

# Parasites, Bacteria and Viruses of *Glis glis*

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Rodents (Rodentia), due to their number and species diversity, are important elements of natural ecosystems. Some species of rodents are widely distributed. *Glis glis* (Linnaeus, 1766) (Rodentia, Gliridae) is one such species. An overview of the parasites, bacteria and viruses of *G. glis* inhabiting the Western Palearctic is given.

Keywords: ectoparasites ; *Glis glis* ; helminths ; overview ; protozoans ; viruses ; Western Palearctic

## 1. Introduction

Rodents (Rodentia), due to their number and species diversity, are important elements of natural ecosystems. Some species of rodents are widely distributed [1][2][3][4][5][6][7]. The European edible dormouse, *Glis glis* (Linnaeus, 1766) is one such species and is widespread across western Eurasia. This rodent species is found in most European countries and regions of western Asia: through northern Turkey to the Caucasus, northern Iran and Turkmenistan [8][9][10][11]. *Glis glis* is the largest member of the family Gliridae, arboreal rodent with a nocturnal lifestyle. This rodent has the longest period of hibernation among the mammals of Europe, up to 9 months [12].

It is known that small wild rodents play an important role in the life cycles of the helminths of carnivorous mammals and birds of prey in higher trophic levels. Small rodents are involved in maintaining natural foci of zoonoses—diseases dangerous to humans and animals [4][13][14][15][16][17][18][19][20][21]. In this regard, the study of the parasite fauna of *G. glis* is of great scientific (biodiversity monitoring) and practical importance (study of the dormouse's role in the spread and preservation of zoonoses).

The literature on parasites, viruses and protozoans of *G. glis* currently contains about 180 references, covering an approximately 200-year period. The first attempts to bring together data about the viruses, parasites and protozoans of *G. glis* were undertaken in the reviews by Rossolimo [22] and Kryštufek [23][24], which contained data on 64 species of ecto- and endoparasites found in the dormouse. Unfortunately, these reviews did not include most papers not indexed in electronic databases, so they are still inaccessible to most researchers.

## 2. Parasites, Bacteria and Viruses of *Glis glis* in the Western Palearctic

At the present stage of research, 104 species (with subspecies) of viruses, protozoans, ectoparasites and helminths were recorded in *G. glis*: 4 viruses, 8 Protozoa, 6 Cestoda, 6 Trematoda, 4 Nematoda, 1 Heteroptera, 2 Anoplura, 39 Siphonaptera and 34 Acari.

### 2.1. Viruses of *Glis glis*

The study of viruses in *G. glis* has a short history spanning only the last decades. Four viruses of three families were found in the edible dormouse (**Table 1**).

**Table 1.** Viruses of *Glis glis* in Western Palearctic.

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
Family Picornoviridae <i>Encephalocarditis virus</i> (EMCV)	E	small rodents	cause myocarditis, diabetes mellitus, reproductive disorders and nervous system damage	Italy	[25][26]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
family Polyomaviridae <i>Polyomavirus</i>	E	<i>Glis glis</i>	—	Germany	[27]
Family Bunyaviridae <i>Hantaan orthohantavirus</i> (HTNV)	E	small rodents	main causative agent of Korean hemorrhagic fever in humans	Slovenia	[28]
<i>Dobrava-Belgrade orthohantavirus</i> (DOBV)	E	<i>Apodemus</i> mice	cause hemorrhagic fever with renal syndrome	Serbia	[29]

Note: E—Europe.

*Encephalocarditis virus* (EMCV) is found in many species of wild and domestic animals in various regions of the world [30]. The host-specific *Polyomavirus* found in *G. glis* belongs to a group of DNA viruses that infect mammals, birds and fish [31] [32]. *Hantaan orthohantavirus* (formerly known as *Hantaan virus*) is a negative-sense RNA virus species. The edible dormouse is a reservoir host for the *Hantaan orthohantavirus* (HTNV). *Dobrava-Belgrade virus* (also known as *Dobrava virus*), found in the edible dormouse, is common in the former Yugoslavia, Germany, Estonia, Slovakia, European Russia and other Eastern European countries [33]. All viruses have a European range (Table 1).

## 2.2. Protozoa of *Glis glis*

Eight protozoan species from the five families are known in the edible dormouse (Table 2).

**Table 2.** Protozoa of *Glis glis* in Western Palaearctic.

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
Family Borreliaceae <i>Borrelia afzelii</i> Canica et al. 1994	E	rodents, dormice	causative agent of Lyme disease (LD)	Croatia Germany	[34] [35][36][37][38]
<i>Borrelia garinii</i> Baranton et al., 1992	E	birds	causative agent of LD	Germany	[36]
<i>Borrelia bavariensis</i> Margos et al., 2009	E	rodents, dormice	causative agent of LD	Germany	[36]
<i>Borrelia miyamotoi</i> Fukunaga et al., 1995	E	dormice	—	Germany	[36]
Family Rickettsiaceae <i>Rickettsia typhi</i> (Wolbach and Todd, 1920)	C	rodents	causative agent of murine typhus, an endemic human typhus	Slovenia	[39]

Species	Distribution	Host Range	Medical & Veterinary		Country	References
			Significance			
<b>Family Yersiniaceae</b>						
<i>Yersinia pestis</i> (Lehmann and Neumann, 1896)	C	wild and domestic animals (mainly rodents)	plague pathogen	—	Europe	[40]
<b>Family Eimeriidae</b>						
<i>Eimeria gliris</i> Musaev and Veysov, 1961	E	<i>Glis glis</i>	—	—	Azerbaijan	[41]
<b>Family Francisellaceae</b>						
<i>Francisella tularensis</i> (McCoy and Chapin 1912)	H	rodents, humans	pathogen of gram-negative coccobacillus, causative agent of tularemia	—	Switzerland	[42]

Note: E—Europe, C—Cosmopolitan, H—Holarctic.

Among the protozoa found in *G. glis*, *Borellia* spp. (family Spirochaetaceae) are most represented (four species). They belong to the *Borrelia burgdorferi* (Johnson et al., 1984) sensu lato species complex. The natural reservoir hosts of *Borrelia* are wild animals (rodents, birds and deer). *Borrelia afzelii* and *B. bavariensis* are associated with rodents [43][36] [44]. *Borrelia garinii* is better adapted to birds [45].

The obligate intracellular bacteria *Rickettsia typhi* (Wolbach and Todd, 1920) is best known as the causative agent of an endemic human typhus that occurs worldwide [46]. This protozoan species can be transmitted to a mammalian host by the bite of an infected flea or louse [47].

### 2.3. Helminths of *Glis glis*

In total, 16 species of parasitic worms were recorded in *G. glis*: 6 Cestoda, 6 Trematoda and 4 Nematoda (Table 3). Most of the helminth species parasitise the edible dormouse at the mature stage (14 species). Only two species of helminths were noted at the larval stage: the trematode *Alaria alata* (Goeze, 1782) and the cestode *Mesocestoides lineatus* (Goeze, 1782), for which the dormice serve as paratenic hosts. The finding of a small number of larval stages of parasitic worms indicates an insignificant role of *G. glis* in the life cycles of helminths of vertebrates of high trophic levels.

**Table 3.** Helminths of *Glis glis* in Western Palaearctic.

Species	Distribution	Host Range	Medical & Veterinary		Country	References
			Significance			
<b>Family Dicrocoeliidae</b>						
<i>Dicrocoelium dendriticum</i> (Rudolphi, 1819)	C	mammals (mainly ungulates)	causative agent of dicroceliosis of livestock	—	Belarus	[48]
<b>Family Cyclophyllidae</b>						
<i>Lyperosomum armenicum</i> (Stcherbakova, 1942)	E	<i>Glis glis</i>	—	—	Armenia	[49]
<b>Family Taeniidae</b>						
<i>Taenia solium</i> (Linnaeus, 1758)	E	humans, pigs	causative agent of taeniasis and cysticercosis	—	Belarus	[48][50][51]

Species	Distribution	Host Range	Medical & Veterinary Significance		Country	References
			—	—		
<b>Family Brachylaimidae</b>						
<i>Brachylaima recurva</i> (Dujardin, 1845)	P	small rodents	—	—	Russia	[52]
<b>Family Plagiorchiidae</b>						
<i>Plagiorchis elegans</i> (Rudolphi, 1802)	H	birds, small mammals, reptiles	—	—	Belarus	[48][50]
<b>Family Lecithodendriidae</b>						
<i>Lecithodendrium semen</i> (Kirschenblatt, 1941)	E	<i>Glis glis</i>	—	—	Belarus	[48][50][53]
<b>Family Diplostomidae</b>						
<i>Alaria alata</i> (Goeze, 1782), msc.	C	amphibians, reptiles, small mammals	causative agent of alariosis of farmed fur animals	—	Belarus	[54]
				—	Switzerland	[55] reported as <i>H. sulcata</i>
				—	Slovakia	[56][57][58][59] [60] reported as <i>H. sulcata</i>
<b>Family Hymenolepididae</b>						
<i>Armadolepis myoxi</i> (sensu stricto) (Rudolphi, 1819) (syn.: <i>Hymenolepis sulcata</i> (von Linstow, 1879))	E	<i>Glis glis</i>	—	—	Croatia	[61] reported as <i>H. sulcata</i> , [62]
				—	Hungary	[63] reported as <i>H. sulcata</i>
				—	Spain	[64][65] reported as <i>H. sulcata</i>
				—	Germany	[66][67] reported as <i>H. sulcata</i>
<i>Armadolepis longisoma</i> Makarikov, Stakheev and Tkach, 2018	E	<i>Glis glis</i>	—	—	Russia	[68] reported as <i>Armadolepis</i> sp. 1, [69][70]
<i>Armadolepis genovi</i> Makarikov and Georgiev, 2020	E	<i>Glis glis</i>	—	—	Bulgaria	[71] reported as <i>H. myoxi</i> , [72]
<i>Armadolepis</i> sp.	E	<i>Glis glis</i>	—	—	Russia	[52] reported as <i>H. myoxi</i>

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
					[73][74] reported as <i>Hymenolepis horrida</i> (Linstow, 1901)
					[50] reported as <i>H. horrida</i> and <i>Rodentolepis straminea</i> (Goeze, 1782)
Hymenolepididae sp.	E	—	—		[75] reported as <i>Hymenolepis diminuta</i> (Rudolphi, 1819)
					[76] reported as <i>R. straminea</i>
					[59] reported as <i>Rodentolepis</i> sp.
Family Mesocestoididae	P	reptiles, small mammals	cause mesocestidosis in humans, carnivores	Italy	[77]
<i>Mesocestoides lineatus</i> (Goeze, 1782), tetrathyridia					
Family Capillariidae	P	small rodents	—	Belarus	[48][50][51]
<i>Pterothominx sadovskoi</i> (Morozov, 1956) (syn.: <i>Thominx sadovskoi</i> Morozov, 1956; <i>Armocapillaria sadovskoi</i> (Morozov, 1956))					

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
				Russia	[52][68][70]
				Belarus	[48][50][51][54]
				Germany	[78][79]
				Bulgaria	[71]
Family Heligmonellidae					
<i>Paraheligmonina gracilis</i> (Leuckart, 1842) (syn.: <i>Heligmosomum gracile</i> (Leuckart, 1842); <i>Longistriata schulzi</i> Schachnasarova, 1949; <i>Longistriata elpatievskii</i> Schachnasarova, 1949)	WP	<i>Glis glis</i>	—	Ukraine Azerbaijan	[76][80][81] [75][82]
				Armenia	[83][84]
				Croatia	[61][62]
				Spain	[64]
				Italy, France	[79]
				Slovakia	[56][57]
Family Rictulariidae					
<i>Rictularia cristata</i> (Frölich, 1802)	E	small rodents	—	Central Europe	[85][86][87]
<i>Rictularia amurensis</i> Schulz, 1927	P	small rodents	—	Belarus	[48][50]

Note: E—Europe, C—Cosmopolitan, H—Holarctic, P—Palaearctic, WP—Western Palaearctic.

## 2.4. Ectoparasites of *Glis glis*

In total, 76 species of ectoparasites were found on *G. glis*, belonging to Anoplura (2 species), Heteroptera (1), Siphonaptera (39) and Acari (34) (Table 4). Only eight species of ectoparasites are host-specific parasites of the edible dormouse: the lice *Schizophthirus gliris* (Blagoveshchensky, 1965) and *Schizophthirus pleurophaeus* (Burmeister, 1839); the fleas *Myoxopsylla jordani* (Ioff and Argyropoulo, 1934) and *Myoxopsylla laverani* (Rothschild, 1911); and the mites *Hirstionyssus gliriculus* (Masan and Ambros, 2010), *Hirstionyssus paulisimilis* (Masan and Fenda, 2010), *Gliricotes glirinus* (Canestrini, 1895) and *Radfordia gliricola* (Vesmanis and Lukoschus, 1978). Three species of ectoparasites are common parasites of arboreal rodents (squirrels and dormice): the fleas *Ceratophyllus sciurorum* (Schrunk, 1803) and *Leptopsylla sciurobia* (Wagner, 1934) and the mite *Hirstionyssus sciurinus* (Hirst, 1921). The other 65 species of ectoparasites are accidental and facultative dormouse parasites, which parasitise many species of mammals and birds.

**Table 4.** Ectoparasites of *Glis glis* in the Western Palaearctic.

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
Family Hoplopleuridae					
<i>Schizophtirus gliris</i> Blagoveshtchensky, 1965	E	<i>Glis glis</i>	—	Poland, Bulgaria, North Makedonia	[88][89]
<i>Schizophtirus pleurophaeus</i> (Burmeister 1839)	WP	dormice	—	West Europe, Belarus	[88][89]
				Hungary	[90]
Family Cimicidae					
<i>Oeciacus hirundinis</i> (Lamarck, 1816)	P	birds (mainly swallows)	—	Slovenia	[91]
			vector of plague bacteria <i>Yersinia pestis</i> ;	Slovakia	[92]
Family Pulicidae					
<i>Pulex irritans</i> Linnaeus, 1758	C	mammals (including humans), birds	intermediate host of the cucumber tapeworm <i>Dipylidium caninum</i> (Linnaeus, 1758), which cause helminthiasis in dogs and cats	Slovenia	[93][94]
Family Ceratophyllidae					
<i>Amalareus penicilliger</i> (Grube, 1851)	P	forest rodents	—	Ukraine	[95]
<i>Leptopsylla taschenbergi</i> (Wagner, 1898)	P	forest rodents, insectivores	—	Armenia	[96]
			—	Russia	[97]
<i>Leptopsylla segnis</i> (Schönherr, 1811)	C	house mice, rats	vector of plague and tularemia	Croatia	[93][94]
<i>Leptopsylla sciuroobia</i> (Wagner, 1934)	P	squirrels, dormice, <i>Apodemus</i> mice	—	Serbia	[93][94]
<i>Peromyscopsylla bidentata</i> (Kolenati, 1863)	P	forest rodents	—	Ukraine	[95][98]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
<i>Ceratophyllus sciurorum</i> (Schrank, 1803)	P	squirrels, dormice	vector of tularemia	Russia Italy Germany Lithuania Serbia, Croatia, Montenegro, Slovenia, North Macedonia	[13][15][52][97] [99][100][101] [102][103]  [77][104][105]  [78][106][107]  [108]
<i>Ceratophyllus sciurorum</i> (Schrank, 1803)	P	squirrels, dormice	—	Bosnia and Herzegovina Ukraine Armenia Belarus Moldova Hungary Poland Bulgaria	[39][93][94][109]  [95][110]  [96][111]  [112]  [73][74]  [113]  [114]  [115]
<i>Ceratophyllus rusticus</i> Wagner, 1903	E	birds	—	Slovenia	[39]
<i>Ceratophyllus carniolicus</i> Brelih and Trilar, 2001	E	<i>Glis glis</i>	—	Germany	[116]
<i>Ceratophyllus hirundinis</i> (Curtis, 1826)	P	birds	—	Slovenia	[93][94]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
<i>Ceratophyllus gallinae</i> (Schrank, 1803)	C	birds	—	Slovenia	[94]
<i>Ceratophyllus borealis</i> Rothschild, 1907	P, G	birds	—	Germany	[116]
<i>Ceratophyllus</i> ( <i>Monopsyllus</i> ) sp.	E	—	—	Lithuania	[108]
<i>Dasypsyllus gallinulae</i> ( <i>gallinulae</i> (Dale, 1878)	C	birds	—	Slovenia	[94]
<i>Megabothris turbidus</i> (Rothschild, 1909)	P	forest rodents	vector of viral hemorrhagic fever and tularemia	Ukraine	[95][98][110]
<i>Megabothris walkeri</i> (Rothschild, 1902)	P	forest rodents	vector of tularemia	Germany	[116]
<i>Myoxopsylla jordani</i> Ioff and Argyropoulo, 1934	E, I	dormice	—	Russia	[13][101]
<i>Myoxopsylla laverani</i> (Rothschild, 1911)	WP	dormice	—	Armenia	[111]
<i>Nosopsyllus consimilis</i> (Wagner, 1898)	P	forest rodents	vector of plague and tularemia	Georgia	[118]
<i>Nosopsyllus fasciatus</i> (Bosc d'Antic, 1800)	C	house mice, rats	vector of the rat tapeworm <i>H. diminuta</i>	Germany	[52][99][102]
				France	[103]
				Armenia	[106][107][116]
				Russia	[119]
				Serbia	[96]
					[13][101]
					[109]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
<i>Orchopeas howardi</i> (Baker, 1895) (syn.: <i>Orchopeas wickhami</i> (Baker, 1895))	N	<i>Sciurus carolinensis</i> Gmelin, 1788	—	UK	[120]
Family Ctenophthalmidae	P	voles	vector of tularemia	Russia	[13][101]
<i>Ctenophthalmus wagneri</i> Tiflov, 1927					
<i>Ctenophthalmus monticola</i> (Kohaut, 1904)	E	insectivores	—	Serbia	[93][94]
<i>Ctenophthalmus agyrtes</i> (Heller, 1896)	E	<i>Apodemus</i> mice	vector of tularemia	Ukraine	[95][98]
<i>Ctenophthalmus agyrtes ohridanus</i> Wagner, 1939	E	small mammals	—	Germany	[116]
<i>Ctenophthalmus agyrtes wagnerianus</i> Peus, 1950	E	small mammals	—	Croatia	[93][94]
<i>Ctenophthalmus proximus</i> (Wagner, 1903)	E	small mammals	—	Russia	[97]
<i>Ctenophthalmus assimilis</i> (Taschenberg, 1880)	P	voles	—	Ukraine	[95]
<i>Ctenophthalmus congener</i> Rothschild, 1907	WP	small mammals	—	Slovenia	[93][94]
<i>Ctenophthalmus nifetodes</i> Wagner, 1933	E	<i>Dinaromys bogdanovi</i> (V. and E. Martino, 1922)	—	Bosnia & Herzegovina, Montenegro	[93][94][121]
<i>Ctenophthalmus nifetodes brelihi</i> Rosicky and Carnelutti, 1959	E	<i>Dinaromys bogdanovi</i>	—	Slovenia	[93][94][121][122]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
<i>Ctenophthalmus nifetodes tvrtkovicci</i> Breljih, 1986	E	<i>Dinaromys bogdanovi</i>	—	Croatia	[93][94][121]
<i>Palaeopsylla soricis</i> (Dale, 1878)	P	insectivores	vector and reservoir of tularemia	Germany Russia	[116] [13][101]
<i>Doratopsylla dasycnema dasycnema</i> (Rothschild, 1897)	P	insectivores	—	former Yugoslavia Germany	[123] [116]
Family Hystrichopsyllidae	P	<i>Talpa europaea</i>	vector and reservoir of tick-borne encephalitis	Lithuania	[108]
<i>Hystrichopsylla talpae</i> (Curtis 1826)				Russia	[13][101]
<i>Hystrichopsylla orientalis</i> Smit, 1956	E	small rodents, insectivores	—	Lithuania	[124]
<i>Hystrichopsylla orientalis orientalis</i> Smit, 1956	E	small rodents, insectivores	—	Bosnia & Herzegovina	[93][94]
Family Ischnopsyllidae					
<i>Ischnopsyllus intermedius</i> (Rothschild, 1898)	E	bats	—	Germany	[116]
Family Laelapidae				Moldova	[73][74]
<i>Androlaelaps casalis</i> (Berlese, 1887) (syn.: <i>Haemolaelaps casalis</i> (Berlese, 1887)	C	birds	cause human dermatitis	Ukraine Belarus	[98] [125]
<i>Laelaps agilis</i> C.L. Koch, 1836	P	forest mice, insectivores, carnivores	vector of plague, tularemia, hemorrhagic fever with renal syndrome (HFRS), tick-borne encephalitis, leptospirosis, brucellosis	Slovakia	[126]

Species	Distribution	Host Range	Medical & Veterinary Significance		Country	References
<i>Eulaelaps stabularis</i> (C.L. Koch, 1836)	C	small mammals, birds	vector of tularemia, Q fever, tick-borne encephalitis, brucellosis, leptospirosis	—	Slovakia	[126]
<i>Myonyssus gigas</i> (Oudemans, 1912)	P	rodents, insectivores, carnivores	—	—	Slovakia	[126]
<i>Haemogamasus horridus</i> Michael, 1892	WP	rodents, insectivores, carnivores	—	—	Slovakia	[126]
<i>Haemogamasus nidi</i> Michael, 1892	H	rodents, insectivores, carnivores	vector of tularemia	—	Slovakia	[126]
<i>Haemogamasus pontiger</i> (Berlese, 1904)	C	rodents, insectivores, carnivores	—	—	Slovakia	[126]
Family Hirstionyssidae		<i>Sciurus vulgaris, Glis glis</i>	vector of tularemia, tick-borne encephalitis, brucellosis, leptospirosis	—	Russia	[13][101]
<i>Hirstionyssus sciurinus</i> (Hirst, 1921)	P	—	—	—	Slovakia	[126]
<i>Hirstionyssus gliriculus</i> Masan and Ambros, 2010	E	<i>Glis glis</i>	—	—	Slovakia	[126]
<i>Hirstionyssus paulisimilis</i> Masan and Fenda, 2010	E	<i>Glis glis</i>	—	—	Slovakia	[126]
<i>Hirstionyssus sunci</i> Wang, 1962	P	small rodents, insectivores	cause human dermatitis	—	Slovakia	[126]
Family Glycyphagidae						
<i>Labidophorus talpae</i> Kramer, 1877	E	moles	—	—	Europe	[127]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
Family Ixodidae					
<i>Ixodes (Ixodes) ricinus</i> (Linnaeus, 1758)	P	mammals, birds	vector of louping-ill virus of sheep, Lyme disease, ehrlichiosis (tick-borne fever) of cattle; transmits <i>Babesia</i> spp., which causes Redwater fever in cattle and sheep	Russia Moldova Ukraine Germany Belarus	[52] [73] [98][110] [35][37][128] [129]
<i>Ixodes (Ixodes) acuminatus</i> Neumann, 1901 (syn. <i>I. redikorzevi</i> Olenew, 1927)	P	rodents, insectivores, carnivores	vector of LD, tularemia, Q fever	Europe	[130]
<i>Ixodes (Ixodes) laguri</i> Olenew, 1929 (syn.: <i>I. laguri colchicus</i> Pomerantzev, 1948)	P	small rodents, hedgehogs, small carnivores	vector of plague and tularemia	Russia	[52][131][132]
<i>Ixodes (Exopalpiger) trianguliceps</i> Birula, 1895	P	rodents, insectivores, carnivores	vector of LD	Ukraine Germany	[98][110] [129]
Family Amblyommidae					
<i>Dermacentor marginatus</i> (Sulzer, 1776)	P	mammals, insectivores, small carnivores	vector of tick-borne Russian spring-summer encephalitis (TBRSE), North Asian tick typhus	Croatia	[133]
Family Bdellidae					
<i>Bdella muscorum</i> Ewing, 1909	H	small mammals	—	Bulgaria	[134]
<i>Cyta latirostris</i> (Hermann, 1804)	C	small mammals	—	Bulgaria	[134]
<i>Cyta coerulipes</i> (Duges, 1834)	C	small mammals	—	Bulgaria	[134]

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
				Germany	<a href="#">[107]</a> <a href="#">[135]</a>
				Italy	<a href="#">[136]</a> <a href="#">[137]</a>
Family Myocoptidae				France	<a href="#">[136]</a> <a href="#">[137]</a>
<i>Gliricotes glirinus</i> (Canestrini, 1895) (syn.: <i>Myocoptes glirinus</i> Can. 1895)	WP	<i>Glis glis</i>	—	Belgium	<a href="#">[138]</a>
				Armenia	<a href="#">[137]</a> <a href="#">[139]</a>
				Russia	<a href="#">[140]</a>
				UK	<a href="#">[135]</a>
Family Myobiidae				Germany	<a href="#">[141]</a>
<i>Radfordia (Graphiurobia) gliricola</i> Vesmanis and Lukoschus, 1978	WP	<i>Glis glis</i>	—	Russia	<a href="#">[142]</a>
Family Trombiculidae					
<i>Ascoschoengastia latyshevi</i> (Schluger, 1955)	P	rodents, insectivores, birds	—	Europe	<a href="#">[143]</a>
<i>Leptotrombidium europaeum</i> (Daniel and Brelih, 1959) (syn.: <i>Leptotrombidium intermedia europaea</i> Daniel and Brelih, 1959)	P	rodents, insectivores	vector of rickettsiosis tsutsugamushi	former Czechoslovakia, former Yugoslavia, Bulgaria, Albania, Spain	<a href="#">[144]</a>
<i>Leptotrombidium sylvaticum</i> Hushcha and Schluger, 1967	P	rodents, insectivores	vector of rickettsiosis tsutsugamushi	Ukraine	<a href="#">[110]</a> <a href="#">[145]</a>
<i>Miyatrombicula muris</i> (Oudemans, 1910)	E	rodents, insectivores	—	Central and South Europe, Russia	<a href="#">[143]</a>
<i>Neotrombicula vernalis</i> (Willmann, 1942)	WP	rodents, insectivores	vector of rickettsiosis tsutsugamushi	Austria	<a href="#">[144]</a>
<i>Neotrombicula austriaca</i> Kepka, 1964	E	rodents, insectivores	vector of rickettsiosis tsutsugamushi	Bulgaria, Moldova	<a href="#">[143]</a>

Species	Distribution	Host Range	Medical & Veterinary Significance	Country	References
<i>Neotrombicula inopinata</i> (Oudemans, 1909) (syn.: <i>N. germanica</i> Willmann, 1952; <i>N. autumnalis</i> <i>germanica</i> (Willmann, 1952)	WP	rodents, insectivores, birds	vector of rickettsiosis tsutsugamushi, cause human trombiculiasis	Germany	[107][143]
				Ukraine	[143][145]
<i>Neotrombicula japonica</i> (Tanaka, Kaiwa, Teramura & Kagaya, 1930) (syn.: <i>Trombicula</i> <i>dubinini</i> Schluger, 1955)	P	rodents, insectivores	vector of rickettsiosis tsutsugamushi	Ukraine	[110][143]
<i>Neotrombicula nagayoi</i> Sasa, Hayashi, Sato, Miura and Asahima, 1950	P	rodents	vector of rickettsiosis tsutsugamushi	Moldova	[73][146]
<i>Neotrombicula vulgaris</i> (Schluger, 1955)	E	rodents	vector of rickettsiosis tsutsugamushi	Ukraine	[110]
<i>Hirsutiella zachvatkini</i> (Schluger, 1948) (syn.: <i>Trombicula zachvatkini</i> Schluger, 1948; <i>Neotrombicula</i> <i>zachvatkini</i> )	P	rodents	vector of diseases causes by <i>Rickettsia</i> spp.	Moldova	[73][74]
				Ukraine	[110][143][145]
<i>Schoutedenichia</i> sp.	P	—	—	Moldova	[73]

Note: E—Europe, C—Cosmopolitan, H—Holarctic, P—Palaearctic, WP—Western Palaearctic, G—Greenland, I—Iran, N—Nearctic.

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