

Review article

Nematodes of birds of Armenia

Sergey O. MOVSESYAN^{1,2}, Egor A. VLASOV³, Manya A. NIKOGHOSIAN²,
Rosa A. PETROSIAN², Mamikon G. GHASABYAN^{2,4},
Dmitry N. KUZNETSOV^{1,5}

¹Centre of Parasitology, A.N. Severtsov Institute of Ecology and Evolution RAS, Leninsky pr., 33, Moscow 119071, Russia

²Institute of Zoology, Scientific Center of Zoology and Hydroecology NAS RA, P. Sevak 7, Yerevan 0014, Armenia

³V.V. Alekhin Central-Chernozem State Nature Biosphere Reserve, Zapovednyi, Kursk district, Kursk region, 305528, Russia

⁴Armenian Society for the Protection of Birds (ASPB), G. Njdeh, 27/2, apt.10, Yerevan 0026, Armenia

⁵All-Russian Scientific Research Institute of Fundamental and Applied Parasitology of Animals and Plants - a branch of the Federal State Budget Scientific Institution "Federal Scientific Centre VIEV", Bolshaya Cheremushkinskaya str., 28, Moscow 117218, Russia

Corresponding Author: Dmitry N. KUZNETSOV; e-mail: dkuznetsov@mail.ru

ABSTRACT. The review provides data on species composition of nematodes in 50 species of birds from Armenia (South of Lesser Caucasus). Most of the studied birds belong to Passeriformes and Charadriiformes orders. One of the studied species of birds (*Larus armenicus*) is an endemic. The taxonomy and host-specificity of nematodes reported in original papers are discussed with a regard to current knowledge about this point. In total, 52 nematode species parasitizing birds in Armenia are reported. Most of the reported species of nematodes are quite common in birds outside of Armenia. One species (*Desmidocercella incognita* from great cormorant) was first identified in Armenia. Great snipe was recorded as a new host for *Hystrichis tricolor*. Zoonotic nematode *Trichinella pseudospiralis* was reported in Armenia from Eurasian blackbird.

Keywords: Armenia, Lesser Caucasus, birds, parasitic nematodes

Introduction

The fauna of birds in Armenia (south of the Lesser Caucasus) is featured by a big diversity. In total, more than three hundred species of birds are registered on this quite small area [1]. The study of nematodes parasitizing birds in Armenia have been started in the 1920s [2–4] and resulted in a significant number of papers. However, the vast majority of them have never been published in international scientific literature.

The aim of the present review is to summarize the data concerning the fauna of nematodes of birds in Armenia in the light of contemporary concepts of their taxonomy and distribution.

Species composition of nematodes parasitizing birds from Armenia

Data on the species composition of nematodes recorded for birds in Armenia are presented in Table 1. Systematic position of birds, their English and Latin names are given according to digital checklist of the birds of the world [5]. The taxonomic affiliation of the detected nematodes is discussed below.

In total, there were studied 50 species of birds from 13 orders: Galliformes (5 species), Anseriformes (3 species), Podicipediformes (3 species), Columbiformes (2 species), Pteroclitiformes (1 species), Caprimulgiformes (1 species), Gruiformes (1 species), Pelecaniformes (4 species), Suliformes (1 species), Charadriiformes (9 species), Accipi-

triformes (3 species), Coraciiformes (1 species) and Passeriformes (16 species). Passeriformes, worldwide, is the most numerous order of birds, which explains the biggest number of the studied species in Armenia. A significant amount of the reviewed studies were conducted nearby the largest body of water in the Caucasus (Lake Sevan), which explains a large amount of data concerning birds from Charadriiformes. One of the species from this order (*Larus armenicus*) is an endemic species. The studies detected 52 species of nematodes, seven of which belong to class Enoplea, and 45 belong to Chromadorea. We have redefined some of these species based on their original descriptions and current knowledge concerning their taxonomy and host-specificity. The classes, orders and families of nematodes are presented according to De Ley and Blaxter [6], and Schmidt-Raesa [7]. Enoplea is presented in birds of Armenia by the orders Trichinellida (families Trichinellidae and Capillariidae) and Dioctophymatida (family Dioctophymatidae). *Trichinella pseudospiralis*, which is potentially dangerous for human [8], was found in Eurasian blackbird [9]. As *T. pseudospiralis* is more typical for carnivorous birds [10], the finding of this parasite in Eurasian blackbird seems to be unusual. However, Asatrian [9] provided measurements of the *T. pseudospiralis* larvae found in Eurasian blackbird, so we have no doubt that this detection is correct. Since there are few studies concerning *T. pseudospiralis* in avian hosts, we believe that this finding [9] worth an attention. As concerning Capillariidae taxonomy, we are following to Moravec [11] and therefore this family is presented with three genera (*Aonchotheca*, *Eucoleus* and *Capillaria*). The family Dioctophymatidae is presented with *Hystrichis tricolor*, a common parasite of birds associated with water [7]. *H. tricolor* was reported in Armenia from the great snipe, and this is the first known record of this parasite from this host [12].

Chromadorea is presented by order Rhabditida with 15 families: Syngamidae (1 species), Amidostomidae (4 species), Ornithostrongylidae (1 species), Subuluridae (2 identified species), Acuariae (14 species), Aprocidae (2 species), Desmidocercidae (1 species), Diplotrienidae (5 species), Heterakidae (2 species), Ascaridiidae (2 species), Heteroxynematidae (1 species), Anisakidae (2 species), Ascarididae (4 species), Habronematidae (3 species) and Physalopteridae (1 species). The following species from the genus *Amidosto-*

mum (family Amidostomidae) were found in Armenia: *A. anseris* from greylag goose, *A. chevreuxi* from tree pipit and *A. fulicae* from Eurasian coot. It is worth mentioning that tree pipit is not a typical host for *A. chevreuxi*, and previously this nematode was reported in black-winged stilt [13]. We believe that nematodes from common coot classified as *A. anseris* in fact belong to *A. fulicae*, which is a specific parasite of this bird in Holarctic [13]. Besides that, we have reclassified *Epomidiostomum orispinum* from white-winged tern to *Epomidiostomum* sp. since the original description based on immature forms [14] does not allow to surely attribute them to any species of this genus and, moreover, this host is unusual for this species. As concerning Subuluridae, we believe that there are two confidently identified species of this family (*Subulura brumpti* and *S. skrjabini*) in Armenia. The records on *S. suctoria* for some birds from Armenia [15–18] we consider as erroneous since this species is known as a parasite of Caprimulgi-formes in South America [19]. *S. coturnicis*, reported for chukar [15–17], we listed as *S. skrjabini*, in agreement with Barus and Sonin [20]. The record of *S. leprincei* from common quail and chukar in Armenia was questioned [21], and this nematode is known as a typical parasite of European nightjar [19]. We agree that these records [15–17] are erroneous identifications. On the other hand, *S. suctoria* was reported from European nightjar in Armenia [16]. We consider this detection as erroneous by the reasons described above and believe that this could be either *S. leprincei* or *S. subulata*, which recorded as parasites of European nightjar in Europe [19]. It worth to mention, that Barus et al. [19] listed *S. leprincei* in fauna of Armenia, however we consider this as insufficiently substantiated, since in the cited publications [15,16] this nematode reported from atypical hosts (*C. coturnix* and *A. chukar*). The record of *S. allodapa* from chukar is considered to be wrong [19] since this species is a specialized parasite of red-legged seriema (*Cariama cristata*) from Brazil. Based on morphological features, Barus et al. [19] supposed that *S. allodapa* recorded from chukar in Armenia could be either *S. brumpti* or *S. differens*.

Fourteen species from 10 genera (*Acuaria*, *Chevreuxia*, *Cheilospirura*, *Cosmocephalus*, *Dispharynx*, *Echinuria*, *Paracuaria*, *Rusguniella*, *Streptocara* and *Syncuaria*) from the family Acuariae were left in the list after our revision. The genus *Acuaria* is presented with two species: *A. anthuris*

and *A. rotundata*. We considered *A. ornata* as a junior synonym of *A. anthuris* following Mutafchiev et al. [22]. Interestingly, that the finding of *A. rotundata* [16] is just the second report of this species since its description by Linstow et al. [23]. Other species referred to the genus *Acuaria* in original papers [15–17] we are ranking to the genus *Cheilospirura* in agreement with Schmidt-Raesa [7], Sonin and Barus [21], Smogorzhevskaya [24]. The genus *Skrjabinocara* was recognized as a junior synonym of *Syncuaria* [25], therefore we noted *Skrjabinocara squamata* from great cormorant [15,17] as *Syncuaria squamata*. The only one species from the genus *Dispharynx* (*D. nasuta*) was found in Armenia (in common starling) [15]. This nematode was reported also as *Acuaria* (*Dispharynx*) *spiralis* [4,17], but we listed it as *D. nasuta* in agreement with Skrjabin et al. [26]. *Cosmocephalus aduncus* found in Armenian gull was transferred to the genus *Paracuaria* by Anderson and Wong [27]. In addition, the name *Rusguniella transcaucasica* was listed as one of the synonyms in re-description of this species [28]. *Rusguniella wedli* reported from black-necked grebe was synonymized with *Rusguniella elongata* [24]. *Streptocara crassicauda*, a well-known parasite of Anatidae, was reported in Armenia from gadwall and great crested grebe [15,17]. But, usually *Streptocara recta* was recorded as a parasite of crested grebe [24], thus we presume that additional studies would be useful to precise what species of *Streptocara* parasitizing grebes in Armenia. There is also one species from Acuariidae that possibly have been found in Armenia. The original paper on Acuariidae of starlings from Don, Armenia and Turkestan [4] does not specify clearly the host and spot of finding for *Syncuaria sturni*. Thus, *S. sturni* could be described from either common starling or rosy starling and from one of the areas in the paper title [4]. It is worth mentioning that Wong et al. [25] consider *S. sturni* as a *species inquirenda*.

As concerning Desmidocercidae, the species from this family (*Desmidocercella incognita*) has been first described from the territory of Armenia (in great cormorant) [29]. Five of the identified and one unidentified species from the family Diplotriaeidae (all from the genus *Diplotriaeana*) were found. It is worth to mention that Sonin [30] considered reports of *Diplotriaeana ozouxi* from thrushes as dubious, so the finding of this nematode in rufous-tailed rock-thrush [17] could be erroneous.

Two species from the Ascaridiidae (*Ascaridia galli* and *A. compar*) were found in birds in Armenia. *A. alectoris*, also reported from Armenia [15–18], now treated as a junior synonym of *A. galli* [21]. *A. ketzkhoveli*, reported from Caucasian grouse [16,17], was recognized as a junior synonym of *A. compar* [21]. In the family Anisakidae we listed two species from the genus *Contracaecum* (*C. microcephalum* and *C. rudolphii*). And we are treating the last one as “sensu lato” since some cryptic species have been found within “*C. rudolphii*” [31]. *C. spiculigerum* reported from great crested grebe [17] was recognized as a junior synonym of *C. microcephalum* [31]. *C. spiculigerum* from great cormorant [15] is treated as incorrect identification of *C. rudolphii* [31]. However, since a few other species of *Contracaecum* were found in grebes [32], we presume that additional studies concerning the identity of *Contracaecum* spp. in grebes from Armenia would be useful. Three species from Habronematidae (*Cyrnea eurycerca*, *Procyrnea leptoptera* and *Viguiera euryoptera*) were reported from Armenia [15–17]. We took into account the taxonomic revisions of *Cyrnea* and *Procyrnea* proposed by Skrjabin and Sobolev [33], and Chabaud [34]. As concerning Physalopteridae, we listed *Physaloptera alata* (for Eurasian sparrowhawk) and *Physaloptera* sp. for Eurasian buzzard and tree pipit. For the last one host we reassigned *Physaloptera* sp. from recorded *Ph. alata*, because tree pipit is an unusual host for *Ph. alata* and there is no data on morphology of the detected nematode in the report [15].

In conclusions, the studies of nematodes parasitizing birds in Armenia showed rather high species diversity. In total, 52 nematode species have been found in birds from Armenia. However, host-specificity and taxonomical position of some of the reported nematodes require additional studies and clarification. Zoonotic nematode *T. pseudospiralis* has been found in Eurasian blackbird, which is unusual host for this parasite. One species (*D. incognita* from great cormorant) has been first described in Armenia. *H. tricolor* has been registered in a new host (great snipe). Most of the reviewed species of nematodes are quite common in birds outside of Armenia.

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Table 1. Species composition of nematodes parasitizing in birds of Armenia

Host species	Species of nematodes	Location	References
Common quail <i>Coturnix coturnix</i> (L., 1758)	<i>Cyrnea eurycerca</i> Scurat, 1914 (recorded in original paper as <i>Seurocyrnea eurycerca</i>)	P	[15-17]
	<i>Heterakis gallinarum</i> (Schrank, 1788) Madsen, 1949	C	[15-18]
	<i>Ascaridia galli</i> (Schrank, 1788) Freeborn, 1923	SI	[15-18]
	<i>Subulura brumpti</i> (Lopez-Neyra, 1922) Cram, 1926	C	[15-17]
	<i>Subulura</i> sp. (recorded as <i>Subulura leprincei</i>)	C	[16,17]
Chukar <i>Alectoris chukar</i> (Gray, 1830) (recorded in original paper as <i>A. graeca</i>)	<i>Aonchotheca caudinflata</i> (Molin, 1858) Moravec, 1982 (recorded as <i>Capillaria caudinflata</i>)	SI	[15-17]
	<i>Cheilospirura gruveli</i> (Gendre, 1913) Cram, 1927 (recorded as <i>Acuaria gruveli</i> and also as <i>A. rotundata</i> , <i>A. spinosa</i> , <i>A.</i> <i>coturnicola</i>)	UCG	[15-17]
	<i>Ch. hamulosa</i> (Diesing, 1851) Diesing, 1861	UCG	[15-17]
	<i>H. gallinarum</i>	C	[16,18]
	<i>Ascaridia compar</i> (Schrank, 1790) Travassos, 1913	SI	[16-18]
	<i>A. galli</i> (recorded as <i>A. alectoris</i>)	SI	[16,17]
	<i>S. brumpti</i>	C	[15,16]
	<i>Subulura skrjabini</i> (Semenov, 1926) (recorded as <i>S. coturnicis</i>)	C	[15,17,18]
	<i>Subulura</i> spp. (recorded as <i>S. suctoria</i> , <i>S. leprincei</i> , <i>S. allodapa</i>)	C	[15-17]
Chicken <i>Gallus gallus</i> f. <i>domestica</i> L., 1758	<i>A. caudinflata</i> (recorded as <i>Capillaria caudinflata</i>)	SI	[18]
	<i>H. gallinarum</i>	C	[16,18]
	<i>A. galli</i> (recorded also as <i>A. alectoris</i>)	O, P, G, SI, C	[16,18]
	<i>A. compar</i>	SI	[18]
	<i>S. brumpti</i>	–	[16]
	<i>Subulura</i> sp. (recorded as <i>S. suctoria</i>)	C	[16,18]
	<i>Syngamus trachea</i> (Montagu, 1811) Chapin, 1925	T, B	[18]
Turkey <i>Meleagris gallopavo</i> L., 1758	<i>H. gallinarum</i>	C	[18]
Caucasian grouse <i>Lyrurus mlokosiewiczi</i> (Taczanowski, 1875)	<i>A. caudinflata</i> (recorded as <i>Capillaria caudinflata</i>)	SI	[15-17]
	<i>H. gallinarum</i>	C	[16,17]
	<i>A. compar</i> (recorded as <i>A. ketzkhoveli</i>)	SI	[16,17]
	<i>A. galli</i> (recorded as <i>A. alectoris</i>)	SI	[15-18]
Greylag goose <i>Anser anser</i> (L., 1758)	<i>Heterakis dispar</i> (Schrank, 1790) Dujardin, 1845 (recorded as <i>Ganguleterakis dispar</i>)	–	[15,17,18]
	<i>Amidostomum anseris</i> (Zeder, 1800) Railliet et Henry, 1909	–	[15,18]
Gadwall <i>Mareca strepera</i> (L., 1758) (recorded as <i>Anas strepera</i>)	<i>Echinuria uncinata</i> (Rudolphi, 1819) Soloviev, 1912	–	[15,17]
	<i>Streptocara crassicauda</i> (Creplin, 1829) Railliet, Henry et Sisoff, 1912	–	[15,17]

Table 1. Species composition of nematodes parasitizing in birds of Armenia

Host species	Species of nematodes	Location	References
Mallard <i>Anas platyrhynchos</i> L., 1758	<i>Hystrichis tricolor</i> Dujardin, 1845	P	[18]
Red-necked grebe <i>Podiceps grisegena</i> Boddaert, 1783	<i>Contraecaecum rudolphii</i> Hartwich, 1964 (s.l.)	–	[14]
Great crested grebe <i>P. cristatus</i> (L., 1758)	<i>S. crassicauda</i>	–	[15]
	<i>Contraecaecum microcephalum</i> (Rudolphi, 1819) Baylis, 1920 (recorded as <i>C. spiculigerum</i>)	G, SI	[17]
Black-necked grebe <i>P. nigricollis</i> Brehm, 1831 (recorded also as <i>P. caspicus</i>)	<i>Rusguniella elongata</i> (Rudolphi, 1819) Seurat, 1919 (recorded as <i>R. wedli</i>)	–	[14]
	<i>C. microcephalum</i> (recorded also as <i>C. spiculigerum</i>)	–	[15]
Common pigeon <i>Columba livia</i> Gmelin, 1789	<i>S. trachea</i>	–	[15,17]
European turtle-dove <i>Streptopelia turtur</i> (L., 1758)	<i>H. gallinarum</i>	–	[15–17]
	<i>Ornithostrongylus quadriradiatus</i> (Stevenson, 1904) Travassos, 1914	–	[15,17]
Black-bellied sandgrouse <i>Pterocles orientalis</i> (L., 1758)	<i>Syphaciella capensis</i> Moennig, 1924	–	[15,17]
European nightjar <i>Caprimulgus europaeus</i> L., 1758	<i>Subulura</i> sp. (recorded as <i>S. suctoria</i>)	C	[16]
Common coot <i>Fulica atra</i> L., 1758	<i>Amidostomum fulicae</i> (Rudolphi, 1819) Seurat, 1918 (recorded as <i>A. anseris</i>)	UCG	[14,15,17]
Squacco heron <i>Ardeola ralloides</i> (Scopoli, 1769)	<i>C. microcephalum</i>	–	[14,17]
	<i>Porrocaecum ardeae</i> (Froelich, 1802) Baylis, 1936	–	[14]
Grey heron <i>Ardea cinerea</i> L., 1758	<i>C. microcephalum</i>	–	[14]
Purple heron <i>A. purpurea</i> L., 1766	<i>C. microcephalum</i>	–	[14]
Great white pelican <i>Pelecanus onocrotalus</i> L., 1758	<i>C. rudolphii</i> (s.l.)	–	[14]
Great cormorant <i>Phalacrocorax carbo</i> (L., 1758)	<i>Syncuaria squamata</i> (Linstow, 1883) Wong, Anderson et Bartlett, 1986 (recorded as <i>Skrjabinocara squamata</i>)	–	[15,17]
	<i>Desmidocercella incognita</i> Ssolonitzin, 1932	–	[17,29]
	<i>C. rudolphii</i> (s.l.) (recorded also as <i>C. spiculigerum</i>)	–	[15]
Black-winged stilt <i>Himantopus himantopus</i> L., 1758	<i>Chevreuxia revoluta</i> (Rudolphi, 1819) Seurat, 1918	–	[14,17]
Kentish plover <i>Charadrius alexandrinus</i> L., 1758	<i>Aprocta turgida</i> Stossich, 1902	–	[15,17]
Northern lapwing <i>Vanellus vanellus</i> (L., 1758)	<i>Eucoleus vanelli</i> (Rud., 1819) Lopez-Neyra, 1947 (recorded as <i>Thominx vanelli</i>)	–	[14,17]
	<i>E. contortus</i> (Creplin, 1839) Gagarin, 1951 (recorded as <i>Thominx contorta</i>)	–	[14]
	<i>Ch. revoluta</i>	–	[15,17]
Sociable lapwing <i>V. gregarius</i> (Pallas, 1771)	<i>Porrocaecum ensicaudatum</i> (Zeder, 1800) Baylis, 1920	–	[15]
Great snipe <i>Gallinago media</i> (Latham, 1787) (recorded as <i>Capella media</i>)	<i>H. tricolor</i>	–	[12,15,18]

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Host species	Species of nematodes	Location	References
Common snipe <i>G. gallinago</i> (L., 1758) (recorded as <i>Capella gallinago</i>)	<i>Cosmocephalus capellae</i> Yamaguti, 1935	–	[15]
Common sandpiper <i>Actitis hypoleucos</i> L., 1758	<i>Porrocaecum semiters</i> (Zeder, 1800) Baylis, 1920	–	[14]
Armenian gull <i>Larus armenicus</i> Buturlin, 1934 (recorded as <i>Larus argentatus armenicus</i> and <i>L. argentatus</i>)	<i>Eucoleus laricola</i> Wassilkowa, 1930	–	[15,17]
	<i>Cosmocephalus obvelatus</i> (Creplin, 1825) Seurat, 1919	–	[15,17]
	<i>Paracuaria adunca</i> (Creplin, 1846) Anderson et Wong, 1981 (recorded as <i>Cosmocephalus aduncus</i> and <i>Rusguniella transcaucasica</i>)	–	[15,17]
White-winged tern <i>Chlidonias leucopterus</i> (Temminck, 1815)	<i>Epomidiostomum</i> sp. (recorded as <i>E. orispinum</i>)	SI	[14]
Western marsh-harrier <i>Circus aeruginosus</i> (L., 1758)	<i>Procyrnea leptoptera</i> (Rudolphi, 1819) Chabaud, 1958 (recorded as <i>Habronema leptoptera</i>)	–	[15,17]
	<i>Porrocaecum depressum</i> (Zeder, 1800) Baylis, 1920	–	[15,17]
Eurasian sparrowhawk <i>Accipiter nisus</i> (L., 1758)	<i>Physaloptera alata</i> Rudolphi, 1819	–	[17]
Eurasian buzzard <i>Buteo buteo</i> (L., 1758)	<i>Physaloptera</i> sp.	–	[17]
European roller <i>Coracias garrulus</i> L., 1758	<i>Squamofilaria coraciae</i> (Gmelin, 1790) Dollfuss, 1962 (recorded as <i>S. coronata</i>)	–	[2,3]
Red-backed shrike <i>Lanius collurio</i> L., 1758	<i>Acuaria rotundata</i> (Linstow, 1907) Railliet, Henry et Sisoff, 1912	–	[16]
Lesser grey shrike <i>L. minor</i> Gmelin, 1788	<i>Viguiera euryoptera</i> (Rudolphi, 1819) Seurat, 1913	–	[17]
Eurasian jackdaw <i>Corvus monedula</i> L., 1758	<i>Acuaria anthuris</i> (Rudolphi, 1819)	–	[17]
Rook <i>C. frugilegus</i> L., 1758	<i>A. anthuris</i>	–	[15,17]
	<i>Diplotriaena tricuspsis</i> (Fedtschenko, 1874) Henry et Ozoux, 1909	–	[17]
	<i>S. trachea</i>	–	[17]
Carrion crow <i>C. corone</i> L., 1758	<i>E. contortus</i> (recorded as <i>Thominx contorta</i>)	–	[15,17]
	<i>A. anthuris</i>	–	[17]
Great reed-warbler <i>Acrocephalus arundinaceus</i> (L., 1758)	<i>Diplotriaena</i> sp.	–	[17]
White-throated dipper <i>Cinclus cinclus</i> (L., 1758)	<i>A. rotundata</i>	–	[16]
Common starling <i>Sturnus vulgaris</i> L., 1758 (recorded also as <i>S. caucasicus</i>)	<i>P. ensicaudatum</i>	–	[15,17]
	<i>P. semiteres</i>	–	[15,17]
	<i>Dispharynx nasuta</i> (Rudolphi, 1819) Railliet, Henry et Sisoff, 1912 (recorded also as <i>Acuaria (Dispharynx) spiralis</i>)	–	[4,15,17]
	<i>Diplotriaena obtusa</i> (Rudolphi, 1802) Henry et Ozoux, 1909	–	[15,17]
	<i>A. anthuris</i> (recorded also as <i>A. ornata</i>)	–	[4,17]
Rosy starling <i>Pastor roseus</i> (L., 1758) (recorded as <i>Sturnus roseus</i>)	<i>Capillaria tridens</i> (Dujardin, 1845) Travassos, 1915 (recorded as <i>Thominx tridens</i>)	–	[17]

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Host species	Species of nematodes	Location	References
Eurasian blackbird <i>Turdus merula</i> L., 1758	<i>Trichinella pseudospiralis</i> Garkavi, 1972	M	[9]
	<i>P. semiteres</i>	–	[17]
Rufous-tailed rock-thrush <i>Monticola saxatilis</i> (L., 1766)	<i>Diplotrriaena pungens</i> (Schneider, 1866) Henry et Ozoux, 1909	–	[17]
	<i>D. ozouxi</i> (Railliet et Henry, 1909) Henry et Ozoux, 1909	–	[17]
Isabelline wheatear <i>Oenanthe isabellina</i> (Temminck, 1829)	<i>Diplotrriaena isabellina</i> Koroliowa, 1926	–	[17]
Pied wheatear <i>Oe. pleschanka</i> (Lepechin, 1770)	<i>P. ensicaudatum</i>	–	[15,17]
Tree pipit <i>Anthus trivialis</i> (L., 1758)	<i>Physaloptera</i> sp. (recorded as <i>Ph. alata</i>)	–	[15]
	<i>Amidostomum chevreuxi</i> Seurat, 1918	–	[15,17]
Western yellow wagtail <i>Motacilla flava</i> L., 175)	<i>D. ozouxi</i>	–	[17]
Common linnet <i>Linaria cannabina</i> L., 1758 (recorded as <i>Cannabina cannabina</i>)	<i>Agamospirura</i> sp. (larvae)	–	[17]

Explanations: T – trachea; B – bronchi; O – oesophagus; P – proventriculus; UCG – under cuticle of gizzard; G – gizzard; SI – small intestine; C – caecum; M – muscles; “–” means location was not defined in the cited sources.

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