

Comparison of rodents' parasitofauna from analogous agroecosystems from greater Poland and Pomerania

Leszek Rolbiecki, Joanna N. Izdebska

Department of Invertebrate Zoology, University of Gdańsk, al. Piłsudskiego 46,
81-378 Gdynia;

e-mail: lrolbiecki@sat.ocean.univ.gda.pl, Izdebska@sat.ocean.univ.gda.pl

Abstract

In 42 rodents (field mouse *Apodemus agrarius*, wood mouse *A. sylvaticus* and pine vole *Pitymys subterraneus*), originating from similar agroecosystems of Greater Poland and Pomerania, 13 taxa of parasites were detected, including 3 Siphonaptera, 3 Anoplura, 1 Acari, 1 Digenea and 5 Nematoda. Most of the parasite species was found in rodents in both instances, and indicated a similar level of infection in general.

Introduction

The parasitofauna of synantropic rodents and of rodents living in various agroecosystems seems to be insufficiently known. Studies most often cover only specific group of parasites (e.g. fleas, ticks or helminths), yet there is a lack of complete studies, covering both ectoparasites and endoparasites. Furthermore, majority of studies taking rodents into account focuses on the parasitofauna of specific species, without taking their living environment into account. Meanwhile, in case of parasites of rodents, who often show slight specificity, the differences and similarities in the composition of the parasitofauna could be related to the type of ecosystem inhabited by the rodents. And so, the rodents from agroecosystems can be a significant parasite reservoir, including species with a large epidemiologic meaning for other mammals.

Material and methods

42 rodents living in agricultures were included in the studies, including: 24 rodents originating from one standing in the Greater Poland area (Słomowo, sugar beet cultivation) - 6 field mouse (*Apodemus agrarius*), 17 wood mouse (*A. sylvaticus*), and 1 pine vole (*Pitymys subterraneus*) and 18 rodents from Pomerania (Pszczółki, sugar beet cultivation) - 3 *A. agrarius*, 15 *A. sylvaticus*. The standings were located near terrains slightly covered with shrubs and trees.

First, in order to detect the presence of ectoparasites, the coat and skin surface was examined. Found specimens were fixed in a 70% ethanol solution, and prepared in Faure's liquid or polivinyl-lactophenol.

Afterwards, the rodents underwent standard helminthological sections. The collected helminths were fixed in a solution of glacial acetic acid and formalin (19:1), after which they were conserved in 70% ethanol. From parts of the parasites, a semipermanent glycerol-jelly parasite mounts were created, in accordance to the methodology described by Rolbiecki (2002).

Results and discussion

In studies of 42 rodents, 7 species of ectoparasites and 6 endoparasites were detected, including one marked as from the genus.

Siphonaptera

***Ctenophthalmus agyrtes* (Heller, 1896)**

Pitymys subterraneus - 1 flea (female) from Greater Poland.

Apodemus agrarius - 1 flea (female) from Greater Poland.

Apodemus sylvaticus - 4 fleas (3 female, 1 male) in 3 mice from Greater Poland.

In total, 6 fleas have been found, in 5 rodents from the Greater Poland area.

The flea is a European species, known from its many standings in Poland, from the Baltic Coast to Tatry. It has a wide host group, and is parasiting mainly on small rodents inhabiting woods and meadows (Skuratowicz 1964).

***Ctenophthalmus assimilis* (Taschenberg, 1880)**

Apodemus agrarius - 1 flea (female) from Pomerania.

Apodemus sylvaticus - 1 flea (female) from Pomerania.

In total, 2 fleas have been found, in 2 rodents from the Pomerania area.

This is a widely propagated species, known from a number of standings throughout Poland, ranging from the Baltic Coast area to mountain areas; in Poland, a common parasite of, mainly, common vole and other small mammals living on open spaces, also often found on field mouse (Skuratowicz 1964).

***Typhloceras poppei* Wagner, 1903**

Apodemus sylvaticus – 1 flea (female) from Greater Poland.

This species exists in northern Africa and western and central Europe; eastern border of coverage runs through, among others, the area of Poland; known from a number of standings throughout Poland. The main host is the wood mouse, although specimens have been found on the common vole (i. a. Skuratowicz 1954, 1964).

Anoplura

***Hoplopleura acanthopus* (Burmeister, 1939)**

Pitymys subterraneus - 2 lice (females) on 1 mouse from Greater Poland.

Apodemus agrarius - 5 lice (3 female, 2 male) in 2 mice from Greater Poland.

Apodemus sylvaticus – 3 lice (female) in 2 mice from Greater Poland.

In total, 10 lice have been found, in 5 rodents from the Greater Poland area.

A common species in Europe and Poland, with a wide group of hosts; found in voles, murids, sometimes in insectivorous or carnivorous (i.a. Wegner 1966, Kadulski and Izdebska 2004).

Hoplopleura affinis (Burmeister, 1939)

Apodemus agrarius - 15 lice in 4 mice from Greater Poland, 2 in 1 mouse from Pomerania.

Apodemus sylvaticus - 11 lice in 3 mice from Greater Poland, 13 in 5 mice from Pomerania.

In total, 26 lice have been found, in 7 rodents from the Greater Poland area and 15 lice in 6 rodents from Pomerania.

This species is known to exist in Europe, Asia, and South America. Widely distributed in Poland; mainly a parasite of field and wood mouse; sometimes observed on northern birch mouse (i.a. Wegner 1966, Kadulski and Izdebska 2004).

Polyplax serrata (Burmeister, 1939)

Apodemus agrarius - 3 lice in 1 mouse from Greater Poland.

Apodemus sylvaticus – 1 lice in 1 mouse from Greater Poland.

In total, 4 lice have been found, in 2 rodents from the Greater Poland area.

The species is widely distributed, known from Europe, Asia and Africa, in Poland can be found from the Baltic Coast to Sudety and Bieszczady Mountains; found on voles and murids (i.a. Wegner 1966, Kadulski and Izdebska 2004).

Acari

***Ixodes ricinus* Linnaeus, 1758**

Pitymys subterraneus - 2 nymphs on 1 mouse from Greater Poland.

Apodemus agrarius - 42 ticks (larvae mostly, also nymphs) on 2 mice from Greater Poland, 2 on 1 mouse from Pomerania.

Apodemus sylvaticus - 11 ticks (larvae and nymphs) on 3 mice from Greater Poland, 12 on 6 mice from Pomerania.

In total, 55 ticks have been found, in 6 rodents from the Greater Poland area and 14 ticks in 7 rodents from Pomerania.

The common tick is a widely distributed species, with a large epidemiologic significance, whereas the rodents constitute a reservoir of juvenile stages of this species.

Digenea

***Echinostoma* spp.**

Apodemus agrarius - 1 fluke from Pomerania.

A cosmopolitan species, common parasite of many species of water birds and mammals (Kostadinova 2005). From rodents found in Poland, this parasite has been observed in the muskrat in the Wielkopolska-Kujawska Lowlands (Grabda 1954) and field mouse in the vicinity of Wrocław (Hildebrand et al. 2004).

Nematoda

***Heligmosomoides polygyrum* (Dujardin, 1845) Boulanger, 1922**

Apodemus agrarius - 6 nematodes in 2 mice from Greater Poland.

Apodemus sylvaticus - 10 nematodes in 2 mice from Greater Poland, 5 in 1 mouse from Pomerania.

In total, 16 nematodes have been found, in 4 rodents from the Greater Poland area and 5 nematodes in 1 rodent from Pomerania.

A common parasite of many rodents in the Palearctic (Asakawa and Tenora 1996), observed also in Northern America (Durette-Desset et al. 1972). Widely

distributed in Poland; mainly a parasite of common vole (e.g. Furmaga 1957, Kisielewska 1971, Pojmańska 1998).

***Heterakis spumosa* Schneider, 1866**

Apodemus agrarius - 2 nematodes in 1 mouse from Greater Poland.

A cosmopolitan species, observed in rats, mice, common hamster and voles (Rizhikov et al. 1979). In Poland, found in brown rat in the the Tri-City agglomeration (Kruminis-Łozowska 1984, Izdebska and Rolbiecki 2004) and in Mazovian Lowland (i.a. Wysocki and Nasiłowska 1959), and in the field mouse in the vicinity of Lublin (Furmaga 1957), and Wrocław (Hildebrand et al. 2004).

***Syphacia frederici* Roman, 1945**

Apodemus agrarius - 16 nematodes in 1 mouse from Greater Poland, 8 in 1 mouse from Pomerania.

A. sylvaticus - 89 nematodes in 3 mice from Greater Poland, 262 nematodes in 6 mice from Pomerania.

In total, 105 nematodes have been found, in 4 rodents from the Greater Poland area and 270 nematodes in 7 rodents from Pomerania.

The nematode is observed in yellow necked mouse and wood mouse in Europe and Northern Africa (Rizhikov et al. 1979). In Poland, found in yellow necked mouse in Warszawa (Guerero 1979 after Pojmańska 1998), in Wrocław (Hildebrand et al. 2004), in the vicinity of Jelenia Góra (Popiołek et al. 2004) and in the Mazury Lakelands (Kuliś et al. 2004).

***Syphacia stroma* (Linstow, 1884) Morgan, 1932**

A. agrarius – 91 nematodes in 5 mice from Greater Poland, 36 in 1 mouse from Pomerania.

A. sylvaticus – 2 nematodes in 1 mouse from Greater Poland, 5 in 1 mouse from Pomerania.

In total, 93 nematodes have been found, in 6 rodents from the Greater Poland area and 41 nematodes in 2 rodents from Pomerania.

Species observed in rodents in Europe (Rizhikov et al. 1979). In Poland, found in field mouse in Warsaw (Guerero 1979 after Pojmańska 1998), in yellow necked mouse and field mouse in Wrocław (Hildebrand et al. 2004) and in yellow necked mouse in the vicinity of Jelenia Góra (Popiołek et al. 2004).

***Trichuris muris* (Schrank, 1788) Hall, 1916**

A. sylvaticus – 3 nematodes in 2 mice from Greater Poland.

A cosmopolitan parasite, commonly observed in various rodents (Anderson 1992). In Poland, found throughout the country; mainly a parasite of common vole (e.g. Furmaga 1957, Kisielewska 1971, Pojmańska 1998).

Summary

In similar agrocenoses of Greater Poland and Pomerania, practically the same species of rodents have been observed, and which had similar parasitofauna. The species that existed only on one of the surveyed standings (*C. agyrtes*, *C. assimilis*, *T. poppei*, *H. acanthopus*, *P. serrata*, *Echinostoma* spp., *H. spumosa*, *T. muris*) are small in numbers and observed only in single hosts. However, in the boundaries of the standing where they existed (*C. agyrtes*, *C. assimilis*, *H. acanthopus*), they sometimes attacked various host species. Common and numerous species were present on both standings, often in all rodent species found in these areas.

References

- Anderson R.C. 1992. Nematode parasites of vertebrates, their development and transmission. CAB International, Wallingford.
- Asakawa M., Tenora, F. 1996. A checklist and epidemiology of nematode parasites of the genus *Apodemus* (Murinae: Rodentia) throughout the World excluding Japan. *J. Rakuno Gakuen Univ.* 20: 181-213.
- Durette-Desset M.C., Kinsella, J.M., Forrester, D.J. 1972. Arguments of faveur de la double origine des Nématodes néartiques du genre *Heligmosomoides* Hall, 1916. *Ann. Parasit. Hum. Comp.* 47: 365-382.
- Furmaga S. 1957. Helmintofauna gryzoni polnych (Rodentia) okolic Lublina. *Acta Parasitol. Polon.* 5: 9-50.
- Grabda J. 1954. Les parasites internes du rat musqué – *Ondatra zibethica* (L.) des environs de Bydgoszcz (Pologne). *Acta Parasitol. Polon.* 2: 17-38.
- Guerero R. 1979. The structure of the endoparasite helminth communities of Rodents in an urban gradient. Rzoprawa doktorska, Instytut parazytologii PAN, Warszawa.
- Hildebrand J., Popiołek M., Okulewicz A., Zaleśny G. 2004. Helmintofauna myszy z rodzaju *Apodemus* z okolic Wrocławia. *Wiad. Parazytol.* 50: 623-628.
- Izdebska N., Rolbiecki L., 2004. Występowanie *Demodex* spp. w korelacji z poziomem zarażenia helmintami szczurów wędrownych *Rattus norvegicus* z aglomeracji Trójmiasta. W: Indykiewicz P., Barczak T. (red.). *Fauna miast Europy Środkowej 21. Wieku.* Wyd. LOGO, Bydgoszcz: 581-584.
- Kadulski S., Izdebska J.N. 2004. Anoplura u gryzoni (Rodentia) z terenów Polski Północnej. *Wiad. Parazytol.* 50: 329-332.
- Kisielewska K. 1971. Intestinal helminths as indicators of the age structure of *Microtus arvalis* Pallas, 1778 population. *Bull. Acad. Pol. Sci., Ser. Biol., Cl. II*, 19: 275-282.
- Kostadinova A. 2005. Family Echinostomatidae Loos, 1899. In: Jones A., Bray R.A., Gibson D.I. (eds.), *Keys to the Trematoda*, vol 2. CABI Publishing: 9-64.
- Kuliś K., Bajer A., Siński E. 2004. Helmintofauna wolno żyjących gryzoni a hormony sterydowe. *Wiad. Parazytol.* 50: 615-622.
- Kruminis-Łozowska W. 1984. Pasożyty wewnętrzne szczurów – *Rattus norvegicus* (Brek.) odławianych na terenie Trójmiasta. *Materiały IX Zjazdu PTP, Wrocław, 20-22 września 1984:* 164.
- Pojmańska T. 1998. Pasożyty ssaków *Parasiti Mammalium*. Katalog Fauny Pasożytniczej Polski. Cz. 5, z. 1, Warszawa.
- Popiołek M., Hildebrand J., Karpińska M., Indyk F., Pawłowska-Indyk A., 2004. Nicienie gryzoni z okolic Jeleniej Góry. *Wiad. Parazytol.* 50: 629-635.
- Rizhikov K.M., Gvosdev E.V., Tokobaev M.M., Shaldybin L.S., Matsaberidze G.V., Merkusheva I.V., Nadtochij E.V., Khokhlova I.G., Sharpilo L.D. 1979: *Opredelitel' gel'mintov gryzunov fauny SSSR. Nematody i akantotsefaly.* Izdatel'stvo Nauka, Moskva.
- Rolbiecki L. 2002. Szybka metoda wykonywania semipermanentnych glicerożelatynowych preparatów z pasożytów. *Wiad. Parazytol.* 48: 87-88.
- Skuratowicz W. 1954. Materiały do fauny pcheł (Aphaniptera) Polski. *Acta Parasitol. Pol.* 2: 65-96.
- Skuratowicz W. 1964. Pchły - Aphaniptera. Katalog Fauny Polski, PWN, Warszawa, cz. 31.
- Wysocki E., Nasiłowska M. 1959. Wyniki badań nad helmintofauną szczurów wędrownych. *Wiad. Parazyt.* 5: 591-594.
- Wegner Z. 1966. Wszy. Anoplura. Katalog Fauny Polski, PWN, Warszawa, cz. 19., z. 2.

ARTHROPODS
Epidemiological importance

Edited by

Alicja Buczek
Czesław Błaszak

KOLIBER
LUBLIN 2006

STAWONOGI

Znaczenie epidemiologiczne

Pod Redakcją

Alicji Buczek

Katedra i Zakład Biologii i Parazytologii
Akademia Medyczna im. Prof. F. Skubiszewskiego w Lublinie

Czesława Błaszaka

Zakład Morfologii Zwierząt
Uniwersytet im. Adama Mickiewicza w Poznaniu

KOLIBER
LUBLIN 2006

PROJEKT OKŁADKI: SEBASTIAN BUCZEK
COVER DESIGN: SEBASTIAN BUCZEK

KOREKTA JĘZYKOWA: MAREK SĘKOWSKI
ENGLISH PROOF - READING: MAREK SĘKOWSKI

WYDANIE DOFINANSOWANE PRZEZ KOMITET ZOOLOGII
PAN I KOMITET BADAŃ NAUKOWYCH

ISBN 83-60497-15-X

KOLIBER
www.kleszcze.pl