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ECTOPARASITE ASSOCIATIONS OF BATS FROM THE URALS (RUSSIA)

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ABSTRACT - New data on bat ectoparasites from the Middle and Northern Urals are reported. Twenty species, belonging to 8 families of insects and mites were found on six bat species: *Myotis dasycneme, M. daubentonii, M. brandtii, Eptesicus nilsonii, Vespertilio murinus, Plecotus auritus*. All ectoparasite species are usual for Northern Eurasia.

Key words: distribution, prevalence, Acari, Insecta, Russia

RIASSUNTO - ***Ectoparassiti dei chirotteri degli Urali (Russia)***. Sono riportati nuovi dati sugli ectoparassiti dei chirotteri degli Urali medio-settentrionali. Venti specie, appartenenti a 8 famiglie di insetti e acari, sono stati trovati sui seguenti pipistrelli: *Myotis dasycneme, M. daubentonii, M. brandtii, Eptesicus nilsonii, Vespertilio murinus, Plecotus auritus*. Tutti gli ectoparassiti sono specie comuni per l'Eurasia settentrionale.

Parole chiave: distribuzione, prevalenza, Acari, Insetti, Russia

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INTRODUCTION

While some information is available about bat ectoparasites of north-western Russia (Leningradskaya region) and the Russian Far East (Stanyukovich 1990; Medvedev et al. 1991), little is known about their occurence and distribution in the Urals. Till now, only two species, *Spinturnix myoti* and *Macronyssus kolenatii* have been reported (Stanyukovich 1997). The aim of this work was to investigate the fauna of bat ectoparasites from this Russian region.

MATERIALS AND METHODS

From 2004 to 2009, bats were captured in the Northern and Middle Urals at five sites: caves "Arakaevskaya" and "Bolshoy proval", "Olenyi ruchyi" natural park (Nizhneserginskiy district); Ekaterinburg city; Dvurechensk settlement (Sysertskiy district); Smolinskaya cave (Kamenskiy district) and Divja cave (Perm region) (Fig. 1). Overall 83 individuals were caught, belonging to three tribes and six species (Myotini: *Myotis dasycneme, M. daubentonii, M. brandtii;* Vespertilionini: *Eptesicus nilsonii, Vespertilio murinus;* Plecotini: *Plecotus auritus*).

A total of 908 ectoparasites was collected from the animals' skin, and then fixed in 70% alcohol. Bats were released soon after their examination at the site of capture. Successively, ticks, mites and fleas were preserved in the Berlese media for permanent storage. Bat flies were stored in 70% alcohol. Ectoparasite species were determined using light microscopy, according to

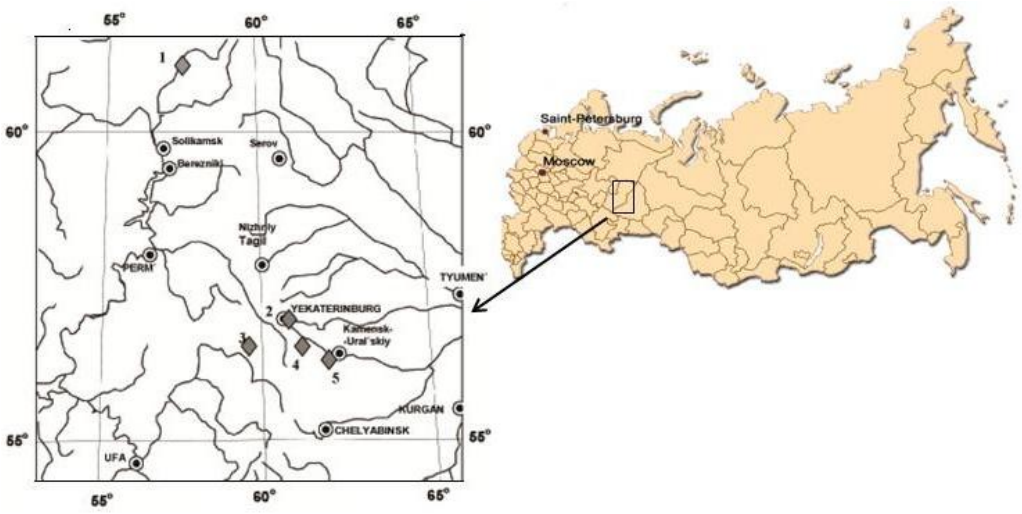

Figure 1 - Study area (1. Divja cave; 2. Ekaterinburg city; 3. "Olenyi ruchyi" Natural park; 4. Dvurechensk Settlement; 5. Smolinskaya cave).

several identification keys (Stanyukovich 1997; Rudnick 1960; Medvedev 1996; Bartonička 2007). They included gamasid and myobiid mites, argasid ticks and three orders of insects: Siphonaptera, Diptera and Hemiptera. Voucher arthropod specimens were deposited in the Zoological Museum of the Institute of Plant and Animal Ecology, Ural Branch of Russian Academy of Sciences.

Both the prevalence (percentage of infested bats) and mean intensity (mean number of ectoparasites per infested bat) of each ectoparasite were assessed.

RESULTS AND DISCUSSION

Twenty species of parasites, belonging to eight families (insects, mites and ticks), were obtained from bats (Tab. 1).

1. Class Arachnida, Subclass Acari

1.1 Order Ixodida, Family Argasidae

Argas vespertilionis (Latreille 1802): 49 larvae were collected from *V. murinus* in Ekateriburg.

1.2 Order Mesostigmata, Family Spinturnicidae

Spinturnix myoti (Kolenati 1856): 56 specimens were found on three hosts: *M. dasycneme* (2 females from Smolinskaya cave), *M. daubentonii* (10 females, 16 males, 5 deutonymphs, 2 protonymphs near Dvurechensk and one female in Smolinskaya cave) and *M. brandtii* (3 females, 2 males, 3 deutonymphs, 2 protonymphs in Dvurechensk; 2 females, 7 males, one deutonymphs in Divya cave).

Spinturnix plecotinus (Koch 1839): 20 specimens (14 females, 6 males) were collected on *Plecotus auritus* in Divya cave.

Spinturnix kolenatii (Oudemans, 1910): 72 specimens (22 males, 28 females, 21 deutonymphs and one protonymphs) were found on *Eptesicus nilsonii* near Dvurechensk. Two females were found on *E. nilsonii* in Bolshoy proval cave.

Table 1 - Bat ectoparasites in the study area. Figures are: number of ectoparasites, prevalence (%) and mean intensity, respectively.

Host / Ectoparasite	*Myotis dasycneme* (N=23)	*Myotis daubentonii* (N=14)	*Myotis brandtii* (N=12)	*Eptesicus nilsonii* (N=13)	*Vespertilio murinus* (N=20)	*Plecotus auritus* (N=4)
ACARI, Mesostigmata, Spinturnicidae						
Spinturnix myoti	2, 8.7, 1.0	34, 78.6, 3.1	20, 50.0, 3.3			
Spinturnix plecotinus						20, 100, 5.0
Spinturnix kolenatii				74, 84.6, 6.7		
Macronyssidae						
Macronyssus granulosus			3, 8.3, 3.0			
Macronyssus charusnurensis			16, 33.3, 4.0			
Macronyssus corethroproctus	604,69.6, 37.8					
Macronyssus diversipilis		1, 7.1, 1.0				
Macronyssus ellipticus			3, 8.3, 3.0			
Macronyssus flavus				12, 30.7, 3.0		
Macronyssus cyclaspis		1, 7.1, 1.0				
Steatonyssus sp.			1, 8.3, 1.0			
Ixodida, Argasidae						
Argas vespertilionis					49, 75.0, 3.3	
Trombidiformes, Trombiculidae						
Trombiculidae						1, 25, 1.0
Prostigmata, Myobiidae						
Acantophthirius mystacinoides			1, 8.3, 1.0			
INSECTA, Diptera, Nycteribiidae						
Nycteribia kolenatii	1, 4.3, 1.0	20, 64.0, 2.2				
Penicillidia monoceros	21, 39.1, 2.6					
Hemiptera, Cimicidae						
Cimex pipistrelli					1, 5, 10	
Siphonaptera, Ischnopsillidae						
Myodopsylla trisellis	8, 34.8, 1.0	3, 14.3, 1.5	9, 41.7, 1.8			
Ischnopsyllus obscurus				1, 7.7, 1.0		
Ischnopsyllus hexactenus				2, 15.4, 1.0		

1.3 Order Mesostigmata, Family Macronyssidae

Macronyssus charusnurensis (Dusbabek 1962): 16 deutonymphs were found on *M. brandtii* in Divja cave.

Macronyssus corethroproctus (Oudemans 1906): 604 individuals were recorded on *M. dasycneme*: one female and 96 protonymphs in Arakaevskaya cave; 11 females, one male, 495 protonimphs in Smolinskaya cave.

Macronyssus cyclaspis (Oudemans 1906): one individual was collected from *M. daubentonii* in Dvurechensk.

Macronyssus diversipilis (Vitzthum 1920): one male was found on *Eptesicus nilsonii* near Dvurechensk.

Macronyssus ellipticus (Kolenati 1856): one male and two protonymphs were recorded on *Myotis brandtii* in Arakaevskaya cave.

Macronyssus flavus (Kolenati 1856): six females were recorded on *Eptesicus nilsonii*: one in Arakaevskaya cave, five, together with six protonymphs, near Dvurechensk.

Macronyssus granulosus (Kolenati 1836): one female and two protonymphs were collected on *Myotis brandtii* in Arakaevskaya cave.

Steatonyssus sp.: one deutonymph was recorded on *M. brandtii* from Divja cave.

1.4 Order Prostigmata, Family Miobiidae

Acantophthirius mystacinoides (Uchikawa 1981): one female on *M. brandtii*.

1.5 Order Acarina, Suborder Trombidiformes, Family Trombiculidae

The larvae of an acarian mite belonging to family Trombiculidae was found on *P. auritus*.

2. Class Insecta

2.1 Order Diptera, Family Nycteribidae

Nycteribia kolenatii (Theodor et Moscona 1954): 20 specimens (12 males and 7 females near Dvurechensk, one male in Smolinskaya cave) were collected from *M. daubentonii* and one male from *M. dasycneme* in Smolinskaya cave.

Penicillidia monoceros (Speiser 1900): 21 specimens were found on *M. dasycneme*: 2 males in Arakaevskaya cave, 1 male near Dvurechensk, 18 individuals (5 males and 13 females) in Smolinskaya cave.

2.2 Order Hemiptera, Suborder Heteroptera, Family Cimicidae

Cimex pipistrelli (Jenyns 1839): one female was collected from *V. murinus* near Dvurechensk.

2.3 Order Siphonaptera, Family Ischnopsyllidae

Myodopsylla trisellis (Jordan 1929): a total of 21 specimens was recorded: 9 were found on *M. dasycneme* (6 females and 3 males in Smolinskaya cave), 3 females on *M. daubentonii* near Dvurechensk, 2 females on *M. brandtii* near Dvurechensk, 6 females and 1 male on *M. brandtii* in Divya cave.

Ichnopsillus obscurus (Wagner 1898): one female was found on *Eptesicus nilsonii* near Dvurechensk.

Ischnopsillus hexactenus (Kolenati 1856): one male and one female were recorded on *Eptesicus nilsonii* in Arakaevskaya cave.

Argas vespertilionis is a common ectoparasite of dendrophile and synanthropic bats from northern Eurasia (Bobkova

2003). Accordingly, we found it on *V. murinus* roosting inside a school building. Our finding of *A. vespertilionis* in the Urals, 56^0 30' North, represents the most northern site of this species for Russia.

High host specificity has been reported for spinturnicid mites (Stanyukovich 1990; Bruyndonckx et al. 2009). In our investigation, *Spinturnix myoti* was recorded on all Myotini, the highest prevalence (78.6%) having been recorded for *M. daubentonii*. *Spinturnix kolenatii* occurred only on *E. nilsonii* (84.6), while all long-eared bats (*P. auritus*) were infested by *Spinturnix plecotinus*.

Macronyssus corethroproctus is monophagous species infesting mostly pond bats (Radovsky 1967). The high number (N = 604) of *M. Corethroproctus* mites found on *M. dasycneme,* mostly juveniles (81.9%), depended on the mite reproductive activity, which unlike most other mites, flies and fleas, occurs in autumn.

Other gamasid mites *Macronyssus granulosus*, *M. charusnurensis* and *M. ellipticus*, collected on *M. brandtii* are polyphagous, parasitizing many species of vespertilionid bats (Dusbabek 1964; Stanyukovich 1997).

The almost exclusive occurrence of *Penicillidia monoceros* and *Nycteribia kolenatii* on *M. dasycneme* and *M. daubentonii*, respectively, agreed with previous information from the East Baltic coast (Farafonova 1985). A maximum of eight bat flies *Penicillidia monoceros* was caught on one bat individual.

In Russia, the Cimicidae parasitizing on bats and their relationship with the host are poorly known. The record of *Cimex pipistrelli* from *V. murinus* stirs further investigations.

Myodopsylla trisellis (Ischnopsyllidae) is a bat flea parasitizing vespertilionid bats of the genus *Myotis* (Medvedev 1996). In our study area, it was found on all analysed *Myotis* species.

Our preliminary screening of the ectoparasite fauna of bats from the Urals allowed to find out several species. Further researches, involving a wider range of bat species, are needed to draw up an exhaustive list.

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