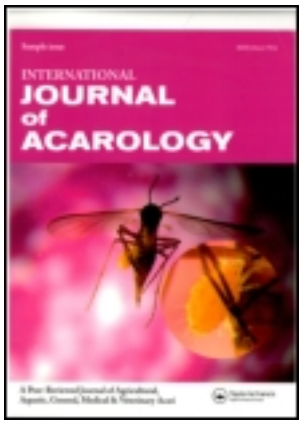

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Mites associated with passerine birds in eastern Iran

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Mites associated with passerine birds in eastern Iran

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This study was carried out to identify mite species infesting passerine birds in eastern Iran. A total of 106 passerine birds from 37 species were captured and examined for mite infestation. Of the 106 birds examined, 35 birds (33.01%) were infested with mites. Fourteen mite species were removed from infested birds and identified as follows: *Leptotrombidium (Ericotrombidium) limpidum* Kudryashova, 1976, *Harpyrhynchoides rubeculinus* Cerny and Sixl, 1971, *Neoschoengastia longitarsalis* Schluger and Belskaj, 1966, *Ptilonyssus pirangae* Cerny, 1969, *Ptilonyssus hirsti* Castro and Pareira, 1947, *Ptilonyssus icteridius* Strandtmann and Furman, 1956, *Proctophyllodes stylifer* Buhholz, 1869, *Proctophyllodes clavatus* Fritsch, 1961, *Proctophyllodes truncatus* Robin, 1877, *Proctophyllodes orientalis* Gaud, 1953, *Dolichodectes edwardsi* Trouessart, 1885, *Strelkoviacarus critesi* Spory 1965, *Dermanyssus brevis* Ewing, 1936 and *Ornithonyssus sylviarum* Canestrini and Fanzago, 1877. In this study *O. sylviarum*, *D. brevis, P. pirangae, P. hirsti, P. icteridius, H. rubeculinus, N. longitarsalis, D. edwardsi, P. stylifer, P. truncates* and *P. clavatus* are new records of these mites for Iran. *Proctophyllodes clavatus* on Common Chiffchaff, *D. edwardsi on* Tree Sparrow and Olivaceous Warbler, *S. critesi* on Common Chiffchaff, House sparrow and Corn Bunting, *P. pirangae* on Common Greenfinch, *H. rubeculinus* on Common Nightingale and *P. icteridius* on Red-headed Bunting were recorded for the first time in the world.

Keywords: nasal mites; passerine birds; Iran; feather mites; Northern Fowl Mite; chiggers

Introduction

At least 2500 species of mites from 40 families are associated with birds (Proctor and Owens 2000). Bird–mite interactions are diverse and although some mites are harmful, others are benign or potentially even beneficial to their avian hosts. Some bird mites dwell in or near the nest and others reside on the body of the host (Proctor and Owens 2000). Species in many families in each of the orders Sarcoptiformes, Mesostigmata and Trombidiformes are associated with birds. The feather mites are a group of avian ectosymbionts belonging to the Sarcoptiformes. This group contains approximately 2500 species in 450 genera and 34–38 families occur throughout the world (Mironov 2012). These mites are mostly saprophagous rather than parasitic. Haematophagous mites of birds belong to the order Mesostigmata and they can impose considerable damage to hosts via reduction of fecundity, virility, haematocrit, growth rate and survival (Burtt et al. 1991; Poiani 1992). They can also transmit viral, rickettsial and protozoan diseases among birds (Proctor and Owens 2000). Some species in the order Trombidiformes that feed on liquefied tissues in their larval stage adversely affect the health of their hosts (Proctor and Owens 2000). Mite infestations of wild birds have been investigated in some countries around the world (Behnke et al. 1995; Bochkov and Literak 2008; Knee et al. 2008; Kolarova and Mitov 2008; Mironov et al. 2012). Iran has a high diversity of birds, approximately 517 species (Scott and Adhami 2006). Despite having a rich avifauna, only a few studies have been conducted on mite infestation in these birds. Rafyi et al. (1966) and Rahbari et al. (2009) studied haematophagous mites in poultry farms and found out that *Dermanyssus gallinae* was the most prevalent blood feeder mite in poultry flocks in Iran. Infestation with *Ornithonyssus bursa* has been reported in breeder flocks in northern Iran (Rahbari et al. 2009). Mites of wild birds in Iran are poorly known: only one study of wild bird nests in Iran has been published (Ardeshir 2010). The aim of this study was to identify mite species infesting wild birds in eastern Iran.

Material and methods

Sampling was performed from March 2011 through January 2012 in eastern Iran. This area is located between 30°21′–38°17′ N latitude and 55°28′– 61°20′ E longitude and is more than 303,513 square kilometres wide (Figure 1).

Birds were caught using mist-nets at 11 different localities of the study area. The captured birds were examined for mites and lice (Moodi et al. 2013). Visual examination and post-mortem-ruffling were used for determining infestation with mites. For live infested birds, the mites were detached by a fine brush and for dead birds mites were removed by immersing the bird in water-detergent solution (1–2% soap) and shaking vigorously. Collected mites were transferred to glasses tubes containing 70% ethanol. The mites were mounted by Hoyer's medium in the lab according to the methodology described by Krantz and Walter (2009).

Figure 1. Bird sampling localities in eastern Iran. Sampling stations are showed by dots.

Identification of mites to the species level (in some individuals) was done by microscopy using the relevant literature. Bird taxonomy follows Dickinson (2003).

Results

A total of 106 passerine birds from 37 species were captured and examined for mites. Of the birds examined, 35 (33.01%) were infested with mites. Fourteen mite species were identified from the infested birds. These mites belonged to three orders and eight families: Sarcoptiformes (Epidermoptidae, Analgidae, Proctophyllodidae), Trombidiformes (Families: Trombiculidae and Harpirhynchidae) and Mesostigmata (Dermanyssidae, Macronyssidae and Rhinonyssidae) (Table 1).

Order **Sarcoptiformes** Reuter, 1909
Family **Epidermoptidae** Trouessart, 1892
Genus ***Promyialges*** Fain, 1965

Promyialges sp.
Host/Locality: Desert Finch *Carduelis obsoleta* (Kashmar).

Family **Analgidae** Trouessart and Mégnin, 1884
Genus ***Strelkoviacarus*** Dubinin, 1953

S. critesi Spory, 1965
Hosts/Localities: Common Chiffchaff *Phylloscopus collybita* (Ghaen), House Sparrow *Passer domesticus* (Ghaen) and Corn Bunting *Emberiza calandra* (Kashmar).

Family **Proctophyllodidae** Mégnin and Trouessart, 1884
Genus ***Dolichodectes*** Park and Atyeo, 1971

D. edwardsi Trouessart, 1885
Hosts/Localities: Tree Sparrow *P. montanus* (Tandoureh National Park) and Olivaceous Warbler *Iduna pallida* (Sarakhs).

Genus ***Proctophyllodes*** Robin, 1868

P. orientalis Gaud, 1953
Host/Locality: *P. montanus* (Mashhad).
P. troncatus Robin, 1877
Host/Locality: *P. domesticus* (Shirvan).
P. stylifer Buchholz, 1869
Host/Locality: Great Tit *Parus major* (Kardeh).
P. clavatus Fritsch, 1961
Host/Locality: *P. collybita* (Tandoureh National Park).

Order **Mesostigmata** Canestrini, 1891
Family **Dermanyssidae** Kolenati, 1859
Genus ***Dermanyssus*** Dugès, 1834

D. brevis Ewing, 1936
Host/Locality: Crested Lark *Galerida cristata* (Ghaen).

Family Macronyssidae Oudemans, 1936
Genus ***Ornithonyssus*** Sambon, 1928

O. sylviarum Canestrini and Fanzago, 1877
Host/Locality: Mourning Wheatear *Oenanthe lugens* (Tandoureh National Park).

Table 1. Inventory of examined birds and their associated mites in eastern Iran.

Host family	Host species	N	N_i	Mite species	Mites family
Emberizidae	*Emberiza bruniceps*	3	1	*Ptilonyssus icteridius* *■	Rhinonyssidae
	E. calandra	3	2	*Strelkoviacarus critesi* ■	Analgidae
				Neoschoengastia longitarsalis	Trombiculidae
Fringillidae	*Carduelis cannabina*	2	0	–	–
	C. chloris	2	1	*Ptilonyssus pirangae* *■	Rhinonyssidae
	C. obsoleta	2	2	*Promyialges* sp.	Epidermoptidae
				Ptilonyssus sp.	Rhinonyssidae
	Fringilla coelebs	3	0	–	–
Passeridae	*Passer domesticus*	8	6	*Strelkoviacarus critesi* ■	Analgidae
				*Proctophyllodes troncatus**	Proctophyllodidae
				Ptilonyssus hirsti *	Rhinonyssidae
	Passer montanus	9	5	*Dolichodectes edwardsi* ■	Proctophyllodidae
				Proctophyllodes orientalis	Proctophyllodidae
				Analges sp.	Analgidae
				Neoschoengastia longitarsalis	Trombiculidae
				Ptilonyssus hirsti	Rhinonyssidae
	Petronia petronia	2	0	–	–
	P. xanthocollis	1	0	–	–
	P. brachydactyla	1	0	–	–
Muscicapidae	*Ficedula parva*	4	0	–	–
	F. striata	3	0	–	–
Turdidae	*Turdus merula*	4	0	–	–
	Luscinia megarhynchos	2	1	*Leptotrombidium limpidum*	Trombiculidae
				Harpyrhynchoides rubeculinus *■	Harpirhynchidae
	Saxicolatorquata	2	0	–	–
	Oenanthelugens	2	1	*Ornithonyssus sylviarum* ■	Macronyssidae
	O. alboniger	2	0	–	–
	O. pleschanka	2	2	*Neoschoengastis longitarsalis* *	Trombiculidae
				Leptotrombidium limpidum	Trombiculidae
	O. picata	2	0	–	–
Sturnidae	*Sturnus vulgaris*	1	0	–	–
	AcridotheresTristis	1	0	–	–
Sittidae	*Sitta neumayer*	1	1	*Leptotrombidium limpidum*	Trombiculidae
Sylviidae	*Hippolais caligata*	3	0	–	–
	Iduna pallida	7	3	*Dolichodectes edwardsi* *■	Proctophyllodidae
	Acrocephalus stentoreus	1	0	–	–
	A. agricola	1	0	–	–
	phylloscopus collybita	11	6	*Proctophyllodes clavatus**■	Proctophyllodidae
				Strelkoviacarus critesi ■	Analgidae
				Neoschoengastia longitarsalis	Trombiculidae
	P. nitidus	2	0	–	–
	Sylvia mystacea	2	0	–	–
	S. communis	1	0	–	–
	Scotocerca inquieta	1	0	–	–
Alaudidae	*Galerida cristata*	2	1	*Dermanyssus brevis**■	Dermanyssidae
	Calandrella rufescens	2	1	*Leptotrombidium limpidum*	Trombiculidae
				Neoschoengastia longitarsalis	Trombiculidae
Paridae	*Parus major*	9	2	*Proctophyllodes stylifer**	Proctophyllodidae
	P. bokharensis	1	0	–	–
Corvidae	*Corvuscorone*	1	0	–	–

Note: N: Number of examined birds; N_i: Number of infested birds; *New record of mite for Iran; ■New host record for the world.

Family Rhinonyssidae Trouessart, 1895
Genus ***Ptilonyssus*** Berlese and Trouessart, 1889

P. pirangae Cerny, 1969
Host/Locality: Common Greenfinch *C. chloris* (Shirvan).
P. hirsti Castro and Periera, 1947
Hosts/Localities: *P. montanus* (Kalat Nader) and *P. domesticus* (Bojnord).
P. icteridius Strandtmann and Furman, 1956
Host/Locality: Red-headed Bunting *E. bruniceps* (Tandoureh National Park).
Ptilonyssus sp.
Host/Locality: *C. obsoleta* (Kashmar and Ghaen)

Order Trombidiformes Reuter, 1909
Family Trombiculidae Ewing, 1929
Genus ***Neoschoengastia*** Ewing, 1929
N. longitarsalis Schluger, 1966

Hosts/Localities: Pied Wheatear *O. pleschanka* (Kalat Nader and Tandoureh National Park), *P. collybita* (Shirvan, Ghaen and Tandoureh National Park), *P. montanus* (Sarakhs), Lesser Short-toed Lark *Calandrella rufescens* (Tandoureh National Park and Kashmar) and *E. calandra* (Kashmar).

Genus **Leptotrombidium** (*Ericotrombidium*) Vercammen, 1966

E. limpidum Kudryashova, 1976
Hosts/Localities: Common Nightingale *Luscinia megarhynchos* (Mashhad), *O. pleschanka* (Tandoureh National Park), *C. rufescens* (Kashmar and Tandoureh National Park) and Western Rock Nuthatch *Sitta neumayer* (Kashmar).

Family Harpirhynchidae Dubinin, 1957
Genus ***Harpyrhynchoides*** Fain, 1972

H. rubeculinus Cerny and Sixl, 1971
Host/Locality: *L. megarhynchos* (Kashmar).

Discussion

The study on ectoparasitic arthropods of wild birds has been relatively neglected In Iran. Therefore, this targeted research was performed on 106 individuals from the order Passeriformes and they were inspected for mite infestation. Our results showed that 33% of examined wild birds were infested with mites. In this study, feather mites (47%), haematophagous mites (12%), nasal mites (23%) and chigger mites (18%) were removed from infested birds and identified.

Feather mite species are specialized to a certain area of plumage of a specific avian group (Kolarova and Mitov 2008). Feather mites occur on domestic fowls and wild birds, but they are rarely considered to be of economic importance. Most of them feed on desquamated skin scales, feathers and oily secretions of the host feathers (Proctor 2003). It is noteworthy that some members of the family Epidermoptidae have parasitic features and may cause mange or pityriasis in their hosts (Krantz 1978). We found six species and three genera within three families of feather mites. Most of these species belonged to the family Proctophyllodidae and genus *Proctophyllodes*. The feather mite *Proctophyllodes* is a species-rich genus and includes about 155 species. Mites of this genus are predominantly found on birds of the order Passeriformes (Mironov et al. 2012). *Proctophyllodes stylifer* has been reported on Great Tit *Parus major*, Winter Wren *Troglodytes troglodytes* and Blue Tit *P. caeruleus* (Behnke et al. 1995; Kolarova and Mitov 2008). In this study, *P. stylifer* was found on *P. major*. *Proctophyllodes clavatus* has been found on Sardinian Warbler *Sylvia melanocephala* in Portugal (Behnke et al. 1995) and it also was identified on Sedge Warbler *Acrocephalus schoenobaenus*, Barred Warbler *Phylloscopus pulcher*, Savi's Warbler *Locustella luscinioides*, Common Whitethroat *S. communis*, Lesser Whitethroat S. althaea and Garden Warbler *S. borin* in Bulgaria (Kolarova and Mitov 2008). Common Chiffchaff *Phylloscopus collybita* is recorded as the new host of *P. clavatus* in this study. Atyeo and Braasch (1966) found *P. orientalis* on Tree Sparrow *Passer montanus* in Vietnam and House Sparrow *P. domesticus* in La Reunion, Indian Ocean. In this survey, it was collected from *P. montanus*. *Proctophyllodes troncatus* was found on *P. domesticus* and this finding is in accordance with the findings of Behnke et al. (1995) and Kolarova and Mitov (2008). Great Reed Warbler *A. arundinaceus* and Sedge Warbler *A. schoenobaenus* have been reported as the hosts of *D. edwardsi* in Bulgaria (Kolarova and Mitov 2008). In this study, *D. edwardsi* was recorded on *P. montanus* and Olivaceous Warbler *Iduna pallida* as its new hosts. *Strelkoviacarus critesi* was another feather mite species that was recovered from *P. collybita*, *P. domesticus* and Corn Bunting *Emberiza calandra*. This species has been found on Red-Winged Black birds *Agelaius phoeniceus* (Spory 1965). To our knowledge this species was recorded on three mentioned hosts in this study for the first time.

Larval stages of trombiculid mites parasitize terrestrial vertebrates. The first faunistic study on trombiculid mites in Iran was conducted from 1966 to 1967 (Vercammen-Grandjean et al. 1970). They collected 83 species of chigger mites from mammals, 11 bird species and reptiles and recorded 19 new species belonging to 10 genera. We found *Leptotrombidium (Ericotrombidium) limpidum* on Common Nightingale *Luscinia megarhynchos*, Pied Wheatear *Oenanthe pleschanka*, Lesser Short-toed Lark *Calandrella rufescens* and Western Rock Nuthatch. This species has been reported from Iran in 1976 (Kudryashova 1976). We also identified *Neoschoengastia longitarsalis* on *O. pleschanka*, *P. collybita*, *P. montanus*, *C. rufescens* and *E. calandra*. *Neoschoengastia longitarsalis* has been found on birds in Turkmenistan and it also reported from Russia (Shluger 1966; Kudryashova 1998). There is no previous record of this species in Iran. The skin mite *Harpyrhynchoides rubeculinus* (Harpirhynchidae) was collected from *L. megarhynchos* in the current study. Bochkov and Literak (2008) and Bochkov and OConnor (2013) have reported this species from European Robin *Erithacus rubecula* in Czech Republic and Olive-backed Thrush *Catharus ustulatus*in North America, respectively. In this study *H. rubeculinus* was identified for the first time in Iran.

Rhinonyssid mites feed on blood and occupy the anterior portion of the nasal cavity, usually in very small numbers (Philips 2000). Of this family we found the genus *Ptilonyssus* that according to Philips (2000) occurs on many types of birds. Because rhinonyssids were not found by visual inspection method of live hosts, therefore, these mites were removed from dead birds when they immersed in water-detergent solution. Knee et al. (2008) recovered *P. hirsti* from *P. domesticus* in Canada. There is no previous record of this family of nasal mites in Iran and

therefore, our reports of *P. pirangae* on Common Greenfinch *Carduelis chloris*, *P. hirsti* on *P. domesticus* and *P. montanus* and *P. icteridius* on Red-headed Bunting are new records for Iran and *C. chloris* and Red-headed Bunting are new host records for the world.

Ornithonyssus sylviarum and *Dermanyssus brevis* were two haematophagous mites that we found on the birds we studied. Hill et al. (1967) have identified *O. sylviarum* on Whitethroat and Linnet in United Kingdom. Shayan and Rafinejad (2006) reported *O. sylviarum* on rodents in Iran. Rahbari et al. (2009) found *O. bursa* and *D. gallinae* in poultry farms but there is no any report of occurrence of *O. sylviarum* and *D. brevis* on birds in Iran. Therefore, the two haematophagous species identified in this study were reported from birds for the first time in Iran.

There were a number of mite specimens that we were not able to identify down to the species level mainly due to our lacking identification keys.

In conclusion, here we report some mite species infesting wild birds for the first time in Iran. We also record some passerine bird species as new hosts of some mite species in the world. As Iran has a relatively high avian diversity, further survey work in this country might provide many other new records of mite fauna for the Middle East.

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