Helminth parasites of the Eurasian water shrew (*Neomys fodiens* pennant, 1771) in South-West Belarus

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Abstract The result of helminthological investigation of 25 Eurasian water shrews during 1996–2011 in South-West Belarus is presented. Sixteen species of helminths (8 species of trematodes, 3 species of cestodes and 5 species of nematodes) were discovered in 92.0 % of animals (23 infected individuals). The most common species is the trematode *Neoglyphe locellus* (Kossack, 1910). The cestode *Triodontolepis sumavensis* (Prokopič, 1957), nematodes *Capillaria konstantini* Romashov, 1999 and *Longistriata neomi* Lubarskaja, 1962 is specified in Belarus for the first time. Twenty-one species of helminths in total were found by helminthologists in this mammal in South-West Belarus in the period 1960–2011.

Keywords Helminth · Eurasian water shrew · *Neomys fodiens* · South-West Belarus

Introduction

The Eurasian water shrew (*Neomys fodiens*) is a one of three species of genus *Neomys* Kaup, 1829 (family Soricidae Fischer, 1814) who lives mainly along the banks of water bodies in Eurasia (Hutterer 2005). This animal is a widely distributed species in Belarus and mostly in south-west of this country.

The Eurasian water shrew may be a host to many species of helminths. They settle in various organs and tissues of the animal, mainly in the esophagus, stomach, intestines

and bladder, causing disease. So, 18 species of helminths parasitizing Eurasian water shrews were found in Bulgaria (Genov 1984). Thus this animal is often infected with nematodes *Eucoleus oesophagicola* (Soltys, 1952) (39.50 %) and *Capillaria incrassata* (Diesing, 1851) (32.65 %). Twelve helminth species were found during a survey of Eurasian water shrews from the Catalan region in Spain (Mas-Coma 1977), 18 helminth species—in West Siberia of Russia (Panov and Karpenko 2004). Moreover, the trematode *Neoglyphe locellus* (Kossack, 1910) is dominant in Russia, and infection occasionally reached 22.1 %.

In Belarus the study of the helminth fauna of Eurasian water shrews was conducted in 50–80 years of the twentieth century (Karasev 1966, 1970, 1972; Arzamasov et al. 1969; Shimalov 1991). Sixteen species of helminths (4 species of trematodes, 5 species of cestodes and 7 species of nematodes) were found at that time. There is little information on helminths of Eurasian water shrews living in South-West Belarus. Only 8 species of helminths were found during 1960–1987 in this region (Arzamasov et al. 1969; Shimalov 1991; Gulyaev and Kornienko 1999).

Materials and methods

The material for this report was collected during 1996–2011 in the South-West Belarus (Brest region: Brest and Malorita districts). The Eurasian water shrews (*Neomys fodiens*) were caught by mousetraps placed in lines (25 traps over 4 days = 100 mousetrap-days) along the banks of drainage channels (15,500 mousetrap-days), and the border of mixed forests near the main roads Brest-Kovel and Brest-Moscow (1700 mousetrap-days) also in the landscape reserve «Bugskiy» (4800 mousetrap-days).

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Table 1 Helminth infections of Eurasian water shrews in South-West Belarus

Species of helminths	Number infected	Prevalence (%)	Number of helminths (min–max)
Trematoda Rudolphi (1808)			
Plagiorchiida La Rue (1957)			
Omphalometridae Looss (1899)			
<i>Neoglyphe locellus</i> (Kossack 1910)	16	64.0	4–135
<i>Rubensstrema exasperatum</i> (Rudolphi 1819)	6	24.0	1–6
<i>R. opisthovitellina</i> (Soltys 1953)	1	4.0	10
Lecithodendriidae Lühe (1901)			
<i>Lecithodendriidae</i> gen. sp.	1	4.0	1
Strigeida (La Rue 1926)			
Brachylaimidae Joyeux et Foley (1930)			
<i>Brachylaima fulvum</i> Dujardin (1843)	1	4.0	1
Leucochloridiidae Poche (1907)			
<i>Pseudoleucloridium soricis</i> (Soltys 1952)	4	16.0	3–22
Diplostomidae Poirier (1886)			
<i>Alaria alata</i> (Goeze 1782), larvae	3	12.0	14–22
Strigeidae Railliet (1919)			
<i>Strigea sphaerula</i> (Rudolphi 1803) larvae	5	20.0	1–13
Cestoda Rudolphi (1808)			
Cyclophyllidea Beneden in Braun (1900)			
Dilepididae Fuhrmann (1907)			
<i>Monocercus arionis</i> Siebold (1850)	1	4.0	1
Hymenolepididae (Ariola 1899)			
<i>Neomylepis magnirostellata</i> (Baer 1931)	9	36.0	1–18
<i>Triodontolepis sumavensis</i> (Prokopič 1957)	1	4.0	2
Nematoda Rudolphi (1808)			
Enoplida Chitwood (1933)			
Capillariidae Neveu-Lemaire (1936)			
<i>Aonchotheca kutori</i> (Ruchljadeva 1946)	3	12.0	1–5
<i>Capillaria konstantini</i> Romashov (1999)	5	20.0	1–3
<i>Eucoleus oesophagicola</i> (Soltys 1952)	7	28.0	1–8
Rhabditida Chitwood (1933)			
Strongyloididae Chitwood et McIntosh (1934)			
<i>Parastrongyloides winchesi</i> Morgan (1928)	3	12.0	1–14
Strongylida Diesing (1851)			
Heligmonellidae Durette-Desset et Chabaud (1977)			
<i>Longistriata neomi</i> Lubarskaja (1962)	1	4.0	2

The total number of mousetrap-days was 22,000. A total of 25 Eurasian water shrews (14 males and 11 females) were investigated (24 animals were caught in mousetraps and one animal was found dead in the landscape reserve «Bugskiy»).

The animals were subjected to a full helminthological examination (dissection and organ compression). Identification of helminths was carried out with the aid of Arzamasov et al. (1969), Genov (1984), Sharpilo and Iskova (1989), Tkach (1991; 1998), Gulyaev and Kornienko (1998; 1999), Romashov (1999, 2001). For the

classification of helminths the system for trematodes (Gibson et al. 2002; Jones et al. 2005; Bray et al. 2008), cestodes (Khalil et al. 1994) and nematodes (Anderson 2000) was used.

Results and discussion

Infestation of Eurasian water shrews with helminths was 92.0 % (23 infected animals). The figures of males and females infection are approximately the same: 92.9 %

and 90.9 %, respectively. The animals are hosts for 16 species of helminths: 8 trematode species, 3 cestode species and 5 nematode species. Infections by 2–6 species of helminths were found in 68.0 % of examined Eurasian water shrews. The result of helminthological examination is presented in Table 1.

Two trematode species of genus *Rubensstrema* Dollfus, 1949, trematode *Brachylaima fulvum* Dujardin, 1843 and nematode *Aonchotheca kutori* (Ruchljadeva, 1946) were located in the stomach, nematode *Eucoleus oesophagicola* (Soltys, 1952) in the gullet, nematode *Capillaria konstantini* Romashov, 1999 in the urinary bladder, larvae of trematodes *Alaria alata* (Goeze, 1782) and *Strigea sphaerula* (Rudolphi, 1803) in adipose, connective and muscular tissue in the region of the neck. Other species of helminths were found in the intestine.

The most frequent species is the trematode *Neoglyphe locellus*. This helminth infected 64.0 % of Eurasian water shrews. The range for the number of these flukes was from 4 to 135.

Almost all species of helminths of Eurasian water shrews are typical parasites of soricids. Only trematode *Lecithodendriidae* gen. sp. is an obligatory parasite of bats.

The Eurasian water shrew is involved in the life cycles of trematodes *A. alata* and *S. sphaerula*. The obligatory definitive hosts of these helminths are canids (for *A. alata*) and corvids (for *S. sphaerula*). Trematode *A. alata* has medical and veterinary significance. This helminth infected humans, pigs, cats and dogs.

In addition, 5 species of helminths were found in Eurasian water shrews in South-West Belarus between 1960 and 1987: cestodes *Coronacanthus integra* (Hamann, 1891) (Arzamasov et al. 1969; Shimalov 1991) and *Cryptocotylepis globosoides* (Soltys, 1954) (Gulyaev and Kornienko 1999), larvae of cestodes *Cladotaenia globifera* (Batsch, 1786) (Shimalov 1991) and *Echinococcus multilocularis* Leuckart, 1863 (Shimalov 2011) also nematode *Capillaria soricicola* (Yokogawa et Nishigori, 1924) (Shimalov 1991). Among these, the cestode *E. multilocularis* is of the greatest interest, which has great medical importance. The Eurasian water shrew, being in the centers of alveolar echinococcosis, may be infected with this parasite and take part in the life cycle of cestode *E. multilocularis*.

Twenty-one species of helminths in total were found in Eurasian water shrews in South-West Belarus. The cestode *Triodontolepis sumavensis* (Prokopič, 1957), nematodes *C. konstantini* and *Longistriata neomi* Lubarskaja, 1962 is specified in Belarus for the first time.

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