

INVESTIGATION OF FLEAS (INSECTA: SIPHONAPTERA) IN LITHUANIA

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Abstract. In this study infestation rates and indices of infestation by fleas in small rodents in Lithuania were investigated. One hundred sixty three specimens of rodents belonging to six species (*Apodemus agrarius*, *A. flavicollis*, *Myodes glareolus*, *Microtus agrestis*, *M. arvalis*, *Sciurus vulgaris*) were caught in 5 locations. A total of 259 fleas identified on rodents belonged to three families (Ceratomyzidae, Ctenophthalmidae and Hystrichopsyllidae) and five species: *Ctenophthalmus* (*Ctenophthalmus*) *agyrtes* (Heller, 1896), *Megabothris* (*Gabiella*) *turbidus* (Rothschild, 1909), *Megabothris* (*Megabothris*) *walkeri* (Rothschild, 1902), *Hystrichopsylla talpae* (Curtis, 1826) and *Ceratophyllus* (*Monopsyllus*) *sciurorum* (Schrank, 1803). The infestation of rodents with fleas was different, depending on rodent species and on the district of capture.

Key words: flea, Siphonaptera, rodents, infestation

Introduction

Fleas are small (mostly 1-5 mm long), wingless, laterally compressed insects with a holometabolous metamorphosis. The eyes are simple and may be vestigial and absent. The mouthparts are specialized for piercing and sucking. Fleas are parasites of mammals and birds, but their larvae are not parasites, and feed on detritus and dried blood provided by the adult fleas (Brinck-Lindroth, 2007)

Siphonaptera constitute one of the smaller orders of insects, comprising about 2000 known species (1957 species according to Lewis, 1998), and perhaps another 300 species worldwide await discovery and description (Brinck-Lindroth, 2007).

The distribution of flea species in Lithuania is not clear. First investigations of rodent's infestation by fleas were made by N. Likevičienė (1957), B. Kadytė (1964) and E. Jeziorskienė (1974). An initial list of Lithuanian fleas was provided by S. Pakalniškis and M. Žygutienė in 2004, based on earlier publications and two collections.

Material and Methods

During the June–September of 2006, fleas were collected from 163 specimens of rodents. Rodents were caught by live traps in 5 localities (Table 1). Captured rodents were decapitated and immediately put into individual plastic bags, with the purpose not to lose the fleas parasitizing them. All fleas collected on small rodents were placed in 70% ethanol and stored at 4° C until analysis.

Fleas were identified by their morphology, using the key of O. I. Skalon (1970). The majority of characters used for species diagnoses are based on the shape and structure of their extraordinarily complex genitalia and the presence and distribution of setae, spines

and ctenidia. Permanent microscopic preparations are needed for the identification of fleas. Many fleas can only be studied and identified satisfactorily if they are mounted properly on slides. The fixed samples of fleas were made using permanent microscopic preparations in Canada balsam. The preparations are stored at the Department of Biology, Vytautas Magnus University.

Results and discussion

From 163 rodents captured in five Lithuanian locations, 259 fleas were collected (Table 1). After morphological analysis, specimens of five species of fleas were identified: 143 specimens belonged to *Ctenophthalmus (Ctenophthalmus) agyrtes* (Heller, 1896), 69 specimens to *Megabothris (Gabiella) turbidus* (Rothschild, 1909), 25 specimens to *Megabothris (Megabothris) walkeri* (Rothschild, 1902), 18 specimens to *Hystrihopsylla talpae* (Curtis, 1826) and four specimens to *Ceratophyllus (Monopsyllus) sciurorum* (Schrank, 1803).

Table 1. List of fleas collected in different localities from different mammal species.

Localities	Mammal species	Intensity of infestation	Flea species				
			<i>C. agyrtes</i>	<i>M. turbidus</i>	<i>M. walkeri</i>	<i>H. talpae</i>	<i>C. sciurorum</i>
Kaunas	<i>A. agrarius</i>	1.5				3	
54°87N, 23°90E	<i>A. flavicollis</i>	2.1	17	5		8	
	<i>M. glareolus</i>	1.5	3	3			
	<i>S. vulgaris</i>	4					4
Prienai	<i>S. vulgaris</i>	4					4
54°38N, 23°56E							
Šilutė district	<i>A. agrarius</i>	2.3	2	3	2		
Kintai	<i>A. flavicollis</i>	3.5	15	4	2		
55°42N, 21°26E	<i>M. glareolus</i>	3.3	8	7	5		
	<i>M. agrestis</i>	5	1		4		
	<i>A. agrarius</i>	5	9	10		1	
Šilutė district	<i>A. agrarius</i>	5	9	10		1	
Muižė	<i>A. flavicollis</i>	4.1	19	12	5	1	
55°39N, 21°24E	<i>M. glareolus</i>	2.2	9	4			
	<i>M. agrestis</i>	3.8	14	4		5	
	<i>M. arvalis</i>	1	1	1			
	<i>A. flavicollis</i>	2	1		1		
Zarasai district	<i>A. flavicollis</i>	2	1		1		
Dusetos	<i>M. glareolus</i>	2	4	4			
55°75N, 25°87E	<i>M. glareolus</i>	2	4	4			
	<i>M. arvalis</i>	3.2	40	12	6		

Specimens of *Ctenophthalmus agyrtes* were collected from *A. agrarius*, *A. flavicollis*, *M. glareolus*, *M. agrestis*, *M. arvalis*. No strict host relationship was found. According to Peus (1972), specimens of this species may be collected all year round, being most frequent in spring and autumn, and although they are often collected on the host's body, this is mainly a nest flea.

Specimens of *Megabothris turbidus* were collected from *A. agrarius*, *A. flavicollis*, *M. glareolus*, *M. agrestis*, *M. arvalis* during the summer season.

Specimens of *Megabothris walkeri* were collected from *A. agrarius*, *A. flavicollis*, *M. glareolus*, *M. agrestis*, *M. arvalis*. *Microtus* are probably the preferred hosts, but this species is also found on other small mammals (Brinck-Lindroth, 2007).

Specimens of *Hystrichopsylla talpae* were collected from *A. flavicollis*, *A. agrarius*, *M. agrestis*. It has also been reported (Brinck-Lindroth, 2007) to be found on mole (*Talpa europaea*) and shrews (Soricidae). It is a late summer or autumn species. It is a nest flea, but is also regularly found on the body of a host (Brinck-Lindroth, 2007).

Specimens of *Ceratophyllus sciurorum* were collected from *Sciurus vulgaris* which is the main host. Mehl (1971) reported it as a summer flea occurring from May to October.

The infestation of rodents with fleas was different, depending on the rodent species and on the district of capture (Table 1). The highest intensity of infestation with fleas was found in Šilutė district on *A. agrarius* and *M. agrestis*.

In the first study of ectoparasites on rodents (Likevičienė, 1957), twelve species of fleas were detected in Lithuania: *Pulex irritans* (Linnaeus, 1758) and *C. sciurorum* on *A. flavicollis*; *C. walkeri* on *Rattus rattus*, *Rattus norvegicus* and *Mus musculus*; *Amalareus penicilliger* (Grube, 1851) on *M. arvalis*; *Nosopsyllus fasciatus* (Bosc d'Antic, 1800) (= *Ceratophyllus fasciatus*) on *Rattus rattus* and *Rattus norvegicus*; *Leptopsylla (Leptopsylla) segnis* (Schönherr, 1811) on *Rattus rattus*, *Rattus norvegicus* and *Mus musculus*; *Palaeopsylla soricis* (Dale, 1878) on *M. glareolus*; *Doratopsylla dasyncnema* (Rothschild, 1897) on *M. glareolus*; *Ctenophthalmus agyrtes* on *M. arvalis*; *Ctenophthalmus bisoctodontatus* (Kolenati, 1863) on *M. glareolus*; *Ctenophthalmus (Euctenophthalmus) asimilis* (Taschenberg, 1880) on *Mus musculus* and *M. arvalis*; *H. talpae* on *M. arvalis*.

In 1964, B. Kadytė identified fourteen species of fleas (*M. walkeri*, *M. turbidus*, *Amalareus penicilliger* (Grube, 1851), *C. sciurorum*, *Megabothris (Gebrella) rectangulatus* (Wahlgren, 1903), *Ctenophthalmus agyrtes*, *Ctenophthalmus (Euctenophthalmus) unicus* (Wagner, 1898), *Leptopsylla bidentata* (Kolenati, 1863), *L. silvatica* (Meinert, 1896), *Doratopsylla dasyncnema* (Rothschild, 1897), *Palaeopsylla soricis* (Dale, 1878), *Rhadinopsylla integella* (Jordan et Rithschild, 1921), *H. talpae*, *Leptopsylla (Leptopsylla) segnis* (Schönherr, 1811)) on rodents, from which we identified five species during our study.

In 1974, E. Jeziorskienė detected seven species of fleas (*Leptopsylla bidentata*, *Ct. agyrtes*, *Ct. uncinatus*, *M. turbidus*, *Rhadinopsylla integella*, *H. talpae*, *Doratopsylla dasyncnema*), while we were able to find only three of these flea species.

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Blusų (Insecta: Siphonaptera) tyrimai Lietuvoje

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Santrauka

Tyrimo metu įvertintas smulkiųjų graužikų užsikrėtimas blusomis Lietuvoje. Penkiose vietovėse buvo sugauti šešių rūšių (*Apodemus agrarius*, *A. flavicollis*, *Myodes glareolus*, *Microtus agrestis*, *M. arvalis*, *Sciurus vulgaris*) 163 graužikai. Nuo graužikų surinktos 259 blusos ir identifikuota jų sisteminė padėtis. Aptiktos blusos priklausė trijų šeimų: Ceratophyllidae, Ctenophthalmidae and Hystrichopsyllidae, penkioms rūšims: *Ctenophthalmus* (*Ctenophthalmus*) *agyrtes* (Heller, 1896), *Megabothris* (*Gabiella*) *turbidus* (Rothschild, 1909), *Megabothris* (*Megabothris*) *walkeri* (Rothschild, 1902), *Hystrichopsylla* *talpae* (Curtis, 1826) and *Ceratophyllus* (*Monopsyllus*) *sciurorum* (Schrank, 1803). Graužikų užsikrėtimas blusomis skyrėsi priklausomai nuo graužiko rūšies ir nuo sugavimo vietovės.

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