

RESEARCH ARTICLE

Chewing lice (Phthiraptera, Amblycera, Ischnocera) from shorebirds (Aves, Charadriiformes) in the Kızılırmak Delta, Turkey

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Abstract

This study was carried out in the Kızılırmak Delta Cernek Bird Ringing Station, Central Black Sea Region, during August and September 2020, to survey the louse species found on shorebirds (Aves: Charadriiformes). A total of 241 birds belonging to 13 species were searched for chewing lice. Eleven species in six genera of the family Scolopacidae (*Actitis hypoleucos*, *Arenaria interpres*, *Calidris alba*, *Calidris alpina*, *Calidris falcinellus*, *Calidris ferruginea*, *Calidris minuta*, *Gallinago gallinago*, *Tringa glareola*, *Tringa totanus*, *Xenus cinereus*) and two species in one genus of the family Charadriidae (*Charadrius dubius*, *Charadrius hiaticula*) were examined. Birds were caught alive with mist-nets, ringed, searched for lice, and released. A total of 153 birds (63.49%) were infested with lice belonging to 16 species, five amblycerans: *Actornithophilus bicolor*, *Actornithophilus ochraceus*, *Actornithophilus totani*, *Actornithophilus umbrinus*, *Austromenopon lutescens*, and eleven ischnocerans: *Carduiceps fulvofasciatus*, *Carduiceps meinertzhageni*, *Carduiceps zonarius*, *Lunaceps actophilus*, *Lunaceps falcinellus*, *Lunaceps schismatus*, *Quadraceps hiaticulae*, *Quadraceps obscurus*, *Quadraceps ravus*, *Quadraceps strepsilaris* and *Saemundssonsonia platygaster frater*. These eight species are new records for Turkey: *Ac. bicolor*, *Ac. ochraceus*, *Ca. fulvofasciatus*, *Lu. falcinellus*, *Lu. schismatus*, *Qu. ravus*, *Qu. strepsilaris* and *Sa. platygaster frater*. In addition, *Quadraceps hiaticulae* was recorded from Little ringed plovers (*Charadrius dubius*)

for the first time in the world in this study. According the lice checklist of wild birds in Turkey, a total of 188 bird species examined and 122 of them were infested, and a total of 217 chewing lice species has been recorded.

Keywords

Bird ringing, Charadriiformes, chewing lice, hosts, infestation, shorebirds, checklist.

Introduction

The order Charadriiformes includes 387 species belonging to 88 genera from 19 families (Gill et al. 2020), with a wide range of vernacular names such as, e.g. shorebirds, plovers, jacanas, gulls, auks. They are a cosmopolitan group of small to medium sized birds living close to water, the seashore, rivers and marshes, with many species being long distance migrants. Their diet consists mainly of invertebrates and small vertebrates (Snow and Perrins 1998). In Turkey, a total of 87 species of Charadriiformes have been recorded (Karataş et al. 2020).

About 4000 species of bird lice have been described so far. They are host-specific and their geographical distribution coincides with the distribution of their hosts (Price et al. 2003). Studies on lice from birds are especially descriptive (Valim et al. 2009), while recent studies focus on species richness, abundance, and prevalence (Tavera et al. 2019).

The louse fauna living on charadriiform birds in Turkey has not been properly studied. In a survey performed in Lake Kuyucuk, 41 birds belonging to seven charadriiform species were searched for lice, and 18 species were recorded (Dik et al. 2010). In other louse studies in Turkey, usually few bird species and/or specimens were examined (Açııcı et al. 2011, Dik et al. 2011a, 2011b, 2015, 2017a, 2017b, Dik and Uslu 2008, Girişgin et al. 2013, Orunç Kılıç et al. 2013, Göz et al. 2015). Until now, only 21 charadriiform bird species were examined for lice in Turkey, representing a 24.2 % of the total fauna, with seventeen of them infested with only one louse species.

The aim of this study was to increase knowledge of the louse fauna found on some charadriiform species in Turkey. The following 13 species were searched for lice: Common sandpiper, *Actitis hypoleucos* (Linnaeus, 1758); Ruddy turnstone, *Arenaria interpres* (Linnaeus, 1758); Sanderling, *Calidris alba* (Pallas, 1764); Dunlin, *Calidris alpina* (Linnaeus, 1758); Broad-billed sandpiper, *Calidris falcinellus* (Pontoppidan, 1763); Curlew sandpiper, *Calidris ferruginea* (Pontoppidan, 1763); Little stint, *Calidris minuta* (Leisler, 1812); Common snipe, *Gallinago gallinago* (Linnaeus, 1758); Wood sandpiper, *Tringa glareola* (Linnaeus, 1758); Common redshank, *Tringa totanus* (Linnaeus, 1758); Terek sandpiper, *Xenus cinereus* (Güldenstädt, 1775); Little ringed plover *Charadrius dubius* Scopoli, 1786; Common ringed plover, *Charadrius hiaticula* Linnaeus, 1758.

Materials and Methods

This survey was performed at the Cernek Ringing Station (41°38'35" N; 36°05'02" E (DMS)) in the Kızılırmak Delta of the Central Black Sea region of Turkey. In 2020, the water level at the Cernek Lake in the Kızılırmak Delta markedly dropped and some small islands appeared close to the shoreline, where many charadriiform birds were present. The ringing team at the Cernek Ringing Station, which especially aims to study migratory passerines, set up three 7-meter mist-nets with 4 shelves and 16 × 16 mm mesh size on these islands from 25 August until 27 September 2020. The height of the mist-nets were 2.5 meters. The mist-nets stayed open from sunrise to sunset every day, and were replaced the same day when destroyed by water buffaloes. The birds caught were extracted from the mist-nets and each bird carried in separate holding bags to the ringing station. The birds were identified, aged and sexed according to Baker (2016), Demongin (2016), and Prater et al. (1977), as well as according to the experience of the ringers. Sampling and ringing birds was performed under the permission of the Ministry of Agriculture and Forestry, General Directorate of Nature Conservation and National Parks (protocol number 72784983-488.04-241348), and ethical permits approved by Ondokuz Mayıs University Animal Ethical Committee (ethical number B.30.2.ODM.0.20.09.00-050.04-96). Gill et al. (2020) has been followed for bird taxonomy and nomenclature.

A total of 241 birds belonging to 13 species, six genera, and two families (Scolopacidae and Charadriidae) were searched for chewing lice. After ringing, each bird was examined by visual examination for the presence of lice by blowing the feathers. All the lice seen on each bird were collected with forceps and stored in 70% alcohol in a plastic vial. A label with the species code, date and ring number was added to each vial, and transported to the parasitology laboratory of the Veterinary Faculty at Selçuk University for further treatment and identification of the louse species.

At the laboratory, the lice were cleared in 10% potassium hydroxide (KOH) for 24 hours, rinsed out in distilled water for 24 hours, then kept in 70% and 99% alcohol serials for 24 hours for dehydration and in saturated alcohol-phenol for a few minutes. Later, they were mounted in Canada balsam on slides. The slides were dried in an incubator at 50–60° C for 2–3 weeks. To avoid transmission of lice to other hosts, hands, bench and the equipment has been cleaned after each treatment. Lice were examined, and photos taken with a camera Leica DM 750 mounted on a trinocular phase-contrast microscope, with a Leica DFC295 application unit, and identified to species using the following references: Clay (1959; 1962; 1969), Clay and Hopkins (1954), Dik et al. (Dik et al., 2010; 2011a; 2011b; 2015; 2017a; 2017b), Dik and Uslu (2008), Gustafsson and Olsson (2012, 2017), Gustafsson et al. (2018), Timmermann (1949; 1950; 1951a; 1951b; 1952; 1953; 1954a; 1954b; 1957; 1969).

While preparing the checklist of lice fauna of wild birds of Turkey, all available peer reviewed articles, grey literature as well as MsC and PhD thesis were searched in Turkish and English using the search terms “lice fauna Turkey”, “bird ectoparasites”, “chewing lice”, “Phtiraptera”, “Ichnocera”, “Amblycera”. The bird species treated as

pets, studied at zoo, domestic poultry have not been included to the recent checklist of lice fauna of wild birds in Turkey.

Results

From a total of 241 birds examined, 153 (63.49%) were found to be infested with chewing lice (Table 1). Dunlin (*Calidris alpina*), Little stint (*Calidris minuta*) and Curlew sandpiper (*Calidris ferruginea*) were the most abundant bird species ringed, while the Common redshank (*Tringa totanus*), the Terek sandpiper (*Xenus cinereus*) and the Little ringed plover (*Charadrius dubius*) were represented by only one bird. Prevalence was highest in Dunlins (*Calidris alpina*) (84.35%), and followed by Common sandpipers (*Actitis hypoleucos*) (71.43%) and Broad-billed sandpipers (*Calidris falcinellus*) (71.43%). No louse was found on Common snipes (*Gallinago gallinago*), the Common redshank (*Tringa totanus*) and the Terek sandpiper (*Xenus cinereus*). The examined shorebirds were co-infested with more than one louse species. The highest prevalence of louse species was detected in *Quadraceps hiaticulae* found on *Charadrius dubius*, and followed by *Lunaceps schismatus* found on *Calidris alpina*.

Sixteen species of lice were collected and identified, as follows: *Actornithophilus bicolor* (Piaget, 1880) (Fig. 1A), *Actornithophilus ochraceus* (Nitzsch, 1818) (Fig. 1B), *Actornithophilus totani* (Schränk, 1803) (Fig. 1C), *Actornithophilus umbrinus* (Burmeister, 1838) (Fig. 1D), *Austromenopon lutescens* (Burmeister, 1838) (Fig. 2A), *Carduiceps fulvofasciatus* (Grube, 1851) (Fig. 2B), *Carduiceps meinertzhageni* Timmermann, 1954 (Fig. 2C), *Carduiceps zonarius* (Nitzsch, 1866) (Fig. 2D), *Lunaceps actophilus* (Kellogg & Chapman, 1899) (Fig. 3A), *Lunaceps falcinellus* Timmermann, 1954 (Fig. 3B), *Lunaceps schismatus* Gustafsson & Olsson, 2012 (Fig. 3C), *Quadraceps hiaticulae* (O. Fabricius, 1780) (Fig. 3D), *Quadraceps obscurus* (Burmeister, 1838) (Fig. 4A), *Quadraceps ravus* (Kellogg, 1899) (Fig. 4B), *Quadraceps strepsilaris* (Denny, 1842) (Fig. 4C) and *Saemundssonina platygaster frater* (Giebel, 1874) (Fig. 4D). In total, 1066 lice (554♀, 444♂ and 68 nymphs) were collected, with a range of 1–24 lice per infested bird. Mean intensity was 6.95. The highest numbers of lice per bird were recorded on *Calidris alpina* (24 individuals), *Arenaria interpres* (21 individuals), *Calidris alba* (20 individuals), and *Calidris minuta* (13 individuals).

Lunaceps was the commonest genus found on the birds, and it was found on 123 out of 136 (90.44%) infested birds in the family Scolapacidae; 494 *L. schismatus* were collected from 69 out of 70 *Calidris falcinellus*, and two were collected from one out of five *Actitis hypoleucos*. Two *L. actophilus* were collected from two out of three *Calidris alba*. 33 *L. falcinellus* were found on 35 out of 70 *Calidris minuta*. 12 *L. falcinellus* were found on 18 out of 30 *Calidris ferruginea*. Nine *L. falcinellus* were found on four out of five *Calidris falcinellus*. Two *L. falcinellus* were found on five out of seven *Actitis hypoleucos*. On one *Actitis hypoleucos* *L. falcinellus* and *L. schismatus* were detected together (Table 1). The second common genus was *Carduiceps*, and it was found on 34 out of 95 (35.78%) infested birds in the family Scolapacidae. Three *Carduiceps* species

Table 1. Bird species examined for lice in this study, and prevalence for each bird and lice species. Abbreviations: NE = number of hosts examined; NI (P) = number of hosts infested (prevalence); NI-L (P) = number of hosts infested by each louse species (prevalence)

Bird family	Bird species	NE	NI (P)	Louse species	NI-L (P)
Scolopaciidae	<i>Actitis hypoleucos</i>	7	5 (71.43%)	<i>Actornitophilus</i> spp.	1 (14.29%)
				<i>Lunaceps falcinellus</i>	2 (28.57%)
				<i>Lunaceps schismatus</i>	1 (14.29%)
				<i>Quadraceps ravus</i>	4 (5.19%)
				<i>Saemundssonina platygaster frater</i>	3 (42.86%)
	<i>Arenaria interpres</i>	12	7 (58.33%)	<i>Actornitophilus bicolor</i>	5 (41.67%)
				<i>Austromenopon lutescens</i>	2 (16.67%)
				<i>Carduiceps</i> spp.	1 (8.33%)
				<i>Quadraceps strepsilaris</i>	7 (58.33%)
	<i>Calidris alba</i>	5	3 (60.0%)	<i>Actornitophilus umbrinus</i>	1 (20.00%)
				<i>Carduiceps zonarius</i>	1 (20.00%)
				<i>Lunaceps actophilus</i>	2 (40.00%)
	<i>Calidris alpina</i>	83	70 (84.34%)	<i>Carduiceps meinertzhagani</i>	14 (16.87%)
				<i>Lunaceps schismatus</i>	69 (83.13%)
				<i>Quadraceps hiaticulae</i>	1 (1.20%)
	<i>Calidris falcinellus</i>	7	5 (71.43%)	<i>Carduiceps fulvofasciatus</i>	2 (28.57%)
				<i>Lunaceps falcinellus</i>	4 (57.14%)
				<i>Actornitophilus umbrinus</i>	12 (40.00%)
	<i>Calidris ferruginea</i>	30	18 (60.00%)	<i>Carduiceps zonarius</i>	9 (30.00%)
				<i>Lunaceps falcinellus</i>	12 (40.00%)
				<i>Austromenopon</i> spp.	1 (1.43%)
	<i>Calidris minuta</i>	70	35 (50.00%)	<i>Carduiceps zonarius</i>	7 (10.00%)
				<i>Lunaceps falcinellus</i>	33 (47.14%)
				<i>Actornitophilus totani</i>	2 (40.00%)
	<i>Tringa glareola</i>	5	2 (40.00%)	<i>Quadraceps obscurus</i>	2 (40.00%)
<i>Charadrius dubius</i>				1	1 (100.00%)
Charadriidae	<i>Charadrius hiaticula</i>	15	7 (46.67%)	<i>Actornitophilus ochraceus</i>	5 (33.33%)
				<i>Quadraceps hiaticulae</i>	5 (33.33%)
				<i>Quadraceps</i> spp.	1 (6.67%)
		241	153 (63.49%)		

were extracted from six bird species (*Arenaria interpres*, *Calidris alba*, *Calidris alpina*, *Calidris falcinellus*, *Calidris ferruginea*, *Calidris minuta*), where *C. meinertzhagani* has the highest prevalence. Four species of *Actornitophilus* were found on 26 out of 47 (55.32%) infested birds of six bird species (*Actitis hypoleucos*, *Arenaria interpres*, *Calidris alba*, *Calidris ferruginea*, *Tringa glareola*, *Charadrius hiaticula*). Four species of *Quadraceps* were found on 21 out of 92 (22.82%) infested birds of six bird species (*Actitis hypoleucos*, *Arenaria interpres*, *Calidris alpina*, *Tringa glareola*, *Charadrius*

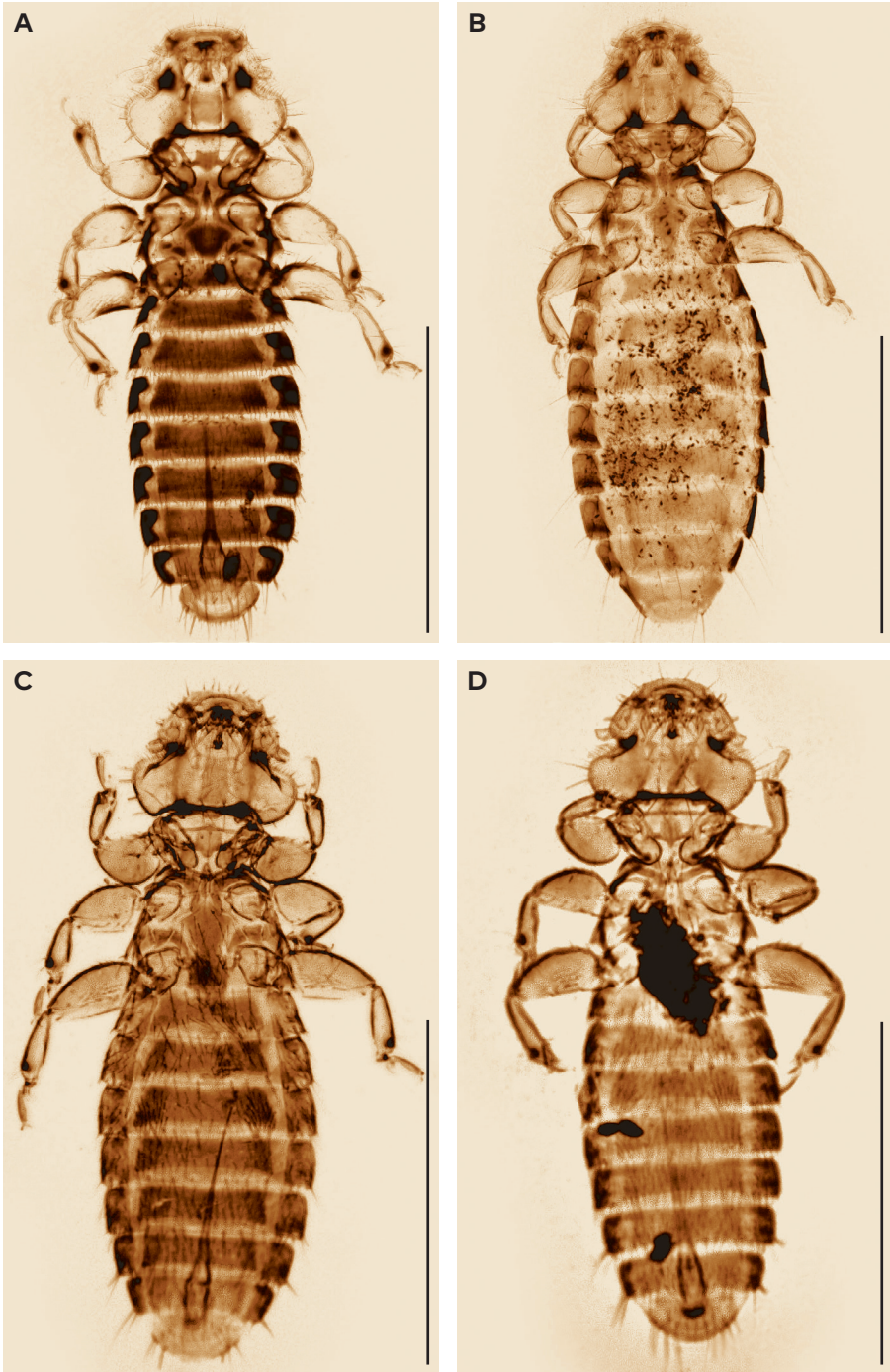


Figure 1. A *Actornithophilus bicolor*, male, from *Arenaria interpres*, original; B *Actornithophilus ochraceus*, female, from *Charadrius hiaticula*, original; C *Actornithophilus totani*, male, from *Tringa glareola*, original; D *Actornithophilus umbrinus*, male, from *Calidris ferruginea*, original. Scale bar = 1000 μm .

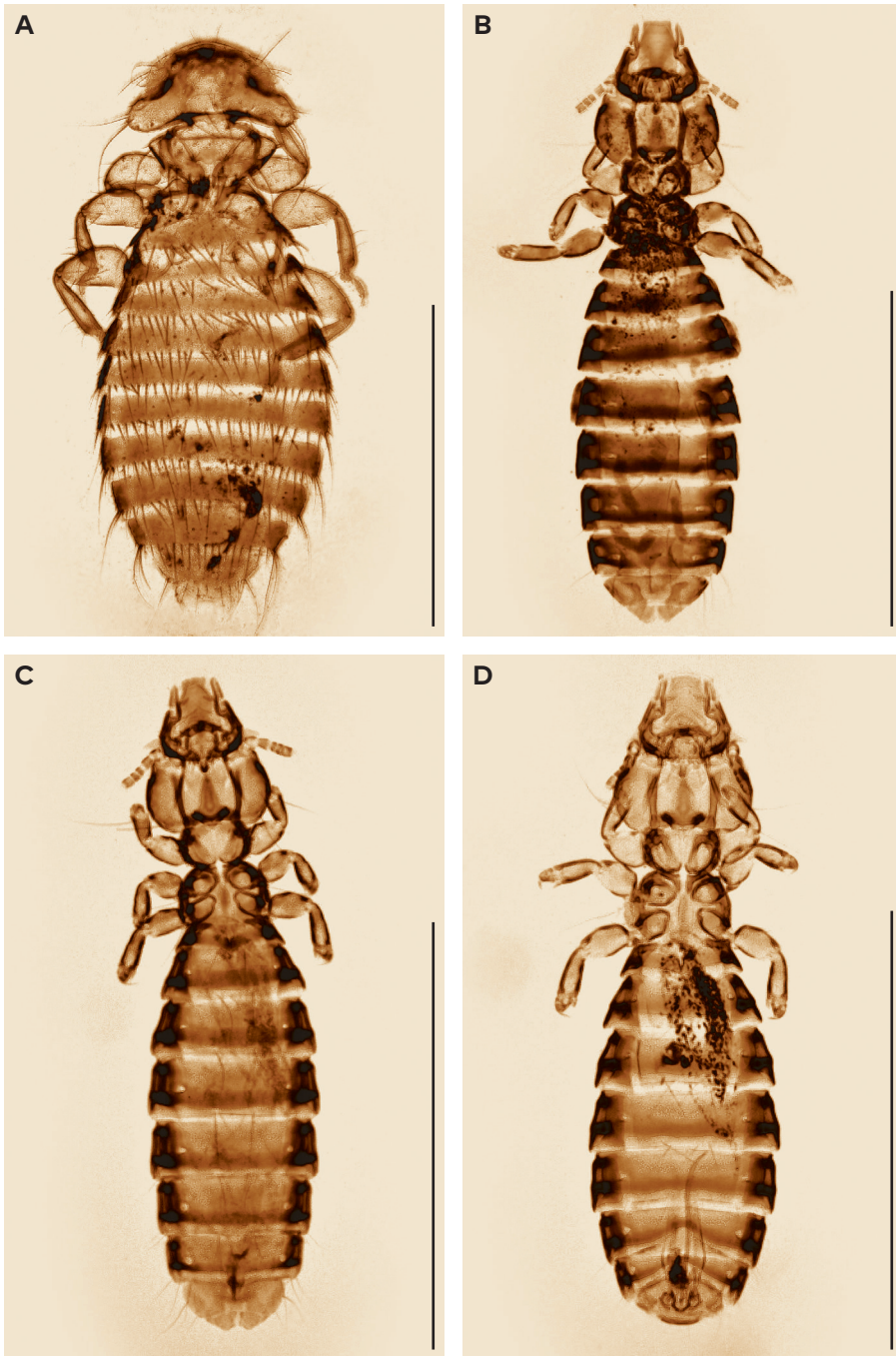


Figure 2. A *Austromenopon lutescens*, female, from *Arenaria interpres*, original; B *Carduiceps fulvofasciatus*, female, from *Calidris falcinellus*, original; C *Carduiceps meinertzhageni*, female, from *Calidris alpina*, original; D *Carduiceps zonarius*, male, from *Calidris ferruginea*, original.

Scale bar = 1000 μm .

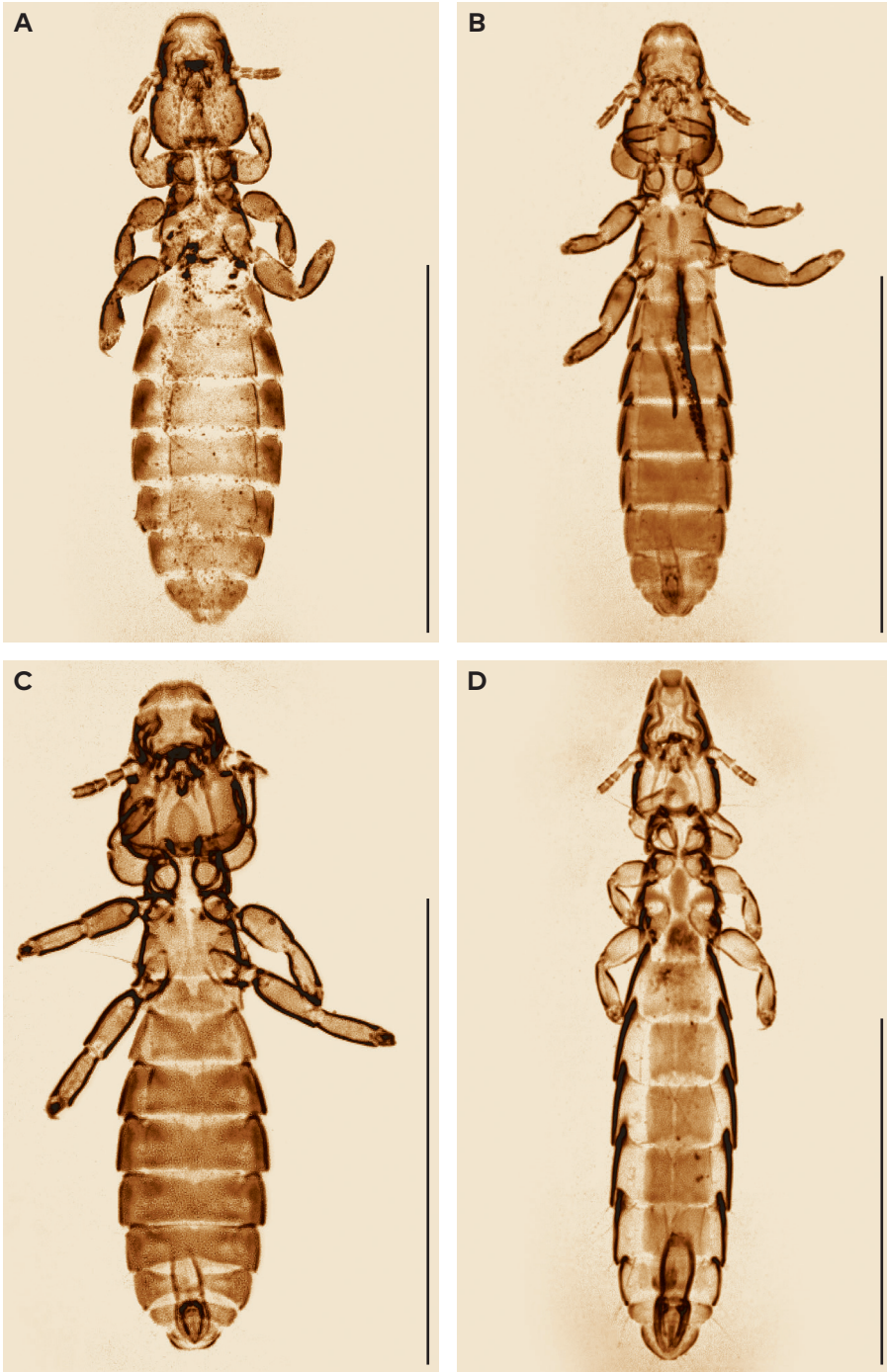


Figure 3. **A** *Lunaceps actophilus*, female, from *Calidris alba*, original; **B** *Lunaceps falcinellus*, male, from *Calidris ferruginea*, original; **C** *Lunaceps schismatus*, male, from *Calidris alpina*, original; **D** *Quadraceps hiaticulae*, male, from *Charadrius hiaticula*, original. Scale bar = 1000 μ m.

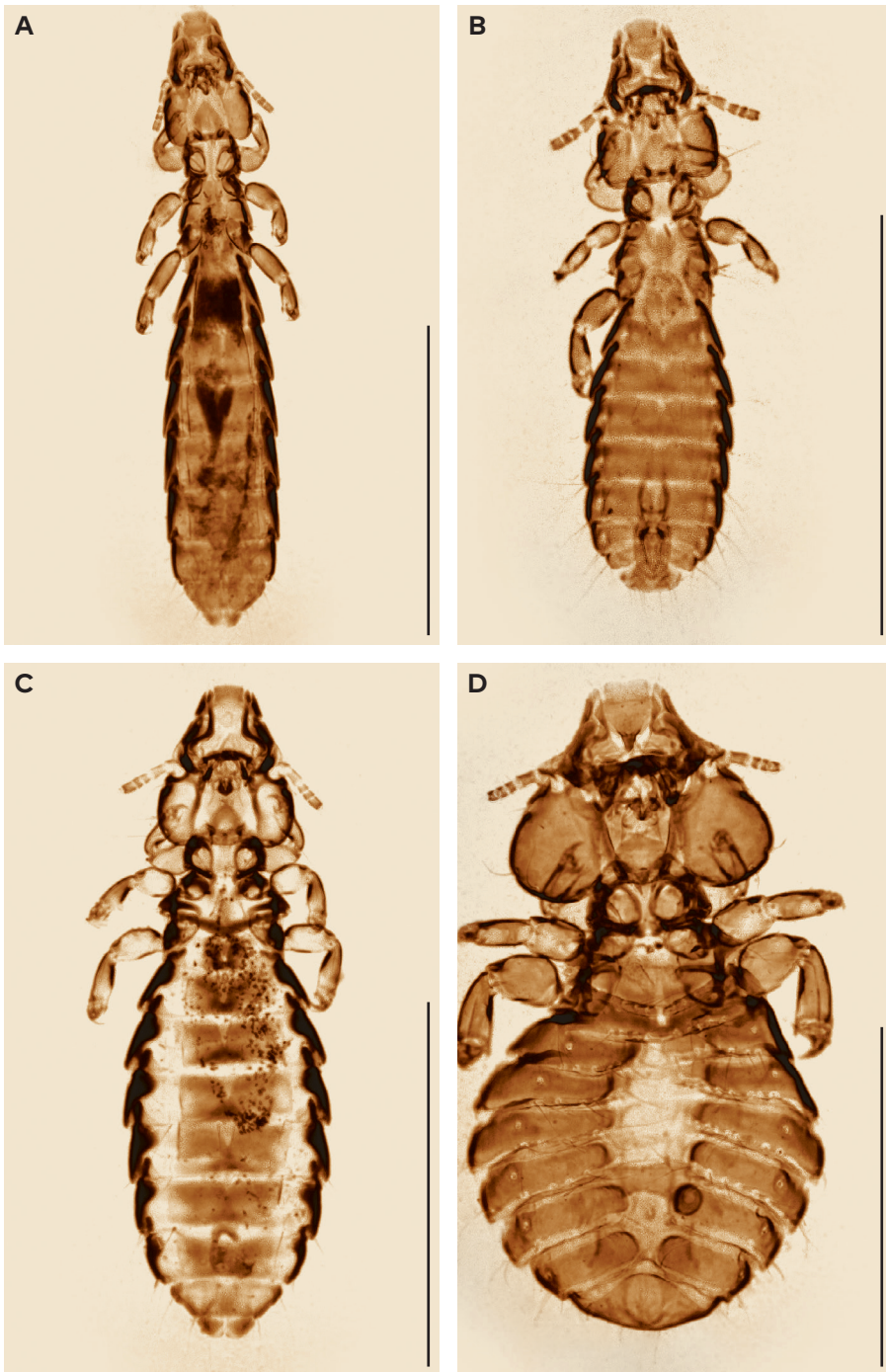


Figure 4. A *Quadriceps obscurus*, female, from *Tringa glareola*, original; B *Quadriceps ravus*, male, from *Actitis hypoleucos*, original; C *Quadriceps strepsilaris*, female, from *Arenaria interpres*, original; D *Saemundssonsonia platygaster frater*, female, from *Actitis hypoleucos*, original. Scale bar = 1000 µm.

dubius, *Charadrius hiaticula*). *Quadriceps hiaticula* on *Charadrius dubius* has the highest prevalence as 100%. Three *Saemundssonina platygaster frater* were detected on 5 out of 7 *Actitis hypoleucos*.

Sample sizes of species of *Lunaceps* were the largest, while those of *Austromenopon* and *Saemundssonina* were the lowest (Table 2). *Lunaceps schismatus* was the most abundant species, with 494 (261♀, 222♂ 11N) specimens from *Calidris alpina*, and two specimens (1♀, 1♂) from *Actitis hypoleucos*. *Lunaceps falcinellus* was next, with 157 specimens (87♀, 63♂ 7N) from *Calidris minuta*, 109 specimens (52♀, 30♂, 27N) from *Calidris ferruginea*, nine specimens (5♀, 3♂, 1N) from *Calidris falcinellus*, and 2 specimens (1♀, 1♂) from *Actitis hypoleucos* (Table 2).

Discussion and Conclusion

The chewing lice fauna from charadriiform birds was poorly known in Turkey. Until now, only 21 out of 87 free living charadriiform species had been examined in Turkey for lice, with 18 of them infested with only one louse species. Previous studies (Açııcı et al. 2011, Dik et al. 2010, 2011a, 2011b, 2015, 2017a, 2017b, Dik and Uslu 2008, Girişgin et al. 2013, 2022, Orunç Kılıç et al. 2013, Göz et al. 2015, Özkan et al. 2017, Eren et al. 2022) reported 38 louse species from Turkey. With the addition of the results of the current study a total of 29 charadriiform species examined for the presence of chewing lice and in total 25 charadriiform species were infested. The total number of lice species found on the charadriiform species were as 51 louse species from Turkey (Table 3).

Species of *Actornithophilus* Ferris 1916 are parasitic on birds belonging to the order Charadriiformes only, in particular those of the families Charadriidae, Haematopodidae, Laridae, Recurvirostridae and Scolopacidae (Clay 1962, Price et al. 2013, Timmermann 1954a, 1954b). Eight species and subspecies of *Actornithophilus* had been previously reported from Turkey (Dik et al. 2010, 2011b, Göz et al. 2015, Özkan et al. 2017): *Ac. hoplopteri* (Mjöberg, 1910), *Ac. multisetosus* (Blagoveshtchensky, 1940), *Ac. piceus lari* (Packard, 1870), *Ac. pustulosus* (Piaget, 1880), *Ac. spinulosus* (Piaget, 1880), *Ac. stictus* (Kellogg & Paine, 1911), *Ac. totani* (Schränk, 1803) and *Ac. umbrinus* (Burmeister, 1838). This paper adds two new records of species of *Actornithophilus* to the Turkish louse fauna: *Ac. bicolor* (Piaget, 1880) on Ruddy turnstone (*Arenaria interpres*), and *Ac. ochraceus* (Nitzsch, 1818) on Common ringed plover (*Charadrius hiaticula*), which had been previously reported from European golden plover (*Pluvialis apricaria* (Linnaeus, 1758)), Common ringed plover (*Charadrius hiaticula*) and Little ringed plover (*Charadrius dubius*) (Price et al. 2003). However, *Ac. ochraceus* was not found on Little ringed plovers (*Charadrius dubius*) in this study. Clay (1962) stated that *Ac. ochraceus* were atypical or natural stragglers on European golden plovers (*Pluvialis apricaria*). However, Gustafsson et al. (2018) reported *Ac. ochraceus* on European golden plovers (*Pluvialis apricaria*), as well as on Common ringed plovers (*Charadrius hiaticula*) and Grey plovers (*Pluvialis*

Table 2. Numbers of lice recorded from charadriiform birds in Kızılırmak Delta, Turkey

Bird family	Bird species	Louse species	♀	♂	N*	Total
Scolopacidae	<i>Actitis hypoleucos</i>	<i>Actornithophilus</i> sp.	0	0	1	1
		<i>Lunaceps falcinellus</i>	1	1	0	2
		<i>Lunaceps schismatus</i>	1	1	0	2
		<i>Quadraceps ravidus</i>	4	1	0	5
		<i>Saemundssonina platygaster frater</i>	1	0	9	10
Scolopacidae	<i>Arenaria interpres</i>	<i>Actornithophilus bicolor</i>	12	15	7	34
		<i>Austromenopon lutescens</i>	1	0	1	2
		<i>Carduiceps</i> sp.	1	0	0	1
		<i>Quadraceps strepsilaris</i>	26	33	0	59
Scolopacidae	<i>Calidris alba</i>	<i>Actornithophilus umbrinus</i>	6	4	0	10
		<i>Carduiceps zonarius</i>	3	3	0	6
		<i>Lunaceps actophilus</i>	7	4	0	11
Scolopacidae	<i>Calidris alpina</i>	<i>Carduiceps meinertzhageni</i>	6	10	0	16
		<i>Lunaceps schismatus</i>	261	222	11	494
		<i>Quadraceps hiaticulae</i>	0	1	0	1
Scolopacidae	<i>Calidris falcinellus</i>	<i>Carduiceps fulvofasciatus</i>	4	2	0	6
		<i>Lunaceps falcinellus</i>	3	5	1	9
Scolopacidae	<i>Calidris ferruginea</i>	<i>Actornithophilus umbrinus</i>	17	11	1	29
		<i>Carduiceps zonarius</i>	28	11	0	39
		<i>Lunaceps falcinellus</i>	52	30	27	109
Scolopacidae	<i>Calidris minuta</i>	<i>Austromenopon</i> sp.	0	1	1	2
		<i>Carduiceps zonarius</i>	6	8	0	14
		<i>Lunaceps falcinellus</i>	87	63	7	157
Scolopacidae	<i>Tringa glareola</i>	<i>Actornithophilus totani</i>	0	1	1	2
		<i>Quadraceps obscurus</i>	7	5	0	12
Charadriidae	<i>Charadrius dubius</i>	<i>Quadraceps hiaticulae</i>	1	0	0	1
Charadriidae	<i>Charadrius hiaticula</i>	<i>Actornithophilus ochraceus</i>	13	5	1	19
		<i>Quadraceps hiaticulae</i>	4	6	0	10
		<i>Quadraceps</i> sp.	2	1	0	3
TOTAL			554	444	68	1066

*N=nymphs

squatarola (Linnaeus, 1758)) in Sweden. *Actornithophilus umbrinus* (Burmeister, 1838) is a cosmopolitan species, originally described from the Curlew sandpiper (*Calidris ferruginea*), but later reported from many species of Charadriiformes, especially of the genus *Calidris* (Clay 1962, Dik et al. 2010, Price et al. 2003). In Turkey,

Ac. umbrinus was previously reported from *Calidris alpina* and *Calidris minuta* (Dik et al. 2010), but this study recorded it from *Calidris alba* and *Calidris ferruginea* for the first time in this country. *Actornithophilus totani* has been recorded from several species of *Tringa* (Clay 1962, Price et al. 2003), and it was previously reported from Wood sandpiper (*Tringa glareola*) in Turkey (Dik et al. 2010, Dik et al. 2017a). The Common sandpiper (*Actitis hypoleucos*) is parasitized by *Actornithophilus flumineus* Clay 1962 (Clay 1962, Price et al. 2003) but, as only a single nymph of *Actornithophilus* was collected from a Common sandpiper (*Actitis hypoleucos*) in this study, it could not be identified at species level. However, this is the first record of *Actornithophilus* from the Common sandpiper (*Actitis hypoleucos*) in Turkey.

Species of *Austromenopon* Bedford, 1939 are parasitic on birds in the orders Charadriiformes, Procellariiformes and Pelecaniformes (Price and Clay 1972, Price et al. 2003). In Turkey, no species of the Procellariiformes has been examined for lice. However, several individuals of eight species of Pelecaniformes occurring in Turkey have been examined, without recording any specimen of *Austromenopon*, this may be due to the fact that *Austromenopon* species traditionally occur on tropical Pelecaniformes members (Dik and Uslu 2008, Inci et al. 2010, Girişgin et al. 2013). Regarding Charadriiformes, six species of *Austromenopon* have been reported in Turkey (Dik et al. 2010, 2017a, 2017b): *Au. alpinum* Timmermann, 1954 on Dunlin, *Au. atrofulvum* (Piaget, 1880) on White-winged black terns (*Chlidonias leucopterus* (Temminck, 1815)), *Au. decorosum* Złotorzycka, 1968 on Wood sandpipers, *Au. durisetosum* Blagoveshtchensky, 1948 on Common snipes (*Gallinago gallinago*), *Au. lutescens* (Burmeister, 1838) on Little stints (*Calidris minuta*) and Ruffs (*Calidris pugnax* (Linnaeus, 1758)) and *Au. transversum* (Denny, 1842) on Mediterranean gulls (*Ichthyaelus melanocephalus* Temminck, 1820). In this study, only two specimens of *Austromenopon* (one male and one nymph) were collected from Little stints (*Calidris minuta*), and two specimens (one female and one nymph) of *Au. lutescens* from Ruddy turnstones (*Arenaria interpres*). Price et al. (2003) do not list any species of *Austromenopon* from Little stints (*Calidris minuta*). However, *Au. lutescens* was reported from Little stints (*Calidris minuta*) in a study performed in the Province of Kars in Eastern Turkey (Dik et al. 2010). The genitalia of our male specimen from

Table 3. Lice species recorded from charadriiform birds in Turkey.

Family	Host species	Louse species	Source
Recurvirostridae	<i>Himantopus himantopus</i>	-	Dik et al. 2011b
Charadriidae	<i>Charadrius dubius</i>	<i>Quadraceps hiaticulae</i>	Current study
		<i>Actornithophilus ochraceus</i>	Current study
	<i>Charadrius hiaticula</i>	<i>Quadraceps hiaticulae</i>	Current study
		<i>Quadraceps</i> sp.	Current study
	<i>Vanellus spinosus</i>	<i>Actornithophilus hoplopteri</i>	Özkan et al. 2017

Table 3. (continued)

Family	Host species	Louse species	Source
Scolopacidae	<i>Actitis hypoleucos</i>	<i>Actornithophilus</i> sp.	Current study
		<i>Lunaceps falcinellus</i>	Current study
		<i>Lunaceps schismatus</i>	Current study
		<i>Quadraceps ravus</i>	Current study
		<i>Saemundssonina platygaster frater</i>	Current study
	<i>Arenaria interpres</i>	<i>Actornithophilus bicolor</i>	Current study
		<i>Austromenopon lutescens</i>	Current study
		<i>Carduiceps</i> sp.	Current study
		<i>Quadraceps strepsilaris</i>	Current study
	<i>Calidris alba</i>	<i>Actornithophilus umbrinus</i>	Current study
		<i>Carduiceps zonarius</i>	Current study
		<i>Lunaceps actophilus</i>	Current study
	<i>Calidris alpina</i>	<i>Actornithophilus umbrinus</i>	Dik et al. 2010
		<i>Austromenopon alpinum</i>	Dik et al. 2010
		<i>Carduiceps meinertzhagani</i>	Dik et al. 2010
		<i>Lunaceps actophilus</i>	Dik et al. 2010
		<i>Lunaceps schismatus</i>	Current study
		<i>Quadraceps hiaticulae</i>	Current study
	<i>Calidris falcinellus</i>	<i>Carduiceps fulvofasciatus</i>	Current study
		<i>Lunaceps falcinellus</i>	Current study
	<i>Calidris ferruginea</i>	<i>Actornithophilus umbrinus</i>	Current study
		<i>Carduiceps zonarius</i>	Current study
		<i>Lunaceps falcinellus</i>	Current study
	<i>Calidris minuta</i>	<i>Actornithophilus umbrinus</i>	Dik et al. 2010
		<i>Austromenopon lutescens</i>	Dik et al. 2010
		<i>Carduiceps zonarius</i>	Dik et al. 2010
		<i>Lunaceps drosti</i>	Dik et al. 2010
		<i>Austromenopon</i> sp.	Current study
		<i>Lunaceps falcinellus</i>	Current study
	<i>Calidris pugnax</i>	<i>Actornithophilus pustulosus</i>	Dik et al. 2010
		<i>Austromenopon lutescens</i>	Dik et al. 2010
		<i>Carduiceps scalaris</i>	Dik et al. 2010
		<i>Lunaceps holophaeus</i>	Dik et al. 2010
	<i>Calidris temminckii</i>	<i>Lunaceps incoensis</i>	Dik et al. 2010
	<i>Gallinago gallinago</i>	<i>Actornithophilus stictus</i>	Dik et al. 2010
		<i>Austromenopon durisetosum</i>	Dik et al. 2010
		<i>Cummingsiella ambigua</i>	Dik et al. 2011a
		<i>Rhynonirmus scolopacis</i>	Dik et al. 2010
	<i>Limosa limosa</i>	<i>Actornithophilus spinulosus</i>	Dik et al. 2017a
		<i>Lunaceps</i> sp.	Dik et al. 2017a
	<i>Limnocyrtus minimus</i>	<i>Actornithophilus multisetosus</i>	Dik et al. 2011a
	<i>Numenius arquata</i>	<i>Actornithophilus patellatus</i>	Açııcı et al. 2021
		<i>Cummingsiella ovalis</i>	Açııcı et al. 2021
		<i>Lunaceps numeni</i>	Açııcı et al. 2021
	<i>Scolopax rusticola</i>	<i>Rhynonirmus helvolus</i>	Dik et al. 2015
		<i>Saemundssonina clayae</i>	Girişgin et al. 2022
		<i>Saemundssonina</i> sp.	Dik et al. 2015
	<i>Tringa glareola</i>	<i>Actornithophilus totani</i>	Dik et al. 2017a
		<i>Austromenopon</i> sp.	Dik et al. 2010
		<i>Quadraceps obscurus</i>	Dik et al. 2010
	<i>Tringa totanus</i>	-	Açııcı et al. 2011b; Dik et al. 2011b; Current study
	<i>Xenus cinereus</i>	-	Current study

Table 3. (continued)

Family	Host species	Louse species	Source
Laridae	<i>Chlidonias leucopterus</i>	<i>Actornithophilus piceus piceus</i>	Dik et al. 2011b
		<i>Austromenopon atrofulvum</i>	Dik et al. 2010
		<i>Quadraceps anagrapsus</i>	Dik et al. 2010
		<i>Saemundssonina lobaticeps</i>	Dik et al. 2010
	<i>Chroicocephalus genei</i>	<i>Actornithophilus piceus</i>	Girişgin et al. 2022
		<i>Saemundssonina lari</i>	Dik et al. 2011b
	<i>Ichthyæetus melanocephalus</i>	<i>Austromenopon transversum</i>	Dik et al. 2017b
		<i>Quadraceps punctatus</i>	Dik et al. 2017b
		<i>Saemundssonina lari</i>	Dik et al. 2017b
	<i>Larus armenicus</i>	<i>Actornithophilus piceus lari</i>	Göz et al. 2015
		<i>Quadraceps punctatus</i>	Orunç Kılıç et al. 2013
		<i>Saemundssonina lari</i>	Orunç Kılıç et al. 2013
	<i>Larus cachinnans</i>	<i>Actornithophilus piceus</i>	Girişgin et al. 2022
		<i>Saemundssonina lari</i>	Girişgin et al. 2013
	<i>Larus michahellis</i>	<i>Quadraceps punctatus</i>	Eren et al. 2022
		<i>Saemundssonina lari</i>	Eren et al. 2022
	<i>Sterna hirundo</i>	-	Dik 2010
	<i>Sternula albifrons</i>	<i>Quadraceps anagrapsus</i>	Açııcı et al. 2011
		<i>Quadraceps nyctemerus</i>	Açııcı et al. 2021

Little stint (*Calidris minuta*) appeared to be different from those of *Au. lutescens*; however, we could not identify it to species level, because it was in poor condition, and the diagnostic morphological characters could not be seen clearly.

Species of the genus *Carduiceps* are parasitic on birds belonging to the family Scolopacidae, in particular the subfamily Calidrinae, in the order Charadriiformes. Few species have been described in this genus (Timmermann 1954a, Price et al. 2003, Gustafsson and Olsson 2017). Three species of *Carduiceps* have been previously recorded from Turkey: *Ca. meinertzhageni* from Dunlins (*Calidris alpina*), *Ca. scalaris* (Piaget, 1880) from Ruffs (*Calidris pugnax*) and *Ca. zonarius* from Little stints (*Calidris minuta*) (Dik et al. 2010). Timmermann (1954a) stated that the species of *Carduiceps* can be separated by examining the male genitalia, while the females have a uniform morphology. Gustafsson et al. (2018) provided an identification key for species of *Carduiceps*, but based on males only. In this study, three species have been identified: *Ca. meinertzhageni* from Dunlins (*Calidris alpina*), *Ca. zonarius* from Curlew sandpipers (*Calidris ferruginea*) and Little stints (*Calidris minuta*), and *Ca. fulvofasciatus* from Broad-billed sandpipers (*Calidris falcinellus*). One female of *Carduiceps* collected from a Ruddy turnstone (*Arenaria interpres*) could not be identified at the species level for the reasons mentioned above. Considering that *Carduiceps* has not yet been recorded from Ruddy turnstones (*Arenaria interpres*) (Price et al. 2003), it is uncertain whether the female reported here is a straggler, or a natural host.

Species of the genus *Lunaceps* Clay and Meinertzhagen, 1939 are parasitic on shorebirds of the family Scolopacidae (Price et al. 2003, Gustafsson and Olsson 2012), and they are morphologically uniform (Gustafsson and Olsson 2012). Five species of

Lunaceps have been previously recorded from Turkey: *Lu. actophilus* on Sanderlings (*Calidris alba*) and Dunlins (*Calidris alpina*), *Lu. drosti* Timmermann, 1954 on Little stints (*Calidris minuta*), *Lu. holophaeus* (Burmeister, 1838) on Ruffs (*Calidris pugnax*), *Lu. incoensis* (Kellogg & Chapman, 1899) on Temminck's stints (*Calidris temminckii*), and *Lunaceps* sp. on Black-tailed godwits [*Limosa limosa* (Linnaeus, 1758)] (Dik et al. 2010). However, Gustafsson & Olsson (2012) regarded the records of *Lu. drosti* and *Lu. incoensis* reported in Turkey by Dik et al. (2010) as junior synonyms of *Lu. falcinellus*. In this study, two species were identified for the first time in Turkey: *Lu. falcinellus* from Common sandpipers (*Actitis hypoleucos*), Broad-billed sandpipers (*Calidris falcinellus*), Curlew sandpipers (*Calidris ferruginea*) and Little stints (*Calidris minuta*), and *L. schismatus* on Common sandpipers (*Actitis hypoleucos*) and Dunlins (*Calidris alpina*).

Species of *Quadraceps* parasitise most charadriiform birds (Timmermann 1952, 1953, Overgaard 1952, Clay 1954, Gustafsson et al. 2018). In Turkey, three *Quadraceps* species have been reported: *Qu. anagrapsus* from Little terns (*Sternula albifrons* (Pallas, 1764)) and White-winged black terns (*Chlidonias leucopterus*), *Qu. punctatus* from Mediterranean (*Ichthyaelus melanocephalus*) and Yellow-legged gulls (*Larus michahellis* Naumann, 1840) and *Qu. obscurus* (Burmeister, 1838) from Wood sandpipers (*Tringa glareola*) (Açııcı et al. 2011, Dik et al. 2010, 2011a, 2017a, 2017b, Göz et al. 2015). In this study, four *Quadraceps* species (*Qu. hiaticulae*, *Qu. obscurus*, *Qu. ravus*, *Qu. strepsilaris*) were collected and identified, plus one specimen which could not be identified at species level. Except *Q. obscurus*, the other three species are reported for the first time in Turkey. Two *Quadraceps* species: *Qu. hiaticulae* and *Qu. fissus* have been recorded on Common ringed plovers (*Charadrius hiaticula*) (Timmermann 1957, Price et al. 2003). Seven out of 15 Common ringed plovers (*Charadrius hiaticula*) examined in this study, were found to be infested with chewing lice. *Quadraceps hiaticulae* was collected from five of them, while *Qu. fissus* was not found. In addition, a new *Quadraceps* species was found on two of them. This species is similar to *Qu. ravus*, but the male genitalia are quite different from those of *Qu. ravus*. In addition, *Qu. hiaticulae* was recorded from Little ringed plovers (*Charadrius dubius*) for the first time in the world. A male *Q. hiaticulae* was collected from a Dunlin (*Calidris alpina*) in this study but, considering that no *Quadraceps* species has been reported from Dunlin (*Calidris alpina*) (Price et al. 2003), we regard it as a straggler.

Species of *Saemundssonina* (Timmermann, 1936) parasitize birds belonging to the orders Anseriformes, Charadriiformes, Gruiformes and Procellariiformes (Price et al. 2003). Two *Saemundssonina* species have been recorded in Turkey: *Sa. lobaticeps* (Giebel, 1874) from White-winged black terns (*Chlidonias leucopterus*) and *Sa. lari* (O. Fabricius, 1780) from Mediterranean, Caspian (*Larus cachinnans* Pallas, 1811) and Yellow-legged gulls (*Larus michahellis*) (Dik et al. 2010, 2017b, Göz et al. 2015). In addition, a nymph of *Saemundssonina* collected from a Eurasian woodcock (*Scolopax rusticola* Linnaeus, 1758) could not be identified to species level (Dik et al. 2015). In this study, only a few specimens of *Saemundssonina* from Common sandpipers (*Actitis*

hypoleucos) were collected and identified as *Sa. platygaster frater*, which is reported for the first time from Turkey.

In a previous study carried out in Turkey, *Austromenopon durisetosum* (Blagoveshtchensky, 1948), *Cummingsiella ambigua* (Burmeister, 1838) and *Rhynonirmus scolopacis* (Denny, 1842) from Common snipes (*Gallinago gallinago*) were reported (Dik et al. 2011a). However, no louse sample was found on four Common snipes (*Gallinago gallinago*) examined in the present study. In another study (Dik et al. 2017a), *Ac. totani* and *Qu. obtusus* were reported from Wood sandpipers (*Tringa glareola*), and both louse species have been recorded from the same bird species in this study.

Considering the total lice fauna of wild birds in Turkey, 188 bird species belonging to 21 order and 52 families were examined, and a total of 122 bird species from 45 families were infested. A total of 217 lice species were recorded in total. There were 21 chewing lice species identified at genus level, while 196 were identified at species level. The maximum chewing lice species found on a single species was nine on *Buteo buteo* and *Buteo rufinus*, followed by 6 lice species on *Ciconia ciconia*, *Columba livia* and *Turdus merula*. The maximum number of chewing lice species recorded on different bird species were 8 for *Menacanthus currucae* (on *Acrocephalus scirpaceus*, *Sylvia atricapilla*, *Sylvia borin*, *Curruca communis*, *Curruca nisoria*, *Iduna pallida*, *Luscinia luscinia*, *Phylloscopus collybita*) and *Menacanthus eurysternus* (on *Erithacus rubecula*, *Passer domesticus*, *Phylloscopus collybita*, *Phylloscopus trochilus*, *Pica pica*, *Sturnus vulgaris*, *Turdus merula*, *Turdus philomelos*) 7 for *Trinoton querquedulae* (on *Anas acuta*, *Anas crecca*, *Anas platyrhynchos*, *Aythya ferina*, *Aythya fuligula*, *Spatula querquedula*, *Tadorna ferruginea*).

In conclusion, the following species: *Ac. bicolor*, *Ac. ochraceus*, *Ca. fulvofasciatus*, *Lu. falcinellus*, *Lu. schismatus*, *Qu. hiaticulae*, *Qu. ravus*, *Qu. strepsilaris* and *Sa. platygaster frater* are reported here for the first time in Turkey in this paper. Also, we have increased the number of charadriiform bird species examined for lice in Turkey to 29, with 25 of them found to be infested. More parasitological surveys are needed to increase knowledge of the chewing lice fauna of the remaining bird species of Charadriiformes from Turkey. Only 188 bird species out of 497 in Turkey have been examined for louse species. There are many more studies needed to increase the coverage of examined species in Turkey to increase the number of the lice fauna (Suppl. Appendix).

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Appendix 1. Louse checklist of wild birds in Turkey.

Order	Family	Host species	Louse species	Source
1 ACCIPITRIFORMES	Accipitridae	<i>Accipiter brevipes</i>	-	Dik et al. 2011a
2 ACCIPITRIFORMES	Accipitridae	<i>Accipiter gentilis</i>	<i>Colpocephalum polonium</i>	Dik et al. 2011b
3 ACCIPITRIFORMES	Accipitridae	<i>Accipiter nisus</i>	<i>Colpocephalum nanum</i>	Dik et al. 2013c
4 ACCIPITRIFORMES	Accipitridae	<i>Accipiter nisus</i>	<i>Degeeriella nisus</i>	Dik et al. 2013c
5 ACCIPITRIFORMES	Accipitridae	<i>Accipiter nisus</i>	<i>Colpocephalum polonium</i>	Girisgin et al. 2022
6 ACCIPITRIFORMES	Accipitridae	<i>Aegypius monachus</i>	<i>Colpocephalum trachelioti</i>	Dik & Yamaç 2008
7 ACCIPITRIFORMES	Accipitridae	<i>Aegypius monachus</i>	<i>Falcolipeurus quadripustulatus</i>	Dik et al. 2013c
8 ACCIPITRIFORMES	Accipitridae	<i>Aegypius monachus</i>	<i>Laemobothrion vulturis</i>	Dik et al. 2013c
9 ACCIPITRIFORMES	Accipitridae	<i>Aquila chrysaetos</i>	<i>Colpocephalum impressum</i>	Eren et al. 2022
10 ACCIPITRIFORMES	Accipitridae	<i>Aquila chrysaetos</i>	<i>Craspedorrhynchus aquilinus</i>	Eren et al. 2022
11 ACCIPITRIFORMES	Accipitridae	<i>Aquila chrysaetos</i>	<i>Degeeriella fulva</i>	Eren et al. 2022
12 ACCIPITRIFORMES	Accipitridae	<i>Aquila chrysaetos</i>	<i>Laemobothrion sp.</i>	Göz et al. 2015
13 ACCIPITRIFORMES	Accipitridae	<i>Aquila pennatus</i>	<i>Laemobothrion maximum</i>	Girisgin et al. 2013
14 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Kurodaia fulvofasciata</i>	Dik 2010
15 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Colpocephalum turbinatum</i>	Eren et al. 2022
16 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Degeeriella nisus</i>	Girisgin et al. 2013
17 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Degeeriella sp.</i>	Girisgin et al. 2013
18 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Falcolipeurus suturalis</i>	Girisgin et al. 2013
19 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Colpocephalum nanum</i>	Inci et al. 2010
20 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Craspedorrhynchus platystomus</i>	Inci et al. 2010
21 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Degeeriella fulva</i>	Inci et al. 2010
22 ACCIPITRIFORMES	Accipitridae	<i>Buteo buteo</i>	<i>Laemobothrion maximum</i>	Inci et al. 2010

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
23 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Craspedorrhynchus platystomus</i>	Dik & Özkayhan 2007
24 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Colpocephalum</i> sp.	Dik 2006
25 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Degeeriella fulva</i>	Dik 2006
26 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Laemobothrion maximum</i>	Dik 2006
27 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Colpocephalum nanum</i>	Dik & Özkayhan 2007
28 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Kurodata fulvofasciata</i>	Göz et al. 2015
29 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Laemobothrion</i> sp.	Gülenber et al. 2006
30 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Craspedorrhynchus</i> sp.	Gülenber et al. 2006
31 ACCIPITRIFORMES	Accipitridae	<i>Buteo rufinus</i>	<i>Degeeriella</i> sp.	Gülenber et al. 2006
32 ACCIPITRIFORMES	Accipitridae	<i>Circus aeruginosus</i>	<i>Degeeriella leucopleura</i>	Giriggin et al. 2013
33 ACCIPITRIFORMES	Accipitridae	<i>Circus aeruginosus</i>	<i>Colpocephalum turbinatum</i>	Dik et al. 2013c
34 ACCIPITRIFORMES	Accipitridae	<i>Circus aeruginosus</i>	<i>Degeeriella fusca</i>	Dik et al. 2013c
35 ACCIPITRIFORMES	Accipitridae	<i>Circus aeruginosus</i>	<i>Kurodata fulvofasciata</i>	Göz et al. 2015
36 ACCIPITRIFORMES	Accipitridae	<i>Circus pygargus</i>	-	Göz et al. 2015
37 ACCIPITRIFORMES	Accipitridae	<i>Clanga clanga</i>	-	Dik 2010
38 ACCIPITRIFORMES	Accipitridae	<i>Milvus migrans</i>	<i>Colpocephalum milvi</i>	Inci et al. 2010
39 ACCIPITRIFORMES	Accipitridae	<i>Pernis apivorus</i>	<i>Degeeriella phlyctopygus</i>	Dik et al. 2013c
40 ACCIPITRIFORMES	Accipitridae	<i>Pernis apivorus</i>	<i>Colpocephalum apivorus</i>	Eren et al. 2022
41 ACCIPITRIFORMES	Accipitridae	<i>Pernis apivorus</i>	<i>Colpocephalum</i> sp.	Inci et al. 2010
42 ACCIPITRIFORMES	Accipitridae	<i>Pernis apivorus</i>	<i>Degeeriella fulva</i>	Inci et al. 2010
43 ACCIPITRIFORMES	Pandionidae	<i>Pandion haliaetus</i>	<i>Colpocephalum napiforme</i>	Eren et al. 2022
44 ACCIPITRIFORMES	Pandionidae	<i>Pandion haliaetus</i>	<i>Degeeriella phlyctopygus</i>	Eren et al. 2022

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
45 ANSERIFORMES	Anatidae	<i>Anas acuta</i>	<i>Anatoecus icterodes</i>	Dik & Uslu 2012
46 ANSERIFORMES	Anatidae	<i>Anas acuta</i>	<i>Holomenopon chypsilargum</i>	Dik & Uslu 2012
47 ANSERIFORMES	Anatidae	<i>Anas acuta</i>	<i>Anaticola crassicornis</i>	Dik et al. 2011a
48 ANSERIFORMES	Anatidae	<i>Anas acuta</i>	<i>Holomenopon</i> sp.	Dik et al. 2011a
49 ANSERIFORMES	Anatidae	<i>Anas acuta</i>	<i>Trinoton querquedulae</i>	Dik et al. 2011a
50 ANSERIFORMES	Anatidae	<i>Anas crecca</i>	<i>Anaticola crassicornis</i>	Dik & Uslu 2012
51 ANSERIFORMES	Anatidae	<i>Anas crecca</i>	<i>Anatoecus dentatus</i>	Dik & Uslu 2012
52 ANSERIFORMES	Anatidae	<i>Anas crecca</i>	<i>Anatoecus icterodes</i>	Dik & Uslu 2012
53 ANSERIFORMES	Anatidae	<i>Anas crecca</i>	<i>Trinoton querquedulae</i>	Dik & Uslu 2012
54 ANSERIFORMES	Anatidae	<i>Anas platyrhynchos</i>	<i>Holomenopon leucoxanthum</i>	Açıcı et al. 2021
55 ANSERIFORMES	Anatidae	<i>Anas platyrhynchos</i>	<i>Anaticola crassicornis</i>	Aksın 2011
56 ANSERIFORMES	Anatidae	<i>Anas platyrhynchos</i>	<i>Anatoecus</i> sp.	Aksın 2011
57 ANSERIFORMES	Anatidae	<i>Anas platyrhynchos</i>	<i>Trinoton querquedulae</i>	Aksın 2011
58 ANSERIFORMES	Anatidae	<i>Anas platyrhynchos</i>	<i>Holomenopon</i> sp.	Göz et al. 2015
59 ANSERIFORMES	Anatidae	<i>Anser anser</i>	<i>Anaticola anseris</i>	Aksın 2004
60 ANSERIFORMES	Anatidae	<i>Anser anser</i>	<i>Holomenopon</i> sp.	Göz et al. 2015
61 ANSERIFORMES	Anatidae	<i>Anser anser</i>	<i>Trinoton anserinum</i>	Göz et al. 2015
62 ANSERIFORMES	Anatidae	<i>Aythya ferina</i>	<i>Anaticola mergiserrati</i>	Dik et al. 2017b
63 ANSERIFORMES	Anatidae	<i>Aythya ferina</i>	<i>Anatoecus icterodes</i>	Dik et al. 2017b
64 ANSERIFORMES	Anatidae	<i>Aythya ferina</i>	<i>Trinoton querquedulae</i>	Eren et al. 2022
65 ANSERIFORMES	Anatidae	<i>Aythya fuligula</i>	<i>Trinoton querquedulae</i>	Dik et al. 2017b
66 ANSERIFORMES	Anatidae	<i>Cygnus cygnus</i>	<i>Anaticola crassicornis</i>	Eren et al. 2022

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
67 ANSERIFORMES	Anatidae	<i>Cygnus cygnus</i>	<i>Anatoecus cygni</i>	Eren et al. 2022
68 ANSERIFORMES	Anatidae	<i>Cygnus cygnus</i>	<i>Ciconiphilus cygni</i>	Eren et al. 2022
69 ANSERIFORMES	Anatidae	<i>Cygnus cygnus</i>	<i>Ornithobius cygni</i>	Eren et al. 2022
70 ANSERIFORMES	Anatidae	<i>Cygnus cygnus</i>	<i>Trinoton anserinum</i>	Oğuz et al. 2015
71 ANSERIFORMES	Anatidae	<i>Mareca strepera</i>	<i>Anaticola sp.</i>	Dik et al. 2017b
72 ANSERIFORMES	Anatidae	<i>Netta rufina</i>	<i>Anatoecus sp.</i>	Dik 2006
73 ANSERIFORMES	Anatidae	<i>Spatula clypeata</i>	-	Göz et al. 2015
74 ANSERIFORMES	Anatidae	<i>Spatula querquedula</i>	<i>Trinoton querquedulae</i>	Dik & Uslu 2012
75 ANSERIFORMES	Anatidae	<i>Tadorna ferruginea</i>	<i>Anaticola magnificus</i>	Dik & Uslu 2012
76 ANSERIFORMES	Anatidae	<i>Tadorna ferruginea</i>	<i>Anatoecus regina</i>	Dik & Uslu 2012
77 ANSERIFORMES	Anatidae	<i>Tadorna ferruginea</i>	<i>Holomenopon tadornae</i>	Dik & Uslu 2012
78 ANSERIFORMES	Anatidae	<i>Tadorna ferruginea</i>	<i>Trinoton querquedulae</i>	Dik & Uslu 2012
79 ANSERIFORMES	Anatidae	<i>Tadorna tadorna</i>	<i>Anaticola crassicornis</i>	Dik & Uslu 2012
80 ANSERIFORMES	Anatidae	<i>Tadorna tadorna</i>	<i>Trinoton sp.</i>	Dik & Uslu 2012
81 APODIFORMES	Apodidae	<i>Apus apus</i>	<i>Dennyus hirundinis</i>	Karataş et al. 2008
82 APODIFORMES	Apodidae	<i>Apus melba</i>	-	Girişgin et al. 2022
83 BUCEROTIFORMES	Upupidae	<i>Upupa epops</i>	<i>Upupicola upupae</i>	Açııcı et al. 2021
84 BUCEROTIFORMES	Upupidae	<i>Upupa epops</i>	<i>Menacanthus fertilis</i>	Dik et al. 2017a
85 CAPRIMULGIFORMES	Caprimulgidae	<i>Caprimulgus europaeus</i>	<i>Mulcticola hypoleucus</i>	Dik 2009
86 CHARADRIIFORMES	Charadriidae	<i>Vanellus spinosus</i>	<i>Actornithophilus hoplopteri</i>	Özkan et al. 2017
87 CHARADRIIFORMES	Laridae	<i>Chlidonias leucopterus</i>	<i>Austromenopon atrofulvum</i>	Dik et al. 2010
88 CHARADRIIFORMES	Laridae	<i>Chlidonias leucopterus</i>	<i>Quadraceps anagrapsus</i>	Dik et al. 2010

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
89 CHARADRIIFORMES	Laridae	<i>Chlidonias leucopterus</i>	<i>Saemundssonina lobaticeps</i>	Dik et al. 2010
90 CHARADRIIFORMES	Laridae	<i>Chlidonias leucopterus</i>	<i>Actornithophilus piceus piceus</i>	Dik et al. 2011b
91 CHARADRIIFORMES	Laridae	<i>Chroicocephalus genei</i>	<i>Saemundssonina lari</i>	Dik et al. 2011b
92 CHARADRIIFORMES	Laridae	<i>Chroicocephalus genei</i>	<i>Actornithophilus piceus</i>	Giriggin et al. 2022
93 CHARADRIIFORMES	Laridae	<i>Ichthyaelus melanocephalus</i>	<i>Austromenopon transversum</i>	Dik et al. 2017b
94 CHARADRIIFORMES	Laridae	<i>Ichthyaelus melanocephalus</i>	<i>Quadraceps punctatus</i>	Dik et al. 2017b
95 CHARADRIIFORMES	Laridae	<i>Ichthyaelus melanocephalus</i>	<i>Saemundssonina lari</i>	Dik et al. 2017b
96 CHARADRIIFORMES	Laridae	<i>Larus armenicus</i>	<i>Actornithophilus piceus lari</i>	Göz et al. 2015
97 CHARADRIIFORMES	Laridae	<i>Larus armenicus</i>	<i>Quadraceps punctatus</i>	Orunç Kılıç et al. 2013
98 CHARADRIIFORMES	Laridae	<i>Larus armenicus</i>	<i>Saemundssonina lari</i>	Orunç Kılıç et al. 2013
99 CHARADRIIFORMES	Laridae	<i>Larus cachinnans</i>	<i>Saemundssonina lari</i>	Giriggin et al. 2013
100 CHARADRIIFORMES	Laridae	<i>Larus cachinnans</i>	<i>Actornithophilus piceus</i>	Giriggin et al. 2022
101 CHARADRIIFORMES	Laridae	<i>Larus michahellis</i>	<i>Quadraceps punctatus</i>	Eren et al. 2022
102 CHARADRIIFORMES	Laridae	<i>Larus michahellis</i>	<i>Saemundssonina lari</i>	Eren et al. 2022
103 CHARADRIIFORMES	Laridae	<i>Sterna hirundo</i>	-	Dik 2010
104 CHARADRIIFORMES	Laridae	<i>Sternula albifrons</i>	<i>Quadraceps anagrapsus</i>	Açııcı et al. 2011
105 CHARADRIIFORMES	Laridae	<i>Sternula albifrons</i>	<i>Quadraceps nyctemerus</i>	Açııcı et al. 2021
106 CHARADRIIFORMES	Recurvirostridae	<i>Himantopus himantopus</i>	-	Dik et al. 2011b
107 CHARADRIIFORMES	Scolopacidae	<i>Calidris alpina</i>	<i>Actornithophilus umbrinus</i>	Dik et al. 2010
108 CHARADRIIFORMES	Scolopacidae	<i>Calidris alpina</i>	<i>Austromenopon alpinum</i>	Dik et al. 2010
109 CHARADRIIFORMES	Scolopacidae	<i>Calidris alpina</i>	<i>Carduiceps meinhartzhagani</i>	Dik et al. 2010
110 CHARADRIIFORMES	Scolopacidae	<i>Calidris alpina</i>	<i>Lunaceps actophilus</i>	Dik et al. 2010

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
111 CHARADRIIFORMES	Scolopacidae	<i>Calidris minuta</i>	<i>Actornithophilus umbrinus</i>	Dik et al. 2010
112 CHARADRIIFORMES	Scolopacidae	<i>Calidris minuta</i>	<i>Austromenopon lutescens</i>	Dik et al. 2010
113 CHARADRIIFORMES	Scolopacidae	<i>Calidris minuta</i>	<i>Carduiceps zonarius</i>	Dik et al. 2010
114 CHARADRIIFORMES	Scolopacidae	<i>Calidris minuta</i>	<i>Lunaceps drosti</i>	Dik et al. 2010
115 CHARADRIIFORMES	Scolopacidae	<i>Calidris pugnax</i>	<i>Actornithophilus pustulosus</i>	Dik et al. 2010
116 CHARADRIIFORMES	Scolopacidae	<i>Calidris pugnax</i>	<i>Austromenopon lutescens</i>	Dik et al. 2010
117 CHARADRIIFORMES	Scolopacidae	<i>Calidris pugnax</i>	<i>Carduiceps scalaris</i>	Dik et al. 2010
118 CHARADRIIFORMES	Scolopacidae	<i>Calidris pugnax</i>	<i>Lunaceps holophaeus</i>	Dik et al. 2010
119 CHARADRIIFORMES	Scolopacidae	<i>Calidris temminckii</i>	<i>Lunaceps incoensis</i>	Dik et al. 2010
120 CHARADRIIFORMES	Scolopacidae	<i>Gallinago gallinago</i>	<i>Actornithophilus stictus</i>	Dik et al. 2010
121 CHARADRIIFORMES	Scolopacidae	<i>Gallinago gallinago</i>	<i>Austromenopon durisetosum</i>	Dik et al. 2010
122 CHARADRIIFORMES	Scolopacidae	<i>Gallinago gallinago</i>	<i>Rhynonirmus scolopacis</i>	Dik et al. 2010
123 CHARADRIIFORMES	Scolopacidae	<i>Gallinago gallinago</i>	<i>Cummingsiella ambigua</i>	Dik et al. 2011a
124 CHARADRIIFORMES	Scolopacidae	<i>Limosa limosa</i>	<i>Actornithophilus spinulosus</i>	Dik et al. 2017a
125 CHARADRIIFORMES	Scolopacidae	<i>Limosa limosa</i>	<i>Lunaceps sp.</i>	Dik et al. 2017a
126 CHARADRIIFORMES	Scolopacidae	<i>Lymnocyrtus minimus</i>	<i>Actornithophilus multisetosus</i>	Dik et al. 2011a
127 CHARADRIIFORMES	Scolopacidae	<i>Numenius arquata</i>	<i>Actornithophilus patellatus</i>	Açıcı et al. 2021
128 CHARADRIIFORMES	Scolopacidae	<i>Numenius arquata</i>	<i>Cummingsiella ovalis</i>	Açıcı et al. 2021
129 CHARADRIIFORMES	Scolopacidae	<i>Numenius arquata</i>	<i>Lunaceps numeni</i>	Açıcı et al. 2021
130 CHARADRIIFORMES	Scolopacidae	<i>Scolopax rusticola</i>	<i>Rhynonirmus helvolus</i>	Dik et al. 2015
131 CHARADRIIFORMES	Scolopacidae	<i>Scolopax rusticola</i>	<i>Saemundssonina sp.</i>	Dik et al. 2015
132 CHARADRIIFORMES	Scolopacidae	<i>Scolopax rusticola</i>	<i>Saemundssonina clayae</i>	Girgisin et al. 2022

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
133 CHARADRIIFORMES	Scolopacidae	<i>Tringa glareola</i>	<i>Austroripon sp.</i>	Dik et al. 2010
134 CHARADRIIFORMES	Scolopacidae	<i>Tringa glareola</i>	<i>Quadriceps obscurus</i>	Dik et al. 2010
135 CHARADRIIFORMES	Scolopacidae	<i>Tringa glareola</i>	<i>Actornithophilus totani</i>	Dik et al. 2017a
136 CHARADRIIFORMES	Scolopacidae	<i>Tringa totanus</i>	-	Açıcı et al. 2011
137 CICONIIFORMES	Ciconiidae	<i>Ciconia ciconia</i>	<i>Ardeicola ciconiae</i>	Dik & Uslu 2006b
138 CICONIIFORMES	Ciconiidae	<i>Ciconia ciconia</i>	<i>Ardeicola incompletus</i>	Dik & Uslu 2006b
139 CICONIIFORMES	Ciconiidae	<i>Ciconia ciconia</i>	<i>Colpocephalum quadripustulatus</i>	Dik & Uslu 2006b
140 CICONIIFORMES	Ciconiidae	<i>Ciconia ciconia</i>	<i>Colpocephalum zebra</i>	Dik & Uslu 2006b
141 CICONIIFORMES	Ciconiidae	<i>Ciconia ciconia</i>	<i>Neophilopterus incompletus</i>	Dik & Uslu 2006b
142 CICONIIFORMES	Ciconiidae	<i>Ciconia ciconia</i>	<i>Ciconiphilus quadripustulatus</i>	Dik et al. 2011b
143 CICONIIFORMES	Ciconiidae	<i>Ciconia nigra</i>	<i>Neophilopterus tricolor</i>	Açıcı et al. 2021
144 COLUMBIFORMES	Columbidae	<i>Columba livia</i>	<i>Columbicola columbae</i>	Dik 2010
145 COLUMBIFORMES	Columbidae	<i>Columba livia</i>	<i>Coloceras israelensis</i>	Dik et al. 2013c
146 COLUMBIFORMES	Columbidae	<i>Columba livia</i>	<i>Menacanthus stramineus</i>	Eren et al. 2022
147 COLUMBIFORMES	Columbidae	<i>Columba livia</i>	<i>Campanulotes bidentatus</i>	Girişgin et al. 2022
148 COLUMBIFORMES	Columbidae	<i>Columba livia</i>	<i>Goniodes dissimilis</i>	Girişgin et al. 2022
149 COLUMBIFORMES	Columbidae	<i>Columba livia</i>	<i>Lipeurus caponis</i>	Girişgin et al. 2022
150 COLUMBIFORMES	Columbidae	<i>Streptopelia decaocto</i>	<i>Coloceras piageti</i>	Dik et al. 2013c
151 COLUMBIFORMES	Columbidae	<i>Streptopelia decaocto</i>	<i>Coloceras hilli</i>	Girişgin et al. 2013
152 COLUMBIFORMES	Columbidae	<i>Streptopelia decaocto</i>	<i>Columbicola bacillus</i>	Girişgin et al. 2013
153 COLUMBIFORMES	Columbidae	<i>Streptopelia senegalensis</i>	<i>Coloceras chinense</i>	Girişgin et al. 2013
154 COLUMBIFORMES	Columbidae	<i>Streptopelia senegalensis</i>	<i>Columbicola bacillus</i>	Girişgin et al. 2022

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
155 COLUMBIFORMES	Columbidae	<i>Streptopelia senegalensis</i>	<i>Columbicola columbae</i>	Giriggin et al. 2022
156 COLUMBIFORMES	Columbidae	<i>Streptopelia senegalensis</i>	<i>Cuculogaster heterographus</i>	Giriggin et al. 2022
157 COLUMBIFORMES	Columbidae	<i>Streptopelia turtur</i>	<i>Columbicola bacillus</i>	Giriggin et al. 2013
158 CORACIIFORMES	Alcedinidae	<i>Alcedo atthis</i>	<i>Alcedofulla alcedinis</i>	Dik et al. 2017a
159 CORACIIFORMES	Meropidae	<i>Merops apiaster</i>	<i>Meromenopon meropis</i>	Dik et al. 2011b
160 CORACIIFORMES	Meropidae	<i>Merops apiaster</i>	<i>Meropoecus meropis</i>	Dik et al. 2011b
161 CORACIIFORMES	Meropidae	<i>Merops apiaster</i>	<i>Brueelia apiastri</i>	Dik et al. 2013c
162 CORACIIFORMES	Meropidae	<i>Merops apiaster</i>	<i>Meropoecus sp.</i>	Dik et al. 2013c
163 CORACIIFORMES	Meropidae	<i>Merops apiaster</i>	<i>Meropsiella apiastri</i>	Dik et al. 2017a
164 CUCULIFORMES	Cuculidae	<i>Cuculus canorus</i>	<i>Cuculicola latirostris</i>	Açııcı et al. 2011
165 FALCONIFORMES	Falconidae	<i>Falco columbarius</i>	-	Dik et al. 2011b
166 FALCONIFORMES	Falconidae	<i>Falco eleonorae</i>	-	Giriggin et al. 2022
167 FALCONIFORMES	Falconidae	<i>Falco naumanni</i>	<i>Degeeriella rufa</i>	Göz et al. 2015
168 FALCONIFORMES	Falconidae	<i>Falco naumanni</i>	<i>Laemobothrion tinnunculi</i>	Göz et al. 2015
169 FALCONIFORMES	Falconidae	<i>Falco peregrinus</i>	-	Dik et al. 2017a
170 FALCONIFORMES	Falconidae	<i>Falco subbuteo</i>	-	Dik 2010
171 FALCONIFORMES	Falconidae	<i>Falco tinnunculus</i>	<i>Degeeriella rufa</i>	Dik et al. 2013c
172 FALCONIFORMES	Falconidae	<i>Falco tinnunculus</i>	<i>Colpocephalum subzerafae</i>	Esatgil et al. 2012
173 FALCONIFORMES	Falconidae	<i>Falco tinnunculus</i>	<i>Laemobothrion tinnunculi</i>	Esatgil et al. 2012
174 FALCONIFORMES	Falconidae	<i>Falco tinnunculus</i>	<i>Degeeriella sp.</i>	Giriggin et al. 2022
175 GALLIFORMES	Phasianidae	<i>Alectoris chukar</i>	<i>Goniodes dispar</i>	Aksın 2003
176 GALLIFORMES	Phasianidae	<i>Alectoris chukar</i>	<i>Menacanthus lyali</i>	Aksın 2003

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
177 GALLIFORMES	Phasianidae	<i>Alectoris chukar</i>	<i>Cuculotogaster sp.</i>	Dik et al. 2015
178 GALLIFORMES	Phasianidae	<i>Alectoris chukar</i>	<i>Goniocotes pusillus</i>	Dik et al. 2015
179 GALLIFORMES	Phasianidae	<i>Alectoris chukar</i>	<i>Cuculotogaster heterographus</i>	Giriggin et al. 2013
180 GALLIFORMES	Phasianidae	<i>Coturnix coturnix</i>	<i>Cuculogaster cinereus</i>	Aksın 2010
181 GALLIFORMES	Phasianidae	<i>Coturnix coturnix</i>	<i>Goniodes astrocephalus</i>	Aksın 2010
182 GALLIFORMES	Phasianidae	<i>Coturnix coturnix</i>	<i>Menacanthus abdominalis</i>	Aksın 2010
183 GALLIFORMES	Phasianidae	<i>Phasianus colchicus</i>	<i>Lipecurus caponis</i>	Dik et al. 2017a
184 GRUIFORMES	Rallidae	<i>Crex crex</i>	<i>Rallicola ortygometrae</i>	Dik et al. 2017a
185 GRUIFORMES	Rallidae	<i>Fulica atra</i>	<i>Fulicoffula lurida</i>	Dik et al. 2011b
186 GRUIFORMES	Rallidae	<i>Fulica atra</i>	<i>Incidifrons fulica</i>	Dik et al. 2011b
187 GRUIFORMES	Rallidae	<i>Fulica atra</i>	<i>Pseudomenopon pilosum</i>	Dik et al. 2011b
188 GRUIFORMES	Rallidae	<i>Fulica atra</i>	<i>Rallicola fulica</i>	Dik et al. 2011b
189 GRUIFORMES	Rallidae	<i>Fulica atra</i>	<i>Laemobothrion atrum</i>	Dik et al. 2017b
190 GRUIFORMES	Rallidae	<i>Gallinula chloropus</i>	<i>Pseudomenapon pilosum</i>	Dik et al. 2017b
191 GRUIFORMES	Rallidae	<i>Gallinula chloropus</i>	<i>Rallicola minutus</i>	Dik et al. 2017b
192 GRUIFORMES	Rallidae	<i>Gallinula chloropus</i>	<i>Fulicoffula gallinula</i>	Giriggin et al. 2022
193 GRUIFORMES	Rallidae	<i>Porphyrio porphyrio</i>	<i>Pseudomenapon concretum</i>	Açıcı et al. 2021
194 GRUIFORMES	Rallidae	<i>Porphyrio porphyrio</i>	<i>Rallicola lugens</i>	Açıcı et al. 2021
195 GRUIFORMES	Rallidae	<i>Rallus aquaticus</i>	<i>Pseudomenapon scopulacorne</i>	Dik et al. 2011a
196 GRUIFORMES	Rallidae	<i>Zapornia parva</i>	<i>Pseudomenapon scopulacorne</i>	Dik et al. 2011a
197 OTIDIFORMES	Otididae	<i>Chlamydotis macqueenii</i>	-	Dik et al. 2015
198 PASSERIFORMES	Acrocephalidae	<i>Acrocephalus arrundinaceus</i>	-	Dik et al. 2011c

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
199 PASSERIFORMES	Acrocephalidae	<i>Acrocephalus melanopogon</i>	-	Dik et al. 2011a
200 PASSERIFORMES	Acrocephalidae	<i>Acrocephalus palustris</i>	<i>Philopterus mirificus</i>	Açıcı et al. 2021
201 PASSERIFORMES	Acrocephalidae	<i>Acrocephalus palustris</i>	<i>Sturnidoecus pflergi</i>	Açıcı et al. 2021
202 PASSERIFORMES	Acrocephalidae	<i>Acrocephalus schoenobaenus</i>	-	Dik et al. 2011c
203 PASSERIFORMES	Acrocephalidae	<i>Acrocephalus scirpaceus</i>	<i>Menacanthus currucae</i>	Açıcı et al. 2011
204 PASSERIFORMES	Acrocephalidae	<i>Hippolais icterina</i>	-	Dik et al. 2017a
205 PASSERIFORMES	Acrocephalidae	<i>Iduna pallida</i>	<i>Menacanthus currucae</i>	Dik et al. 2017a
206 PASSERIFORMES	Aegithalidae	<i>Aegithalos caudatus</i>	-	Açıcı et al. 2011
207 PASSERIFORMES	Alaudidae	<i>Melanocorypha calandra</i>	<i>Menacanthus alaudae</i>	Dik et al. 2011a
208 PASSERIFORMES	Alaudidae	<i>Melanocorypha calandra</i>	<i>Menacanthus pusillus</i>	Dik et al. 2011c
209 PASSERIFORMES	Certhiidae	<i>Certhia brachydactyla</i>	-	Dik et al. 2013b
210 PASSERIFORMES	Certhiidae	<i>Certhia familiaris</i>	-	Dik et al. 2013b
211 PASSERIFORMES	Cettiidae	<i>Cettia cetti</i>	<i>Penenirmus longuliceps</i>	Dik et al. 2015
212 PASSERIFORMES	Corvidae	<i>Coloeus monedula</i>	-	Giriggin et al. 2013
213 PASSERIFORMES	Corvidae	<i>Corvus corax</i>	<i>Menacanthus gonophaeus</i>	Açıcı et al. 2021
214 PASSERIFORMES	Corvidae	<i>Corvus cornix</i>	-	Dik 2010
215 PASSERIFORMES	Corvidae	<i>Corvus frugilegus</i>	<i>Menacanthus gonophaeus</i>	Eren et al. 2022
216 PASSERIFORMES	Corvidae	<i>Corvus frugilegus</i>	<i>Philopterus atratus</i>	Eren et al. 2022
217 PASSERIFORMES	Corvidae	<i>Corvus frugilegus</i>	<i>Brueelia tasniemae</i>	Giriggin et al. 2022
218 PASSERIFORMES	Corvidae	<i>Corvus frugilegus</i>	<i>Myrsidea isostoma</i>	Giriggin et al. 2022
219 PASSERIFORMES	Corvidae	<i>Garrulus glandarius</i>	-	Giriggin et al. 2022
220 PASSERIFORMES	Corvidae	<i>Pica pica</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2011a

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
221 PASSERIFORMES	Corvidae	<i>Pica pica</i>	<i>Myrsidea picae</i>	Dik et al. 2011a
222 PASSERIFORMES	Corvidae	<i>Pica pica</i>	<i>Brueelia biocellata</i>	Dik et al. 2013a
223 PASSERIFORMES	Emberizidae	<i>Emberiza calandra</i>	-	Dik et al. 2011a
224 PASSERIFORMES	Emberizidae	<i>Emberiza citrlus</i>	-	Dik et al. 2013b
225 PASSERIFORMES	Emberizidae	<i>Emberiza citrinella</i>	-	Dik et al. 2017a
226 PASSERIFORMES	Emberizidae	<i>Emberiza hortulana</i>	-	Dik et al. 2017a
227 PASSERIFORMES	Emberizidae	<i>Emberiza melanocephala</i>	<i>Brueelia sp.</i>	Dik et al. 2015
228 PASSERIFORMES	Emberizidae	<i>Emberiza melanocephala</i>	<i>Penenirmus sp.</i>	Dik et al. 2015
229 PASSERIFORMES	Emberizidae	<i>Emberiza schoeniclus</i>	<i>Menacanthus chrysophaeus</i>	Dik et al. 2011c
230 PASSERIFORMES	Fringillidae	<i>Carduelis carduelis</i>	-	Dik et al. 2011b
231 PASSERIFORMES	Fringillidae	<i>Coccothraustes coccothraustes</i>	<i>Philopterus eurasiatricus</i>	Açıcı et al. 2021
232 PASSERIFORMES	Fringillidae	<i>Fringilla coelebs</i>	<i>Ricinus fringillae</i>	Açıcı et al. 2011
233 PASSERIFORMES	Fringillidae	<i>Fringilla montifringilla</i>	<i>Philopterus rapax</i>	Dik et al. 2017a
234 PASSERIFORMES	Fringillidae	<i>Linaria cannabina</i>	-	Dik et al. 2013c
235 PASSERIFORMES	Fringillidae	<i>Loxia curvirostra</i>	-	Dik et al. 2011b
236 PASSERIFORMES	Fringillidae	<i>Serinus serinus</i>	-	Dik et al. 2013b
237 PASSERIFORMES	Fringillidae	<i>Spinus spinus</i>	-	Dik et al. 2017a
238 PASSERIFORMES	Hirundinidae	<i>Delichon urbicum</i>	-	Dik 2010
239 PASSERIFORMES	Hirundinidae	<i>Hirundo rustica</i>	<i>Brueelia domestica</i>	Açıcı et al. 2011
240 PASSERIFORMES	Hirundinidae	<i>Hirundo rustica</i>	<i>Myrsidea rustica</i>	Açıcı et al. 2011
241 PASSERIFORMES	Hirundinidae	<i>Hirundo rustica</i>	<i>Menacanthus sp.</i>	Dik et al. 2015
242 PASSERIFORMES	Hirundinidae	<i>Riparia riparia</i>	<i>Myrsidea sp.</i>	Dik et al. 2017a

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
243 PASSERIFORMES	Laniidae	<i>Lanius collurio</i>	<i>Menacanthus camelinus</i>	Açııcı et al. 2011
244 PASSERIFORMES	Laniidae	<i>Lanius collurio</i>	<i>Brueelia cruciata</i>	Dik et al. 2011c
245 PASSERIFORMES	Laniidae	<i>Lanius collurio</i>	<i>Menacanthus sp.</i>	Eren et al. 2022
246 PASSERIFORMES	Locustellidae	<i>Locustella fluviatilis</i>	-	Dik et al. 2015
247 PASSERIFORMES	Locustellidae	<i>Locustella luscinioides</i>	-	Açııcı et al. 2011
248 PASSERIFORMES	Locustellidae	<i>Locustella luscinioides</i>	<i>Brueelia locustellae</i>	Açııcı et al. 2021
249 PASSERIFORMES	Motacillidae	<i>Anthus campestris</i>	-	Dik et al. 2017a
250 PASSERIFORMES	Motacillidae	<i>Anthus spinoletta</i>	<i>Menacanthus pusillus</i>	Dik et al. 2011a
251 PASSERIFORMES	Motacillidae	<i>Anthus trivialis</i>	-	Dik et al. 2017a
252 PASSERIFORMES	Motacillidae	<i>Motacilla alba</i>	-	Açııcı et al. 2011
253 PASSERIFORMES	Motacillidae	<i>Motacilla citreola</i>	-	Dik et al. 2011c
254 PASSERIFORMES	Motacillidae	<i>Motacilla flava</i>	<i>Menacanthus pusillus</i>	Dik et al. 2011c
255 PASSERIFORMES	Motacillidae	<i>Motacilla flava</i>	<i>Menacanthus sp.</i>	Dik et al. 2017a
256 PASSERIFORMES	Muscicapidae	<i>Erithacus rubecula</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2011a
257 PASSERIFORMES	Muscicapidae	<i>Erithacus rubecula</i>	<i>Menacanthus sp.</i>	Dik et al. 2015
258 PASSERIFORMES	Muscicapidae	<i>Ficedula albicollis</i>	<i>Brueelia sp.</i>	Dik et al. 2017a
259 PASSERIFORMES	Muscicapidae	<i>Ficedula hypoleuca</i>	-	Açııcı et al. 2011
260 PASSERIFORMES	Muscicapidae	<i>Ficedula parva</i>	-	Açııcı et al. 2011
261 PASSERIFORMES	Muscicapidae	<i>Ficedula semitorquata</i>	-	Dik et al. 2017a
262 PASSERIFORMES	Muscicapidae	<i>Luscinia luscinia</i>	<i>Brueelia lais</i>	Açııcı et al. 2021
263 PASSERIFORMES	Muscicapidae	<i>Luscinia luscinia</i>	<i>Menacanthus currucae</i>	Dik et al. 2017a
264 PASSERIFORMES	Muscicapidae	<i>Luscinia megarhynchos</i>	<i>Brueelia lais</i>	Açııcı et al. 2021

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
265 PASSERIFORMES	Muscicapidae	<i>Luscinia svecica</i>	-	Dik et al. 2011a
266 PASSERIFORMES	Muscicapidae	<i>Muscicapa striata</i>	<i>Penenirmus</i> sp.	Dik et al. 2017a
267 PASSERIFORMES	Muscicapidae	<i>Muscicapa striata</i>	<i>Philopterus desertus</i>	Dik et al. 2017a
268 PASSERIFORMES	Muscicapidae	<i>Oenanthe hispanica</i>	-	Dik et al. 2013b
269 PASSERIFORMES	Muscicapidae	<i>Oenanthe oenanthe</i>	-	Dik et al. 2017a
270 PASSERIFORMES	Muscicapidae	<i>Phoenicurus ochruros</i>	-	Dik et al. 2017a
271 PASSERIFORMES	Muscicapidae	<i>Phoenicurus phoenicurus</i>	<i>Penenirmus silvicultrix</i>	Dik et al. 2015
272 PASSERIFORMES	Muscicapidae	<i>Saxicola maura</i>	-	Dik et al. 2011c
273 PASSERIFORMES	Muscicapidae	<i>Saxicola rubetra</i>	-	Dik et al. 2017a
274 PASSERIFORMES	Muscicapidae	<i>Saxicola rubicola</i>	-	Dik et al. 2017a
275 PASSERIFORMES	Oriolidae	<i>Oriolus oriolus</i>	<i>Brueelia munda</i>	Dik et al. 2013c
276 PASSERIFORMES	Oriolidae	<i>Oriolus oriolus</i>	<i>Menacanthus oriole</i>	Dik et al. 2013c
277 PASSERIFORMES	Oriolidae	<i>Oriolus oriolus</i>	<i>Maculnirmus mundus</i>	Dik et al. 2017a
278 PASSERIFORMES	Oriolidae	<i>Oriolus oriolus</i>	<i>Ricinus dolicocephalus</i>	Dik et al. 2017a
279 PASSERIFORMES	Paridae	<i>Cyanistes caeruleus</i>	-	Dik et al. 2011b
280 PASSERIFORMES	Paridae	<i>Parus major</i>	-	Dik et al. 2011c
281 PASSERIFORMES	Paridae	<i>Periparus ater</i>	-	Dik et al. 2013b
282 PASSERIFORMES	Paridae	<i>Poecile lugubris</i>	-	Dik et al. 2013b
283 PASSERIFORMES	Paridae	<i>Poecile palustris</i>	-	Dik et al. 2013b
284 PASSERIFORMES	Passeridae	<i>Passer domesticus</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2013c
285 PASSERIFORMES	Passeridae	<i>Passer domesticus</i>	<i>Philopterus fringillae</i>	Dik et al. 2013c
286 PASSERIFORMES	Passeridae	<i>Passer hispaniolensis</i>	-	Açıcı et al. 2011

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
287 PASSERIFORMES	Passeridae	<i>Passer montanus</i>	-	Dik et al. 2011a
288 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus collybita</i>	<i>Menacanthus currucae</i>	Dik et al. 2011a
289 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus collybita</i>	<i>Penenirmus rarus</i>	Dik et al. 2011c
290 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus collybita</i>	<i>Menacanthus agilis</i>	Dik et al. 2015
291 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus collybita</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2017a
292 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus sibilatrix</i>	-	Dik et al. 2013b
293 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus sindianus</i>	-	Dik et al. 2011a
294 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus trochilus</i>	<i>Brueelia</i> sp.	Dik et al. 2017a
295 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus trochilus</i>	<i>Menacanthus agilis</i>	Dik et al. 2017a
296 PASSERIFORMES	Phylloscopidae	<i>Phylloscopus trochilus</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2017a
297 PASSERIFORMES	Prunellidae	<i>Prunella modularis</i>	-	Açııcı et al. 2011
298 PASSERIFORMES	Regulidae	<i>Regulus ignicapilla</i>	-	Dik et al. 2017a
299 PASSERIFORMES	Regulidae	<i>Regulus regulus</i>	<i>Philopterus reguli</i>	Dik et al. 2017a
300 PASSERIFORMES	Regulidae	<i>Regulus regulus</i>	<i>Ricinus frenatus</i>	Dik et al. 2017a
301 PASSERIFORMES	Sittidae	<i>Sitta krueperi</i>	<i>Philopterus sitta</i>	Dik et al. 2013b
302 PASSERIFORMES	Sturnidae	<i>Sturnus vulgaris</i>	<i>Brueelia nebulosa</i>	Dik et al. 2009
303 PASSERIFORMES	Sturnidae	<i>Sturnus vulgaris</i>	<i>Brueelia</i> sp.	Dik et al. 2009
304 PASSERIFORMES	Sturnidae	<i>Sturnus vulgaris</i>	<i>Myrsidea cucullaris</i>	Dik et al. 2009
305 PASSERIFORMES	Sturnidae	<i>Sturnus vulgaris</i>	<i>Sturnioecus sturni</i>	Dik et al. 2009
306 PASSERIFORMES	Sturnidae	<i>Sturnus vulgaris</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2013c
307 PASSERIFORMES	Sylviidae	<i>Sylvia atricapilla</i>	<i>Menacanthus</i> sp.	Dik et al. 2015
308 PASSERIFORMES	Sylviidae	<i>Sylvia atricapilla</i>	<i>Menacanthus currucae</i>	Dik et al. 2017a

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
309 PASSERIFORMES	Sylviidae	<i>Sylvia borin</i>	<i>Menacanthus currucae</i>	Açııcı et al. 2011
310 PASSERIFORMES	Sylviidae	<i>Sylvia borin</i>	<i>Penenirmus affectator</i>	Açııcı et al. 2011
311 PASSERIFORMES	Sylviidae	<i>Sylvia borin</i>	<i>Myrsidea sp.</i>	Dik et al. 2015
312 PASSERIFORMES	Sylviidae	<i>Curruca communis</i>	<i>Myrsidea sp.</i>	Dik et al. 2015
313 PASSERIFORMES	Sylviidae	<i>Curruca communis</i>	<i>Menacanthus currucae</i>	Dik et al. 2017a
314 PASSERIFORMES	Sylviidae	<i>Curruca curruca</i>	-	Açııcı et al. 2011
315 PASSERIFORMES	Sylviidae	<i>Curruca melanocephala</i>	<i>Penenirmus sp.</i>	Açııcı et al. 2011
316 PASSERIFORMES	Sylviidae	<i>Curruca melanocephala</i>	<i>Menacanthus sp.</i>	Dik et al. 2015
317 PASSERIFORMES	Sylviidae	<i>Curruca nisoria</i>	<i>Myrsidea sp.</i>	Dik et al. 2015
318 PASSERIFORMES	Sylviidae	<i>Curruca nisoria</i>	<i>Penenirmus pikulai</i>	Dik et al. 2015
319 PASSERIFORMES	Sylviidae	<i>Curruca nisoria</i>	<i>Menacanthus currucae</i>	Dik et al. 2017a
320 PASSERIFORMES	Troglodytidae	<i>Troglodytes troglodytes</i>	-	Dik et al. 2011a
321 PASSERIFORMES	Turdidae	<i>Turdus iliacus</i>	<i>Brueelia iliaci</i>	Dik et al. 2015
322 PASSERIFORMES	Turdidae	<i>Turdus iliacus</i>	<i>Ricinus elongatus</i>	Dik et al. 2017a
323 PASSERIFORMES	Turdidae	<i>Turdus merula</i>	<i>Brueelia merulensis</i>	Açııcı et al. 2011
324 PASSERIFORMES	Turdidae	<i>Turdus merula</i>	<i>Menacanthus eurysternus</i>	Açııcı et al. 2011
325 PASSERIFORMES	Turdidae	<i>Turdus merula</i>	<i>Ricinus elongatus</i>	Dik & Dinçer 2012
326 PASSERIFORMES	Turdidae	<i>Turdus merula</i>	<i>Menacanthus sp.</i>	Dik et al. 2011a
327 PASSERIFORMES	Turdidae	<i>Turdus merula</i>	<i>Brueelia jacobii</i>	Dik et al. 2013b
328 PASSERIFORMES	Turdidae	<i>Turdus merula</i>	<i>Philopterus sp.</i>	Dik et al. 2013b
329 PASSERIFORMES	Turdidae	<i>Turdus philomelos</i>	<i>Brueelia turdimulae</i>	Açııcı et al. 2011
330 PASSERIFORMES	Turdidae	<i>Turdus philomelos</i>	<i>Menacanthus eurysternus</i>	Dik et al. 2015

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
331 PASSERIFORMES	Turdidae	<i>Turdus philomelos</i>	<i>Brueelia marginata</i>	Dik et al. 2017a
332 PASSERIFORMES	Turdidae	<i>Turdus viscivorus</i>	<i>Philopterus vernus</i>	Dik et al. 2013b
333 PELECANIFORMES	Ardeidae	<i>Ardea alba</i>	<i>Comatomenapon elongatum</i>	Inci et al. 2010
334 PELECANIFORMES	Ardeidae	<i>Ardea cinerea</i>	<i>Ciconiphilus decimfasciatus</i>	Eren et al. 2022
335 PELECANIFORMES	Ardeidae	<i>Botaurus stellaris</i>	-	Dik 2010
336 PELECANIFORMES	Ardeidae	<i>Egretta garzetta</i>	<i>Ciconiphilus decimfasciatus</i>	Eren et al. 2022
337 PELECANIFORMES	Ardeidae	<i>Ixobrychus minutus</i>	<i>Ardeicola celeris</i>	Dik et al. 2017a
338 PELECANIFORMES	Ardeidae	<i>Ixobrychus minutus</i>	<i>Ardeicola ixobrychae</i>	Giriggin et al. 2022
339 PELECANIFORMES	Pelecanidae	<i>Pelecanus crispus</i>	<i>Piagetella titan</i>	Dik & Uslu 2006a
340 PELECANIFORMES	Pelecanidae	<i>Pelecanus crispus</i>	<i>Pectinopygus bifasciatus</i>	Dik et al. 2017b
341 PELECANIFORMES	Pelecanidae	<i>Pelecanus crispus</i>	<i>Pectinopygus sp.</i>	Giriggin et al. 2013
342 PELECANIFORMES	Pelecanidae	<i>Pelecanus onocrotalus</i>	<i>Colpocephalum eucarenum</i>	Dik & Uslu 2008
343 PELECANIFORMES	Pelecanidae	<i>Pelecanus onocrotalus</i>	<i>Pectinopygus forficulatus</i>	Dik & Uslu 2008
344 PELECANIFORMES	Pelecanidae	<i>Pelecanus onocrotalus</i>	<i>Piagetella titan</i>	Dik et al. 2013c
345 PELECANIFORMES	Pelecanidae	<i>Pelecanus onocrotalus</i>	<i>Pectinopygus sp.</i>	Giriggin et al. 2013
346 PELECANIFORMES	Threskiornithidae	<i>Platalea leucorodia</i>	<i>Ardeicola plataleae</i>	Giriggin et al. 2013
347 PELECANIFORMES	Threskiornithidae	<i>Platalea leucorodia</i>	<i>Ibidoecus plataleae</i>	Giriggin et al. 2013
348 PHOENICOPTERIFORMES	Phoenicopteridae	<i>Phoenicopterus roseus</i>	<i>Anaticola phoenicopter</i>	Dik et al. 2011b
349 PHOENICOPTERIFORMES	Phoenicopteridae	<i>Phoenicopterus roseus</i>	<i>Anatoecus pygaspis</i>	Dik et al. 2011b
350 PHOENICOPTERIFORMES	Phoenicopteridae	<i>Phoenicopterus roseus</i>	<i>Colpocephalum heterosoma</i>	Dik et al. 2011b
351 PHOENICOPTERIFORMES	Phoenicopteridae	<i>Phoenicopterus roseus</i>	<i>Trinoton femoratum</i>	Dik et al. 2011b
352 PICIFORMES	Picidae	<i>Dendrocopos syriacus</i>	-	Giriggin et al. 2022

Appendix 1. (continued)

Order	Family	Host species	Louse species	Source
353 PICIFORMES	Picidae	<i>Jynx torquilla</i>	<i>Penenirmus serrilimbus</i>	Dik et al. 2017a
354 PODICIPEDIFORMES	Podicipedidae	<i>Podiceps cristatus</i>	<i>Aquanirmus podiceps</i>	Dik et al. 2017b
355 PODICIPEDIFORMES	Podicipedidae	<i>Podiceps cristatus</i>	<i>Pseudomenopon dolium</i>	Dik et al. 2017b
356 PODICIPEDIFORMES	Podicipedidae	<i>Tachybaptus ruficollis</i>	-	Açıcı et al. 2011
357 STRIGIFORMES	Strigidae	<i>Asio otus</i>	<i>Strigiphilus barbatus</i>	Dik 2010
358 STRIGIFORMES	Strigidae	<i>Asio otus</i>	<i>Columbicola columbae</i>	Dik et al. 2013c
359 STRIGIFORMES	Strigidae	<i>Athene noctua</i>	<i>Strigiphilus cursitans</i>	Girisgin et al. 2013
360 STRIGIFORMES	Strigidae	<i>Bubo bubo</i>	<i>Strigiphilus strigis</i>	Dik & Uslu 2007
361 STRIGIFORMES	Strigidae	<i>Bubo bubo</i>	<i>Kurodaia longipes</i>	Dik et al. 2015
362 STRIGIFORMES	Strigidae	<i>Otus scops</i>	-	Dik et al. 2017a
363 STRIGIFORMES	Strigidae	<i>Strix aluco</i>	-	Dik et al. 2015
364 STRIGIFORMES	Tytonidae	<i>Tyto alba</i>	<i>Kurodaia subpachygaster</i>	Eren et al. 2022
365 STRIGIFORMES	Tytonidae	<i>Tyto alba</i>	<i>Colpocephalum</i> sp.	Girisgin et al. 2022
366 SULIFORMES	Phalacrocoracidae	<i>Gulosus aristotelis</i>	<i>Eidmanniella pellucida</i>	Karatepe et al. 2017
367 SULIFORMES	Phalacrocoracidae	<i>Gulosus aristotelis</i>	<i>Pectinopygus brevicornis</i>	Karatepe et al. 2017
368 SULIFORMES	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	<i>Eidmanniella pellucida</i>	Açıcı et al. 2021
369 SULIFORMES	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	<i>Pectinopygus excornis</i>	Açıcı et al. 2021