

Current Knowledge of Turkey's Louse Fauna

Türkiye'deki Bit Faunasının Mevcut Durumu

Abdullah İNCİ¹, Alparslan YILDIRIM¹, Bilal DİK², Önder DÜZLÜ¹

¹ Department of Parasitology, Faculty of Veterinary Medicine, Erciyes University, Kayseri

² Department of Parasitology, Faculty of Veterinary Medicine, Selcuk University, Konya, Türkiye

ABSTRACT

The current knowledge on the louse fauna of birds and mammals in Turkey has not yet been completed. Up to the present, a total of 109 species belonging to 50 genera of lice have been recorded from animals and humans, according to the morphological identification. Among the avian lice, a total of 43 species belonging to 22 genera were identified in *Ischnocera* (Philopteridae). 35 species belonging to 14 genera in Menoponidae were detected and only 1 species was found in Laemobothriidae in *Amblycera*. Among the mammalian lice, a total of 20 species belonging to 8 genera were identified in *Anoplura*. 8 species belonging to 3 genera in *Ischnocera* were determined and 2 species belonging to 2 genera were detected in *Amblycera* in the mammalian lice. (*Türkiye Parazitol Derg* 2010; 34: 212-20)

Key Words: Avian lice, mammalian lice, Turkey

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ÖZET

Türkiye'deki kuşlarda ve memelilerde bulunan bit türlerinin mevcut durumu henüz daha tamamlanmamıştır. Bugüne kadar insan ve hayvanlarda morfolojik olarak teşhis edilen 50 cinste 109 bit türü bildirilmiştir. Kanatlı bitleri arasında, 22 cinse ait toplam 43 tür *Ischnocera*'da tespit edilmiştir. *Amblycera*'da ise Menoponidae familyasında 14 cinste 35 tür saptanırken, Laemobothriidae familyasında yalnızca bir tür bulunmuştur. Memeli bitleri arasında *Anoplura*'da 8 cinste 20 tür tespit edilmiştir. Yine memeli bitleri arasında *Ischnocera*'da 3 cinste 8 tür saptanırken, *Amblycera*'da 2 cinste 2 tür bulunmuştur. (*Türkiye Parazitol Derg* 2010; 34: 212-20)

Anahtar Sözcükler: Kanatlı bitleri, memeli bitleri, Türkiye

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INTRODUCTION

Ideas concerning the phylogenetic relationships among the major taxa of arthropods, and the included insect, are dynamic. The phylogenetic arrangement of the higher groups of insects has been contentious since the time of Linnaeus. Insects belong to arguably the most successful major lineage of the phylum Arthropoda, the joint-legged animals. The latter clade comprises myriapods (centipedes, millipedes, and their relatives), chelicerates (horseshoe crabs and arachnids), crustaceans (crabs, shrimps, and relatives) and hexapoda (the six-legged arthropods, and their relatives) (1).

Hexapoda (ranked usually as a superclass) contains all six-legged arthropods; diagnosis includes possession of unique tagmosis, namely specialization of successive body segments that more or less unite to form sections or tagmata: head, thorax, and abdomen. The extant hexapoda includes true insects and non-insects (2, 3).

True insects (*Class Insecta*) range from minute to large (0.2-360 mm in length) and are very variable in appearance. They typically have ocelli and compound eyes, at least in adults, and the mouthparts are exposed (ectognathous) with the maxillary and labial palps usually well developed. The tho-

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Address for Correspondence/Yazışma Adresi: Dr. Abdullah İnci, Department of Parasitology, Faculty of Veterinary Medicine, Erciyes University, Kayseri, Turkey Phone: +90 352 339 23 12 E-mail: ainci@erciyes.edu.tr

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rax is variably developed in the immature stages, but distinct in adults with the degree of development dependent on the presence of wings. Thoracic legs have more than 5 segments. The abdomen is primitively 11-segmented with gonopore nearly always on segment 8 in the female and segment 9 in the male. Cerci are primitively present. Gas exchange is predominantly thacheal with spiracles present on both the thorax and abdomen, but variably reduced or absent (e.g., in many immature stages). Larval or nymphal development is epimorphic, that the number of body segments is constant during development. Class insecta may be divided into two subclasses as "Apterygota (=wingless)" and "Pterygota (=winged)" (2, 4, 5).

Pterygota are the winged or secondarily wingless (apterous) insects, with thoracic segments of adults being usually large and with the meso- and metathorax variably united to form a pterothorax. The spiracles primarily have a muscular closing apparatus. Mating is by copulation. Metamorphosis is hemi- to holometabolus, with no adult ecdysis, except for the subimago (subadult) stage in Ephemeroptera. Subclass pterygota may be divided into five subdivisions as Palaeoptera, Polyneoptera, Paraneoptera, Endopterygota (=Holometabola) and Neuropterida (2, 4, 5).

Subdivision Paraneoptera (Acercaria, or Hemipteroid assemblage) comprises the orders Psocoptera (*booklice*), Phthiraptera (*parasitic lice*), Thysanoptera, and Hemiptera. This group is defined by derived features of mouthparts, including the slender, elongate maxillary lacinia separated from the stipes and swollen postclypeus containing and enlarged cibarium (sucking pump), and the reduction in tarsomere number to three or less (2, 4, 5).

Order Phthiraptera (parasitic lice, Hemimetabola) may be divided into 4 suborders as *Anoplura*, *Amblycera*, *Ischnocera* and *Rhyncophthirina* according to historical (6) and modern (7) classifications. The later three suborders have been treated traditionally as a monophyletic Mallophaga (biting and chewing lice) based on their feeding mode and morphology, in contrast to the piercing and blood-feeding *Anoplura*. Cladistic analysis of morphology has disputed Mallophagan monophyly,

suggesting the relationship with *Amblycera* [*Ischnocera* (*Anoplura*+*Rhyncophthirina*)] (1). The suborder *Anoplura* (sucking lice) includes those that are exclusive ectoparasites of eutherian mammals (8). Molecular data have supported a classification in which *Amblycera* is sister to *Liposcelididae* (book lice), and parasitism of vertebrates arose twice independently within Psocodea, once in the common ancestor of *Amblycera* and once in the common ancestor of all other parasitic lice (9). Most recently, molecular sequence data have offered additional information for classification of Hexapoda (10) and the Phthiraptera order (11).

The latest position of *Phthiraptera* (*parasitic lice*) order in the systematic of Arthropoda phylum is as shown in the Taxonomicon and Systema Nature 2000 (12).

Phthirapterans are wingless, dorso-ventrally flattened, obligate and permanent ectoparasites of birds and mammals, lacking any free-living stage, with nearly 5000 species in some 28 families. Adults range in length from less than 0.5 to 11 mm, and have diversified into a great variety of morphological types. Lice are the only truly parasitic group amongst the exopterygote insects. They exhibit a remarkable level of host specificity which is unparalleled in most other metazoan parasites. Abiotic factors are known to influence the geographic distribution of lice (13). In a rapidly changing global environment, continued study of life patterns and harmonious relationships of two ecosystem partners, parasites and their hosts, established through long coevolutionary processes, should offer a better understanding of dynamics of parasite communities on host animals including humans (8). Parasitic lice have medical and veterinary importance, and their successful transmission is possible by direct physical contact and phoresy between host individuals.

Our knowledge on the louse fauna of birds and mammals in Turkey has not been completed. Up to the present, a total of 109 species belonging to 50 genera of lice have been recorded from animals, based on the morphological identification of these parasites (Figure 1-3).

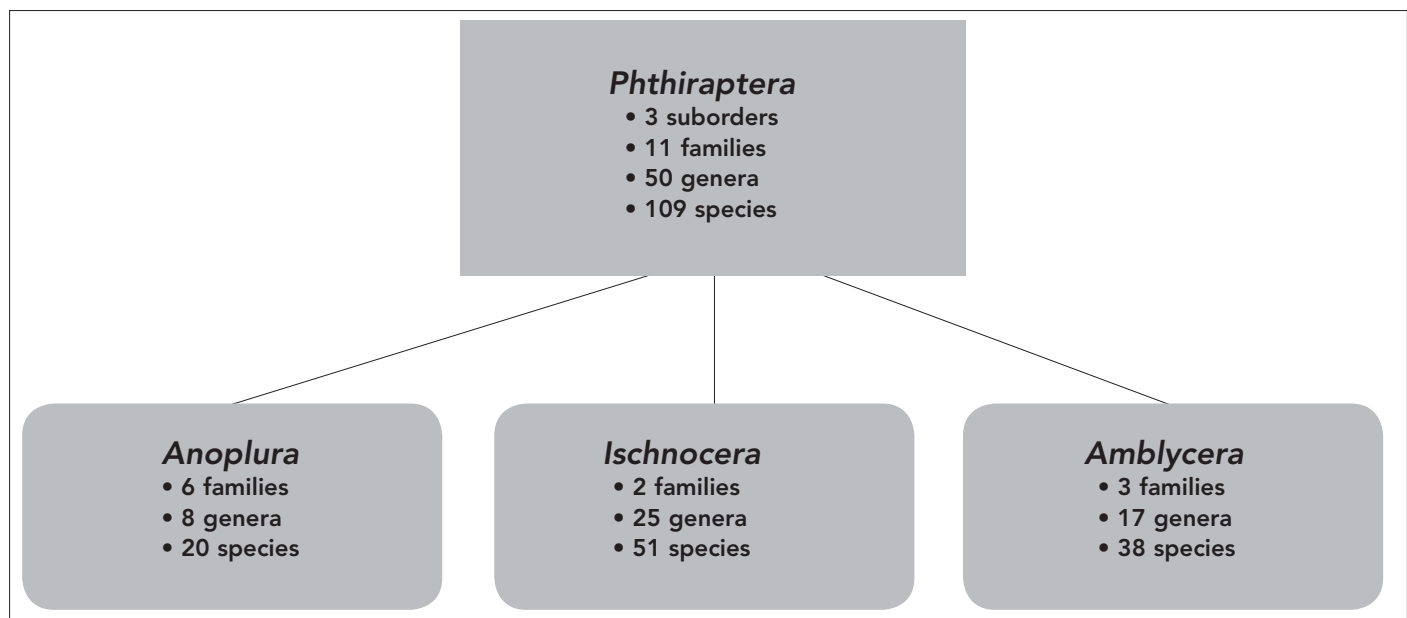


Figure 1. Total louse number reported from Turkey

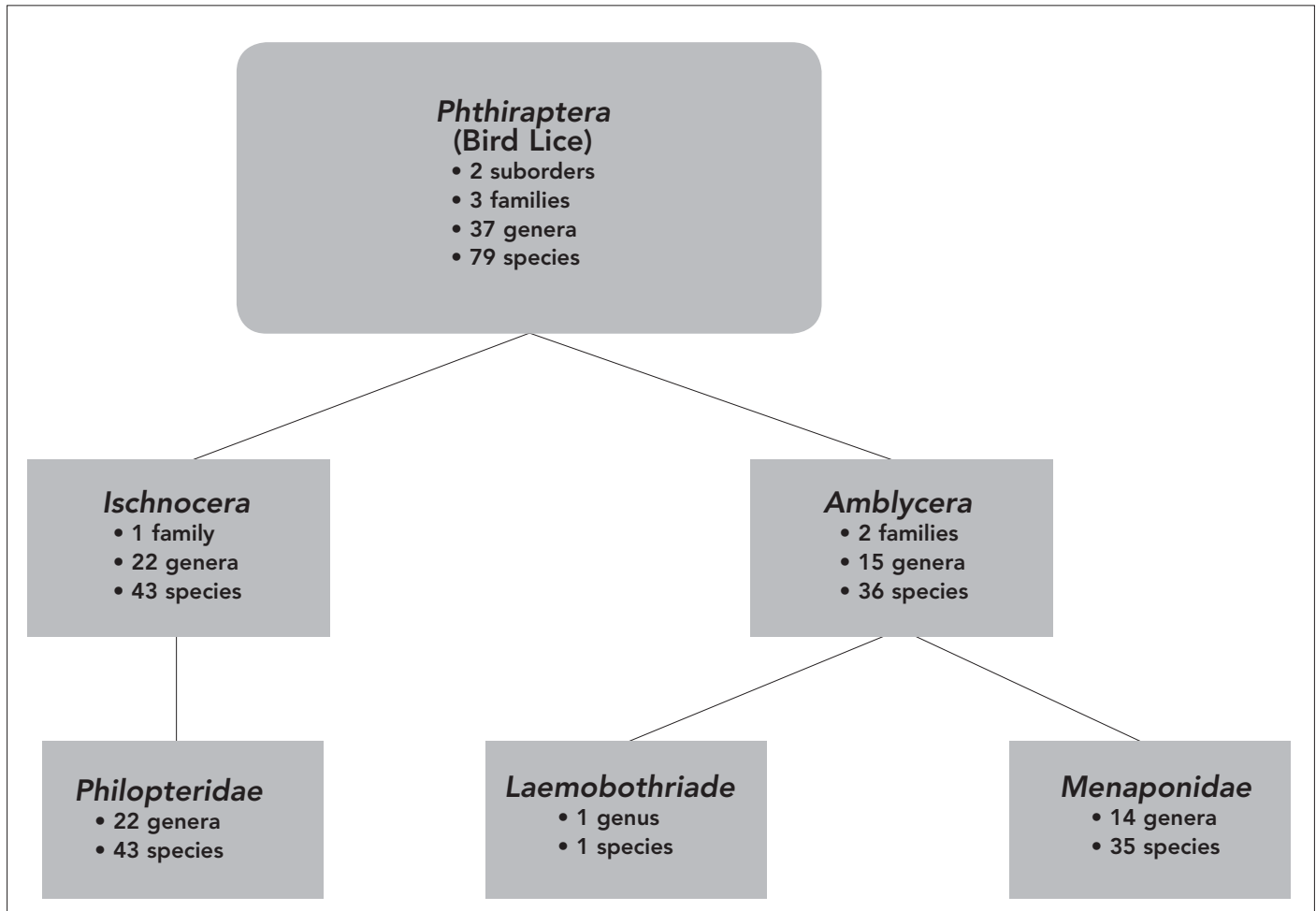


Figure 2. Total avian louse number reported from Turkey

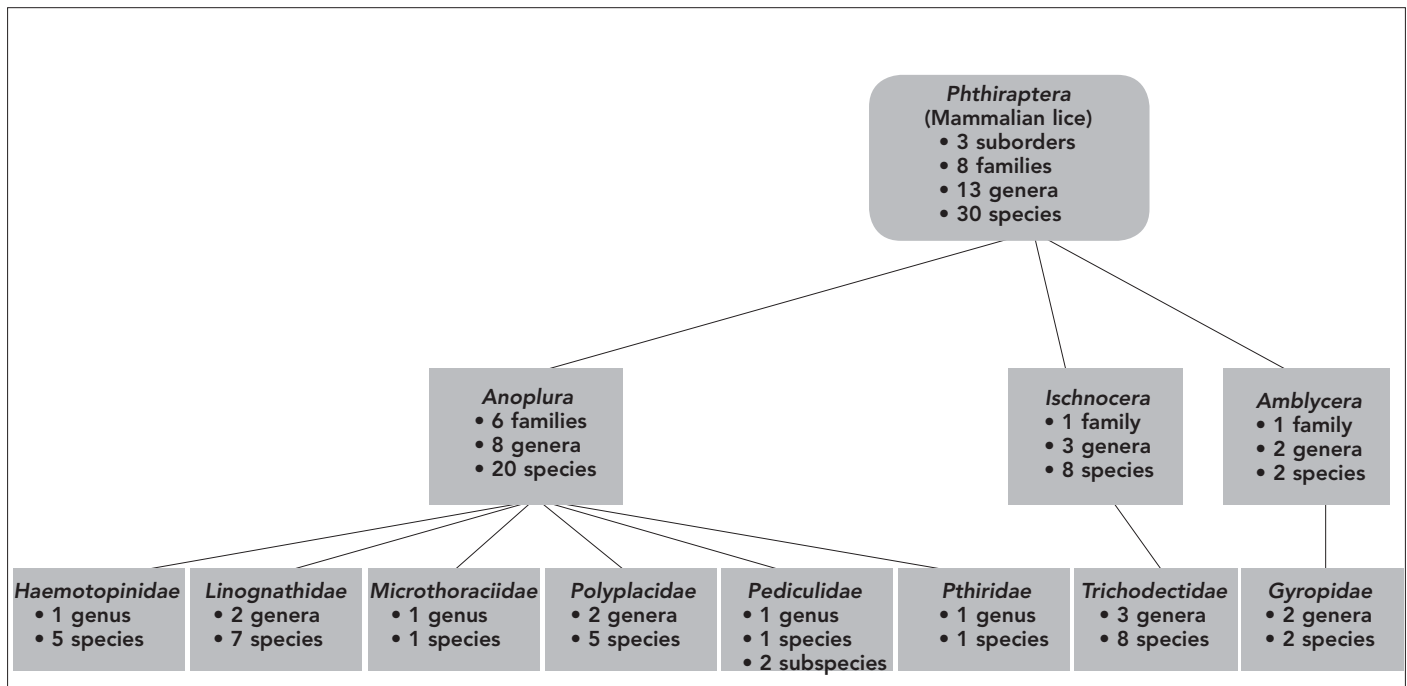


Figure 3. Total mammalian louse number reported from Turkey

Table 1. Reported louse species from birds in Turkey

	Reported Species	References	Reported Species	References
Ischnocera Kellogg, 1896	Anaticola Clay, 1936		Goniodes Nitzsch, 1818	
	<i>A. anseris</i> (Linnaeus, 1758)	14, 15	<i>G. colchici</i> (Denny, 1842)	41
	<i>A. crassicornis</i> (Scopoli, 1763)	15	<i>G. dissimilis</i> (Denny, 1842)	29-31, 38, 39
	Anatoecus Cummings, 1916		<i>G. gigas</i> (Tashenberg, 1879)	30, 31
	<i>A. icterodes</i> (Nitzsch, 1818)	16	<i>G. dispar</i> (Burmeister, 1838)	40
	Anatoecus sp.	17	<i>G. astrocephalus</i>	32
	Ardeicola Clay, 1936		Lipeurus Nitzsch, 1818	
	<i>A. ciconiae</i> (Linnaeus, 1758)	18	<i>L. caponis</i> (Linnaeus, 1758)	30, 31, 39
	Brueelia Kéler, 1936		Lunaceps Clay & Meinertzhagen, 1939	
	<i>B. cruciata</i> (Burmeister, 1838)	19	<i>L. drosti</i> (Timmermann, 1954)	25
	<i>B. nebulosa</i> (Burmeister, 1838)	20	<i>L. actophilus</i>	25
	Brueelia sp.	20	<i>L. holophaeus</i> (Burmeister, 1838)	25
	Campanulotes Kéler, 1939		<i>L. incoenis</i> (Kellogg & Chapman, 1899)	25
	<i>C. bidentatus</i> (Scopoli), 1763)	21-24	Multicola Clay & Meinertzhagen, 1938	
	Carduiceps Clay & Meinertzhagen 1939		<i>M. hypoleucus</i> (Denny, 1842)	42
	<i>C. meinertzhageni</i> (Timmermann, 1954)	25	Neophliopterus Cummings, 1916	
	<i>C. scalaris</i> (Piaget, 1880)	25	<i>N. incompletus</i> (Denny, 1842)	18
	<i>C. zonarius</i> (Nitzsch [in Giebel], 1866)	25	Penenirmus Clay & Meinertzhagen, 1938	
	Columbicola Ewing, 1929		<i>P. rarus</i> (Zlotorzycza, 1976)	19
	<i>C. bacillus</i> (Giebel, 1866)	16	Quadriceps Clay & Meinertzhagen, 1939	
	<i>C. columbae</i> (Linnaeus, 1758)	21-24, 26, 27	<i>Q. anagrapsus</i> (Nitzsch [in Giebel], 1866)	25
	Cuclotogaster Carriker, 1936		<i>Q. obscurus</i> (Burmeister, 1838)	25
	<i>C. heterographus</i> (Nitzsch [in Giebel], 1866)	28-31	Rhynonirmus Thompson, 1935	
	<i>C. cinereus</i>	32	<i>R. scolopacis</i> (Denny, 1842)	25
	Craspedorhynchus Kéler, 1938		Saemundssonina Timmermann, 1936	
	<i>C. fraterculus</i> (Eichler & Zlotorzycza, 1975)	33	<i>S. (Saemundssonina) lobaticeps</i> (Giebel, 1874)	25
	<i>C. platystomus</i> (Burmeister, 1838)	26, 33-37	Strigiphilus Mjöberg, 1910	
	Degeeriella Neumann, 1906		<i>S. barbatus</i> (Osborn, 1902)	25, 37
	<i>D. aequilum</i> (Eichler, 1943)	33	<i>S. strigis</i> (Pontoppidan, 1763)	43
<i>D. fulva</i> (Giebel, 1874)	26, 34, 36, 37	Stumidoecus Eichler, 1944		
<i>D. fusca</i> (Denny, 1842)	33	<i>S. sturni</i> (Schrank, 1776)	20	
Goniocotes Burmeister, 1838				
<i>G. gallinae</i> (De Geer, 1778)	24, 29-31, 38, 39			
<i>G. pusillus</i> (Nitzsch [in Giebel], 1866)	40			

Phlipteridae

Table 2. Reported louse species from birds in Turkey (Continued)

Reported Species	References	Reported Species	References
Laemobothrion Nitzsch, 1818			
<i>L. (Laemobothrion) maximum</i> (Scopoli, 1763)	33-37		
Actornithophilus Ferris, 1916		Holomenapon Eichler, 1941	
<i>A. pustulosus</i> (Piaget, 1880)	25	<i>H. obscurum</i> (Piaget, 1880)	15
<i>A. stictus</i> (Kellogg & Paine, 1911)	25	Kurodaia Uchida, 1926	
<i>A. totani</i> (Schrank, 1803)	25	<i>K. (Kurodaia) fulvofasciata</i> (Piaget, 1880)	26
<i>A. umbrinus</i> (Burmeister, 1838)	25	Menacanthus Neumann, 1912	
Afrimenapon Price, 1970		<i>M. cornutus</i> (Schömmmer, 1913)	29-31, 38, 39
<i>A. waar</i> (Eichler 1947)	16	<i>M. lyali</i> (Rodríguez Caabeiro et al., 1983)	40
Austromenapon Bedford, 1939		<i>M. pusillus</i> (Nitzsch, 1866)	19
<i>A. alpinum</i> (Timmermann, 1954)	25	<i>M. stramineus</i> (Nitzsch, 1818)	29-31, 46-48
<i>A. atrofulvum</i> (Piaget, 1880)	25	Menacanthus sp.	19
<i>A. durisetosum</i> (Blagoveshtchensky, 1948)	25	<i>M. abdominalis</i>	32
<i>A. lutescens</i> (Burmeister, 1838)	25	<i>M. camelinus</i>	49
Austromenapon sp.	25	Menapon Nitzsch, 1818	
Ciconiphilus Bedford, 1939		<i>M. gallinae</i> (Linnaeus, 1758)	23, 27, 29-31, 38, 39
<i>C. quadripustulatus</i> (Burmeister, 1838)	18	Myrsidea Waterston, 1915	
Colpocephalum Nitzsch, 1818		<i>M. rustica</i> (Giebel, 1874)	19
<i>C. impressum</i> (Rudow, 1866)	33	<i>M. cucullaris</i> (Nitzsch, 1818)	20
<i>C. milvi</i> (Tendeiro, 1979)	37	Piagetiella Neumann, 1906	
<i>C. nanum</i> (Piaget, 1890)	26, 35, 37	<i>P. titan</i> (Piaget, 1880)	50
<i>C. trachelioti</i> (Price & Beer, 1963)	44	Trinoton Nitzsch, 1818	
<i>C. turbinatum</i> (Denny, 1842)	15	<i>T. anserinum</i> (Fabricius, 1805)	51
<i>C. zebra</i> (Burmeister, 1838)	18, 37	<i>T. queredulae</i> (Linnaeus, 1758)	15
Colpocephalum sp.	34, 37		
Comatomenapon Uchida, 1920			
<i>C. elongatum</i> (Uchida, 1920)	37		
Dennyus Neumann, 1906			
<i>D. (Dennyus) hirundinis</i> (Linnaeus, 1761)	45		

Amblycera Kellogg, 1896

Menapontidae

Laemobothriidae

Table 3. Reported louse species from mammalian including human in Turkey

Order	Suborder	Family	Reported Species	References	Order	Suborder	Family	Reported Species	References		
Anoplura	Gyropidae	Pediculidae	Gyropus Nitzsch, 1818		Anoplura	Pediculidae	Pediculus Linnaeus, 1758				
			G. ovalis (Burmeister, 1838)	52			P. humanus capitis (Degeer, 1778)	66-77			
		Haematopiniidae	Gyropidae	Gliricola Mjöberg, 1910				Polyplicidae	Haematopiniidae	P. humanus humanus (Linnaeus, 1758)	70, 78
				G. porcelli (Schränk, 1781)			52			Haemodipsus Enderlein, 1904	
				Haematopinus Leach, 1815						H. lyriocephalus (Burmeister, 1839)	43, 79, 80
	Haematopiniidae	Gyropidae	Haematopiniidae	H. asini (Linnaeus, 1758)		15	Polyplicidae	Haematopiniidae	H. setoni (Ewing, 1924)	43, 79	
				H. eurysternus (Nitzsch, 1818)		48, 53-55			H. ventricosus (Denny, 1842)	15	
				H. quadripertusus (Fahrenholz, 1916)		54, 56			Polyplax Enderlein, 1904		
				H. tuberculatus (Burmeister, 1839)		48, 54, 55, 57			P. serrata (Burmeister, 1839)	81, 82	
				H. suis (Linnaeus, 1758)		52, 58			P. spinulosa (Burmeister, 1839)	52, 82	
Anoplura	Lingnathidae	Lingnathidae	Lingnathus Enderlein, 1905		Trichodectidae	Lingnathidae	Pthirus Leach, 1815				
			L. africanus (Kellogg and Paine, 1911)	57, 59-64			P. pubis (Linnaeus, 1758)	15, 78, 83-87			
			L. vituli (Linnaeus, 1758)	47, 48, 53-57, 65			Bovicola Ewing, 1929				
			L. ovillus (Neumann, 1907)	15, 57, 59, 62			B. (Bovicola) bovis (Linnaeus, 1758)	15, 48, 53-57, 61, 65,			
			L. pedalis (Osborn, 1896)	46, 57, 59, 62			B. (Bovicola) caprae (Gurtl, 1843)	15, 46, 57, 59, 61-64			
			L. setosus (Von Olfers, 1816)	15			B. (Holakartikos) crassipes (Rudow, 1866)	46, 57, 61, 62, 64			
			L. stenopsis (Burmeister, 1838)	46, 61, 52, 62, 64			B. (Werneckiella) equi (Denny, 1842)	52, 88			
			Solenopotes Enderlein, 1904				B. (Bovicola) limbatus (Gervais, 1844)	15, 57, 61, 62, 64			
			S. capillatus (Enderlein, 1904)	47, 48, 54, 56, 57			B. (Bovicola) ovis (Schränk, 1781)	15, 46, 57, 59, 61, 63, 89			
			Microthoracii	Microthoracii			Microthoracii	Microthoracius Fahrenholz, 1916		Trichodectidae	Microthoracii
M. camelii (Linnaeus, 1758)	15	F. (Felicola) subrostratus (Burmeister, 1838)			80, 90						
							Trichodectes Nitzsch, 1818				
							T. canis (De Geer, 1778)	52			

Among the avian lice (*Ischnocera*, *Phthopteridae*) a total of 43 species belonging to 22 genera have been identified. These are: *Anaticola* (*A. anseris*, *A. crassicornis*), *Anatoecus* (*A. icterodes*, *Anatoecus* sp.), *Ardeicola* (*A. ciconiae*), *Brueelia* (*B. cruciata*, *B. nebulosa*, *Brueelia* sp.), *Campanulotes* (*C. compar*), *Carduceps* (*C. meinertzhageni*, *C. scalaris*, *C. zonarius*), *Columbicola* (*C. bacillus*, *C. columbae*), *Cuclotogaster* (*C. heterographus*, *C. cinereus*), *Craspedorrhynchus* (*C. fraterculus*, *C. platystomus*), *Degeeriella* (*D. aquilarum*, *D. fulva*, *D. fusca*), *Goniocotes* (*G. gallinae*, *G. pusillus*), *Goniodes* (*G. colchici*, *G. dissimilis*, *G. gigas*, *G. dispar*, *G. astrocephalus*), *Lipeurus* (*L. caponis*), *Luniceps* (*L. drosti*, *L. holophaeus*, *L. incoenis*, *L. actophilus*), *Mulcticola* (*M. hypoleucus*), *Neophilopterus* (*N. incompletes*), *Penenirmus* (*P. rarus*), *Quadriceps* (*Q. anagrapsus*, *Q. obscurus*), *Rhynonirmus* (*R. scolopacis*), *Saemundssonina* (*S. lobaticeps*), *Strigiphilus* (*S. barbatus*, *S. strigis*) and *Sturnidoecus* (*S. sturni*). Among *Amblycera*, *Laemobothriidae*, only 1 species (*L. (Laemobothrion) maximum*) has been detected, while in *Menoponidae*, 35 species belonging to 14 genera have been found, i.e., *Actornithophilus* (*A. pustulosus*, *A. stictus*, *A. totani*, *A. umbrinus*), *Afrimenopon* (*A. waar*), *Austromenopon* (*A. alpinum*, *A. atrofulvum*, *A. durisetosum*, *A. lutescens*, *Austromenopon* sp.), *Ciconiphilus* (*C. quadripustulatus*), *Colpocephalum* (*C. impressum*, *C. milvi*, *C. nanum*, *C. trachelioti*, *C. turbinatum*, *C. zebra*, *Colpocephalum* sp.) *Comatomenopon* (*C. elongatum*), *Dennyus* (*D. (Dennyus) hirundinis*), *Holomenapon* (*H. obscurum*), *Kurodaia* (*K. (Kurodaia) fulvofasciata*), *Menacanthus* (*M. cornutus*, *M. lyali*, *M. pusillus*, *M. stramineus*, *Menacanthus* sp., *M. abdominalis*, *M. camelinus*), *Menopon* (*M. gallinae*), *Myrsidea* (*M. rustica*, *M. cucullaris*), *Piagetiella* (*P. titan*) and *Trinoton* (*T. anserinum*, *T. quereduluae*) have been recorded. Among the mammalian lice (*Anoplura*), the *Pediculidae* family has been represented with 2 subspecies; namely *Pediculus humanus capitis* and *P. humanus humanus* and the *Pthiridae* family with *Pthirus pubis*. From the *Haematopinidae* family, 5 species of *Haematopinus* (*H. asini*, *H. eurysternus*, *H. quadripertusus*, *H. tuberculatus*, *H. suis*), from *Linognathidae* 6 species of *Linognathus* (*L. africanus*, *L. vituli*, *L. ovillus*, *L. pedalis*, *L. setosus*, *L. stenopsis*) and 1 species of *Solenopotes* (*S. capillatus*) are known. From *Microthoraciidae*, 1 species of *Microthoracius* (*M. camelli*) is known. From *Polyplacidae* 3 species of *Haemodipsus* (*H. lyriocephalus*, *H. setoni*, *H. ventricosus*) and 2 of *Polyplax* (*P. serrata*, *P. spinulosa*) are known. The *Ischnoceran* family of *Trichodectidae* is represented with 8 species, i.e., *Bovicola* (*B. (Bovicola) bovis*, *B. (Bovicola) caprae*, *B. (Holakartikos) crassipes*, *B. (Verneckiella) equi*, *B. (Bovicola) limbatus*, *B. (Bovicola) ovis*), *Felicola* (*F. (Felicola) subrostratus*) and *Trichodectes* (*T. canis*). The *Amblyceran* family of *Gyropidae* is presented with 2 species of *Gyropus* (*G. ovalis*) and *Gliricola* (*G. porcelli*). The louse species, which were reported from birds and mammals, are presented in Table 1, Table 2 and Table 3, respectively.

Conflict of Interest

No conflict of interest was declared by the authors.

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