Cestodes of shrews (Insectivora, Soricidae) from Lithuania

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The fauna and infection levels of helminths in two species of *Sorex* shrews *(Sorex araneus* and *S. minutus)* were studied in various parts of Lithuania. There were found 10 species of cestodes. The total number of cestode species, the helminth burden and the number of species per host were all higher in *S. araneus* than in *S. minutus*. The geographical distribution and community structure of cestodes are briefly analysed.

Key words: cestode, helminth, shrew, *Insectivora, Sorex araneus, Sorex minutus*

INTRODUCTION

Sorex shrews are characterised by relatively diverse and abundant communities of intestinal helminths, especially cestodes, which may be related to the opportunistic feeding habits of shrews [6]. Kennedy et al. [9] have shown that diverse helminth communities are typical of birds and fish hosts with broad diets, whereas selective feeding on potential intermediate hosts of helminth often leads to abundant but less diverse helminth communities [13].

In Lithuania two species of shrew in the genus *Sorex* occur sympatrically. These species comprise a practically non-overlapping series in size and exhibit differences in other aspects of their biology, including physiology, abundance, habitat and food selection [11]. In addition to the diet of shrews, these differences may affect the diversity and abundance of their helminth communities.

Here are no data on the fauna of parasitic worms of shrews in Lithuania. This fact provokes interest to study cestodes of shrews. The purpose of this study was to characterize the fauna of cestodes in two species of *Sorex* shrews (*S. araneus* and *S. minutus*).

MATERIAL AND METHODS

The material was collected from June till October in 1999 and in 2000. The shrews were trapped in western and eastern Lithuania. A total of 55 shrews belonging to the species *Sorex araneus* (n = 37) and *Sorex minutus* (n = = 18) was studied for helminths. The individuals were trapped in four areas: Šilutė district, Šakiai district, Anykščiai district and Vilnius City. *S. araneus* and *S. minutus* were represented in all samples. Shrews were trapped using pitfall. They were dissected immediately after being caught.

The intestines as well as other inner organs and body cavities were examined under binocular microscope for helminths by the method of total parasitological autopsy [3]. Cestodes were removed from the intestine and stored in 4% formaldehyde solution, then stained in Ehrlich-colour and mounted in Canada balsam.

RESULTS

Ten species of cestodes were found to parasitize shrews in Lithuania (Table). This cestode community is dominated by *Hymenolepididae.*

Table. **Prevalences (% of shrews infected) and intensities (x, geometric mean number of helminths per host) of cestodes in two species of *Sorex* shrews in Lithuania**

Cestoda	*Sorex araneus*		*Sorex minutus*	
	%	x	%	x
Hymenolepididae:				
Neoskrjabinolepis schaldybini	54	26.4	78	35.6
N. singularis	3	0.1	–	–
Staphylocystis furcata	16	0.4	11	0.6
Vigisolepis spinulosa	14	0.3	17	1.6
Lineolepis scutigera	22	3.8	–	–
Pseudodiorchis prolifera	19	131.5	11	15.6
Ditestolepis diaphana	14	14.6	11	1.8
Soricinia soricis	3	1.9	–	–
Dilepididae:				
Dilepis undula	24	0.38	–	–
Molluscotaenia crassiscolex	49	3.8	–	–
Total	95	183.2	78	55.3

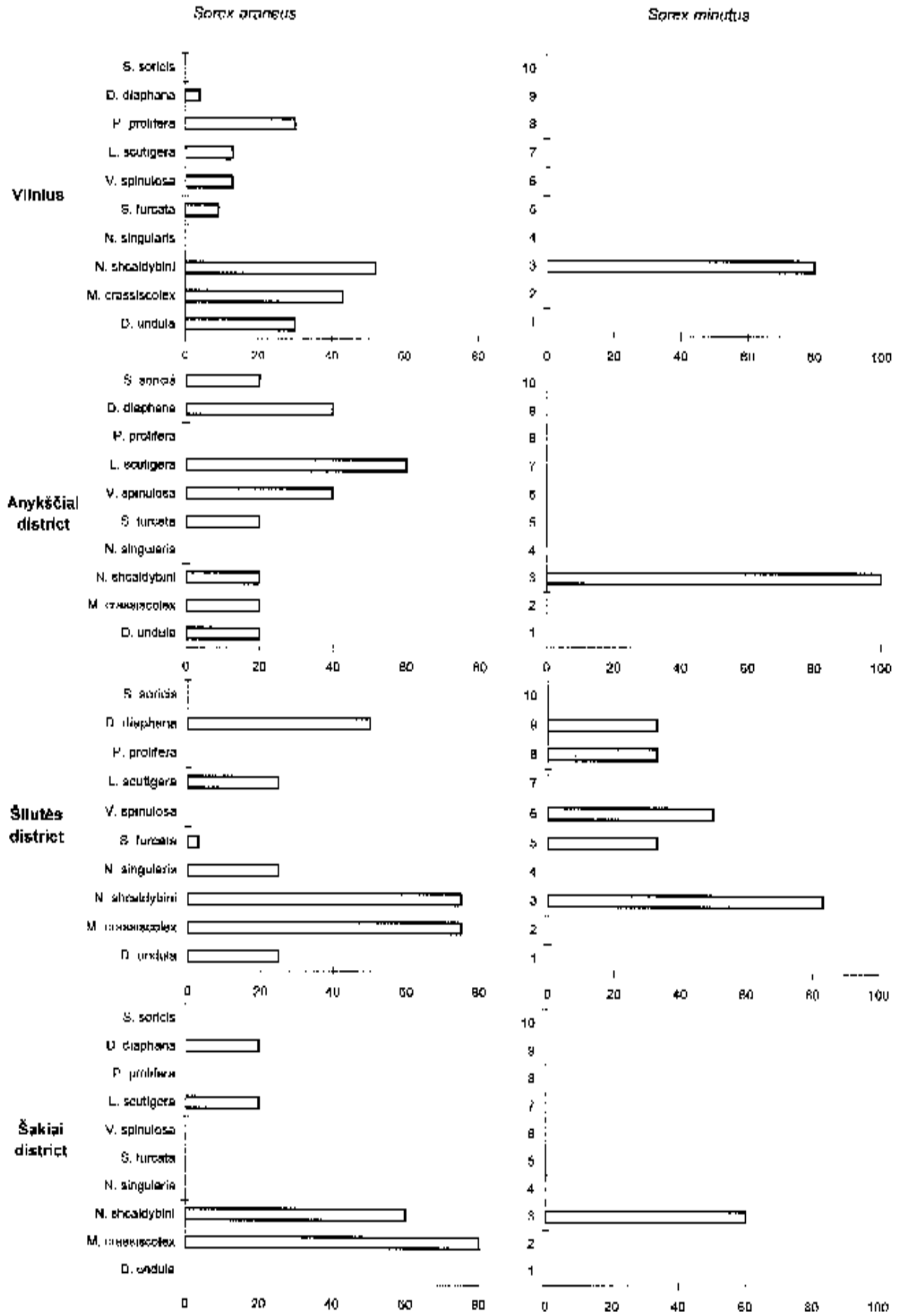

Figure. Prevalences (% of hosts infected) of cestodes in the shrews *S. araneus* and *S. minutus* in four regions of Lithuania

One rare species, *Dilepis undula,* cannot be regarded as a true member of these communities. *Dilepis undula* is a parasite of passerine birds, but occurs accidentally in shrews, however, is not able to mature in them. The number of cestode species varied considerably between host species (Table). *S. araneus* harboured all of the species in the cestode community (9 species, omitting *D. undula), S. minutus* had 5 species. All the five species were found in Šilutės district, while in the other three studied areas they were infected only with *N. schaldybini*.

The intensity of infection of most cestode species was highest in *S. araneus* (Table), but the intensity of *N. schaldybini* was relatively higher in *S. minutus* than in *S. araneus.* The total intensity and the average number of species per host were significantly higher in *S. araneus* than in *S. minutus* in all areas (Figure).

Three of the cestode species (*N. schaldybini, D. diaphana, M. crassiscolex,)* occurred in all four localities (Figure).

DISCUSSION

The dominant feature of shrew cestodes communities in Lithuania is the clear difference in cestode species diversity and in the infection levels between *S. araneus* and *S. minutus. S. araneus* harbours more cestode species, with on average a higher total intensity and more species per host individual than in *S. minutus.* Taking into account that *S. araneus* is also the dominant shrew species [11], it is evident that the bulk of cestode individuals live in *S. araneus,* the other shrews playing a minor role in their circulation [8].

Other things being equal, bigger specimens of *S. araneus* consuming a large amount of food and having long intestines can be expected to harbour larger populations of cestodes than do small shrews. *S. araneus,* which has the most diverse helminth fauna, is distinctly larger (this study: x = 9.2 g) than *S. minutus* (x = 3.5 g), and it has consequently a higher food requirement than has *Sorex minutus* [7].

S. araneus has a more diversified diet than *S. minutus*. *S. araneus,* more frequently than *S. minutus,* consumes earthworms, slugs and snails and is also able to consume larger food items than the smaller specimens of *S. minutus* [2, 5, 12]. The broad diet of *S. araneus* contributes to the high cestodes diversity in this species. Differences in diet seem to explain some of the interspecific differences in the occurrence of helminths. The cestode *L. scutigera* is transmitted primarily by large copro- and necrophagous beetles such as *Geotrupes, Nicrophorus, Oeceoptoma* and *Silpha*, which may explain its absence in smaller shrews. *Neoskrjabinolepis schaldybini,* which is often a dominant species in *S. minutus,* uses smaller beetles such as *Catops* and *Tachinus* as its intermediate hosts [14].

The Lithuanian material shows that despite comparable prevalences of the dominant helminths in different shrew species, the intensities are almost invariably highest in *S. araneus.* Similar results have been reported for *S. araneus* and *S. minutus* in Wales [9], Moldavia [1], West-Siberia [4] and Finland [8].

According to the abundance-hypothesis, *S. araneus* harbours many cestode species and has heavy cestode burdens, because the helminths have specialized on the most abundant species in the shrew community. This should be the general pattern in Europe and western Siberia, where *S. araneus* dominates the shrew communities [8].

S. minutus has five species of intestinal helminths only in Šilutė district. The high infection levels of the cestodes *L. scutigera* and *N. schaldybini* indicate that some of the shrew helminths can circulate efficiently in *S. minutus* even in the absence of other, larger and generally more abundant shrew species.

Consequently, diet and population density of shrews are likely to contribute to the observed differences in helminth burdens in *Sorex* shrews.

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KIRSTUKŲ (Insectivora, Soricidae) CESTODAI LIETUVOJE

S a n t r a u k a

Tirti *Sorex* genties paprastieji kirstukai (*Sorex araneus)* ir kirstukai nykštukai (*Sorex minutus*), sugauti Lietuvoje 1999–2000 m. balandžio–spalio mėn., Šilutės, Anykščių ir Šakių rajonuose, tai pat Vilniaus mieste. Buvo išskrosti 55 kirstukai: 37 buvo *S. araneus* ir 18 – *S. minutus* rūšies kirstukai.

Iš viso nustatyta 10 rūšių cestodų. Visos šios rūšys, išskyrus *D. undula*, yra specifiniai kirstukų parazitai. Dažniausiai pasitaikė kirstukų, užsikrėtusių *Neoskrjabinolepis shcaldybini* ir *Molluscotaenia crassiscolex* cestodais. *S. araneus* ir *S. minutus* kirstukai buvo užsikrėtę vienodomis cestodų rūšimis, tokiomis kaip *Neoskrjabinolepis shcaldybini, Staphylocystis furcata, Vigisolepis spinulosa, Pseudodiorchis prolifera, Ditestolepis diaphana*. Užsikrėtimo beveik visomis cestodų rūšimis intensyvumas, cestodų rūšių gausa ir kiekis, tenkantis vienam individui, buvo didesnis *S. araneus* kirstukuose. Tik *N. schaldybini* rūšies cestodų intensyvumas ir jų kiekis, tenkantis vienam kirstukui, buvo didesnis *S. minutus* kirstukuose, negu *S. araneus* kirstukuose. Tai galima paaiškinti tuo, kad *S. araneus* kirstukai yra vyraujanti rūšis, taigi jie daug intensyviau dalyvauja cestodų cirkuliacijoje, taip pat skirtingas yra šių kirstukų racionas. *S. araneus* yra didesni, taigi jų racionas yra įvairesnis ir pašaro kiekis didesnis. Šie kirstukai ėda sliekus, sraiges, vabzdžių lervas dažniau nei *S. minutus* kirstukai. *Neoskrjabinolepis schaldybini* cestodų, dominuojančių *S. minutus,* tarpiniai šemininkai yra mažieji vabalai, tokie kaip *Catops* ir *Tachinus,* kuriuos dažniausiai ir ėda kirstukai nykštukai. Taigi cestodų rūšių įvairovės gausa ir pasiskirstymas kirtukuose priklauso nuo jų biologijos, raciono sudedamųjų dalių ir paplitimo tankio.