CHEWING LICE (PHTHIRAPTERA: AMBLYCERA, ISCHNOCERA) FROM SOME WILD BIRDS IN THE KIZILIRMAK DELTA (TURKEY)

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Abstract. We present the results of the studies on the chewing lice collected during the period 2009-2010 from 32 wild birds belonging to 11 species, in the Kızılırmak Delta of Turkey. From the 13 chewing louse species identified in the studied material, six of them are new records for the parasitological fauna of Turkey, namely: *Ricinus fringillae* De Geer, 1778 ex *Fringilla coelebs*; *Cuculicola latirostris* (Burmeister, 1838) ex *Cuculus canorus*; *Brueelia domestica* (Kellogg & Chapman, 1899) ex *Hirundo rustica*; *Brueelia merulensis* (Denny, 1842) ex *Turdus merula*; *Brueelia turdinulae* Ansari, 1956 ex *Turdus philomelos*; and *Penenirmus affectator* (Złotorzycka, 1976) ex *Sylvia borin*. Also, the following two new chewing louse – bird species associations are reported for the first time all over the world: *Quadriceps anagrapsus* (Nitzsch [in Giebel], 1866) ex *Sterna albifrons*; and *Penenirmus* sp. ex *Sylvia melanocephala*. The presence of a chewing louse species is reported on *S. melanocephala* for the first time in the world. And not the least, it is reported, for the first time, the presence of three chewing louse species – bird species associations in the Turkish parasitological fauna: *Menacanthus curuccae* (Schränk, 1776) ex *Acrocephalus scirpaceus* and *Sylvia borin*; and *Menacanthus eurysternus* (Burmeister, 1838) ex *Turdus merula*.

Résumé. On présente les résultats de l'étude contre les mallophages collectées au cours de la période 2009-2010 sur 32 oiseaux sauvages appartenir à 11 espèces, dans le delta Kızılırmak de la Turquie. Entre les 13 espèces de mallophages identifiées dans le matériel analysé, six sont des nouveaux, signalés pour la faune parasitologique de la Turquie, à savoir: *Ricinus fringillae* De Geer, 1778 sur *Fringilla coelebs*; *Cuculicola latirostris* (Burmeister, 1838) sur *Cuculus canorus*; *Brueelia domestica* (Kellogg & Chapman, 1899) sur *Hirundo rustica*; *Brueelia merulensis* (Denny, 1842) sur *Turdus merula*; *Brueelia turdinulae* Ansari, 1956 sur *Turdus philomelos*; et *Penenirmus affectator* (Złotorzycka, 1976) sur *Sylvia borin*. Aussi sont signalées pour la première fois dans le monde les suivants deux nouvelles associations espèces mallophage - espèces oiseaux: *Quadriceps anagrapsus* (Nitzsch [in Giebel], 1866) sur *Sterna albifrons*; et *Penenirmus* sp. sur *Sylvia melanocephala*. On a signalée pour la première fois dans le monde la présence d'une espèce de mallophage sur *S. melanocephala*. Et non des moindres, on a signalée pour la première fois dans la faune parasitologique de la Turquie, l'existence de trois associations espèces mallophages - espèces oiseaux: *Menacanthus curuccae* (Schränk, 1776) sur *Acrocephalus scirpaceus* et *Sylvia borin*; et *Menacanthus eurysternus* (Burmeister, 1838) sur *Turdus merula*.

Key words: Phthiraptera, chewing lice, wild birds, the Kızılırmak Delta, the Black Sea, Turkey.

INTRODUCTION

Chewing lice are relatively benign parasites. When present in large numbers, they can cause severe irritation and reduced host survival and reproductive success (Clayton et al., 2008). Therefore, the knowledge of this group of ectoparasites has also an important practical applicative importance besides the theoretical one. In spite of this, up to now, the chewing lice were relatively less studied in Turkey. An analyse of the knowledge of the chewing louse fauna on the birds of Turkey was recently published by İnci et al. (2010). Taking into account the data given by this paper of synthesis (İnci et al., op. cit.), and also by the subsequent ones (Dik et al., 2011; Dik, Şekercioğlu & Kirpik, 2011; Dik, Yamaç & Uslu, 2011), we can assert that, for the time being, in Turkey only 95 chewing louse species belonging to 44 genera (46 species belonging to 17 amblyceran genera, and the other 49 species belonging to 27 ischnoceran genera) were reported from birds. In this estimation, we haven't included those reports based on an identification till the genus level.

Taking into consideration that the Turkish avifauna is estimated at 491 birds species at present, according to the data given by Lepage (2011) (including the wild species occurred accidentally, from wildlife), as well as the parasite chewing louse species from them, then the parasite chewing louse fauna from birds of Turkey could be estimated to over 900 species. Analysing these data, it can be established that, at present, in the Turkish territory, less than 10% of the total number of chewing louse species possibly present in the fauna of this country were reported, thus the necessity of continuing and deepening the studies in this direction distinguishing. Starting from this necessity, we proposed to study the chewing louse fauna from the occurred birds in one of the most important areas from the avifaunal point of view of Turkey that is the delta of the Kızılırmak River. Within this area, such kind of studies was not made till now.

The Kızılırmak Delta is one of the largest deltas on the Turkish territory, formed at the mouth of the Kızılırmak River (the longest river of Turkey) at the Black Sea, in the central-northern part (coordinates of the river mouth: 41°44' N, 35°57' E) (Fig. 1). This delta lays to the north of Bafra locality (Fig. 2), by both sides of the river, on a surface of over 56000 ha, including a very large range of habitat types (lakes; reed areas; freshwater marshes and swamps; watery meadows; pastures; forests; dunes; coastal lakes; lagoons; and agricultural areas). At present, in this area, the presence of 331 bird species was reported, out of which 124 are passerine species (Bariş et al., 2010).

By the results of our studies, included in this paper, which are, as a matter of fact, preliminary, and by their reporting to those already published in the specialized literature, we succeeded in completing both the world list of the bird species-chewing louse species associations (host-parasite) and the faunal list of the parasite chewing lice from the wild birds of Turkey.

Fig. 1 - Geographical position of the Kızılırmak Delta (adapted from Google Earth).

Fig. 2 - Geographical position of collecting place in the Kızılırmak Delta (adapted from Google Earth).

MATERIAL AND METHOD

Studied material was collected within the period 2009–2010. Studied birds were captured in an area between Cernek Lake and the Black Sea coast, close to Cernek Birdring & Birdwatch Station, GPS coordinates of the collecting place being 41°38.843' N, 36°04.841' E (Fig. 2). Birds were captured with mist nets, and the ectoparasitological material collected from them was labelled and preserved in 70% alcohol.

Totally, a number of 189 birds, which belong to 37 species of 18 families and 6 orders, were examined. From all these examined birds, we found chewing lice only on 32 individuals (belonging to 11 species of 8 families and 3 orders). On the other 157 birds (belonging to 34 species of 16 families and 5 orders) (Tab. 1) we did not find chewing lice. Total prevalence of the chewing louse infestation in the studied birds was of 16.9 (n=189). In the case of Podicipediformes, Strigiformes and Coraciiformes orders, the prevalence of the chewing louse infestation was zero. From the other bird orders, the lowest value of the prevalence (P) occurred in Passeriformes (P=16.1; n=180), and the highest value, in Cuculiformes (P=100; n=1) and Charadriiformes (P=66.6; n=3) (Tab. 1). From passeriforms, the most numerous not infested birds were those of the family Sylviidae, and the most numerous infested birds belonged to family Laniidae.

The captured birds were identified using the field guides by Porter et al. (1996) and Porter & Aspinall (2010), and the taxonomy of the birds followed Clements (2007).

For the chewing lice identification, a part of the collected material was mounted in Canada balsam, following the technique of Palma (1978). The rest of the material is preserved in 70% alcohol.

Identifications of the chewing lice based on Marshall (2002), Nelson (1972), Palma et al. (1998), Price (1977), Rheinwald (1968; 2007) and Złotorzycka (1976). The scientific names of the chewing lice used in this paper are according to the chewing louse list published by Price et al. (2003).

RESULTS

From all collected material, 88 chewing louse specimens were identified. Later, these chewing louse specimens were identified as belonging to eight genera and 13 species (Tab. 1). From the 88 collected specimens, 54 are females (61.36%), 17 males (19.32%) and 17 nymphs (19.32%).

From the chewing lice collected by us, 51 specimens (32 females, 10 males and 9 nymphs) (57.95%) belong to the suborder Amblycera, the best represented being genus *Menacanthus* (38 specimens: 21 females, 8 males and 9 nymphs), and the rest of 37 specimens (22 females, 7 males and 8 nymphs) (42.05%) belong to the suborder Ischnocera, within it the best represented being genus *Brueelia* (23 specimens: 12 females, 5 males and 6 nymphs).

Table 1

List of examined wild bird hosts and chewing louse species from the Kizilirmak Delta.

Examined host birds				Chewing lice			
Order/Family/Species	NEB ¹	NIB ²	Prev. ³ (%)	Species	♂	♀	Total
Order Podicipediformes							
1. Family Podicipedidae							
<i>Tachybaptus ruficollis</i> (Pallas, 1764)	1	0	0	-	-	-	-
Order Charadriiformes							
2. Family Scolopacidae							
<i>Calidris alpina</i> (Linnaeus, 1758)	1	1	100	<i>Lunaceps actophilus</i> (Kellogg & Chapman, 1899)	-	1	1
<i>Tringa totanus</i> (Linnaeus, 1758)	1	0	0	-	-	-	-
3. Family Laridae							
<i>Sterna albifrons</i> Pallas, 1764	1	1	100	<i>Quadriceps anagrapsus</i> (Nitzsch [in Giebel], 1866)	1	3	5
Order Cuculiformes							
4. Family Cuculidae							
<i>Cuculus canorus</i> Linnaeus, 1758	1	1	100	<i>Cuculicola latirostris</i> (Burmeister, 1838)	-	2	3
Order Strigiformes							
5. Family Strigidae							
<i>Athene noctua</i> (Scopoli, 1769)	1	0	0	-	-	-	-
Order Coraciiformes							
6. Family Alcedinidae							
<i>Alcedo atthis</i> (Linnaeus, 1758)	3	0	0	-	-	-	-
Order Passeriformes							
7. Family Hirundinidae							
<i>Hirundo rustica</i> Linnaeus, 1758	7	3	28.5	<i>Myrsidea rustica</i> (Giebel, 1874)	-	2	2
			42.8	<i>Brueelia domestica</i> (Kellogg & Chapman, 1899)	1	3	6
8. Family Motacillidae							
<i>Motacilla alba</i> Linnaeus, 1758	2	0	0	-	-	-	-
<i>Motacilla flava</i> Linnaeus, 1758	1	0	0	-	-	-	-
9. Family Prunellidae							
<i>Prunella modularis</i> (Linnaeus, 1758)	1	0	0	-	-	-	-
10. Family Turdidae							
<i>Luscinia luscinia</i> (Linnaeus, 1758)	4	0	0	-	-	-	-
<i>Phoenicurus phoenicurus</i> (Linnaeus, 1758)	8	0	0	-	-	-	-
<i>Turdus merula</i> Linnaeus, 1758	11	6	54.5	<i>Menacanthus eurysternus</i> (Burmeister, 1838)	2	5	3
			45.4	<i>Brueelia merulensis</i> (Denny, 1842)	4	8	4
<i>Turdus philomelos</i> Brehm, C. L., 1831	3	1	33.3	<i>Brueelia turdinulae</i> Ansari, 1956	-	1	1

Table 1 (continued)

Examined host birds			Chewing lice		
Order/Family/Species	NEB ¹	NIB ²	Prev. ³ (%)	Species	♂ ♀ N ⁴ Total
11. Family Muscicapidae					
<i>Eriothacus rubecula</i> (Linnaeus, 1758)	23	0	0	-	- - - -
<i>Ficedula albicollis</i> (Temminck, 1815)	3	0	0	-	- - - -
<i>Ficedula hypoleuca</i> (Pallas, 1764)	3	0	0	-	- - - -
<i>Ficedula parva</i> (Bechstein, 1792)	3	0	0	-	- - - -
12. Family Regulidae					
<i>Regulus regulus</i> (Linnaeus, 1758)	1	0	0	-	- - - -
13. Family Sylviidae					
<i>Acrocephalus scirpaceus</i> (Hermann, 1804)	5	1	20	<i>Menacanthus currucae</i> (Schrank, 1776)	- 1 - 1
<i>Cettia cetti</i> (Temminck, 1820)	14	0	0	-	- - - -
<i>Locustella luscinioides</i> (Savi, 1824)	2	0	0	-	- - - -
<i>Phylloscopus collybita</i> (Vieillot, 1817)	6	0	0	-	- - - -
<i>Phylloscopus trochilus</i> (Linnaeus, 1758)	9	0	0	-	- - - -
<i>Sylvia atricapilla</i> (Linnaeus, 1758)	29	0	0	-	- - - -
<i>Sylvia borin</i> (Boddaert, 1783)	8	2	12.5	<i>Menacanthus currucae</i> (Schrank, 1776)	- 2 - 2
<i>Sylvia communis</i> Latham, 1787	3	0	0	<i>Penenirmus affectator</i> (Zlotorzyska, 1976)	1 2 - 3
<i>Sylvia curruca</i> (Linnaeus, 1758)	2	0	0	-	- - - -
<i>Sylvia melanocephala</i> (Gmelin, J. F., 1789)	6	1	16.6	<i>Penenirmus</i> sp.	- 2 - 2
<i>Sylvia nisoria</i> (Bechstein, 1792)	1	0	0	-	- - - -
14. Family Aegithalidae					
<i>Aegithalos caudatus</i> (Linnaeus, 1758)	1	0	0	-	- - - -
15. Family Laniidae					
<i>Lanius collurio</i> Linnaeus, 1758	13	12	92.3	<i>Menacanthus camelinus</i> (Nitzsch [in Giebel], 1874)	6 13 6 25
16. Family Sturnidae					
<i>Sturnus vulgaris</i> Linnaeus, 1758	1	0	0	-	- - - -
17. Family Passeridae					
<i>Passer domesticus</i> (Linnaeus, 1758)	3	0	0	-	- - - -
<i>Passer hispaniolensis</i> (Temminck, 1820)	3	0	0	-	- - - -
18. Family Fringillidae					
<i>Fringilla coelebs</i> Linnaeus, 1758	4	3	75	<i>Ricinus fringillae</i> De Geer, 1778	2 9 - 11
TOTAL	189	32	16.9		17 54 17 88

¹NEB = number of examined birds; ²NIB = number of infested birds; ³Prev. = prevalence; ⁴N = nymphs.

Taking into account the number of species, from the 13 chewing louse species identified by us, 5 (of the three genera and two families) belong to the suborder Amblycera, and 8 (of five genera and a family) belong to the suborder Ischnocera. Also, from the number of species point of view, *Menacanthus* was the best represented genus of the suborder Amblycera, in our material, with three species, and from the suborder Ischnocera, *Brueelia* was the best represented genus, also with three species. Therefore, it can be observed that, in our material, amblycerans are prevalent in the specimen number, and ischnocerans, in the species one.

Table 1 includes the systematic list of the host species and chewing louse species, collected and identified. Also in this table, the total number of controlled individuals are mentioned for each bird species, the number of individuals infested with chewing lice and their prevalence, and for the species of collected chewing lice, the number of collected specimens are mentioned (males, females and nymphs).

DISCUSSIONS

Analysing the data from the specialized literature regarding the chewing louse fauna of Turkey (İnci et al., 2010; Dik et al., 2011; Dik, Şekercioğlu & Kirpik, 2011; Dik, Yamaç & Uslu, 2011), published up to now and we were aware, we can assert that from all studied species the next six species, collected from the wild birds, are reported for the first time in the ectoparasitological fauna of this country: *Ricinus fringillae* De Geer, 1778 ex *Fringilla coelebs* (Fig. 3 B, C); *Cuculicola latirostris* (Burmeister, 1838) ex *Cuculus canorus* (Fig. 3 D); *Brueelia domestica* (Kellogg & Chapman, 1899) ex *Hirundo rustica* (Figs 4 D; 5 A); *Brueelia merulensis* (Denny, 1842) ex *Turdus merula* (Fig. 5 B, C); *Brueelia turdinulae* Ansari, 1956 ex *Turdus philomelos* (Fig. 5 D); and *Penenirmus affectator* (Złotorzycka, 1976) ex *Sylvia borin* (Fig. 6 A).

For the first time throughout the world, we report two new parasite species-host species associations (unmentioned in the world catalogue published by Price et al. in 2003), which can be considered normal, because it is not about deserting cases, considering that the new hosts which we found are closely related to the hosts they were reported before. It is about the following chewing louse species – bird species associations, namely: *Quadriceps anagrapsus* (Nitzsch [in Giebel], 1866) ex *Sterna albifrons* (Fig. 4 A, B, C); and *Penenirmus* sp. ex *Sylvia melanocephala* (Fig. 6 B).

We report, for the first time in the world, the presence of the chewing louse genus *Penenirmus* on the bird species *Sylvia melanocephala*, this chewing louse genus being reported on other species of *Sylvia* up to now. As a matter of fact, we report for the first time in the world the presence of a chewing louse species on the bird species *S. melanocephala*. *Penenirmus* sp. distinguishes from the other species of *Penenirmus* from the birds of the genus *Sylvia* especially by some features as: chaetotaxy and morphology of the preantennal part of the head; abdominal tergal, sternal and pleural chaetotaxy; thoracic sternal chaetotaxy; number of the vulval posterior marginal setae.

Fig. 3 - *Menacanthus curuccae* (from *Sylvia borin*): A, female; *Ricinus fringillae* (from *Fringilla coelebs*): B, female; C, male; *Cuculicola latirostris* (from *Cuculus canorus*): D, female.

Fig. 4 - *Quadriceps anagrapsus* (from *Sterna albifrons*): A, female; B, male; C, male genitalia; *Brueelia domestica* (from *Hirundo rustica*): D, female.

Fig. 5 - *Brueelia domestica* (from *Hirundo rustica*): A, male; *Brueelia merulensis* (from *Turdus merula*): B, female; C, male; *Brueelia turdinulae* (from *Turdus philomelos*): D, female.

Fig. 6 - *Penenirmus affectator* (from *Sylvia borin*): A, male; *Penenirmus* sp. (from *Sylvia melanocephala*): B, female.

Q. anagrapsus was reported only on *Chlidonias hybridus* and *Ch. leucopterus* (Price et al., 2003) till now, species of the same family with *Sterna albifrons*, on which we report it now. Normally, *S. albifrons* is parasitized by the species *Quadriceps nycthemerus* (Burmeister, 1838). The two species differs one another by the following features: body length (longer in *Q. anagrapsus* than in *Q. nycthemerus*); form of the abdominal tergal and sternal plates of the females (Fig. 4 A); form of the abdominal pleural plates V and VI in males (in *Q. anagrapsus* only the anterior part is chitinized, so distinguishing from the rest of the abdominal pleural plates) (Fig. 4 B); and by the conformation of male genitalia (Fig. 4 C).

And not the least, we report for the first time in the parasitological fauna of Turkey, the presence of the following three host-parasite associations: *Menacanthus curuccae* (Schrank, 1776) ex *Acrocephalus scirpaceus* and *Sylvia borin* (Fig. 3 A); and *Menacanthus eurysternus* (Burmeister, 1838) ex *Turdus merula*.

The results of the present survey add data to the limited epidemiological information regarding chewing louse faunal composition in wild birds from the Black Sea region of Turkey.

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MALOFAGE (PHTHIRAPTERA: AMBLYCERA, ISCHNOCERA) DE PE UNELE PĂSĂRI SĂLBATICE DIN DELTA KIZILIRMAK (TURCIA)

REZUMAT

Sunt prezentate rezultatele cercetării asupra malofagelor colectate în perioada 2009-2010 de pe 32 de păsări aparținând la 11 specii, în Delta Kızılırmak din Turcia. Dintre cele 13 specii de malofage identificate în materialul cercetat, șase reprezintă semnalări noi pentru fauna parazitologică a Turciei, și anume: *Ricinus fringillae* De Geer, 1778 de pe *Fringilla coelebs*; *Cuculicola latirostris* (Burmeister, 1838) de pe *Cuculus canorus*; *Brueelia domestica* (Kellogg & Chapman, 1899) de pe *Hirundo rustica*; *Brueelia merulensis* (Denny, 1842) de pe *Turdus merula*; *Brueelia turdinulae* Ansari, 1956 de pe *Turdus philomelos*; și *Penenirmus affectator* (Złotorzycka, 1976) de pe *Sylvia borin*. De asemenea, sunt semnalate pentru prima dată în lume următoarele două asocieri noi specie malofag – specie pasăre: *Quadriceps anagrapsus* (Nitzsch [in Giebel], 1866) de pe *Sterna albifrons*; și *Penenirmus* sp. de pe *Sylvia melanocephala*. Pe *S. melanocephala* se semnalează pentru prima dată în lume prezența unei specii de malofag. Și nu în ultimul rând, este semnalată pentru prima dată existența în fauna parazitologică a Turciei a trei asocieri specie malofag – specie pasăre: *Menacanthus currucae* (Schränk, 1776) de pe *Acrocephalus scirpaceus* și *Sylvia borin*; și *Menacanthus eurysternus* (Burmeister, 1838) de pe *Turdus merula*.

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