

New data on systematics of the quill mites of the genus *Torotrogla* Kethley, 1970 (Acari, Syringophilidae)

Maciej SKORACKI

Department of Animal Morphology, A. Mickiewicz University, 28 Czerwca 1956/198, 61-485
Poznań, Poland (e-mail: skoracki@amu.edu.pl).

Abstract

Three new species of the genus *Torotrogla* are described from passerine birds: *T. rubeculi* sp. n. from *Erithacus rubecula*, *T. luscinae* sp. n. from *Luscinia megarhynchos* and *L. svecica*, and *T. calcarius* sp. n. from *Calcarius lapponicus*. New host records and localities for species of the genus *Torotrogla* are given.

Keywords: Syringophilidae, *Torotrogla*, quill mites, ectoparasites, taxonomy.

Introduction

The species of the genus *Torotrogla* are medium sized mites (700-900 µm). They occupy secondary feathers of various passeriform birds from families (see Tab. 1) (KETHLEY, 1970; BOCHKOV & MIRONOV, 1998; SKORACKI & SKORACKA, 1999; SKORACKI *et al.*, 2000, 2001). The genus *Torotrogla* was established by KETHLEY (1970). To present, only six species of this genus parasitizing six avian hosts were known. In this paper, three new species belonging to this genus are described from passerine birds: *T. rubeculi* sp. n. from *Erithacus rubecula*, *T. luscinae* sp. n. from *Luscinia megarhynchos* and *L. svecica*, and *T. calcarius* sp. n. from *Calcarius lapponicus*. In addition, six bird species are registered as new hosts for quill mites of the genus *Torotrogla*.

Material and methods

The syringophilid mites from *Luscinia megarhynchos*, *L. svecica* and *Calcarius lapponicus* were obtained from the bird collection kept at the Museum of Natural History, Wrocław University (Poland) (NMW). The remaining material was collected from birds caught by various ornithologists in Poland. Mites were mounted on microslides in a polyvinylolactophenol

Table 1. Quill mite species of the genus *Torotrogl*a.

Mite species	Host species	Host family	Distribution
<i>T. mima</i> KETHLEY, 1970	<i>Mimus polyglottos</i>	Mimidae	USA
<i>T. villosa</i> (HANCOCK, 1895)	<i>Phainopepla nitens</i>	Ptilonotidae	USA
<i>T. lullulae</i> SKORACKI <i>et al.</i> , 2001	<i>Lullula arborea</i>	Alaudidae	Slovakia
<i>T. rubeculi</i> sp. n.	<i>Erithacus rubecula</i>	Turdidae	Poland
<i>T. lusciniae</i> sp. n.	<i>Luscinia megarhynchos</i>	Turdidae	Italy
	<i>Luscinia svecica</i>	Turdidae	?
<i>T. merulae</i> SKORACKI <i>et al.</i> , 2000	<i>Turdus merula</i>	" Turdidae	Poland, Germany
	<i>Turdus viscivorus</i>	Turdidae	Poland, Romania
	<i>Turdus philomelos</i>	Turdidae	Poland
<i>T. calcarius</i> sp. n.	<i>Calcarius lapponicus</i>	Emberizidae	Finland
<i>T. gaudi</i> BOCHKOV & MIRONOV, 1998	<i>Fringilla coelebs</i>	Fringillidae	Russia, Poland
	<i>Fringilla montyfringilla</i>	Fringillidae	Poland
	<i>Pyrrhula pyrrhula</i>	Fringillidae	Poland
<i>T. cardueli</i> BOCHKOV & MIRONOV, 1999	<i>Carduelis spinus</i>	Fringillidae	Russia, Poland
	<i>Carduelis cannabina</i>	Fringillidae	Poland
	<i>Carduelis carduelis</i>	Fringillidae	Poland

medium and examined with the Nomarsky interference-contrast-phase with microscope an Olymplus BH2.

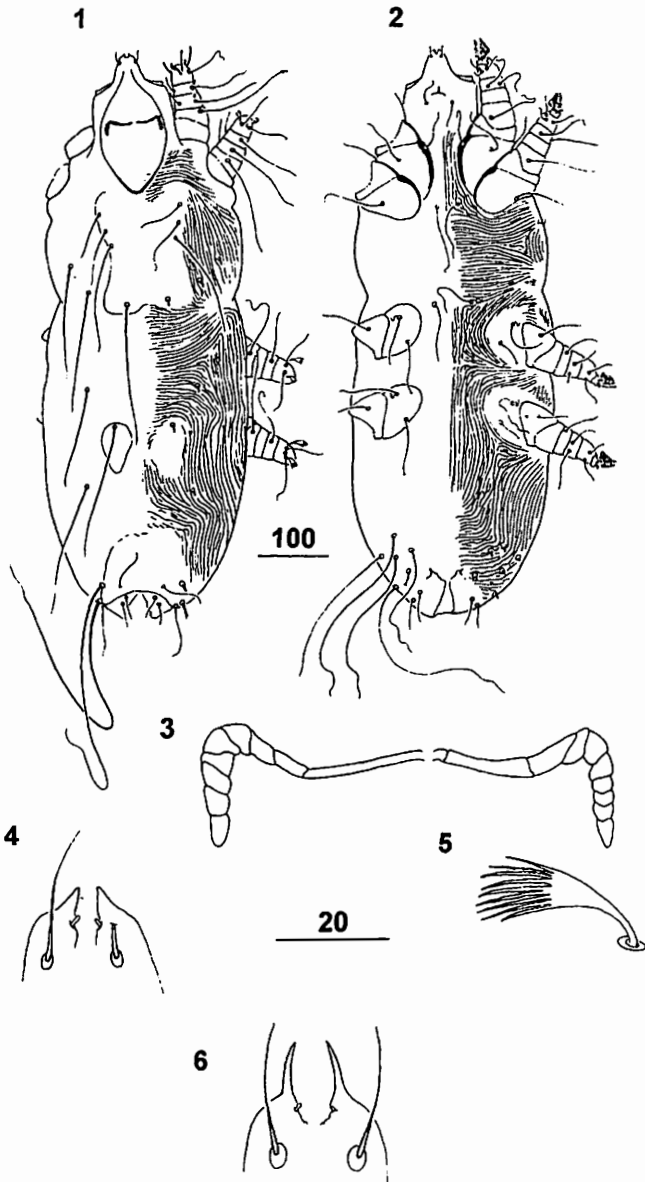
The nomenclature of idiosomal setae is based on that of FAIN (1979) in the version adapted for the family Syringophilidae (BOCHKOV & MIRONOV, 1998). The terminology for morphology and leg chaetotaxy follows these of GRANDJEAN (1944) and KETHLEY (1970), respectively. Bird taxonomy follows Howard & Moore (1991). All measurements are given in micrometers (μm). The holotypes and most of the paratypes are deposited in the Department of Animal Morphology, A. Mickiewicz University, Poznań, Poland (UAM). Some paratypes are deposited in the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN) and in the National Museum of Natural History, Smithsonian Institution, Washington, USA (SNM).

Results

Family Syringophilidae LAVOPIERRE, 1953
 Subfamily Syringophilinae LAVOPIERRE, 1953
 Genus *Torotrogl*a KETHLEY, 1970

1. *Torotrogl*a *rubeculi* sp. n.

Female (Figs 1-5). Total body length of holotype 805 (735-865 in 10 paratypes). *Gnathosoma*. Gnathosoma ventrally without punctate ornamentation. Hypostomal apex with pair of small and sharp-ended protuberances (Fig. 4). Stylophore constricted posteriorly, 200 (185-200) long. Each transverse branch of peritremes with 3-4 chambers, each longitudinal



Figs 1-6. *Torotrogl* spp., female. *Torotrogl rubeculi* sp. n. (Figs 1-5), 1: dorsal view, 2: ventral view, 3: hypostomal apex, 4: peritremes, 5: fan-like seta p'III. *Torotrogl merulae* SKORACKI et al., 2000 (Fig. 6), 6: hypostomal apex.

branch with 5-7 chambers (Fig. 3). *Idiosoma*. Propodosomal shield concave on anterior margin, without punctate ornamentation, bearing setae *vi*, *ve*, *sci* and *d1*. Length ratio of setae *vi:ve:sci* 1:1.1-1.2:2.2-2.5. Hysterosomal shield represented by pair of small plates, situated between bases of setae *d2* and *l2*. Bases of setae *d2* situated 1.5 times closer to *l1* than to *l2*. Setae *l2* and *d2* 1.2 times longer than *l1*. Pygidial shield present. Paragenital series variable, 4-6 pairs of paragenital setae (*pg*) present. Cuticular striations as in figs 1, 2. *Legs*. All coxae well sclerotized and without punctations. Fan-like setae *p'* and *p''* of legs III-IV with 9 tines (Fig. 5). Setae *tc'* and *tc''* of legs III-IV subequal in length. Setae *sc2* longer than *sc4*.

Lengths of setae: *vi* (65-75); *ve* (75-80); *sci* 175 (160-170); *h* (160-180); *sce* 180 (175-195); *l1* (140-160); *l2* 190 (180-190); *l4* 380 (320-370); *l5* 455 (385-420); *d1* 215 (190-210); *d2* (175-190); *d4* 65 (55-65); *d5* 70 (65-70); *a1* and *a2* subequal 30 (30); *g1* and *g2* subequal 45 (35-45); *sc1* (45-50); *sc2* 60 (60-65); *sc3* 50 (50-85); *sc4* 45 (45); *tc'* and *tc''* of legs III-IV 80 (70-80).

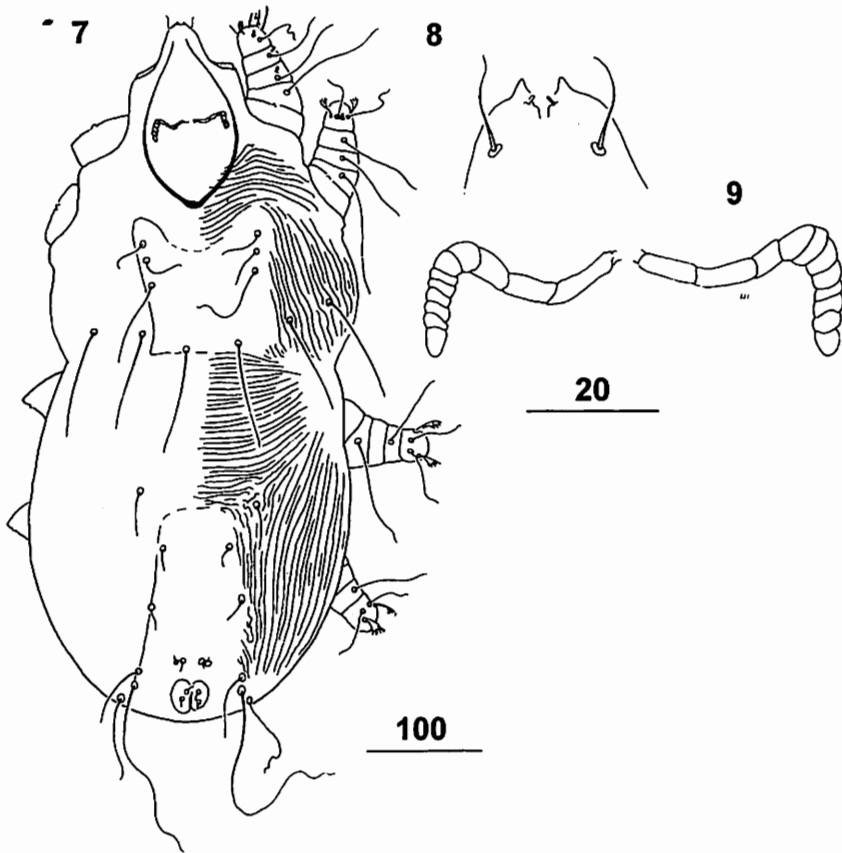
Male (Figs 7-9). Total body length 570-645 in 4 paratypes. *Gnathosoma*. Hypostomal apex with pair of small protuberances (Fig. 8). Each transverse branch of peritremes with 4 chambers, each longitudinal branch with 7 chambers (Fig. 9). Stylophore slightly constricted posteriorly, 155-170 long. *Idiosoma*. Propodosomal shield well sclerotized with deeply concave anterior margin, not punctated, setae *vi*, *ve*, *sci* and *d1* situated on this shield. Setae *vi* and *ve* subequal in length and about 2 times shorter than *sci*. Hysterosomal shield present, not punctated, bearing setae *d2*, *l2*, *d5* and *l5*. Setae *l1* 1.5 times longer than *d2* and *l2*. Cuticular striations as in fig. 7. *Legs*. Coxae without punctate ornament, I and II well sclerotized, III and IV weakly sclerotized. Fan-like setae *p'* and *p''* of legs I-II with 5-6 tines, of legs III-IV with 6-7 tines. Setae *tc'* and *tc''* of legs III-IV subequal in length.

Lengths of setae: *vi* 25-35; *ve* 20-35; *sci* 65-80; *h* 100; *sce* 80; *l1* 30-35; *l2* 20-25; *l5* 145-165; *d1* 90-95; *d2* 20-25; *d5* 45; *tc'III-IV* 50-55; *tc''III-IV* 50-60; *sc1* 30; *sc2* 40-45; *sc3* 45-55; *sc4* 40.

Type material. Female holotype (No. Syr.71.1.), paratypes: 19 females, 4 males from secondaries of *Erethacus rubecula* (L., 1758) (Passeriformes: Turdidae); Poland, Bukowo Kopań, 15.IV.1999, leg. M. SKORACKI. Holotype and most of paratypes are deposited at UAM, 2 female paratypes at SNM.

Etymology. The name *rubeculi* refers to the specific name of the host.

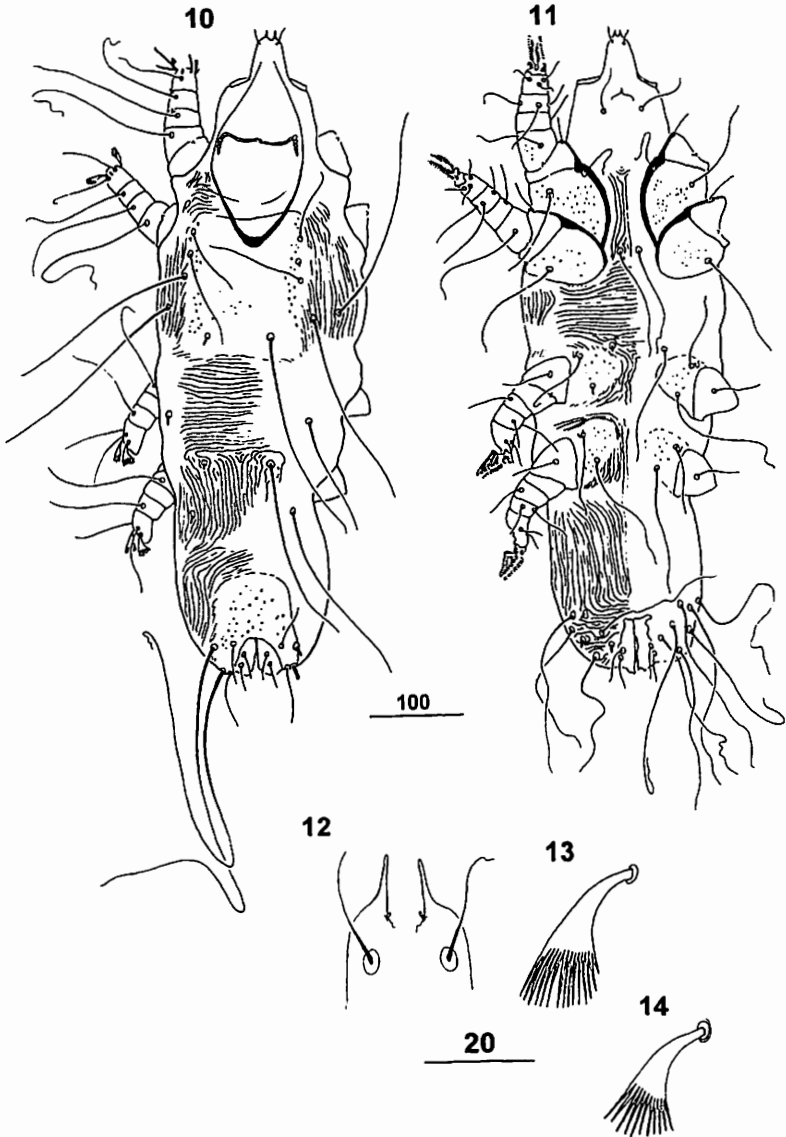
Differential diagnosis. *Torotroglia rubeculi* sp. n. is closely related to *T. merulae* SKORACKI, DABERT & EHRNSBERGER, 2000 described from *Turdus merula* L., 1758 (Passeriformes: Turdidae) from Poland (SKORACKI *et al.*, 2000). In both species the hysterosomal shield is present; setae *d4* are no more than 1.2 times longer than *d5*. The new species differs from *T. merulae* by the following characters. In females of *T. rubeculi* sp. n., the hypostomal protuberances are short and wide (Fig. 4); the stylophore is 185-200, long; setae *ve* are shorter than 90. In females of *T. merulae* the hypostomal protuberances are long and slim (Fig. 6); the stylophore is 220-245, long; setae *ve* are longer than 140.



Figs 7-9. *Torotrogla rubeculi* sp. n., male. 7: dorsal view, 8: hypostomal apex, 9: peritremes.

2. *Torotrogla luscinae* sp. n.

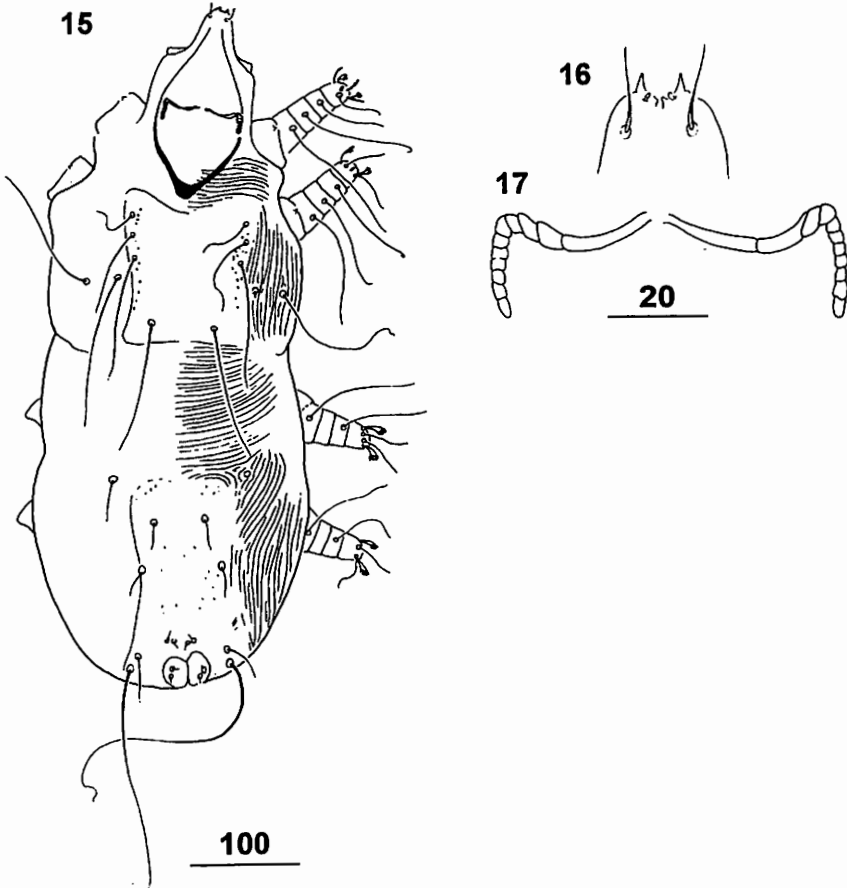
Female (Figs 10-13). Total body length of holotype 645 (645-715 in 5 paratypes). *Gnathosoma*. Gnathosoma ventrally without punctate ornamentation. Hypostomal apex with pair of large and blunt-ended protuberances (Fig. 12). Stylophore constricted posteriorly, 215 (215) long. Each longitudinal branch of peritremes with 5 chambers. *Idiosoma*. Propodosomal shield well sclerotized, rectangular in shape, punctated in lateral parts, bearing setae *vi*, *ve*, *sci* and *d1*. Length ratio of setae *vi:ve:sci* 1:1.5-1.7:2.5-3. Hysterosomal shield absent. Bases of setae *d2* situated equidistant to *l1* and *l2*. Setae *l2* 1.4-1.6 times longer than *l1*. Pygidial shield punctated, bearing setae *l4* and *d4*. Paragenital series variable, 6-7 pairs of paragenital setae (*pg*) present. Cuticular striations as in figs 10 and 11. *Legs*. All coxae well sclerotized and punctated. Fan-like setae *p'* and *p''* of legs III-IV with 14-15 tines (Fig. 13). Setae *tc'* and *tc''* of legs III-IV subequal in length. Setae *sc2* and *sc4* subequal in length.



Figs 10-14. *Torotrogla* spp., female. *Torotrogla lusciniae* sp. n. (Figs 10-13), 10: dorsal view, 11: ventral view, 12: hypostomal apex, 13: fan-like seta *p'III*. *Torotrogla merulae* SKORACKI *et al.*, 2000 (Fig. 14), 14: fan-like seta *p'III*.

Lengths of setae: *vi* (60-80); *ve* 115 (100-115); *sci* 210 (190-195); *h* 225 (195-215); *sce* 220 (215-225); *l1* 150 (130-145); *l2* 190 (175-225); *l4* 480 (380-450); *l5* 505 (430-450); *d1* 240 (220-255); *d2* 205 (180-235); *d4* 60 (60-70); *d5* 70 (70-80); *a1* 25 (25-30); *a2* 30 (30); *g1* 30 (40); *g2* 35 (40-50); *sc1* 25 (20-25); *sc2* 30 (30); *sc3* 50 (40-50); *sc4* 35 (30-35); *tc'* and *tc''* of legs III-IV subequal 70 (60-70); *l1-d2* 60 (60); *d2-l2* 60 (60); *cxIII1* (75); *cxIII2* 160 (170).

Male (Figs 15-17). Total body length 570 in 4 paratypes. *Gnathosoma*. Hypostomal apex with pair of small and sharp-ended protuberances (Fig. 16). Each transverse branch of peritremes with 3 chambers, each longitudinal branch with 8 chambers (Fig. 17). Stylophore slightly constricted posteriorly, 185-195 long. *Idiosoma*. Propodosomal shield well sclerotized with slightly concave anterior margin, punctated in lateral parts, setae *vi*, *ve*, *sci* and *d1* situated on this shield. Setae *vi* 1.4-1.7 times shorter than *ve*. Hysterosomal



Figs 15-17. *Torotrogla luscinae* sp. n., male. 15: dorsal view, 16: hypostomal apex, 17: peritremes.

shield punctated, bearing setae *d2*, *l2*, *d5* and *l5*. Setae *l1* 1.5-1.6 times longer than *d2* and *l2*. Cuticular striations as in fig. 15. *Legs*. Coxae I-II well sclerotized, III-IV weakly sclerotized. Fan-like setae *p'* and *p''* of legs III-IV with 9-10 tines. Setae *tc'* and *tc''* of legs III-IV subequal in length.

Lengths of setae: *vi* 40-50; *ve* 70-75; *sci* 100-155; *h* 120-170; *sce* 165; *l1* 30-45; *l2* 20-25; *l5* 245-255; *d1* 130; *d2* 20-25; *d5* 40; *tc'* and *tc''* of legs III-IV 50; *sc2* 25; *sc3* 35-40.

Type material. Female holotype (No. Syr.72.1.), paratypes: 7 females, 6 males, 8 nymphs from secondaries of *Luscinia megarhynchos* (C. L. BREHM, 1831) (Passeriformes: Turdidae); Italy; 1911, no other data. The specimen of type host is deposited at MNHW. Holotype and most of the paratypes are deposited at UAM, 1 female and 1 male paratypes at SNM, 1 female and 1 male paratypes at ZIN.

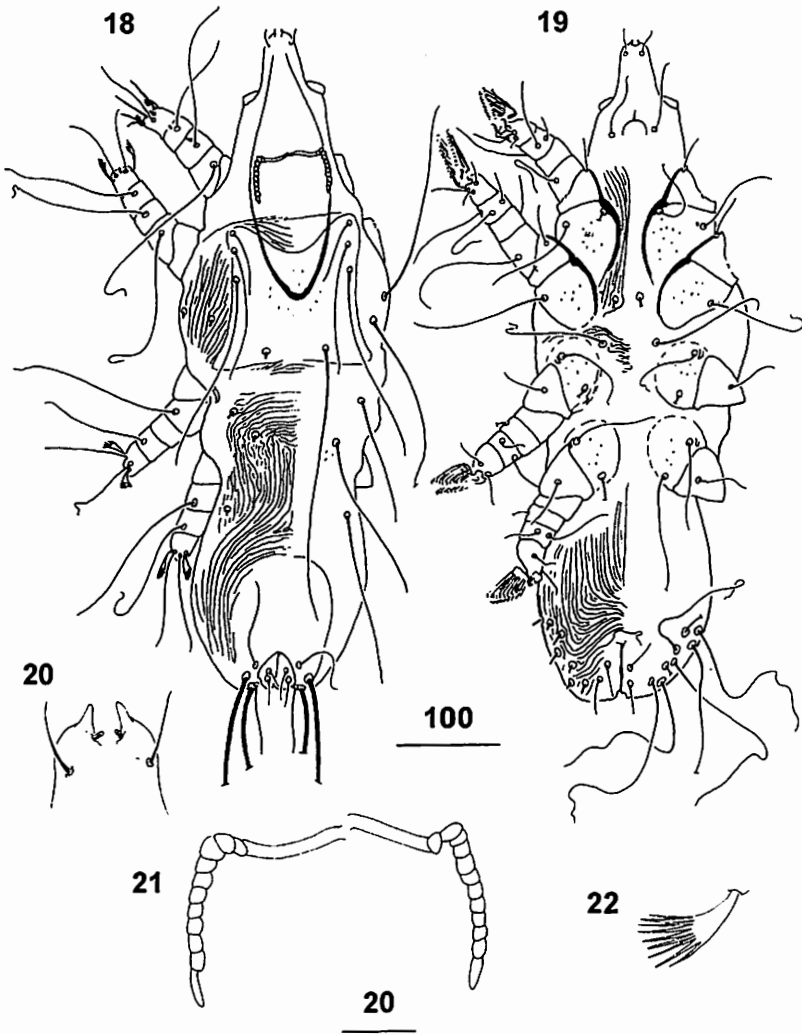
Additional material. 12 females, 4 males and 5 nymphs (No. Syr. 73) from secondaries of *Luscinia svecica* (L., 1758) (Passeriformes: Turdidae); no other data. The host specimen is deposited at MNHW. Whole material is deposited at UAM except 2 females at SNM.

Etymology. The name *luscinae* refers to the generic name of the host.

Differential diagnosis. This new species is closely related to *T. merulae*. In both species females have the long hypostomal protuberances; setae *d4* are no more than 1.2 times longer than *d5*. *Torotroglia luscinae* sp. n. differs from *T. merulae* by the following characters. In females of *T. luscinae* sp. n. the pygidial shield and all coxae are punctated, the hysterosomal shield is absent, the fan-like setae of legs III-IV are with 14-15 tines (Fig. 13), seta *sc3* (30 in length) is extending to the genu. In females of *T. merulae*, the pygidial shield and all coxae are without punctations, hysterosomal shield is present, the fan-like setae of legs III-IV with 10-11 tines (Fig. 14), seta *sc3* (60-75 in length) is extending to the tarsus.

3. *Torotroglia calcarius* sp. n.

Female (Figs 18-22). Total body length of holotype 630. *Gnathosoma*. *Gnathosoma* ventrally without punctation. Hypostomal apex with pair of medium sized, blunt-ended, and bill-like protuberances (Fig. 20). Stylophore constricted posteriorly, 260 long. Each transverse branch of peritremes with 2-3 chambers, each longitudinal branch with 9-10 chambers (Fig. 21). *Idiosoma*. Propodosomal shield well sclerotized with concave anterior margin, sparse punctated in median part, bearing setae *vi*, *ve*, *sci* and *d1*. Length ratio of setae *vi:ve:sci* 1:2.3:3. Hysterosomal shield represented by punctated area near bases of setae *d2*. Setae *d2* and *l2* 1.3 times longer than *l1*. Pygidial shield large in size, not punctated, rounded anteriorly, bearing setae *l4* and *d4*. Paragenital series variable, 7-8 pairs of paragenital setae (*pg*) present. Cuticular striations as in figs 18 and 19. *Legs*. All coxae well sclerotized, scarcely punctated. Fan-like setae *p'* and *p''* of legs III-IV with 9 tines (Fig. 22). Setae *tc'* and *tc''* of legs III-IV subequal in length. Setae *sc2* and *sc4*

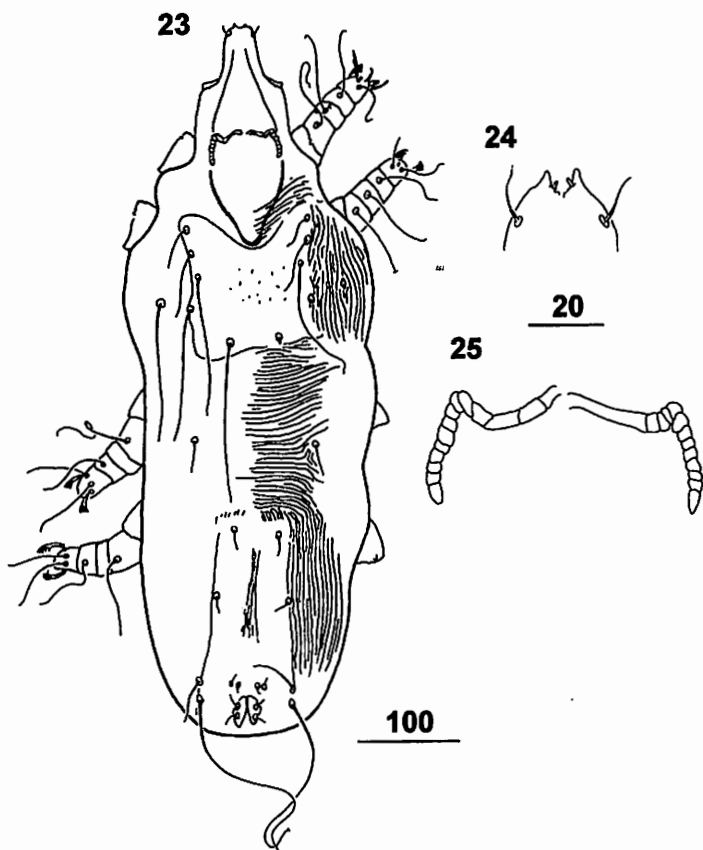


Figs 18-22. *Torotroglacarius* sp. n., female. 18: dorsal view, 19: ventral view, 20: hypostomal apex, 21: peritremes, 22: fan-like seta $p'III$.

subequal in length.

Lengths of setae: vi 60; ve 135; sci 180; h 190; $l1$ 125; $l2$ 160; $d1$ 260; $d2$ 160; $d4$ 95; $d5$ 65; $a1$ and $a2$ subequal in length 30; $g1$ 40; $g2$ 35 (40-50); $sc1$ 30; $sc2$ 45; $sc3$ 45; $sc4$ 45; tc' and tc'' of legs III-IV subequal 85; $cxIII1$ (75); $cxIII2$ 160 (170).

Male (Figs 23-25). Total body length 670-770 (in 2 paratypes).



Figs 23-25. *Torotrogla calcarius* sp. n., male. 23: dorsal view, 24: hypostomal apex, 25: peritremes.

Gnathosoma. Hypostomal apex with pair of small sized and blunt-ended protuberances (Fig. 24). Each transverse branch of peritremes with 4-5 chambers, each longitudinal branch with 9 chambers (Fig. 25). Stylophore constricted posteriorly, 215-230 long. *Idiosoma*. Propodosomal shield well sclerotized with concave anterior margin, sparse punctated in median part, setae *vi*, *ve*, *sci*, *sce* and *d1* situated on this shield (bases of setae *sce* set on lateral margins of this shield). Setae *vi* about 2 times shorter than *ve* and 3 times than *sci*. Hysterosomal shield present, not punctated, bearing setae *d2*, *l2*, *d5* and *l5*, weakly sclerotized in median part. Setae *l1* 2 times longer than *d2* and *l2*. Paragenital series variable, 4-5 pairs of paragenital setae (*pg*) present. Cuticular striations as in fig. 23. *Legs*. Coxae I-IV well sclerotized, scarcely punctated or without punctations. Fan-like setae *p'* and *p''* of legs III-IV with 7-9 tines.

Lengths of setae: *vi* 35-40; *ve* 65-80; *sci* 120-135; *h* 130; *sce* 105-120; *l1* 30-40; *l2* 20; *l5* 160; *d1* 140-150; *d2* 15-20; *d5* 35; *sc1* 35; *sc2* 30-50; *sc4* 45.

• **Type material.** Female holotype (No. Syr.83.1.) and 2 male paratypes from secondaries of *Calcarius lapponicus* (L., 1758) (Passeriformes: Emberizidae); Finland, Lapland, 1905, no other data. The host specimen is deposited at MNHW. Whole material is deposited at UAM.

Etymology. The name *calcarius* refers to the generic name of the host.

Differential diagnosis. *Torotrogl*a *calcarius* sp. n. is closely related to *T. cardueli* BOCHKOV & MIRONOV, 1999 described from *Carduelis spinus* (L., 1758) (Passeriformes: Fringillidae) from Russia (BOCHKOV & MIRONOV, 1999). In both species females have the hypostomal apex with a pair of bill-like protuberances, setae *d4* are no more than 1.2 times longer than *d5*. This new species differs from *T. cardueli* by the following characters. In females of *T. lusciniae* sp. n. the longitudinal branch of peritremes consists of 9-10 chambers, the pygidial shield is rounded anteriorly; the length ratio of setae *vi:ve* is 1:2.3; the stylophore is 260, long; in males, longitudinal branch of peritremes consists 9 chambers. In females of *T. cardueli* the longitudinal branch of peritremes consists 5-6 chambers, the pygidial shield is tapering anteriorly; the length ratio of setae *vi:ve* is 1:1.2-1.4; the stylophore is 220-230, long (in 7 females from type host); in males, longitudinal branch of peritremes consists 6 chambers.

4. *Torotrogl*a *gaudi* BOCHKOV & MIRONOV, 1998

This species was reported from the type host, *Fringilla coelebs* L., 1758 (Passeriformes: Fringillidae) from Russia and Poland (BOCHKOV & MIRONOV, 1998; SKORACKI & SKORACKA, 1999).

Material examined. 3 females (No. Syr.74) from secondaries of *Fringilla montifringilla* L., 1758 (Passeriformes: Fringillidae) (new host); Poland, Kuznica-Hel; IV.1998; leg. M. Skoracki. Whole material is deposited at UAM. 3 females, 1 male and 7 nymphs (No. Syr.75) from secondaries of *Pyrrhula pyrrhula* (L., 1758) (Passeriformes: Fringillidae) (new host); Poland, near Gryfino; VI.2001; leg. G. KILJAN. Whole material is deposited at UAM.

5. *Torotrogl*a *merulae* SKORACKI, DABERT & EHRNSBERGER, 2000

This species was previously reported from the type host, *Turdus merula* from Poland and Germany (SKORACKI *et al.*, 2000; SCHMÄSCHKE *et al.*, 2003).

Material examined. 3 females, 1 male and 1 nymph (No. Syr.78) from secondaries of *Turdus viscivorus* L., 1758 (Passeriformes: Turdidae) (new host); Romania (new locality); 1970.V.19; leg. T. WEISZ. The host specimen is deposited at SMB (No. 237/70). Whole material is deposited at UAM except 1 female and 1 nymph at SNM. 2 females from the same host species and habitat; Poland, Przebendowo; V.2000; leg. W. BUSSE. Whole material is deposited at UAM. 12 females, 10 males, 11 nymphs and 1 larva (No. Syr.79) from secondaries of *Turdus philomelos* C. L. BREHM, 1831 (Turdidae) (new host); Poland, Jeziory near Poznań; 23.IV.2002; leg. M. SKORACKI; 4 females from the same host species and habitat; Poland, Kuznica-Hel; 03.IV.1997; leg. M. SKORACKI. Whole material is deposited at UAM except 2 females at SNM.

6. *Torotroglia cardueli* BOCHKOV & MIRONOV, 1999

This species was originally described from *Carduelis spinus* (L., 1758) (Passeriformes: Fringillidae) from Russia (BOCHKOV & MIRONOV, 1999) and to this time there were no other data since first description.

Material examined. 10 females and 1 male (No. Syr.80) from secondaries of the type host *Carduelis spinus*; Poland (new locality), near Świnoujście; 2001; leg. G. KILJAN. Whole material is deposited at UAM except 1 female at SNM. 7 females and 1 male (No. Syr.84) from secondaries of *Carduelis cannabina* (Fringillidae) (new host); Poland, Świnoujście; VI.2001; leg. G. KILJAN. Whole material is deposited at UAM except 1 female at SNM. 1 female (No. Syr.81) from secondaries of *Carduelis carduelis* (L., 1758) (Fringillidae) (new host); Poland, Bukowo-Kopań; V.1999; leg. M. SKORACKI. This specimen is deposited at UAM.

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