

Data on the distribution of *Hystrichopsylla orientalis* fleas (Siphonaptera) in Lithuania

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The aim of this study was to present data on the distribution of *Hystrichopsylla* fleas collected from different animals in Lithuania. The study was done by analyzing collections of fleas from 2011 to 2017. A total of 96 fleas of the genus *Hystrichopsylla* were collected from nine mammalian species (*Apodemus flavicollis*, *Apodemus agrarius*, *Micromys minutus*, *Myodes glareolus*, *Microtus oeconomus*, *Microtus arvalis*, *Sorex araneus*, *Neomys fodiens*, and *Glis glis*). Morphological analysis showed that all fleas were of the species *Hystrichopsylla orientalis* Smit, 1956.

Keywords: fleas, *Hystrichopsylla orientalis*, rodents, insectivores

INTRODUCTION

Fleas (Siphonaptera) are common ectoparasites of mammals and birds in different habitats throughout the world. More than 2500 species within 18 families of fleas are known (Krasnov, 2008). Only five flea families occur on birds and all other species parasitize mammals (Whiting et al., 2008).

The genus *Hystrichopsylla* Taschenberg, 1880 is composed of more than 30 species/subspecies. Fleas of this genus are the largest fleas in the world, with the body length that can reach up to 10 mm (Holland, 1957; Rosicky, 1957; Brinck-Lindroth, Smit, 2007). Fleas of *Hystrichopsylla* species are more commonly found in nests, but are also found in small amounts on the body of a host (Stanko et al., 2002; Brinck-Lindroth, Smit, 2007; Krasnov, 2008). They are primarily found on insectivores and rodents and occasionally on birds (Brinck-Lindroth, Smit, 2007; Whitaker,

2007). Currently, one member of the genus *Hystrichopsylla* – *Hystrichopsylla talpae* Curtis, 1826 (Pakalniškis, Žygutienė, 2004) is on the list of Lithuanian flea fauna. Therefore, the aim of this study was to present data on the distribution of *Hystrichopsylla* fleas collected from different small animals in Lithuania.

MATERIALS AND METHODS

Fleas were selected from samples collected from different small animals between 2011 and 2017, and stored in 70% ethanol at –20°C until further investigation. Identification of fleas before species and sex was done with a stereomicroscope with the aid of keys (Rosicky, 1957; Brinck-Lindroth, Smit, 2007).

Flea samples were fixed on permanent microscopic preparations in Canada balsam (Brinck-Lindroth, Smit, 2007). The preparations are stored at the Department of Biology, Vytautas Magnus University (Kaunas, Lithuania). Flea samples were also documented using digital camera.

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RESULTS AND DISCUSSION

In the present study, 96 *Hystrichopsylla orientalis* Smit, 1956 fleas were collected from nine (*Apodemus flavicollis*, *Apodemus agrarius*, *Micromys minutus*, *Myodes glareolus*, *Microtus oeconomus*, *Microtus arvalis*, *Sorex araneus*, *Neomys fodiens*, and *Glis glis*) mammalian species in ten localities of Lithuania (Table). In previous studies, another flea species of the genus *Hystrichopsylla* – *Hystrichopsylla talpae* Curtis, 1826 – was detected on *A. flavicollis*, *A. agrarius*, *Mus musculus*, *Microtus agrestis*, *M. arvalis*, and *M. glareolus* in Lithuania (Likevičienė, 1957; Kadytė, 1964; Jeziorskienė, 1974; Lipatova, Paulauskas, 2010). Moles (*Talpa europaea*) are pri-

mary hosts of *Hystrichopsylla* fleas. However, they are also found on other small mammals such as voles (Cricetidae), mice (Muridae), and shrews (Soricidae) (Smit, 1957; Brinck-Lindroth, Smit, 2007; Baláž, Zigová, 2020). *Hystrichopsylla* fleas are found very rarely in the nests of dormice (Libois, 1979; Kirillova et al., 2006). Also, sometimes *Hystrichopsylla* fleas can parasitize weasels (*Mustela*), badgers (*Meles*), foxes (*Vulpes vulpes*), rabbits (*Oryctolagus cuniculus*), birch mice (*Sicista betulina*), rats (*Rattus norvegicus*), birds (*Anthus trivialis*), and even the nests of bumblebees (*Bombus*) (Skuratowicz, 1967).

Fleas of *H. orientalis* species are morphologically very similar to *H. talpae* species. Their main difference is the number of stout

Table. Distribution of *Hystrichopsylla orientalis* in small mammals in Lithuania

Mammalian		<i>Hystrichopsylla orientalis</i>		Localities (coordinates)
Family	Species (n)	♀	♂	
Muridae	<i>Apodemus flavicollis</i> (n = 27)	22	19	Juodkrantė (55.552538, 21.125899); Karvaičiai (55.389804, 21.072440); Pervalka (55.410144, 21.085537); Nida Dump (55.392025, 21.049570); Guodžiai (56.005028, 24.627481); Birštonas (54.588625, 23.997127)
	<i>Apodemus agrarius</i> (n = 12)	9	7	Rusnė (55.297802, 21.377023); Petkėniškės (54.653489, 24.825414); Bezdonys (54.799160, 25.543547); Birštonas (54.588625, 23.997127)
	<i>Micromys minutus</i> (n = 9)	3	6	Juodkrantė (55.552538, 21.125899); Pervalka (55.410144, 21.085537)
Cricetidae	<i>Myodes glareolus</i> (<i>Clethrionomys glareolus</i>) (n = 18)	14	9	Juodkrantė (55.552538, 21.125899); Karvaičiai (55.389804, 21.072440); Pervalka (55.410144, 21.085537); Giedraičiai (55.073973, 25.258796); Birštonas (54.588625, 23.997127); Guodžiai (56.005028, 24.627481); Dusetos (55.745495, 25.761763)
	<i>Microtus oeconomus</i> (n = 1)	1		Rusnė (55.297802, 21.377023)
	<i>Microtus arvalis</i> (n = 1)	1		Petkėniškės (54.653489, 24.825414)
	<i>Sorex araneus</i> (n = 1)	1		Juodkrantė (55.552538, 21.125899);
Soricidae	<i>Neomys fodiens</i> (n = 1)	1		Rusnė (55.297802, 21.377023)
Gliridae	<i>Glis glis</i> (n = 2)	1	2	Strošiūnai (54.825676, 24.507302); Baruoliai (54.811280, 24.591299)

n – number of collected animals

outer setae on hind tibia. *H. orientalis* flea species has three setae on the penultimate notch of the posterior margin, while *H. talpae* has only two setae (Figs. 1–2) (Brinck-Lindroth, Smit, 2007). All analyzed *Hystrichopsylla* fleas had clear three setae on hind tibia (Fig. 3). Females of both species have two spermathecae. However, *H. orientalis* flea species has base of duc-

tus bursae with dark sclerities, while *H. talpae* has base of ductus bursae without sclerotisation (Fig. 4–5) (Brinck-Lindroth, Smit, 2007). A total of 53 females of *Hystrichopsylla* species fleas were collected. All of them had sclerotized base of ductus bursae (Fig. 6 A-B). Males

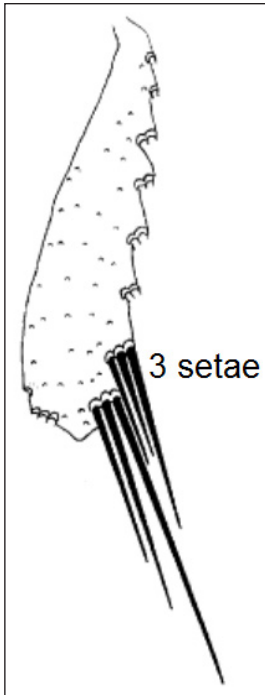


Fig. 1. Hind tibia of *Hystrichopsylla orientalis* (adapted from Brinck-Lindroth, Smit, 2007)

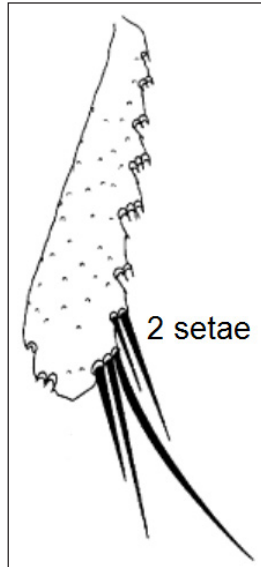


Fig. 2. Hind tibia of *Hystrichopsylla talpae* (adapted from Brinck-Lindroth, Smit, 2007)

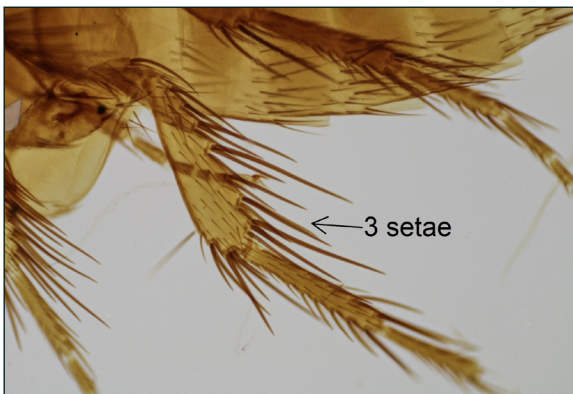


Fig. 3. Representative hind tibia of *Hystrichopsylla orientalis* collected in Lithuania

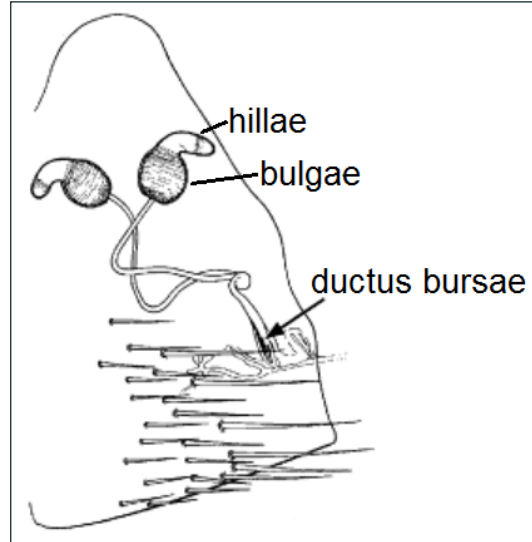


Fig. 4. Spermathecae and ductus bursae of *Hystrichopsylla orientalis* (adapted from Brinck-Lindroth, Smit, 2007)

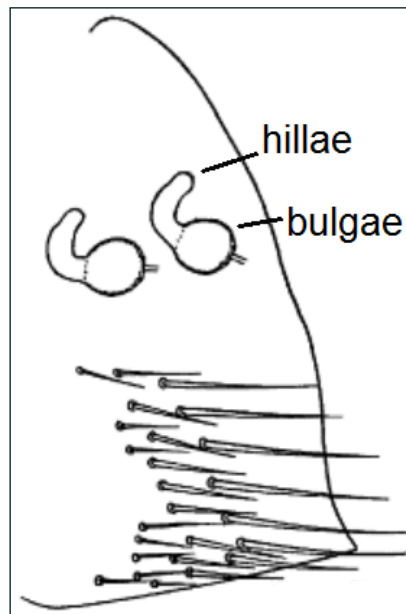


Fig. 5. Spermathecae of *Hystrichopsylla talpae* (adapted from Brinck-Lindroth, Smit, 2007)

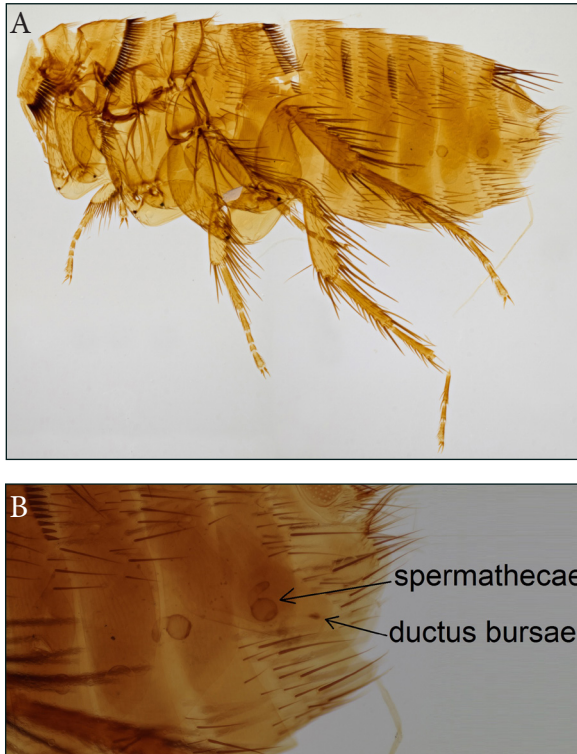


Fig. 6. A. Representative female of *Hystrichopsylla orientalis* collected in Lithuania; B. Female genitalia

of these two species have small morphological diversity on setae of sternum IX and aedeagus. *H. orientalis* flea species has well separated basal spiniform setae of sternum IX from other crowded together spiniforms, while *H. talpae* has rather widely and uniformly spaced spiniform setae of sternum IX (Fig. 7–8) (Brinck-Lindroth, Smit, 2007). A total of 43 males of

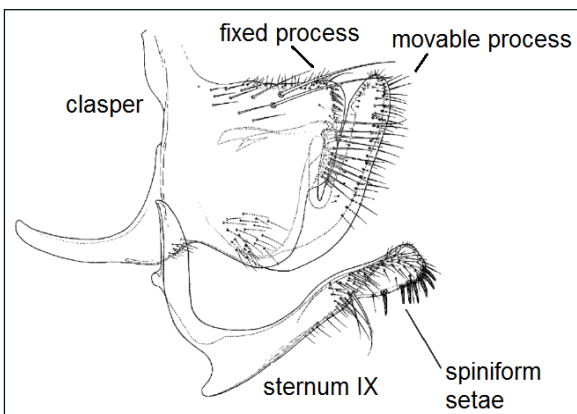


Fig. 7. Sternum IX of *Hystrichopsylla orientalis* (adapted from Brinck-Lindroth, Smit, 2007)

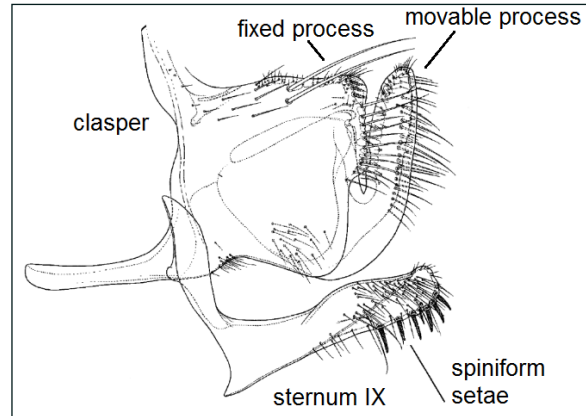


Fig. 8. Sternum IX of *Hystrichopsylla talpae* (adapted from Brinck-Lindroth, Smit, 2007)

Hystrichopsylla fleas were collected. All of them had basal spiniform setae of sternum IX separated from other spiniforms (Fig. 9 A-B).

Both species of fleas have similar host specificity and the same biology, but the distribution

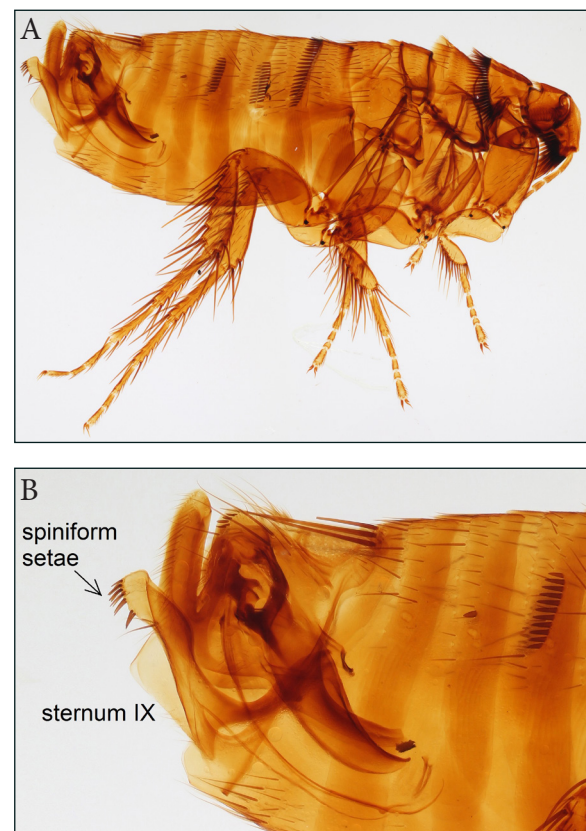


Fig. 9. A. Representative male of *Hystrichopsylla orientalis* collected in Lithuania; B. Male genitalia

is slightly different. *H. talpae* fleas are found in Poland, Latvia, Estonia, Norway, Germany, the Netherlands, Belgium, France, Switzerland, northern Italy, northern Spain, Hungary, the Czech Republic, Slovakia, Austria, Luxembourg, the United Kingdom, Ireland, Denmark, Bulgaria, Greece, Turkey, and extend eastwards to the Krasnoyarsk region in Russia and southwards to the Altai, Tian Shan, and the Caucasus mountains (Holland, 1957; Skuratowicz, 1967; Smit, 1969; Pototski, 1990; Brinck-Lindroth, Smit, 2007; Whitaker, 2007). *H. orientalis* fleas are distributed in continental and eastern Europe, in southern Poland to Switzerland, in northern Italy, including Russia and Siberia in the east (Smit, 1969; Brinck-Lindroth, Smit, 2007; Baláž, Zígová, 2020). Both species of fleas are found during late summer or autumn. This study is the first report on the presence of *H. orientalis* fleas in Lithuania. Fleas were collected during autumn season (37 in September, 48 in October, and eight in November).

CONCLUSIONS

The results of this study have shown that *H. orientalis* fleas are distributed in Lithuania.

ACKNOWLEDGEMENTS

The author is very grateful to Povilas Sakalauskas for photographing the specimens of *Hystrichopsylla orientalis*.

Received 25 October 2020

Accepted 25 November 2020

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***HYSTRICHOPSYLLA ORIENTALIS* RŪŠIES
BLUSŲ (SIPHONAPTERA) PAPLITIMAS
LIETUVOJE**

Santrauka

Šio tyrimo tikslas – pateikti duomenis apie *Hystrichopsylla* genties blusų paplitimą Lietuvoje. Tyrimo metu analizuotos 2011–2017 metų blusų kolekcijos. Iš viso aptikta 96 *Hystrichopsylla* genties blusos, surinktos nuo 9 rūšių žinduolių (*Apodemus flavicollis*, *Apodemus agrarius*, *Micromys minutus*, *Myodes glareolus*, *Microtus oeconomus*, *Microtus arvalis*, *Sorex araneus*, *Neomys fodiens*, *Glis glis*). Morfologinė analizė rodo, kad visos blusos buvo *Hystrichopsylla orientalis* Smit, 1956 rūšies.

Raktažodžiai: blusos, *Hystrichopsylla orientalis*, graužikai, vabzdžiaėdžiai