

Original papers

Interaction of ectoparasites in cohabitating colonies of pond bats *Myotis dasycneme* (Boie, 1825) and species of genus *Pipistrellus* from northern Poland[1]

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ABSTRACT. The article presents data on ectoparasites of pond bat (rare in Europe bat species) in northern Poland region. We discuss the species composition and relationship between ectoparasites of several bat species in mixed colonies. Temporary ectoparasites of pipistrelle bats suppress permanent ectoparasites of pond bats it the cohabitating colonies.

Key words: pond bat, bat ectoparasites, *Spinturnix*, *Carios*, Pomorskie province

Introduction

The pond bat *Myotis dasycneme* (Boie, 1825) is a very rare bat species in Europe [1]. Currently there are only two large colonies of this species recorded in northern Poland [2]. Specific permanent ectoparasites of pond bat includes gamasid mites: *Spinturnix myoti* (Kolenati, 1856) (specific ectoparasite of genus *Myotis*) and *Macronyssus corethroproctus* (Oudemans, 1902) [4–9]. Species of genus *Pipistrellus* harbor temporary ectoparasites (argasid ticks *Carios vespertilionis* and gamasid mites *Steatonyssus periblepharus*). However, at the cohabitation in the colonies of pond bat and pipistrelle bat a suppression of specific ectoparasite fauna of the first species by temporary ectoparasites is observed.

Material and Methods

Material was collected in northern Poland (Pomorskie province) in two locations: bat colonies of pond bats, soprano pipistrelle bats and Nathusius's pipistrelle bats in the attic of home near Lubnia (53°56'11" N, 17°48'19" E) (May–June 2009 and June 2011) and feeding pond bats, captured on the river near Płęsno (53°52'15" N, 17°33'10" E) (June 2011) (GDOS no. DOP-OZGIZ.6401.09.19.2011.km (7.06.2011)). In total, 960 ectoparasites were collected from 30 individual pond bats; additionally 68 ectoparasites were collected from 5 soprano pipistrelle bats, *Pipistrellus pygmaeus* (Leach, 1825) and 168 ectoparasites from 2 Nathusius's pipistrelle bats, *Pipistrellus nathusii* (Keyserling et Blasius, 1839). Preparation and species identification of ectoparasites involved standard methods [10].

Ectoparasite species were determined using light microscopy, according to several identification keys and articles [4,11,12]. According to Stanyukovich [13] and Estrada-Pena and Sanchez [14], *Spinturnix dasycnemi* (Kolenati, 1859) and *Spinturnix daubentoni* (Kolenati, 1857) are not regarded as separate species, and require more research for confirm independence of both these species. The regarded name of this mite is *Spinturnix myoti* (Kolenati, 1856) [13].

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Mean intensity (MI) was calculated as the mean number of ectoparasites found per host individual (not including parasite-free individuals). Prevalence was calculated as the percentage of bats infested [15].

Arthropod specimens were deposited in the Zoological Museum of the Institute of Plant and Animal Ecology, Ural Branch of Russian Academy of Sciences.

Results and Discussion

Acari
Mesostigmata
Spinturnicidae

Spinturnix myoti (Kolenati, 1856)

44 individuals were collected: 12 (3♂, 3♀ (including 2 females with internal eggs), 3 N1, 3 N2) in 2009 and 32 (11♂, 2♀ with internal eggs, 4 N1, 15 N2) in 2011. This is an oligophagous ectoparasite species which parasitizes bats of the genus *Myotis* [8]. Previously *Spinturnix myoti* has been recorded on pond bats in Poland [16], Germany [17], Baltic region [8], Udmurt Republic [18] and in the Urals [19].

Macronyssidae

Macronyssus corethroproctus (Oudemans, 1902)

25 mites of this species were removed: 5♂, 19♀ (including 14 with internal eggs) and 1 protonymph (N1). This is a monophagous specific ectoparasite on pond bats, found in Poland [7], Germany [17], Baltic region [8], Udmurt Republic [18] and in the Urals [19].

Steatonyssus periblepharus (Kolenati, 1858)

280 individuals of this species were in our material. Of those, 236 mites were collected from pond bats: 10♂, 33♀ (including 7 with internal eggs) and 191 N1. 19 individuals were collected from soprano pipistrelle bats (3♂, 12♀, 4 N1). 25 individuals (2♂, 7♀ (including 1 individual with internal egg) and 16 N1) were found on Nathusius's pipistrelle.

Steatonyssus periblepharus is a polyphagous species that is a parasite on many bat species in the families Vespertilionidae and Rhinolophidae. However, it occurs most frequently on pipistrelles (*Pipistrellus pipistrellus, Pipistrellus nathusii*) [8,17].

Ixodida
Argasidae

Carios vespertilionis (Latreille, 1796)

Our material includes 802 ticks of this species. From pond bats we collected 611 individuals (larvae): 371 specimens were collected in 2009 and 240 in 2011. This is transpalaearctic species, occurring in areas south of 60°N [11,16,20–22]; it is a polyphagous species that parasitizes a broad spectrum of hosts but is most abundant on various species of bats: *Myotis myotis* (Borkhausen, 1797), *Myotis brandtii* (Eversmann, 1845), *Myotis mystacinus* (Kuhl, 1817), *Nyctalus noctula* (Schreber, 1774), *Eptesicus serotinus* (Schreber, 1774), *Pipistrellus pipistrellus*, *P. pygmaeus*, *P. nathusii* [22,23] and other, but prefers pipistrelle bats [16]. Of the total, 49 specimens (larvae) were collected from soprano pipistrelles and 142 (larvae)

Table 1. Species and characteristics of infrapopulations of ectoparasites on bats captured in northern Poland

Ectoparasite species	Lubnia			Płęsno
	Pipistrellus pygmaeus (N=5)	*Pipistrellus nathusii* (N=2)	*Myotis dasycneme* (N=28)	*Myotis dasycneme* (N=2)
Carios vespertilionis	49 12,3 80%	142 142 –	605 24 89%	6 6 –
Steatonyssus periblepharus	19 4,8 80%	25 25 –	235 21 39%	1 1 –
Spinturnix myoti	–	–	12 2 18%	32 16 –
Macronyssus corethroproctus	–	–	–	25 12,5 –

Explanations: N – total number of caught bats. First line – number of parasites, second line – mean intensity, third line – prevalence [%].

from Nathusius's pipistrelle.

Ectoparasites of the pond bat were investigated in Poland and Germany by Vitzthum [3], Dusbabek [6], Haitlinger [7,16,17] and in the Baltic region by Stanyukovich [8]. We investigated the ectoparasite fauna of *M. dasycneme* in the Urals, in the ecological center of the range of this species [9,19,24]. It was shown that the ectoparasite fauna of pond bats mainly comprises the permanent ectoparasites: *Spinturnix andegavinus* (Kolenati, 1857), *S. myoti*, *S. kolenatii* (Oudemans, 1910), *Macronyssus corethroproctus*, *M. diversipilis* (Vizthum, 1920), *M. ellipticus* (Kolenati, 1956), *M. crosbyi* (Ewing et Stover, 1915).

There are two permanent ectoparasite species of *M. dasycneme* that can be found throughout the range of this bat: *Spinturnix myoti* and *Macronyssus corethroproctus*. These two species form a core of ectoparasite fauna of pond bats [25]. During the summer season the proportion of bats infested with the mite *Spinturnix myoti* in nursery colonies is normally high (prevalence is around 100% in nursery colonies) because life cycles of many species of the *Spinturnix* genus are synchronized with those of their hosts [26,27,own data]. The proportion infested with the mite *Macronyssus corethroproctus* during summer also reaches 100% in nursery colonies (the average number of mites on one infested host bat is 11) [9]. Temporary ectoparasites collected from pond bats includes *Steatonyssus periblepharus* in the Baltic region [8] and *Steatonyssus spinosus* (Willmann, 1936) in the Urals [9] and in the Kirov region [18]; also *Carios vespertilionis* has been recorded in northern Germany [17] and the Baltic [8].

However, the ectoparasite fauna of pond bats in northern Poland differs from the previously described pattern. The gamasid mite *Macronyssus*

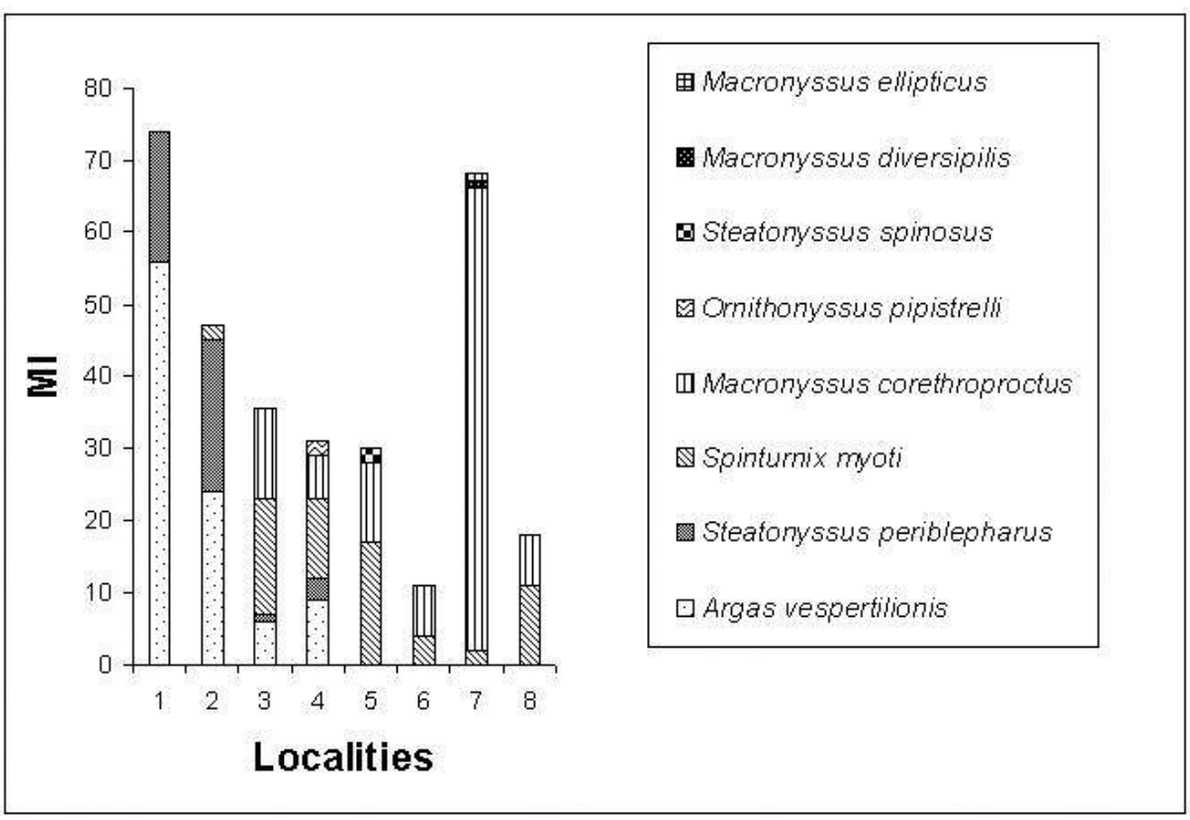

Fig.1. Mean intensity (MI) of ectoparasites infestation in pond bat from several parts of its area
Localities:
1. Poland, Lubnia, soprano pipistrelle (n=5)
2. Poland, Lubnia, pond bat (n=28)
3. Poland, Płęsno, pond bat (n=2)
4. Germany, Kiel, pond bat (own data) (n=6)
5. Russia, South Urals, Karabash town environs, pond bat (n=15) [9]
6. Russia, Northern Urals, Severouralsk town environs, pond bat (n=10) [9]
7. Russia, Middle Urals, Kamensk-Uralsky town environs, pond bat (n=10) [9]
8. Russia, Khanty-Mansiysk Autonomous Okrug, Kondinsky settlement, pond bat (n=5) (own data)

corethroproctus is a common species in pond bats elsewhere, but was not found on animals from Lubnia colony. Also, the proportion of animals infested by the tick *Spinturnix myoti* was relatively low in this local colony. Additionally, all the specimens of *S. myoti* were collected in 2009 (16 bats were examined) but not one of this parasite species was found on the 10 bats examined from this colony in 2011. This is evidence of reduction of this ectoparasite species population. On the other hand, pond bats from Lubnia showed considerable infestation by *Carios vespertilionis* and *Steatonyssus periblepharus* (Table 1). Those ectoparasite species were also found on Nathusius's pipistrelle (*Pipistrellus nathusii*), a large colony of which inhabited the same roof area.

The proportion of bats infested was similar for both Nathusius's pipistrelle and pond bat. The skin of all the examined animals was extensively irritated by bites of argasid ticks.

Meanwhile, two pond bats caught in Płęsno showed a different ectoparasite species composition, similar to that found in other parts of the pond bat's range [3,8,16,17,19]. The core ectoparasite fauna from Płęsno was represented by *Spinturnix myoti*, *Macronyssus corethroproctus* and *Steatonyssus periblepharus.* Pond bats from this colony showed healthy skin, without the scratches and marks seen on animals from Lubnia. It is probable that these bats belong to another colony, in an as yet unknown locality.

Therefore, our study suggests that, throughout the investigated range of the pond bat, the common gamasid mite ectoparasite species were *Spinturnix myoti* and *Macronyssus corethroproctus*. Both species were absent on the animals of Lubnia colony in 2011, and single finds of the mite *Spinturnix myoti* were made in 2009 (this species is normally abundant on pond bats during summer period). The composition of the gamasid mite ectoparasite fauna is identical to that of the Nathusius's pipistrelle colony inhabiting the same roof (Fig.1.).

In conclusion, it appears that cohabitation of the bat species *M. dasycneme* and *P. nathusii* leads to the repression of permanent specific ectoparasite fauna of pond bats by nonspecific temporal ectoparasites of Nathusius's pipistrelle. This phenomenon is described for the first time. It is interesting because on one hand it illustrates intraspecies relationships of ectoparasites from different ecological groups and on the other hand it can be used as „marker" for the colony. As a result we suggested that in addition to the Lubnia colony there is another colony of pond bats in northern Poland, representatives of which were caught in Płęsno. Searches were successful: two satellite colonies of pond bat females were found in northern Poland one year later (own data). Seeing *M. dasycneme* is very rare species in this region, such researches of pond bat ectoparasites is important.

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