proctophillodes* spp. ventral view (10X)

Fig. 3. *Menachantus* spp. dorsal view (stereomicroscop)

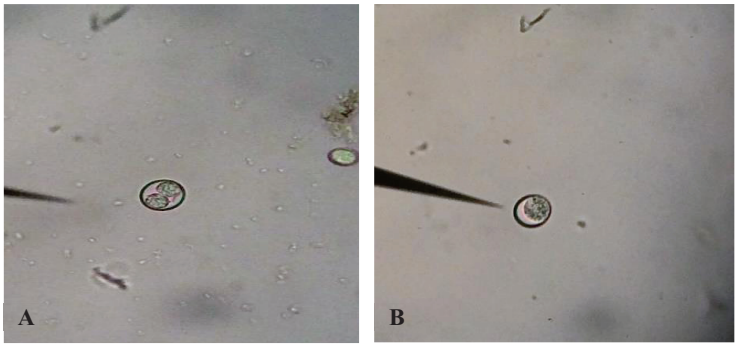

Fig. 4. Coccidial oocyst in fecal samples from passerines birds (*Acrocephalus scirpaceus*): A) *Isospora* spp. oocyst (20X); B) *Eimeria* spp. oocysts (20X)

In the present study, feather mites belonged to *Proctophyllodida*e and *Troussartiidae* families, similar to the data obtained by other authors (Lyra-Neves et al., 2003; Kolarova and Mitov, 2008), where the most frequently species of feather mites found, belonged to *Proctophyllodes*, *Analges, Pterodectes* and *Trouessartia* genera. The families *Proctophyllodidae* and *Trouessartiidae* are predominately associated with wild birds passerines, while species of the families *Analgidae* are known from various orders of birds (Proctor, 2003).

Regarding the ectoparasites in wild birds, in Romania, more than 25 species of feather mites were studied (Constantinescu et al., 2013) and from the chewing lices, suborder Ischnocera (91.91%) and Amblycera (8.09%) were recorded by some authors (Adam and Sandor, 2005).

Ectoparasites, including chewing lice, may play a role in bird migration, and especially in small transcontinental passerine birds (Sychara et al. 2011). The study performed in cliff swallows showed that chewing lices together with other ectoparasites may influence the return rate of birds from wintering sites to their nests (Brown et al. 1995).

In the present study, the most common endoparasites found in investigated birds were represented by Coccidia. Similar data were reported by Bandelj et al. (2015), in Slovenia, where the most frequently detected parasite infection in wild birds was with coccidians, and the prevalence of internal parasites was 15%. In the present study, intrenal parasites were more found in insectivorous passerines (39.13%; 9/23). It has been reported that the prevalence of internal parasites in European passerine birds is not associated with migration but with the type of diet, and insectivorous and omnivorous passerines birds were more prone to be infested with a variety of parasite during their feeding (Bandelj et al., 2015).

CONCLUSIONS

The present study provides data on the presence and prevalence of some ecto- and endoparasites in wild birds. To our knowledge, endoparasite infections with *Eimeria* and *Isospora* found in wild birds in the DDBR are described for the first time in the present study.

The findings emphasize a high occurrence of feather mites in migratory birds from Danube Delta Biospfere Reserve.

Due to intense migration of wild birds, follow-up studies of prevalence of parasites species and other epidemiological factors that might have a negative effect on wild bird populations are useful and necessary.

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