

LARVAE OF TROMBICULID MITES (ACARINA: TROMBICULIDAE) IN WILD BIRDS IN SLOVAK AND POLISH CARPATHIANS

I. LITERÁK¹, M. HONZA², B. PINOWSKA³, A. HAMAN³

¹Department of Biology and Wildlife Diseases, Faculty of Veterinary Hygiene and Ecology, University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic

²Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Brno, Czech Republic

³Institute of Ecology, Polish Academy of Sciences, Dziekanów Leśny, Łomianki, Poland

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Abstract

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The larvae of trombiculid mites were surveyed in wild birds at four localities in Slovakia and one locality in Poland (all localities are situated in the Carpathian Mountains) from 1999 to 2000. The total of 1354 birds of 59 species was examined between July and September. The trombiculid mites were found in 169 (12 %) birds. The highest prevalences (37 % and 18 %) were detected at two forest localities in the Velká Fatra Mts., the lowest prevalence (2 %) in the High Tatras above the tree line. Prevalences of more than 20 % were found in *Turdus philomelos* (50 %, 5 positive, 10 examined), *Prunella modularis* (41 %, 48/116), *Troglodytes troglodytes* (39 %, 11/28), *Emberiza citrinella* (29 %, 4/14), *Turdus torquatus* (29 %, 2/7) and *Erithacus rubecula* (26 %, 64/244). Larvae of the trombiculid mites belong to common parasites in birds in the Carpathians in late summer, especially in birds which are feeding on the ground. Mite larvae were determined as *Neotrombicula vernalis* (Willmann, 1942) in *Erithacus rubecula* (Krempna, Beskid Niski Mts., Poland) and *Prunella modularis* (Blatnica, Velká Fatra Mts., Slovakia).

Passerines, parasites, Europe, skin, mountains, Trombiculidae

At various localities in Slovakia (Blatnica, Ruské, Necpaly, Tatranská Javorina) and Poland (Krempna) wild birds were examined for cutaneous trematode *Collyriclum faba* during summer periods from 1996 to 2000. The foci of this trematode were recently recorded in Slovakia (Literák and Sitko 1997; Literák and Honza 2000). Cutaneous trombiculid larvae were found in some examined birds in close proximity of the cloaca.

Because there is relatively little data about trombiculid mites in wild birds in Central Europe (Daniel 1961; Haitlinger 1987), the aim of our work was to document and compare the prevalences of their larvae in individual species of wild birds in study areas.

Materials and Methods

Birds were captured in mist-nets and visually examined for cutaneous cysts of *Collyriclum faba*. Skin was checked on the legs, ventral part of the body, especially between the sternum and cloaca, below the wings, around the preen gland, and on the whole head. Trombiculid larvae were recorded and their occurrence was retrospectively evaluated. Only parasites of two birds were collected into 70% ethanol and determined in the laboratory.

Site descriptions

Blatnica (Martin District) - 48.56 N 18.56 E, 940 m above sea level

The trapping site lies in the Veterná Valley of the Velká Fatra Mts. near a stream lined mainly with stands of beech *Fagus sylvatica* and spruce *Picea abies*. Birds were trapped between 2 and 8 August 1999.

Ruské (Snina District) - 49.07 N 22.21 E, 600 m above sea level

An area abandoned by its former inhabitants in the vicinity of the source of the Cirocha River, Bukovské Hills. Birds were trapped in successive tree growths near the former village of Ruské. At trapping sites, areas with

Address for correspondence:

Doc. MVDr. Ivan Literák, CSc.
Department of Biology and Wildlife Diseases
Faculty of Veterinary Hygiene and Ecology
University of Veterinary and Pharmaceutical Sciences
Palackého 1-3, 612 42 Brno, Czech Republic

Phone: + 420 5 41562525
Fax: + 420 5 49243020
E-mail: literaki@vfu.cz
<http://www.vfu.cz/acta-vet/actavet.htm>

deciduous trees of different age with a predominance of beech alternated with meadows. The birds were examined between 11 and 25 September 1999.

Necpaly (Martin District) - 48.59 N 18.58 E, 760 m above sea level

The trapping site lies near a stream in the Necpalská Valley in the Veľká Fatra Mts. The most numerous around the site were beech and spruce trees. Birds were examined here from 25 July to 6 August 2000.

Tatranská Javorina (Kežmarok District) - 49.16 N 20.09 E, 1450 m above sea level

The trapping site lies in the Javorová Valley in the High Tatras just above the tree line. Birds were trapped in dwarf mountain pines *Pinus mugo*, and along a borderline between the dwarf pines and a mountain meadow. Birds were examined between 8 and 19 August 2000.

Krempna (Jaslo District) - 49.30 N 21.29 E, 400 m above sea level

The trapping site was on the borderline between farms and large forests in the Beskid Niski Mts. The nets were situated near a stream along the edge of a deciduous forest, and in a shrub growth between farm buildings. Birds were examined between 21 and 26 August 2000.

Results

Parasite determination

Mites were collected from two birds for correct species determination. The mites collected from *Prunella modularis* (Blatnica, Veterná Valley, 3 August 1999), see Plate VI, Fig. 1, and from *Erithacus rubecula* (Krempna, 22 August 2000) coincided with characteristics typical of the genus *Neotrombicula* and within the frame of intraspecific variability corresponded with *Neotrombicula vernalis* (Willmann 1942) of the species complex *Neotrombicula autumnalis* (Shaw 1790) as described by Kepka (1964ab, 1966) and Vercammen-Grandjean and Kolebinova (1985).

Intensity of infection and prevalence of trombiculid mite larvae in wild birds

The intensity of parasitic infection varied among individual birds – from individual mites to mite groups not countable by eye. In the case of more mites, clearly demarcated orange colonies with the diameter up to 1 mm were seen. In some cases, there were more mites around the cloaca or created a ring-shaped circle round the cloaca (Plate VI, Fig. 2).

Positive birds for trombiculid larvae were determined in 14 out of 59 examined bird species (Table 1). In six species (*Emberiza citrinella*, *Erithacus rubecula*, *Prunella modularis*, *Troglodytes troglodytes*, *Turdus philomelos*, and *T. torquatus*) the prevalences were higher than 20%. In three species (*Parus major*, *P. montanus* a *Sylvia communis*) the prevalences were 10 - 20%, and in five other species (*Fringilla coelebs*, *Parus caeruleus*, *P. palustris*, *Sylvia atricapilla* and *Turdus merula*) were under 10%.

The parasites were found in all of the five Carpathian localities (Table 1). Prevalences of neotrombiculid larvae reached 37 % in Blatnica in August 1999, 10 % in Ruské in September 1999, 18 % in Necpaly between July and August 2000, 2 % in Tatranská Javorina in August 2000, and 14 % in Krempna in August 2000. The total prevalence was 12 %.

Discussion

The mite *Neotrombicula vernalis* collected from two birds (*Prunella modularis* in Slovakia and *Erithacus rubecula* in Poland) was unambiguously determined. Because findings in other birds were practically identical concerning colour and size of parasites as well as the place in immediate proximity of the cloaca, these mites were determined as trombiculid larvae.

Trombiculid larvae that infest mammals and birds can usually cause skin pruritus in affected individuals due to saliva excretion of larvae. Lytic enzymes in saliva cause the formation of tubes penetrating dermis (histiosiphon or stylostom) so that the larvae can suck macerated tissue of the host (Coignoul 1976). Heavily parasitized birds become droopy, refuse to eat, and may die from starvation and exhaustion (Phillips 1998). Intensity of the larvae of neotrombiculid mite infection was in some cases, especially in *Prunella modularis*

Table 1
Occurrence of larvae of trombiculid mites in wild birds from Carpathians

Species	Blatnica August 1999	Ruské September 1999	Necpaly July-August 2000	Tatranská Javorina August 2000	Krempna August 2000	Total
<i>Accipiter nisus</i>	Nt	0 ¹ /2 ² (0 ³)	Nt	Nt	Nt	0/2 (0)
<i>Acrocephalus palustris</i>	0/1 (0)	Nt	Nt	Nt	0/1 (0)	0/2 (0)
<i>Alcedo atthis</i>	Nt	Nt	Nt	Nt	0/3 (0)	0/3 (0)
<i>Aegithalos caudatus</i>	Nt	0/11 (0)	Nt	Nt	Nt	0/11 (0)
<i>Anthus trivialis</i>	Nt	0/5 (0)	0/2 (0)	Nt	Nt	0/7 (0)
<i>Bonasa bonasia</i>	Nt	0/1 (0)	Nt	0/1 (0)	Nt	0/2 (0)
<i>Buteo buteo</i>	Nt	0/2 (0)	Nt	Nt	Nt	0/2 (0)
<i>Carduelis carduelis</i>	Nt	0/2 (0)	Nt	Nt	Nt	0/2 (0)
<i>Carduelis spinus</i>	0/1 (0)	Nt	0/1 (0)	0/1 (0)	Nt	0/3 (0)
<i>Certhia familiaris</i>	0/1 (0)	0/1 (0)	0/2 (0)	0/2 (0)	0/2 (0)	0/8 (0)
<i>Cinclus cinclus</i>	0/3 (0)	Nt	Nt	Nt	Nt	0/3 (0)
<i>Coccothraustes coccothraustes</i>	Nt	0/1 (0)	Nt	Nt	Nt	0/1 (0)
<i>Crex crex</i>	Nt	0/1 (0)	Nt	Nt	Nt	0/1 (0)
<i>Delichon urbica</i>	Nt	Nt	Nt	0/1 (0)	Nt	0/1 (0)
<i>Dendrocopos leucotos</i>	Nt	0/1 (0)	Nt	Nt	Nt	0/1 (0)
<i>Dendrocopos major</i>	Nt	0/2 (0)	Nt	Nt	Nt	0/2 (0)
<i>Dendrocopos minor</i>	Nt	0/1 (0)	Nt	Nt	Nt	0/1 (0)
<i>Emberiza citrinella</i>	Nt	0/1 (0)	Nt	Nt	4/13 (31)	4/14 (29)
<i>Eriothacus rubecula</i>	14/22 (64)	36/130 (28)	6/38 (16)	0/27 (0)	8/27 (30)	64/244 (26)
<i>Ficedula hypoleuca</i>	Nt	Nt	Nt	0/2 (0)	Nt	0/2 (0)
<i>Ficedula parva</i>	Nt	0/3 (0)	0/1 (0)	0/1 (0)	0/1 (0)	0/6 (0)
<i>Fringilla coelebs</i>	1/6 (17)	1/12 (8)	Nt	0/3 (0)	2/27 (7)	4/48 (8)
<i>Garrulus glandarius</i>	Nt	0/4 (0)	Nt	Nt	Nt	0/4 (0)
<i>Hippolais icterina</i>	Nt	0/1 (0)	Nt	Nt	0/3 (0)	0/4 (0)
<i>Hirundo rustica</i>	Nt	Nt	Nt	Nt	0/15 (0)	0/15 (0)
<i>Jynx torquilla</i>	Nt	Nt	Nt	0/1 (0)	Nt	0/1 (0)
<i>Lanius collurio</i>	Nt	0/3 (0)	Nt	Nt	0/1 (0)	0/4 (0)
<i>Locustella naevia</i>	Nt	Nt	Nt	Nt	0/1 (0)	0/1 (0)
<i>Motacilla cinerea</i>	0/8 (0)	Nt	0/2 (0)	Nt	Nt	0/10 (0)
<i>Muscicapa striata</i>	Nt	Nt	Nt	Nt	0/4 (0)	0/4 (0)
<i>Nucifraga caryocatactes</i>	Nt	0/4 (0)	Nt	Nt	Nt	0/4 (0)
<i>Parus ater</i>	0/1 (0)	0/2 (0)	Nt	0/24 (0)	0/1 (0)	0/28 (0)
<i>Parus caeruleus</i>	0/3 (0)	2/45 (4)	Nt	Nt	0/5 (0)	2/53 (4)
<i>Parus cristatus</i>	Nt	Nt	Nt	0/2 (0)	Nt	0/2 (0)
<i>Parus major</i>	Nt	9/54 (17)	0/1 (0)	Nt	2/11 (18)	11/66 (17)
<i>Parus montanus</i>	0/1 (0)	2/7 (29)	Nt	0/2 (0)	2/16 (13)	4/26 (15)
<i>Parus palustris</i>	Nt	1/8 (13)	0/2 (0)	Nt	0/6 (0)	1/16 (6)
<i>Phoenicurus ochruros</i>	Nt	Nt	0/1 (0)	0/3 (0)	0/1 (0)	0/5 (0)
<i>Phoenicurus phoenicurus</i>	Nt	0/1 (0)	Nt	Nt	Nt	0/1 (0)
<i>Phylloscopus collybita</i>	0/17 (0)	0/187 (0)	0/2 (0)	0/26 (0)	0/33 (0)	0/265 (0)
<i>Phylloscopus sibilatrix</i>	Nt	Nt	Nt	Nt	0/2 (0)	0/2 (0)
<i>Phylloscopus trochilus</i>	0/2 (0)	0/12 (0)	Nt	0/1 (0)	Nt	0/15 (0)
<i>Picus canus</i>	Nt	0/2 (0)	Nt	Nt	Nt	0/2 (0)
<i>Prinella modularis</i>	28/30 (93)	3/7 (43)	7/10 (70)	5/63 (8)	5/6 (83)	48/116 (41)
<i>Pyrrhulla pyrrhulla</i>	0/3 (0)	0/4 (0)	0/2 (0)	0/3 (0)	0/8 (0)	0/20 (0)
<i>Regulus ignicapillus</i>	Nt	Nt	Nt	Nt	0/1 (0)	0/1 (0)
<i>Regulus regulus</i>	Nt	Nt	0/1 (0)	0/64 (0)	Nt	0/65 (0)
<i>Saxicola rubetra</i>	Nt	Nt	Nt	0/1 (0)	Nt	0/1 (0)
<i>Scolopax rusticola</i>	Nt	0/2 (0)	Nt	Nt	Nt	0/2 (0)
<i>Sitta europaea</i>	0/1 (0)	Nt	Nt	Nt	0/1 (0)	0/2 (0)
<i>Strix aluco</i>	Nt	Nt	0/1 (0)	Nt	Nt	0/1 (0)
<i>Sylvia atricapilla</i>	1/25 (4)	2/53 (4)	1/20 (5)	0/15 (0)	5/34 (15)	9/147 (6)
<i>Sylvia borin</i>	0/1 (0)	Nt	0/1 (0)	0/1 (0)	0/4 (0)	0/7 (0)
<i>Sylvia communis</i>	Nt	1/1 (100)	Nt	0/1 (0)	1/11 (9)	2/13 (15)
<i>Sylvia curruca</i>	Nt	0/2 (0)	Nt	Nt	0/2 (0)	0/4 (0)
<i>Troglodytes troglodytes</i>	0/1 (0)	5/18 (28)	1/2 (50)	0/1 (0)	5/6 (83)	11/28 (39)
<i>Turdus merula</i>	Nt	2/27 (7)	0/8 (0)	Nt	0/1 (0)	2/36 (6)
<i>Turdus philomelos</i>	3/3 (100)	0/2 (0)	2/3 (67)	0/1 (0)	0/1 (0)	5/10 (50)
<i>Turdus torquatus</i>	1/1 (100)	Nt	1/1 (100)	0/5 (0)	Nt	2/7 (29)
Total	48/131 (37)	64/622 (10)	18/101(18)	5/252 (2)	34/248 (14)	169/1354(12)

Nt – Not tested, ¹- Positive, ²- Tested, ³- Prevalence (%).

so heavy, that a negative influence on the health status was probable in affected individuals.

According to our results, the infestation of wild birds by trombiculid larvae is common in Slovak Carpathians from July to September. There is not much work on this topic in Central Europe. Only Daniel (1961) examined 16 species of birds in the area of eastern Slovakia (Ondava Highlands). He found in four bird species four species of trombiculid larvae: *Neotrombicula autumnalis* (Shaw 1792) s. l. in *Turdus ericetorum* and *Phoenicurus ochruros*, *Neotrombicula talmiensis* (Schluger, 1955) in *Sylvia communis*, *Leptotrombidium europaeum* (Daniel et Brelih, 1959) and *Ascoschoengastia latyshevi* (Schluger, 1955) in *Parus major*.

N. autumnalis belongs to the commonly occurring mites in Slovakia (Vater, 1982); however, their distribution was studied especially in small ground mammals (recently, e.g. Kalúz et al., 1996). From the species group of *Neotrombicula autumnalis*, the species *Neotrombicula inopinata* (Oudemans, 1909), *N. vernalis* (Willmann 1942) and *N. earis* (Kepka 1964) were found in small mammals in Vihorlat Mts., Malé Karpaty Mts. and in the Záhorská Lowlands (Kováčik 1983, 1984, 1985). The species *N. vernalis* and *N. earis* are considered to be the steppe species in the area of the Malé Karpaty Mts., inhabiting forest-steppe and steppe habitats. Our finding of *N. vernalis* in *Prunella modularis* in the higher part of Veľká Fatra Mts. indicates that the ecological valence of this species is larger than predicted.

In Poland, *N. autumnalis* s.l. belongs to the commonly occurring mites. However, in birds it was described for the first time in *Sitta europaea* in September 1982 (Haitlinger 1987).

It is obvious that affected wild birds in the Slovak and Polish Carpathians often foraged on the ground. A remarkably high prevalence of mite larvae was found in some Slovak localities, especially in *Prunella modularis*. We think that different prevalences in individual species of wild birds depend on various length of individual exposure in the environment with neotrombiculid larvae occurrence. All six species with prevalence higher than 20 % belong to the ground feeding or near-ground feeding species. Individuals from other groups feed on the ground only occasionally and that apparently is the reason for their lower parasitic prevalence.

In the forests of the Carpathians in the Veľká Fatra Mts., Bukovské Hills and Beskid Niski Mts., the mite larvae prevalence was 10-37%. A remarkably lower 2% prevalence was noticed in wild birds in the High Tatras. The growth of dwarf pines above the tree line in Javorová Valley, the site of bird examination in the High Tatras is probably less convenient for larvae of trombiculid mites than the Carpathian forests, nevertheless the occurrence of larvae of trombiculid mites is possible even in this environment at 1450 m above sea level.

In affected birds, larvae of trombiculid mites were exclusively in close proximity to the cloaca. Mites *N. autumnalis* were observed in *Turdus merula* in the Netherlands in the same body area (Bronsvijk 1977).

Larvy sametek (Acarina: Trombiculidae) u volně žijících ptáků ve slovenských a polských Karpatech

V letech 1999-2000 byli na čtyřech lokalitách Slovenska a jedné lokalitě v Polsku (všechny lokality se nacházejí v Karpatech) vyšetřováni volně žijící ptáci na přítomnost larev roztočů z čeledi Trombiculidae. Během měsíců červenec až září bylo vyšetřeno 1354 ptáků 59 druhů. Napadeno bylo celkem 169 (12 %) ptáků na všech pěti lokalitách. Nejvyšší prevalence (37 % a 18 %) byly na 2 lesních lokalitách ve Velké Fatře, nejnižší (2 %) na lokalitě ve Vysokých Tatrách, která se nacházela nad horní hranicí lesa. Prevalence vyšší než 20 % byla u *Turdus philomelos* (50 %, 5 pozitivních, 10 vyšetřených), *Prunella modularis* (41 %, 48/116), *Troglodytes troglodytes* (39 %, 11/28), *Emberiza citrinella* (29 %, 4/14), *Turdus torquatus* (29 %, 2/7) a *Erithacus rubecula* (26 %, 64/244). Larvy roztočů

čeledi Trombiculidae jsou v Karpatech během pozdně letního období častými parazity ptáků, kteří se při sběru potravy pohybují na zemi. Larvy roztočů z *Erithacus rubecula* (Krempna, Beskid Niski, Polsko) a z *Prunella modularis* (Blatnica, Veľká Fatra, Slovensko) byly determinovány jako *Neotrombicula vernalis* (Willmann, 1942).

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References

- BRONSVIJK, J.E.M.H. van 1977: Chigger infestation of a nineteenth century fortress near Utrecht, The Netherlands (Acari: Trombiculidae). *Int. J. Acarology* **3**: 27-36
- COIGNOUL, F. 1976: Infestation par les Trombididae chez les carnivores domestiques. *Ann. Med. Veter.* **120**: 549-550
- DANIEL, M. 1961: The bionomics and developmental cycle of some chiggers (Acariformes, Trombiculidae) in the Slovak Carpathians. *Čs. Parasitol.* **7**: 31-118
- HAITLINGER, R. 1987: *Dermanyssus alaudae* (Schränk, 1781) i inne roztocze (Acari: Dermanyssidae, Macronyssidae, Hirstionyssidae, Trombiculidae, Erythraeidae) zebrane z ptaków w Polsce. *Wiad. Parazyt.* **33**: 233-245
- KALÚZ, S., MÁJSKY, J., HRBATY, J. 1996: Chiggers (Acarina: Trombiculidae) in forest and wind-break of the Danubian plain. *Biológia (Bratislava)* **51**: 135-141
- KEPKA, O. 1964a: Zur Taxonomie der Formen von *Neotrombicula (N.) autumnalis* (Shaw 1790), (Acari, Trombiculidae). *Zeitschr. Zool. Syst. Evolutionsforschung* **2**: 123-173
- KEPKA, O. 1964b: Die Trombiculinae (Acari, Trombiculidae) in Österreich. *Zeitschr. Parasitenkunde* **23**: 548-642
- KEPKA, O. 1966: Trombiculidae (Acari) aus Türkei. II. *Zeitschr. Parasitenkunde* **27**: 43-63
- KOVÁČIK, J. 1983: Roztoče čelade Trombiculidae (Acarina) drobných zemných cicavcov Vihorlatu. *Zbor. Vých.-slov. Múz. Košice, Prír. vedy* **23**: 183 - 190
- KOVÁČIK, J. 1984: Trombikuly (Acarina, Trombiculidae) Záhorskej nížiny a Malých Karpát. *Biológia (Bratislava)* **39**: 215-222
- KOVÁČIK, J. 1985: Poznámky k ekológii larev trombikúl (Acarina: Trombiculidae) Záhorskej nížiny a Malých Karpát. *Biológia (Bratislava)* **40**: 613-620
- LITERÁK, I., HONZA M. 2000: Trematode *Collyriclum faba* in small passerines in the Veľká Fatra Mountains. *Helminthologia* **37**: 185
- LITERÁK, I., SITKO J.: Prevalence of the trematode *Collyriclum faba* in robins (*Erithacus rubecula*) in Slovakia. *Veter. Rec.* **141**: 273-274
- PHILIPS, J.R.. 1998: Mites (Ectoparasites, Poultry). In: Aiello S. (ed.): *The Merck Veterinary Manual* (Eighth Edition). MERCK and CO., INC., Whitehouse Station, N. J., USA, p. 1958-1960
- VATER, G. 1982: Zur geographischen Verbreitung der Erntemilbe *Neotrombicula autumnalis* (Acari: Trombiculidae). *Zool. Jb. Syst.* **109**: 329-356
- VERCAMMEN- GRANDJEAN, P. H., KOLEBINOVA, M. 1985: Revision of *Neotrombicula* complex (Acarina: Trombiculidae). *Acta Zool. Bulgarica* **29**: 65-78



Fig. 1. Larva of *Neotrombicula vernalis*.

(Photo by František Dusábek)



Fig. 2. *Prunella modularis* with larvae of *Neotrombicula vernalis* around its cloaca. (Photo by Marcel Honza)