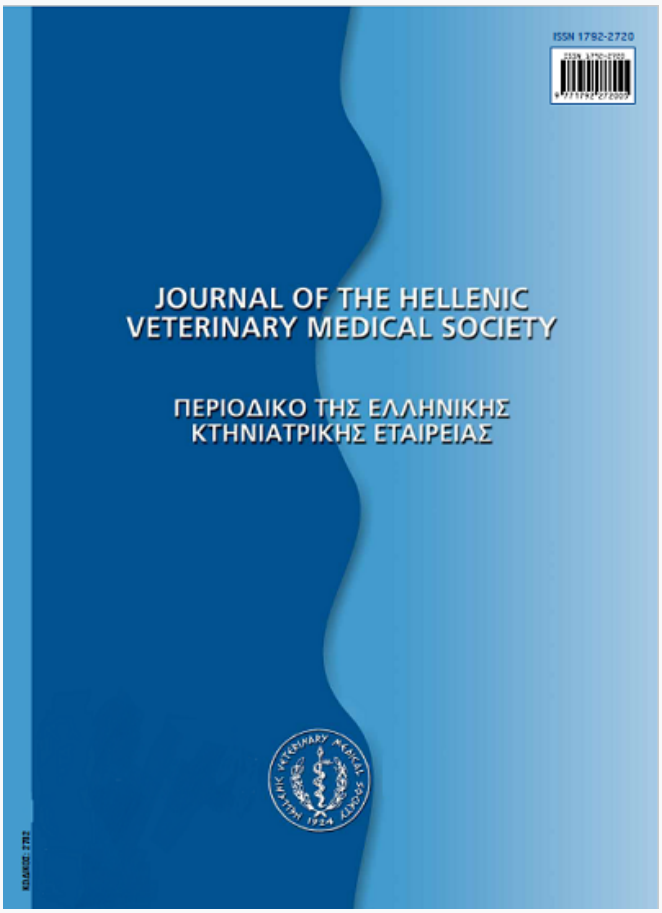
Journal of the Hellenic Veterinary Medical Society

Vol 63, No 2 (2012)



Two new species of nasal mites of the genus Ptilonyssus (Rhinonyssidae) from sparrows from the Leningrad province, Russia

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doi: 10.12681/jhvms.15432

J HELLENIC VET MED SOC 2012, 63(2): 167-176
ΠΕΚΕ 2012, 63(2): 167-176

Original article
Ερευνητικό άρθρο

Two new species of nasal mites of the genus Ptilonyssus (Rhinonyssidae) from sparrows from the Leningrad province, Russia

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Δύο νέα είδη ρινικών ακάρεων του γένους Ptilonyssus (Rhinonyssidae) από σπουργίτια της επαρχίας του Λένινγκραντ της Ρωσίας

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Abstract

Two new nasal mites of the genus Ptilonyssus Berlese and Trouessart, 1889 are described from sparrows of the genus Passer (Passeriformes: Ploceidae) found in the Leningrad province, Russia: *Ptilonyssus degtiarevae*, n. sp. from *Passer domesticus* (L.) and *Ptilonyssus lovottiae* n. sp. from *Passer montanus* (L.). *Ptilonyssus degtiarevae*, n. sp. belongs to the newly established *orthonychus* species complex, and *Ptilonyssus lovottiae* n. sp. is referred to the *hirsti* species complex. The species content of the *hirsti* complex0, originally defined by Fain and Bafort 1963 is enlarged comparing to the concept of previous researchers.

Keywords: Rhinonyssid nasal mites, *Ptilonyssus degtiarevae, Ptilonyssus lovottiae,* sparrows *(Passeriformes)*

Περίληψη

Δύο νέα ρινικά ακάρεα του γένους Ptilonyssus Berlese και Trouessart 1889, περιγράφονται από σπουργίτια του γένους Passer (Στρουθιόμορφα: Ploceidae) που βρέθηκαν στην επαρχία Λένινγκραντ της Ρωσίας: Ptilonyssus degtiarevae, n. sp. από το Passer domes*ticus* (L.) και *Ptilonyssus lovottiae* n. sp. από το *Passer montanus* (L.). Το *Ptilonyssus degtiarevae*, n. sp. ανήκει στο νεοϊδρυθέν συγκρότημα ειδών *orthonychus*, και το *Ptilonyssus lovottiae* n. sp. αναφέρεται στο συγκρότημα ειδών *hirsti*. Τα συμπεριλαμβανόμενα είδη του συγκροτήματος *hirsti*, που αρχικά ορίσθηκαν από τους Fain και Bafort 1963, διευρύνονται σε σύγκριση με την αντίληψη των προηγούμενων ερευνητών.

Λέξεις ευρετηρίασης: Ρινικά ακάρεα *Rhinonyssid, Ptilonyssus degtiarevae, Ptilonyssus lovottiae*, σπουργίτια (*Passeriformes*)

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Submission date: 20.12.2011
Acceptance date: 28.05.2012

Ημερομηνία υποβολής: 20.12.2011
Ημερομηνία αποδοχής: 28.05.2012

Υπεύθυνος επιμελητής σύνταξης: Α. Τυρπένου

INTRODUCTION

Mites of the family Rhinonyssidae, Trouessart, 1895 are permanent parasites of birds located in respiratory system of these hosts (Fain, A., 1994, George E., 1961, Knee & Proctor, 2010). The greatest majority of them parasitize in the nasal cavities, though some species occupy the lungs, tracheal tissues and even body cavity of birds (Porter & Strandtmann 1952, Krantz & Walter, 2009). They are obligate hematophagous endoparasites (Vitzthum 1935). These mites are viviparous, and their females produce eggs in which larvae are almost completely formed (Bregetova 1956). Rhinonyssid mites are usually transmitted directly from host to host via the oral route or when infested adult birds regurgitate food to their nestlings or during courtship behavior. Indirect transmission has been detected through water, perches, or other contaminated surfaces (Bell, 1996). The family Rhinonyssidae currently includes about 500 described species arranged in eight genera: *Larinyssus, Mesonyssus, Mesonyssoides, Ptilonyssus Rallinyssus, Rhinonyssus, Sternostoma, Tinaminyssus,* (Domrow, 1969, Fain 1994; Knee, 2008). Host specificity of rhinonyssid genera is variable; some genera are constrained to one host family, while others observed in hosts from different orders (Pence 1973). Investigations of rhinonyssids are important, because of the direct damage to their hosts, which has been described as Rhinonyssidosis avium disease (Dimov, 2011). Rhinonyssid mites were detected as reservoirs and vectors of encephalitis (Winn & Bennington 1959). There is a probability that they could also be reservoirs or vectors of other infections (Bregetova 1956, Domrow, 1969).

The genus *Ptilonyssus* Berlese and Trouessart, 1889 is the most species-rich genus of the family and currently includes over 130 species (Pence, 1975, Fain 1994). Members of the genus *Ptilonyssus* are large mites elliptical form, slightly sclerotized, and have dorsolateral stigmata with short peritremes. Representatives of this genus are known from 3 orders, and the majority of species are recorded from the order Passeriforms. There is no a universally accepted view on taxonomic boundaries of this genus. According to "wide" concept proposed by Domrow (1969) and used by most experts, the genus *Ptilonyssus* incorporates a number of taxa previously established as separate genera (*Rhinonyssoides* Hirst, 1921, *Neonyssus* Hirst, 1921, *Neonyssoides* Hirst, 1923, *Ptilonyssoides* Vitzthum, 1935).

In the present work we describe two new species of the genus *Ptilonyssus* found on passeriform hosts in the Leningrad province, Russia.

MATERIALS AND METHODS

Eight birds (road killed) – five *Passer domesticus* (L) and three *Passer montanus* (L.) were collected in a neighborhood of Gavrilovo village, Konzj, Novaya Ladoga and Boronichevo (Leningrad Province, Russia). Nineteen mites were collected from all birds by dissecting the host's nasal cavities. The bird's heads were placed in a glass dish with 80% ethanol, dissected and examined under a dissecting stereomicroscope; found mite specimens were preserved in 70% ethanol.

Descriptions of new species are given in a standard format for rhinonyssid mites (Pence 1975, Knee 2008). Descriptions are based upon the holotype, and paratypes if present. Idiosomal chaetotaxy is based upon the system proposed by Lindquist & Evans (1965). We complete here the idiosomal chaetotaxy by adding a nomenclature for minute setae on the opisthosomal shield. The following designations, adapted from Fain & Hyland (1962). LB- length of body including palps; WID – width of idiosoma; LPS – length of podosomal shield; WPS – width of podosomal shield; LOS – length of opisthosomal shield; WOS – width of opisthosomal shield; LpS – length of pygidial shield; WpS – width of pygidial shield; LSS – length of sternal shield; WSS – width of sternal shield; LGS – length of genital shield; WGS – width of genital shield; LAS- length of anal shield; WAS- width of anal shield; LG – length of gnathosoma, ventral view, including palps; WG – width of gnathosoma; LCH – length of helicerae; WCH - width of helicerae; Lleg I to Lleg IV - length of leg, including coxa, excluding ambulacrum. We complete these set of measurements with the size of mesosomal shieldlets: LMS_L – length of left mesosomal shieldlets; LMS_R – length of right mesosomal shieldlets; WMS_L - width of left mesosomal shieldlets; WMS_R - width of right mesosomal shieldlets. All measurements are in micrometers.

Holotypes and paratypes are deposited in the collections of Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

RESULTS AND DISCUSSION

In this survey there were described two mites

Ptilonyssus degtiarevae, n. sp. from *Passer domesticus* (L.) and *Ptilonyssus lovottiae* n. sp. from *Passer montanus* (L).

***Ptilonyssus degtiarevae* n. sp.** (Figures 1-3 and 3a)

Female: *(holotype and 3 paratypes):*

Large mites elliptical form with podosomal and pygidial shields. Podosomal shield egg-shaped form with 10 pairs of setae. One pair mesosomal shieldlets present. Genital shield with two pairs of setae. Cribrum present.

Measurements: LB- 753-766 μm.; WID – 234-237 μm; LPS – 178-192 μm; WPS – 150-169 μm; LpS – 41-45 μm; WpS – 69-73 μm; LMS_L – 20-22 μm; LMS_R – 19-20 μm; WMS_L – 18-20 μm; WMS_R – 17-20 μm; LSS – 78-84 μm; WSS – 70-79 μm; LGS – 90-104 μm; WGS – 53-62 μm; LAS- 42-51 μm; WAS- 31-38 μm; LG – 124 -135 μm; WG – 53-65 μm; LCH – 98-109 μm; WCH – 14-18 μm; Lleg I – 247-262 μm; Lleg II – 164-205 μm; LlegIII – 179- 197 μm; Lleg IV – 193- 231 μm.

Dorsum: (Figure 1) Podosomal shield egg-shaped form with 10 pairs of setae (j_{1-5},z_{2-6}). 3 pairs of setae situated laterally of the shield (r_{4-6}). One pair of mesosomal shieldlets rectangular in form, situated behind podosomal shield. Opisthosoma with 16 pairs of setae (J_{1-9}, Z_{1-6}, $R_{1,2}$). Pygidial shield extensive, with rounded anterior margin, posterior margin invaginated, with 1 pair of setae (J_8).

Venter: (Figure 2) Sternal shield large, with distinct borders, with 3 pairs of sternal setae (st_{1-3}). One pair metasternal setae (st_4). Genital shield wide, with 2 pairs of setae ($he_{4,5}$). Opisthosoma with 8 pairs of setae (Jv_{1-4}, $Zv_{1,2,3}$, U_{R1}). Anal shield with postanal and paranal setae (Ad, Pa) posterior to anal opening. Anus located near anterior margin of anal shield. Cribrum present.

Gnathosoma: (Figure 2) One pair of subcapitular setae (cs). 7 deutosternal dents present. Three pairs of hypostomal setae (hyp1-3). Palps long, with short and tiny setae.

Legs: All legs six-segmented. Coxae I – III with 2 setae each, coxa IV with 1 seta. Claws straight, tapering. Coxal formula 2-2-2-1.

Larva: (1 paratype) (Figure 3) LB- 316 μm ; WID – 195 μm; Lleg I - 113 μm ; Lleg II - 93 μm; LlegIII -

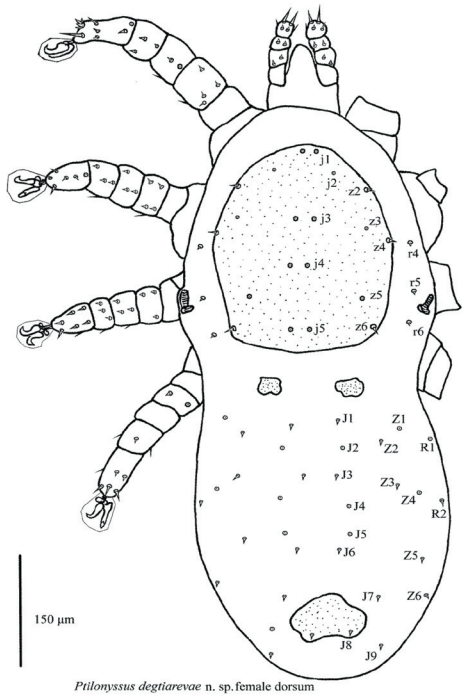


Figure 1. Ptilonyssus degtiarevae n. sp., female dorsum.

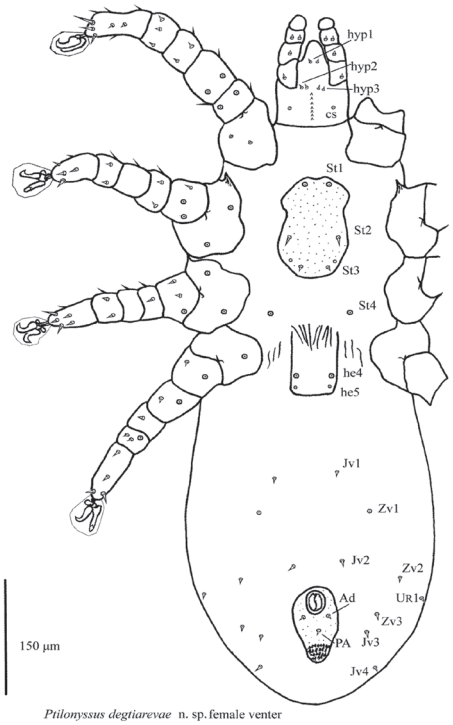


Figure 2. Ptilonyssus degtiarevae n. sp., female venter.

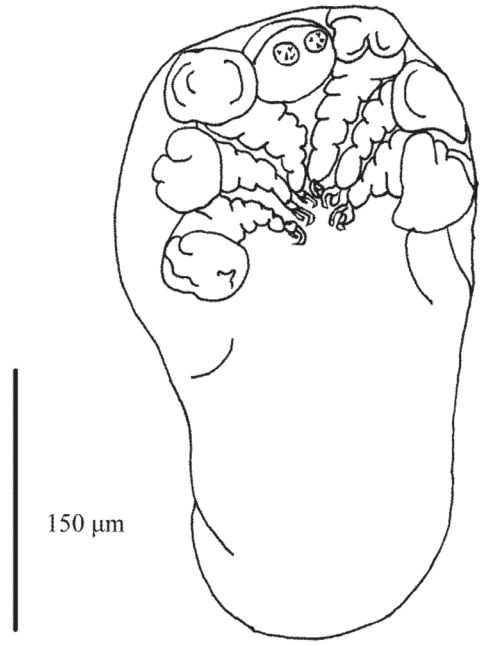


Figure 3. Ptilonyssus degtiarevae n. sp., larva.

Figure 3a. Ptilonyssus degtiarevae n. sp., female dorsum (holotype).

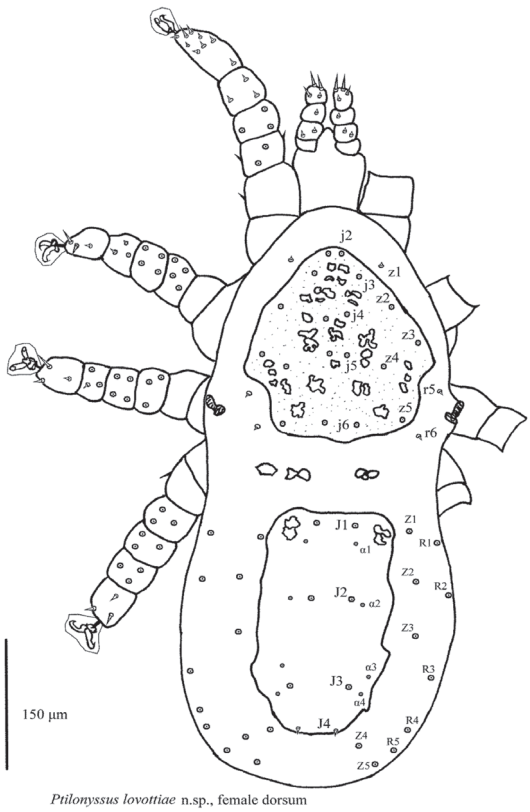


Figure 4. Ptilonyssus lovottiae n. sp., female dorsum.

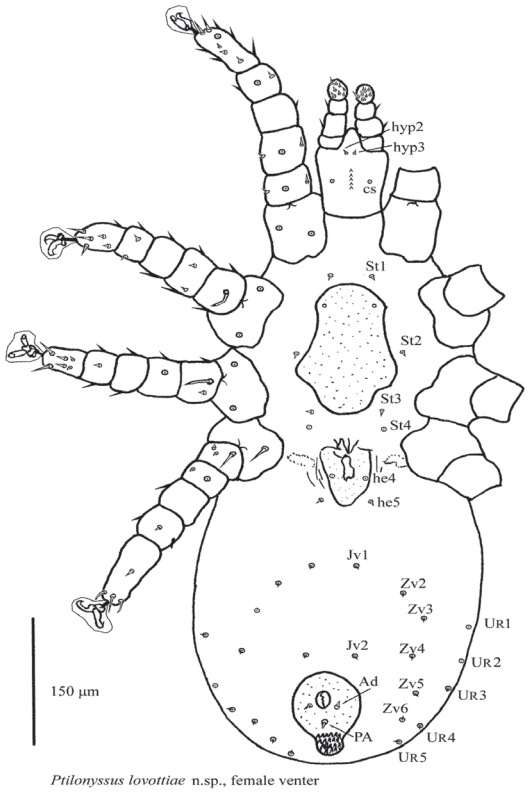


Figure 5. Ptilonyssus lovottiae n. sp., female venter.

76 μm. All tarsi with small claws.

Male, nymphs: Unknown

Type material. Female holotype (ZISP 4717), 3 female and 1 larva paratypes (ZISP 4718-4720) from *Passer domesticus* (L.) (Passeridae), Russia, Leningrad province, Gavrilovo village (60°35' N, 29°02' W) 21.09.2010, coll. I. Dimov.

Etymology: *Ptilonyssus degtiarevae* n. sp. is named for Larisa Degtiareva in appreciation her help and kindness.

Ptilonyssus lovottiae, n.sp. (Figures 4- 11 and 11a)

Key to *Ptilonyssus* species of sparrows based on the females.

Opisthosomal shield present	*Ptilonyssus lovottiae*, n.sp.
Opisthosomal shield absent	*Ptilonyssus degtiarevae* n. sp.
Pygidial shield present	*Ptilonyssus degtiarevae* n. sp.
Pygidial shield absent	*Ptilonyssus lovottiae*, n.sp.
Genital shield with two pairs of setae	*Ptilonyssus degtiarevae* n. sp.
Genital shield with one pairs of setae	*Ptilonyssus lovottiae*, n.sp
Seven deutosternal dents present	*Ptilonyssus degtiarevae* n. sp.
Five deutosternal dents present	*Ptilonyssus lovottiae*, n.sp.
Three pairs of hypostomal setae	*Ptilonyssus degtiarevae* n. sp.
One pair of hypostomal setae	*Ptilonyssus lovottiae*, n.sp.

Description

Female: (*holotype and 14 paratypes*)

Middle – sized mites with podosomal and opisthosomal shields and with mesosomal shieldlets. Shields of idiosoma with numerous setae. Four pairs of sternal setae present. Anal shield of quince-shaped form. Cribrum present.

Measurements: LB- 584-640 μm; WID – 166-212 μm; LPS – 151-159 μm; WPS – 144-153 μm; LOS –189-194 μm; WOS – 95-104 μm; LMS_L – 7-9 μm; LMS_R – 9-11 μm; WMS_L – 9-10 μm; WMS_R – 11-16 μm; LSS – 51-63 μm ; WSS – 43-47 μm; LAS- 61-69 μm; WAS- 33-39 μm; LGS – 45-50 μm; WGS – 37-43 μm; LG – 118-125 μm; WG – 42-50 μm; LCH – 69-77 μm; WCH – 5-8 μm; Lleg I – 238-250 μm; Lleg II – 176-191 μm; LlegIII – 177 -186 μm; Lleg IV – 213-229 μm.

Dorsum: (Figure 4) Podosomal shield rounded anteriorly, with 18 well developed setae (j_{2-6}, z_{2-5}). 1 pair of setae (z1) situated near antero-lateal margins of podosomal shield; 2 pairs of setae situated laterally to posterior half of this shield ($r_{5,6}$). In holotype 3 mesosomal shieldlets of irregular form present (on other specimens 2 mesosomal shieldlets present). Dorsal opisthosoma with 22 setae (Z_{1-5}, R_{1-5}). Opisthosomal shield rectangular, with uneven margins, with 8 well developed setae (J_{1-4}) and with 8 minute setae (α1-4). Podosomal shield well sclerotized.

Venter: (Figure 5) Sternal shield large, with posterior part widened. 2 pairs of sternal setae ($st_{1,2}$) situated anterior and lateral to this shield, espectively. One pair of sternal setae (st_3) situated posterior to sternal shield, and one pair of metasternal setae (st_4) situated at level of posterior margin of coxa III. Anteriorly of sternal shield with one pair of small pores. Genital shield wide, with 1 pair of setae (he_4), one pair of setae (he_5) near this shield. 24 setae on the opisthosomal idiosoma (Jv_{1-2}, Zv_{2-6}, UR_{1-5}). Anal shield wide, quince-shaped. Cribrum present. Paranal and postanal setae (Ad, Pa) posterior to anus.

Gnathosoma: (Figure 5) One pair of subcapitular setae(cs) and one pair of hypostomal setae (hyp2,3). 5 deutosternal dents.

Legs: (Figure 5) All legs six-segmented. Coxae I – III with two setae each; coxa IV with one seta. All tarsi with curved claws. Coxal formula : 2-2-2-1.

Male: *(10 paratypes)* LB- 464-492 μm; WID – 148-171 μm; LPS – 132-142 μm; WPS – 144-168 μm;

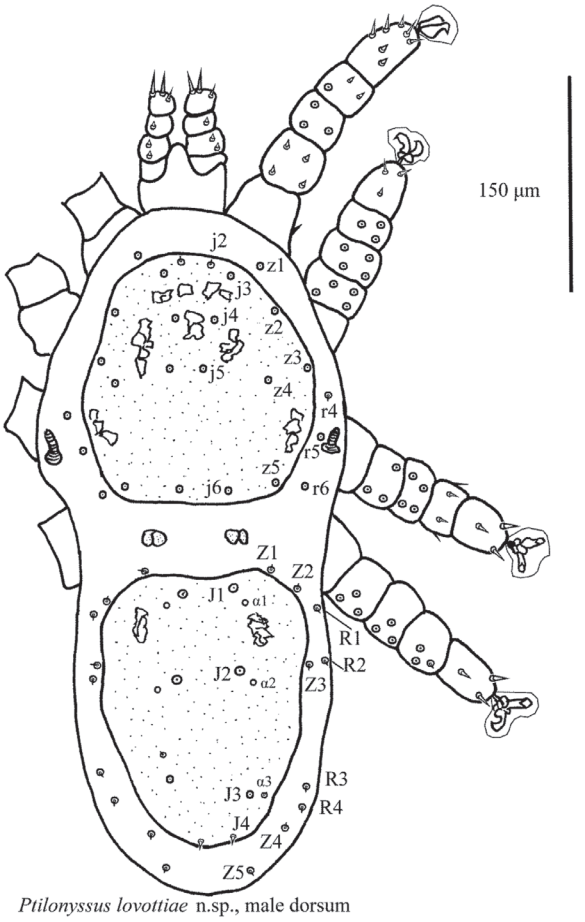


Figure 6. Ptilonyssus lovottiae n. sp., male dorsum.

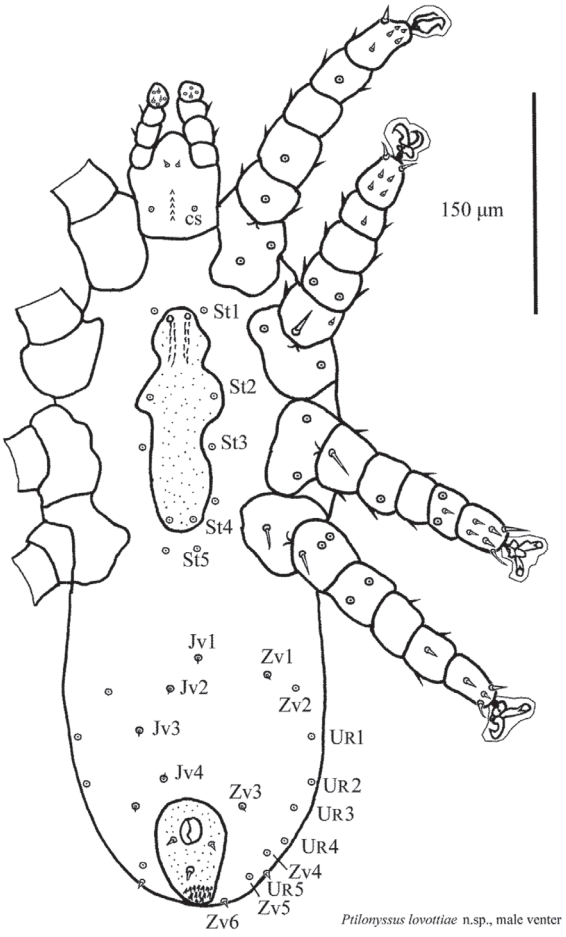


Figure 7. Ptilonyssus lovottiae n. sp., male venter.

LOS – 150-155 μm; WOS – 107-112 μm; LMS_L – 6-8 μm; LMS_R – 6-7 μm; WMS_L – 9-12 μm; WMS_R –6-8 μm; LSS – 71 -78 μm; WSS – 32-49 μm; LAS- 46 -53 μm; WAS- 33-41 μm; LG – 74-90 μm; WG – 40-47 μm; LCH – 58-65 μm; WCH – 7-11 μm; Lleg I – 193-297 μm; Lleg II – 158-165 μm; LlegIII - 161-167 μm; Lleg IV – 183-192 μm.

Dorsum: (Figure 6) Podosomal and opisthosomal shields cover most of idiosoma. Podosomal shield with 18-20 setae (j_{2-6}, z_{1-5}). 3 pairs of setae situated laterally of the shield (r_{4-6}). One pair of mesosomal shieldlets present. Opisthosomal idiosoma with 18 setae (Z_{1-5}, R_{1-4}). Opisthosomal shield of oval form, with 14 setae (J_{1-4}, α1-3).

Venter: (Figure 7) Sternogenital shield with 4 setae and 4 setae around this shield (st1,2,3). Metasternal setae (st4,5) Opisthosomal idiosoma with 21-22 setae (Jv_{1-4}, Zv_{1-6}, UR_{1-5}). Anal shield wide, with quince-shaped form. Paranal and postanal setae (Ad, Pa) posterior to anus. Cribrum present.

Gnathosoma: (Figure 7) One pair of subcapitular setae(cs) and one pair of hypostomal setae (hyp).

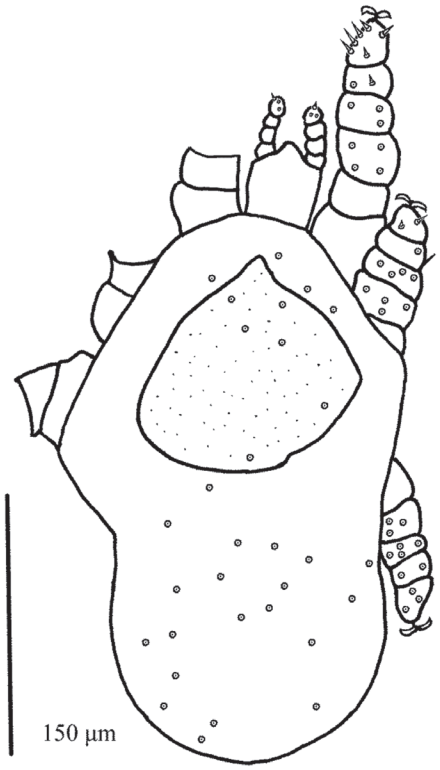
Legs : (Figure 7) All legs six-segmented. Coxae I – III with two setae; coxa IV with one seta. All tarsi with curved and powerful claws. Coxa formula: 2-2-2-1

Larva: *(1 paratype)* LB- 325 μm; WID – 153 μm; LPS – 86 μm; WPS – 81 μm; LG – 73 μm ; WG – 30 μm; Lleg I - 134 μm; Lleg II – 103 μm ; LlegIII – 94 μm.

Dorsum: (Figure 8) Small oval corpus. Dorsal idiosoma with 24 setae. Podosomal shield large with indistinct margins, with 6 setae.

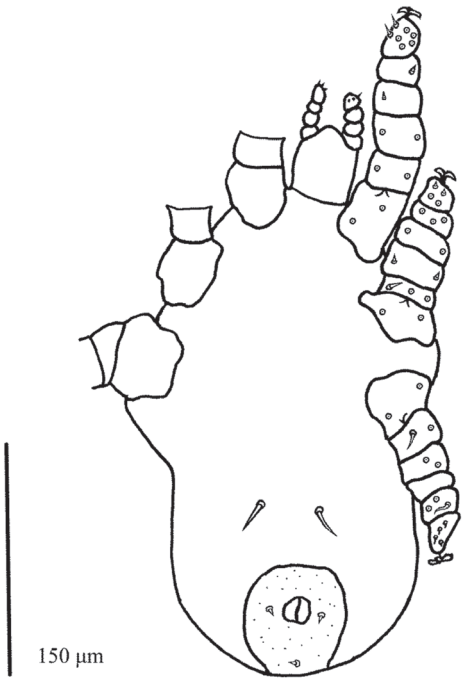
Venter: (Figure 9) Two large setae on tventral idiosoma. Anal shield wide with 3 setae.

Gnathosoma: Gnathosoma wide, palps long, with



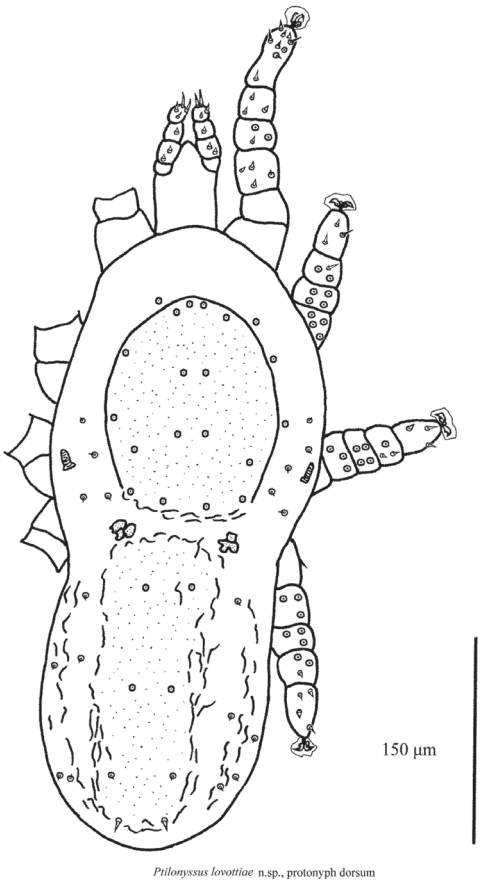
Ptilonyssus lovottiae n.sp., larva dorsum

Figure 8. Ptilonyssus lovottiae n. sp., larva dorsum.



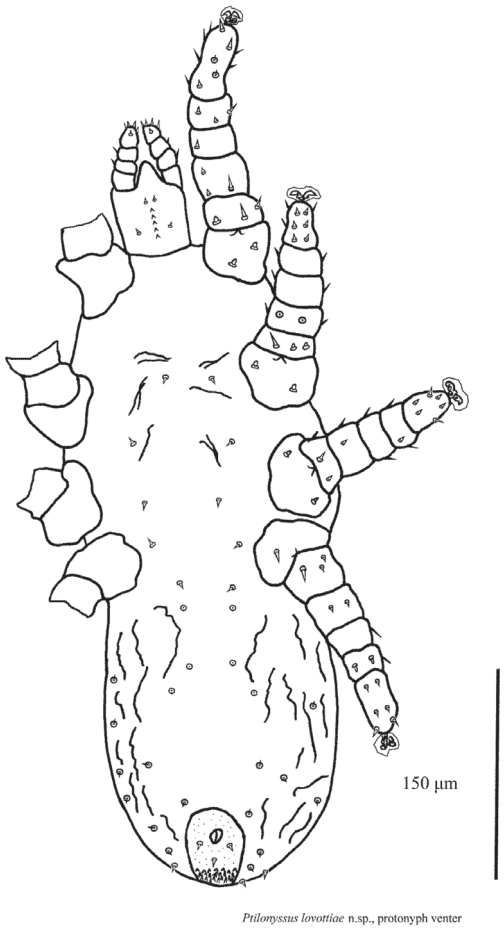
Ptilonyssus lovottiae n.sp., larva venter

Figure 9. Ptilonyssus lovottiae n. sp., larva venter.



Ptilonyssus lovottiae n.sp., protonyph dorsum

Figure 10. Ptilonyssus lovottiae n. sp., protonymph dorsum.



Ptilonyssus lovottiae n.sp., protonyph venter

Figure 11. Ptilonyssus lovottiae n. sp., protonymph venter.

Figure 11a. Ptilonyssus lovottiae n. sp., female dorsum (holotype).

short and tiny setae.

Legs: All legs six-segmented. All tarsi with very small claws.

Protonymph: *(1 paratype)* LB- 494 μm; WID – 172 μm; LPS – 109 μm; WPS – 101 μm; LOS – 144 μm; WOS – 62 μm; LAS- 34 μm; WAS- 32 μm; LG – 79 μm; WG –40 μm; LCH – 27 μm; WCH – 6 μm; Lleg I – 172 μm; Lleg II – 135 μm; LlegIII – 133 μm; Lleg IV – 154 μm.

Dorsum: (Figure 10) Podosomal shield egg-shaped, with 16 setae. Peritreme situated dorsolaterally at level coxa III. Opisthosomal shield with poorly distinct margins, rectangular in form, with 8 setae. Opisthosomal idiosoma with 10 setae.

Venter: (Figure 11) Sternal shield absent. Three pairs of sternal setae and one pair of metasternal setae. Opisthosomal idiosoma with 12 pairs of setae. Anal shield wide, quince-shaped form. Paranal and postanal setae posterior anus. Cribrum present.

Gnathosoma: Gnathosoma wide, with long palps.

Legs: (Figure 11) All legs six-segmented. Coxae I through III with two setae; coxa IV with one seta. All tarsi with slightly curved and very small claws. Coxal formula 2-2-2-1

Deutonymph: Unknown

Type material: Female holotype with male paratype (ZISP 4721), 14 female, 9 male, 1 larva, 1 protonymph paratypes (ZISP 4722-4727) from Passer montanus (L.) Russia, Leningrad province, Konzj, (59° 52' N, 31° 43' E), 09.08.2010; Novaya Ladoga (60° 07' N, 32° 17' E) 11.06.2010; Boronichevo (59° 50' N, 32° 20' E), 21.08.2010; coll. I. Dimov

Etymology: The new mite species *Ptilonyssus lovottiae*, n.sp. has been named after Dimov's sister Maya Lovotti. I am grateful for her help in my researches on Rhinonyssid nasal mites.

The genus *Ptilonyssus* Berlese and Trouessart in 1889 is the most diversiform and species-rich genus within the family Rhinonyssidae and currently includes over 130 species (Pence 1975). We recognize here one new small complex of species, named here as the *orthonychus* species complex, and rearrange in part the species content of the *hirsti* species complex Fain and Bafort (1963. The species included in the complex *orthonychus* are characterized by the following combination of features: the dorsal idiosoma bears the podosomal shield of the egg-shaped form; the pygidial shield is unpaired; the dorsal mesosoma has a pair of mesosomal shieldlets; and the anal shield, situated on the ventral idiosoma has the postanal and paranal setae situated posterior to the anal opening. The complex *orthonychus* includes two species: *Ptilonyssus degtiarevae* n.sp. and *P. orthonychus* Domrow 1968.

Representatives of *hirsti* complex are characterized by the following combination: the dorsal idiosoma bears the podosomal shield, opisthosomal shield and a pair of mesosomal shieldlets. The *hirsti* complex includes eight species: *Ptilonyssus lovotti* n. sp., *P. hirsti* Castro and Pereira 1947, *P. carduelis* Fain 1962, *P. capensis* Zumpt and Till 1955, *P. emberizae* Fain 1956, *P. icteridius* Strandtmann and Furman 1956, *P. zumpti* Fain 1956 and *P. astridae* Fain 1956.

CONCLUSIONS

Ptilonyssus degtiarevae n. sp. is most similar to P. *nudus*, Berlese & Trouessart, 1889 by the presence of the opisthosomal shield and pygidial shield. The new

species most clearly differs from the latter species by the presence of mesosomal shieldlets and having four setae on the genital shield. Other differential characters are given in **Table 1.**

Ptilonyssus lovottiae n. sp. is most similar to *Ptilonyssus hirsti*, Castro and Pereira, 1947 by having podosomal shield, mesosomal shieldlets and opisthosomal shield. The new species most clearly differs from that species by the forms the podosomal and opisthosomal shields and setation of the dorsal opisthosoma, opisthosomal shield and ventral opisthosoma. Other differential characters are given in **Table 2.**

ACKNOWLEDGEMENTS

We are especially grateful to our friends Jadwiga Sinskaja, Anton Rubtsov, Mihail Galizkii, Vladimir Steblezov, Olga Sizmina and Larisa Johanson for providing us with bird samples for the present research.

Table 1. Differential characters of *Ptilonyssus degtiarevae*, n. sp. and *P. nudus*

Character	*Ptilonyssus degtiarevae*, n. sp.	*Ptilonyssus nudus*
Setation of dorsal opisthosoma	32	22
Mesosomal shieldlets	Present	Absent
Setae on the genital shield	4	2
Hypostomal setae	6	4
Deutosternal dents	7	9
Setation of tarsus I	19	18
Setation of tarsus IV	10	15

Table 2. Differential characters of *Ptilonyssus lovottiae*, n.sp. and *Ptilonyssus hirsti.*

Character	*Ptilonyssus lovottiae*, n.sp.	*Ptilonyssus hirsti*
Caudo-lateral setae near podosomal shield	4	8
Mesosomal shieldlets	3 (2)	2
Setation of dorsal opisthosoma	22	16
Setation of opisthosomal shield	16	10
Setation of ventral opisthosoma	24	16
Hypostomal setae	2	6
Setation of tarsus I	20	24
Setation of tarsus IV	7	14

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