DOI: 10.2478/s11686-009-0001-y

Acta Parasitologica, 2009, 54(1), 64–72; ISSN 1230-2821

VERSITA

New data on systematics of the quill mites of the genus *Syringophiloidus* Kethley, 1970 (Acari, Syringophilidae) from North American birds

Maciej Skoracki[1]*, Maureen E. Flannery[2,3] and Greg S. Spicer[2]

[1]Department of Animal Morphology, Faculty of Biology, Adam Mickiewicz University, Umultowska 89, 61-614 Poznań, Poland;
[2]Department of Biology, San Francisco State University, 1600 Holloway Ave., San Francisco, California, 94132, USA;
[3]Department of Ornithology and Mammalogy, California Academy of Sciences, 55 Concourse Drive, Golden Gate Park, San Francisco, California, 94118, USA

Abstract

Six species of the syringophilid mites belonging to the genus *Syringophiloidus* Kethley, 1970 (Acari, Prostigmata) are recorded from eight avian hosts from USA. Four new species are described and illustrated: *S. molothrus* sp. nov. from the Brown-headed Cowbird *Molothrus ater* (Boddaert) (Passeriformes, Icteridae), *S. carolae* sp. nov. from the Acorn Woodpecker *Melanerpes formicivorus* (Swainson) (Piciformes, Picidae) and from the Northern Cardinal *Cardinalis cardinalis* (Linnaeus) (Passeriformes, Cardinalidae), *S. sialius* sp. nov. from the Western Bluebird *Sialia mexicana* Swainson (Passeriformes, Turdidae), and *S. thryothorus* sp. nov. from the Carolina Wren *Thryothorus ludovicianus* (Latham) (Passeriformes, Troglodytidae). The previously described species *S. motacillae* Bochkov et Mironov, 1998 is new for USA. Two host species, the American Robin *Turdus migratorius* Linnaeus (Turdidae) and the Steller's Jay *Cyanocitta stelleri* (Gmelin) (Passeriformes, Corvidae), are new for *S. presentalis* Chirov et Kravtsova, 1995.

Keywords

Syringophilidae, *Syringophiloidus*, quill mites, ectoparasites, new species, taxonomy

Introduction

The mites of the genus *Syringophiloidus* Kethley, 1970 are small to medium sized syringophilid mites (600–925 µm) inhabiting quills of various types of feathers (primaries, secondaries, great coverts and tail feathers) (Kethley 1970, Skoracki 2004). This diverse genus includes 22 named species and four taxa described here, being confined mainly to passeriform birds with two exceptions: *Syringophiloidus cypsiuri* Fain, Bochkov et Mironov, 2000 described from the African Palm Swift *Cypsiurus parvus* (Lichtenstein) (Apodiformes, Apodidae) and *S. carolae* sp. nov. found on the Acorn Woodpecker *Melanerpes formicivorus* (Swainson) (Piciformes, Picidae) (Fain *et al*. 2000, Skoracki 2004, present paper).

Although, members of this genus were reported from all regions of the World, the quill mite fauna of the genus *Syringophiloidus* of North America is very poorly known, with only four species recorded from this area to this time: *S. minor* (Berlese, 1887) parasitizing the House Sparrow *Passer domesticus* (Linnaeus) (Ploceidae); *S. seiuri* (Clark, 1964) reported from three host species: the Owenbird *Seiurus aurocapillus* (Linnaeus) (Parulidae); the Worm-eating Warbler *Helmitheros vermivorus* (Gmelin) (Parulidae) and the Song Sparrow *Melospiza melodia* (Wilson) (Emberizidae); *S. motacillae* Bochkov et Mironov, 1998 found on the White-throated Sparrow *Zonotrichia albicollis* (Gmelin) (Emberizidae); and *S. daberti* Bochkov, Fain et Skoracki, 2004 from the Painted Bunting *Passerina ciris* (Linnaeus) (Emberizidae) (Clark 1964, Kethley 1970, Bochkov and Galloway 2001, Bochkov *et al*. 2004).

The present paper contains the descriptions of four new species: *S. molothrus* sp. nov. from the Brown-headed Cowbird *Molothrus ater* (Boddaert) (Passeriformes, Icteridae); *S. carolae* sp. nov. from the Acorn Woodpecker *Melanerpes formicivorus* (Swainson) (Piciformes, Picidae) and from the Northern Cardinal *Cardinalis cardinalis* (Linnaeus) (Passeriformes, Cardinalidae); *S. sialius* sp. nov. from the Western Bluebird *Sialia mexicana* Swainson (Passeriformes, Turdidae); and *S. thryothorus* sp. nov. from the Carolina Wren *Thryothorus ludovicianus* (Latham) (Passeriformes, Troglodyti-

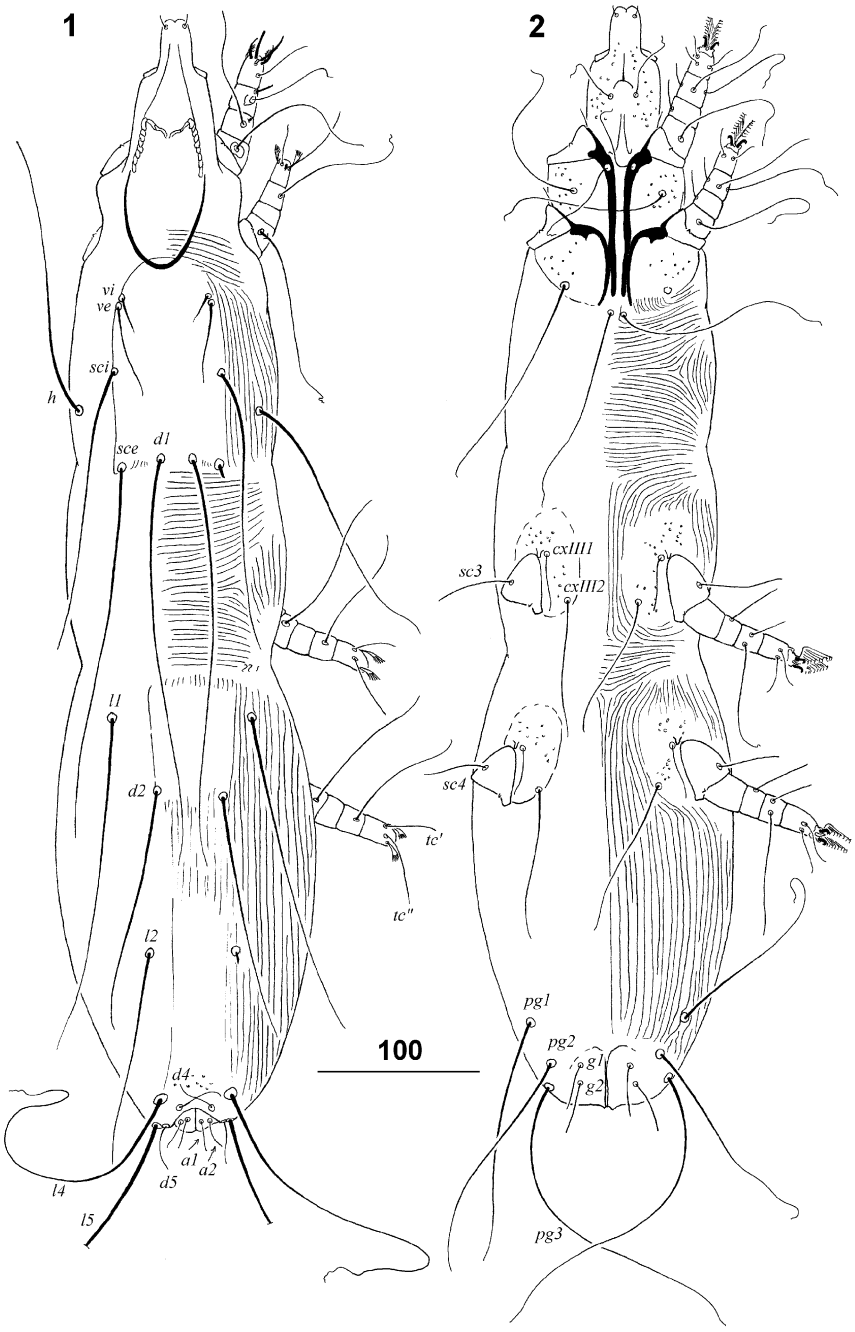
*Corresponding author: skoracki@amu.edu.pl

dae). In addition, *S. motacillae* Bochkov et Mironov, 1998 is a new species for USA, and two bird species, the American Robin *Turdus migratorius* Linnaeus (Turdidae) and the Steller's Jay *Cyanocitta stelleri* (Gmelin) (Corvidae), are new hosts for *S. presentalis* Chirov et Kravtsova, 1995.

Materials and methods

Passerines examined in this study were collected from various localities in California and Texas between the years 2001 and 2005. Feathers were completely removed from each specimen and examined under an Olympus ZSX12 compound microscope using 7–20X magnification. When quill mites were present, the feather was dissected under the microscope and individual mites were removed. Mites mounted for morphological examination were first cleared in lactophenol and then mounted on slides in Hoyer's solution.

Mites were examined using an Olympus BH2 microscope with DIC optics. The nomenclature of idiosomal setae is based on that of Fain (1979) in the version adapted for the family Syringophilidae (Bochkov and Mironov 1998) and the



Figs 1 and **2.** *Syringophiloidus molothrus* sp. nov., female: **1** – dorsal view; **2** – ventral view

chaetotaxy for the legs is that of Grandjean (1944). Bird taxonomy is that of Dickinson (2003). The position of each feather on the wing was recorded using the feather nomenclature of Pyle (1997): L (left), R (right), p (primary), s (secondary), and cov (covert). All measurements including scale bars in figures are given in micrometres (μm). Abbreviations for institutions where the materials are deposited: NMNH – Smithsonian National Museum of Natural History, USA; AMU – Department of Animal Morphology, Adam Mickiewicz University, Poznań, Poland.

Results

Family: Syringophilidae Lavoipierre, 1953
Subfamily: Syringophilinae Lavoipierre, 1953
Genus: *Syringophiloidus* Kethley, 1970

***Syringophiloidus molothrus* sp. nov.** (Figs 1–5)

Description (female, holotype): Total body length 695. Gnathosoma punctured on ventral side. Each transverse branch of peritremes with 3 long chambers, each longitudinal branch with 9–10 chambers (Fig. 3). Chelicerae 90 long. Stylophore 175 long. Idiosoma: Propodonotal shield well sclerotized, not punctated, striae not discernible. All propodonotal setae serrate (Fig. 4). Length ratio of setae *vi*:*ve* 1:2.8. Bases of setae *d1* situated slightly anterior to level of *sce* bases. Hysteronotal shield invisible in middle part, sparsely punctated in posterior part. Bases of setae *d2* situated about 2 times closer to *l1* than to *l2*. Setae *l1* 1.5 times longer than *l2*. Setae *d4* and *d5* subequal in length. Two pairs of anal setae present. Paragenital setae *pg1* and *pg2* subequal in length, both 1.3 times shorter than *pg3*. Cuticular striations as in Figures 1 and 2. Legs: Coxal fields densily punctured. Fan-like setae *p'* and *p"* of legs III and IV with 7–8 tines (Fig. 5). Setae *tc"III-IV* 1.6 times longer than *tc'III-IV*. Setae *cxIII2* 2.5 times longer than *cxIII1*. Lengths of setae: *vi* 25, *ve* 70, *h* 230, *sce* 230, *l1* 230, *l2* 150, *l4* 275, *l5* <325, *d1* 260, *d2* 160, *d4* and *d5* 25, *a1* and *a2* 20, *g1* 25, *g2* 25, *pg1* 170, *pg2* 165, *pg3* 215, *sc3* 35, *sc4* 35, *tc'III-IV* 40, *tc"III-IV* 65, *cxIII1* 35, *cxIII2* 90.

Male unknown.

Type material: Female holotype and 2 nymphal paratypes from secondary quill (Rs6) of the Brown-headed Cowbird *Molothrus ater* (Boddaert, 1783) (Passeriformes, Icteridae), USA, Texas, Hood Co., Jones Ranch, 20 April 2005, Coll. Greg Spicer (GSS#1662). All material is deposited at AMU.

Etymology: The name *molothrus* refers to the generic name of the host.

Differential diagnosis

Syringophiloidus molothrus sp. nov. is morphologically similar to *S. tarnii* Skoracki et Sikora, 2002 described from the Black-throated Thuet-Thuet *Pteroptochos tarnii* (King) (Passeriformes, Rhinocryptidae) from Argentina (Skoracki and Sikora 2002). In both species the females have two pairs of anal setae, each transverse branch of peritremes has 3 relatively long chambers, setae *sci* are longer than *vi* and *ve*, fan-like setae *p'* and *p"* has no more than 8 tines, and coxal fields are densely punctured.

This new species is distinguishable from *S. tarnii* by the following characters: in females of *S. molothrus* sp. nov., setae *vi*, *ve* and *sci* and remainig propodonotal setae are discernibly serrate, the length ratio of setae *vi*:*ve* is 1:2.8, and setae *l1* are 1.5 times longer than *l2*. In females of *S. tarnii*, setae *vi*, *ve* and *sci* are slightly serrate or smooth and the remaining propodonotal setae are smooth, the length ratio of setae *vi*:*ve* is 1:1.3–1.5, and setae *l1* and *l2* are subequal in the length.

***Syringophiloidus carolae* sp. nov.** (Figs 6–9)

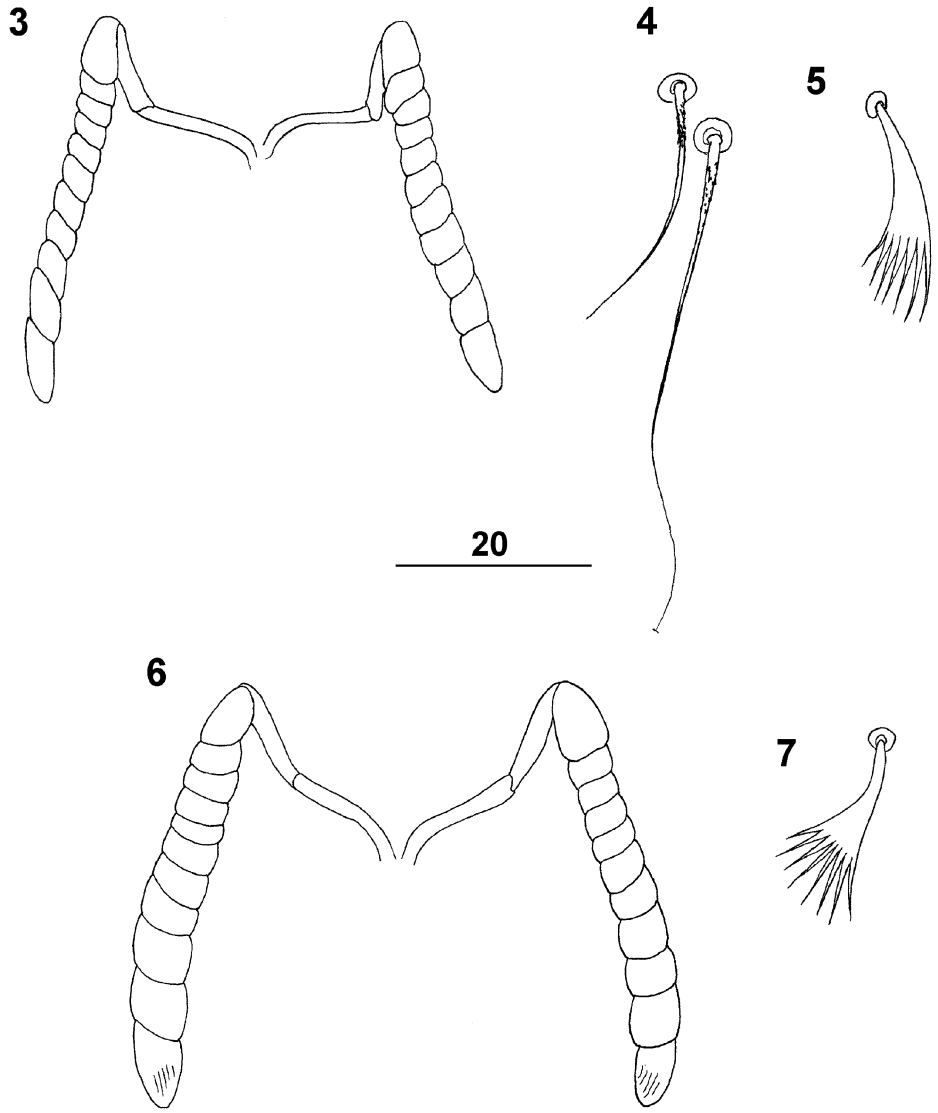
Description (female): Total body length 700 in holotype (645–700 in 4 paratypes). Gnathosoma punctured on ventral side. Each transverse branch of peritremes with 3 long chambers, each longitudinal branch with 8–10 chambers (Fig. 6). Chelicerae 135 (135–145) long. Stylophore 170 (165–175) long. Idiosoma: Propodonotal shield well sclerotized, sparsely punctated, striae visible in anterior part of shield. Setae *vi*, *ve* and *sci* slightly serrate, remaining propodonotal setae smooth. Length ratio of setae *vi*:*ve*:*sci* 1:3–3.4:5–6.5. Bases of setae *d1* and *sce* situated at the same transverse level. Hysteronotal shield well sclerotized, punctured in anterior and posterior part. Bases of setae *d2* situated 1.5–1.7 times closer to *l1* than to *l2*. Setae *l1* 1.3–1.6 times longer than *l2*. Setae *d4* and *d5* subequal in length. Two pairs of anal setae present. Paragenital setae *pg1* and *pg2* subequal, both 1.2–1.4 times shorter than *pg3*. Cuticular striations as in Figures 8 and 9. Legs: Coxal fields sparsely punctured. Fan-like setae *p'* and *p"* of legs III and IV with 7–8 tines (Fig. 7). Setae *tc"III-IV* about 1.6 times longer than *tc'III-IV*. Setae *cxIII2* 3.6–4 times longer than *cxIII1*. Lengths of setae: *vi* 35 (25–35), *ve* 105 (90–130), *sci* 215 (190–225), *h* 255 (220–260) *sce* 255 (245–255), *l1* 255 (220–240), *l2* 160 (145–170), *l4* 320 (305–320), *l5* (405), *d1* 290 (255–305), *d2* 180 (160–180), *d4* 40 (30–40), *d5* 40 (30–40), *a1* 20 (20–25), *a2* 25 (20–25), *g1* 35 (30–40), *g2* 35 (30–40), *pg1* 125 (125–145), *pg2* 125 (125–145), *pg3* 175 (180–185), *sc3* 55 (45–55), *sc4* 40 (40), *tc'III-IV* 45 (40–45), *tc"III-IV* 75 (60–70), *cxIII1* 25 (25), *cxIII2* 90 (90–100).

Male unknown.

Type material: Female holotype, 15 female and 4 nymphal paratypes from covert and secondary quills (Rs5, scovs) of the Northern Cardinal *Cardinalis cardinalis* (Linnaeus, 1758) (Passeriformes, Cardinalidae), USA, Texas, Hood Co., Jones Ranch, 20 April 2005, Coll. Greg Spicer (GSS#1686). All material is deposited at AMU.

Additional material: 5 females from covert quill (pcovs) of the Acorn Woodpecker *Melanerpes formicivorus* (Swainson, 1827) (Piciformes, Picidae), USA, Texas, Jeff Davis Co., Fort Davis, 12 April 2005, Coll. Greg Spicer (GSS#1624). All material is deposited at NMNH, except 1 female at AMU.

Etymology: This species is named in honor of Carol F. Spicer, the wife of the junior author, in recognition of her support and assistance for the past 30 years.



Figs 3–7. *Syringophiloidus* spp., females: *S. molothrus* sp. nov. (**3**–**5**) and *S. carolae* sp. nov. (**6** and **7**): **3** – peritremes; **4** – propodonotal setae *vi* and *ve*; **5** – fan-like seta *p'* of leg III; **6** – peritremes; **7** – fan-like seta *p'* of leg III

Differential diagnosis

This new species is most similar to *S. molothrus* sp. nov. described above, by the following characters: in both species the females have transverse branch of peritremes with 3 relatively long chambers, setae *sci* are longer than *vi* and *ve*, fan-like setae *p'* and *p''* has no more than 8 tines, and setae *l1* are longer than *l2*.

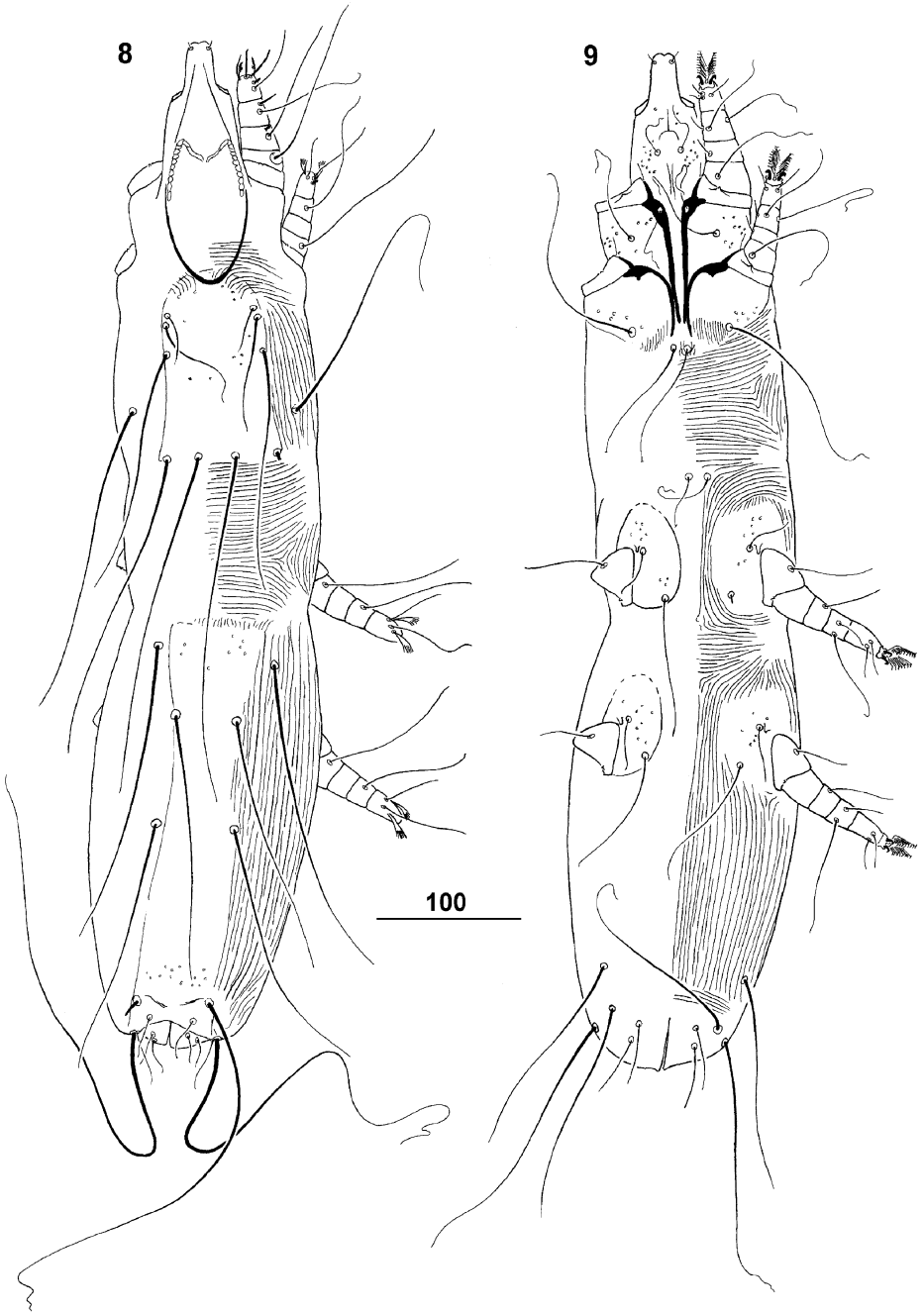
Syringophiloidus carolae sp. nov. is distinguished from *S. molothrus* sp. nov. by the following characters. In females of *S. carolae* sp. nov., the ventral side of gnathosoma is sparse punctated, setae *vi*, *ve* and *sci* are slightly serrate and remaining propodonotal setae are smooth, setae *ve* are 3–3.3 times longer than *vi*, length of setae *ve* is 105–130, and the hysteronotal shield is punctured in anterior and posterior part. In females of *S. molothrus* sp. nov., the ventral side of gnathosoma is densely punctated, all propodonotal setae are discernible serrate, setae *ve* are 2–2.3 times longer than *vi*, length of setae *ve* is 50–70, and the hysteronotal shield is not punctured.

Remarks

Presence of *S. carolae* sp. nov. on two very distantly related host species seems to be a result of horizontal transfer (host switching) between these hosts. Both, the Acorn Woodpecker and the Northern Cardinal, are permanent residents in oak forests (Probs 1979).

***Syringophiloidus sialius* sp. nov.** (Figs 10–13)

Description (female): Total body length 750 in holotype (845 in one paratype). Gnathosoma punctured ventrally. Each transverse branch of peritremes with 3 chambers, each longitudinal branch with 11–12 chambers (Fig. 12). Chelicerae 135 (130)

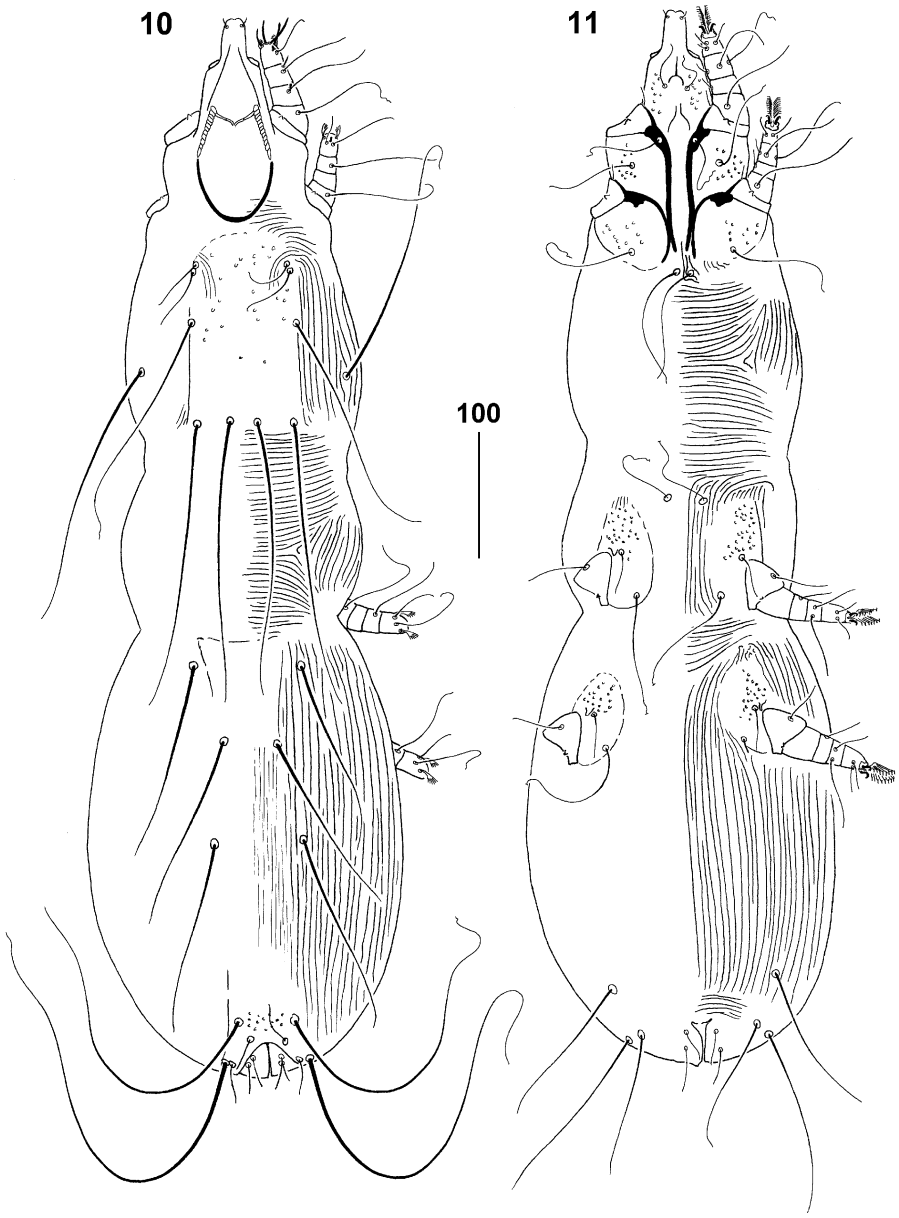


Figs 8 and **9.** *Syringophiloidus carolae* sp. nov., female: **8** – dorsal view; **9** – ventral view

long. Stylophore 170 (165) long. Idiosoma: Propodonotal shield well sclerotized, sparse punctated, striae visible in anterior part of shield. Setae *vi*, *ve* and *sci* and other propodonotal setae, smooth. Length ratio of setae *vi*:*ve*:*sci* 1:1:4.5–4.8. Bases of setae *d1* and *sce* set at the same transverse level. Hysteronotal shield invisible in middle part, anterior and posterior part well sclerotized. Bases of setae *d2* situated 1.2–1.3 times closer to *l1* than to *l2*. Setae *l1*, *d2* and *l2* subequal in length. Setae *d4* and *d5* subequal in length. Two pairs of anal setae present. Paragenital setae *pg1-3* subequal in length. Cuticular striations as in Figures 10 and 11. Legs: Coxal fields densely punctured. Fan-like setae *p'* and *p"* of legs III and IV with 7 tines (Fig. 13). Setae *tc"III-IV* about 1.6 times longer than *tc'III-IV*. Lengths of setae: *vi* 30 (40), *ve* 30 (45), *sci* 145 (180), *h* 190 (205), *sce* 230 (205), *l1* 145 (140), *l2* 135 (130), *l4* 255, *l5* 330, *d1* (205), *d2* 145 (150), *d4* 30 (40), *d5* 30 (40), *a1* and *a2* 20 (20), *g1* and *g2* 30 (30), *pg1* 115 (125), *pg2* 110, *pg3* 125, *sc3* and *sc4* 45 (45), *tc'III-IV* 45, *tc"III-IV* 70.

Male unknown.

Type material: Female holotype and 1 female and 1 nymphal paratypes from covert quill (pcovs) of the Western Bluebird *Sialia mexicana* Swainson, 1832 (Passeriformes, Turdi-



Figs 10 and **11.** *Syringophiloidus sialius* sp. nov., female: **10** – dorsal view; **11** – ventral view

dae), USA, California, Mendocino Co., Hopland, 10 October 2003, Coll. Greg Spicer (GSS#1652). All material is deposited at NMNH.

Etymology: The name *sialius* refers to the generic name of the host.

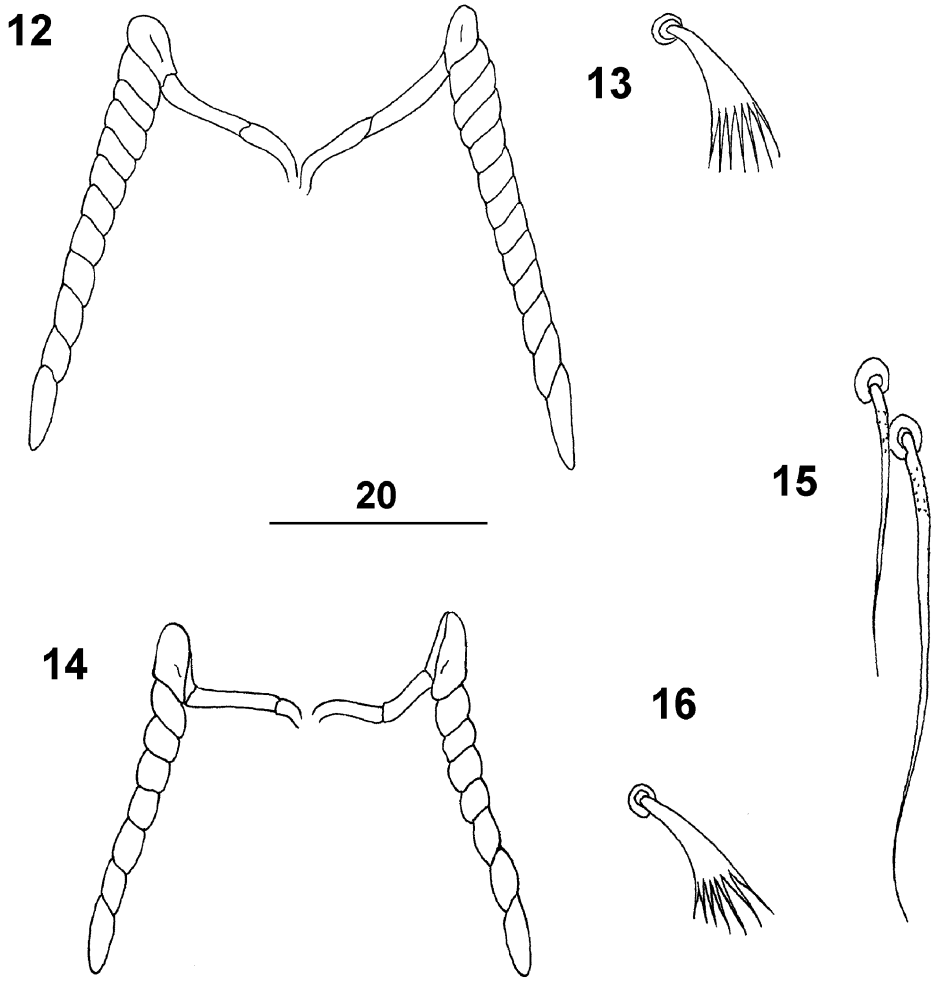
Differential diagnosis

Syringophiloidus sialius sp. nov. is morphologically similar to *S. erythrurus* Skoracki, 2004 described from the Blue-faced Parrotfinch *Erythrura trichroa* (Kittlitz) (Estrildidae) (Skoracki 2004). In both species, the females have two pairs of anal setae, each transverse branch of peritremes has 3 relatively long chambers, setae *vi* and *ve* are subequal in the length, and fan-like setae *p'* and *p''* has no more than 8 tines.

This new species is distinguishable from *S. erythrurus* by the following characters: in females of *S. sialius* sp. nov., the propodonotal shield is punctured, paragenital setae *pg1-3* are subequal in the length, coxal fields are densely punctured. In females of *S. erythrurus*, the propodonotal shield is not punctured, paragenital setae *pg2* are twice shorter than *pg1* and about 3 times shorter than *pg3*, coxal fields are sparse punctured or without punctate ornament.

***Syringophiloidus thryothorus* sp. nov.** (Figs 14–18)

Description (female): Total body length 605 in holotype (605–680 in 3 paratypes). Gnathosoma sparse punctured on ventral side. Each transverse branch of peritremes with 3 long cham-



Figs 12–16. *Syringophiloidus* spp., female: *S. sialius* sp. nov. (**12** and **13**) and *S. thryothorus* sp. nov. (**14–16**): **12** – peritremes; **13** – fan-like seta *p'* of leg III; **14** – peritremes; **15** – propodonotal setae *vi* and *ve*; **16** – fan-like seta *p'* of leg III

bers, each longitudinal branch with 7 chambers (Fig. 14). Chelicerae 105 (105–110) long. Stylophore 145 (135–145) long. Idiosoma: Propodonotal shield well sclerotized, punctured. Setae *vi*, *ve* and *sci* slightly serrate, remaining propodonotal setae smooth (Fig. 15). Length ratio of setae *vi*:*ve*:*sci* 1:1.3–1.6:5. Bases of setae *d1* situated slightly anterior to level of *sce* bases. Hysteronotal shield indiscernible. Bases of setae *d2* situated 1.7–1.9 times closer to *l1* than to *l2*. Setae *l1*, *d2* and *l2* subequal in length. Setae *d4* and *d5* subequal in length. Two pairs of anal setae present. Paragenital setae *pg1* and *pg2* subequal, both 1.2–1.4 times shorter than *pg3*. Cuticular striations as in Figures 17 and 18. Legs: Coxal fields I and II sparse punctured, III and IV densely punctured. Fan-like setae *p'* and *p"* of legs III and IV with 7–8 tines (Fig. 16). Setae *tc"III-IV* about 1.5 times longer than *tc'III-IV*. Setae *cxIII2* 2.8–3 times longer than *cxIII1*. Lengths of setae: *vi* (30–35), *ve* (45–50), *sci* 170 (150–175), *h* 180, *sce* (200–220), *l1* (180), *l2* 155 (140–155), *l4* (205), *l5* 315 (285–345), *d1* 225 (210–220), *d2* 155 (140–185), *d4* 25 (25), *d5* 25 (25), *a1* 20 (20–25), *a2* 20 (20–25), *g1* 30 (25–30), *g2* 30 (25–30), *pg1* 155 (125–155), *pg2* (125–135), *pg3* (145–165), *sc3* 25 (25), *sc4* 25 (25), *tc'III-IV* (40), *tc"III-IV* 70 (60–70), *cxIII1* (30), *cxIII2* 90 (85–90).

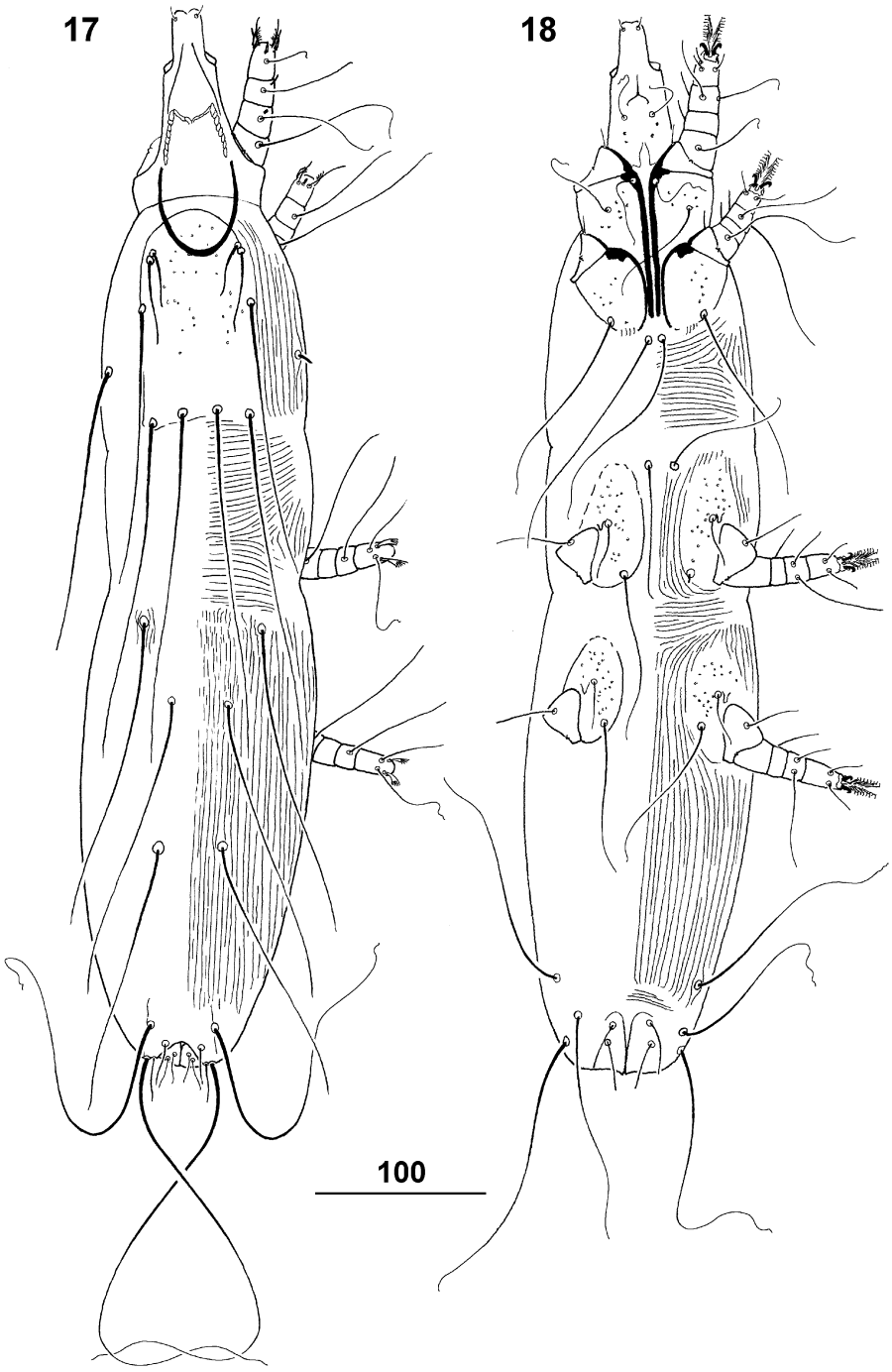
Male unknown.

Type material: Female holotype and 3 female paratypes from covert and secondary quills (pcovs, scovs, Ls6) of the Carolina Wren *Thryothorus ludovicianus* (Latham, 1790) (Troglodytidae), USA, Texas, Hood Co., Jones Ranch, 20 April 2005, Coll. Greg Spicer (GSS#1673). All material is deposited at NMNH, except 2 females at AMU.

Etymology: The name *thryothorus* refers to the generic name of the host.

Differential diagnosis

Syringophiloidus thryothorus sp. nov. is also morphologically similar to *S. tarnii* Skoracki et Sikora, 2002. In both species the females have two pairs of anal setae, each transverse branch of peritremes has 3 relatively long chambers, setae *sci* are longer than *vi* and *ve* and fan-like setae *p'* and *p"* has no more than 8 tines, propodonotal setae *vi*, *ve* and *sci* are slightly serrate, setae *ve* are 1.3–1.6 times longer than *vi*, coxal fields III and IV are densely punctured and hysteronotal setae *d2* and



Figs 17 and **18.** *Syringophiloidus thryothorus* sp. nov., female: **17** – dorsal view; **18** – ventral view

l2 are subequal. This new species is distinguishable from *S. tarnii* by the following characters: in females of *S. thryothorus* sp. nov., the gnathosoma is sparsely punctured on ventral side, each longitudinal branch of the peritremes has 7 chambers, the length of the stylophore is 135–145, the propodonotal shield is punctured. In females of *S. tarnii*, the gnathosoma is densely punctured on ventral side, each longitudinal branch of the peritremes has 10–11 chambers, the length of the stylophore is 175–180, the propodonotal shield is not punctured.

***Syringophiloidus presentalis* Chirov et Kravtsova, 1995**

Up to date, this polyxenous species was reported from four passeriform avian hosts: the Common Starling *Sturnus vulgaris* Linnaeus (Sturnidae) from Kirghizia (Chirov and Kravtsova 1995), the Eurasian Jay *Garrulus glandarius* (Linnaeus) (Corvidae) from Russia, the Fieldfare *Turdus pilaris* (Linnaeus) from Russia (Bochkov and Mironov 1998), and the Eurasian Blackbird *T. merula* Linnaeus (Turdidae) from Jordan

(Glowska *et al*. 2007). Collecting this species from the American Robin *Turdus migratorius* Linnaeus and the Steller's Jay *Cyanocitta stelleri* (Gmelin) are the new host and locality records.

Material examined: One female, 4 nymphs from covert quills (cov2, Rscov) of the American Robin *Turdus migratorius* Linnaeus, 1766 (Turdidae), USA, California, Madera Co., Sierra National Forest, 2000, Coll. Greg Spicer (GSS#35). Six females, 1 male, 11 nymphs from covert and secondary quills (Rscov, cov1, Ls8) of the same host species, USA, California, Sierra Co., Beartrap Meadow, 24 July 2005, Coll. Greg Spicer (QM2, GSS#1502). Nine females, 6 males, 8 nymphs from secondary quill (Ls5) of the same host species, USA, California, Sierra Co., Beartrap Meadow, 4 August 2005, Coll. Greg Spicer (GSS#1516).

Seven females and 8 nymphs from covert quill (pcovs) of the Steller's Jay *Cyanocitta stelleri* (Gmelin, 1788) (Corvidae), USA, California, Lake Co., Lake Pillsbury, 11 March 2005, Coll. Greg Spicer (QM1, GSS#1410). All material is deposited at NMNH.

Syringophiloidus motacillae Bochkov et Mironov, 1998

Syringophiloidus motacillae was described from the Yellow Wagtail *Motacilla flava* Linnaeus (Motacillidae) from Russia (Bochkov and Mironov 1998). Later on, it was reported from the White-throated Sparrow *Zonotrichia albicollis* (Gmelin) (Emberizidae) from Canada (Bochkov and Galloway 2001). We recollected this species from the second host species from USA (new locality).

Material examined: 12 females and 12 nymphs from primary quill (Rp2) of the White-throated Sparrow *Zonotrichia albicollis* (Gmelin, 1789) (Emberizidae), USA, Texas, Johnson Co., Garen Ranch, 21 March 2004, Coll. Greg Spicer (GSS #1358). All material is deposited at NMNH, except 2 females at AMU.

Acknowledgements. We would like to acknowledge two anonymous referees for valuable comments and encouragement.

References

Bochkov A.V., Fain A., Skoracki M. 2004. New quill mites of the family Syringophilidae (Acari: Cheyletoidea). *Systematic Parasitology*, 57, 135–150. DOI: 10.1023/B:SYPA.00000138 58.86399.69.

Bochkov A.V., Galloway T.D. 2001. Parasitic cheyletoid mites (Acari: Cheyletoidea) associated with passeriform birds (Aves: Passeriformes) in Canada. *Canadian Journal of Zoology*, 79, 2014–2028. DOI: 10.1139/cjz-79-11-2014.

Bochkov A.V., Mironov S.V. 1998. Quill mites of the family Syringophilidae Lavoipierre, 1953 (Acariformes: Prostigmata) parasitic on birds (Aves) of the fauna of the former USSR. *Acarina*, 6, 3–16.

Chirov P.A., Kravtsova N.T. 1995. A new genus and new species of mites of the family Syringophilidae. *Parazitologiya*, 29, 370–379 (In Russian).

Clark G.M. 1964. The acarine genus *Syringophiloidus* in North American birds. *Acarologia*, 6, 76–92.

Dickinson E.C. 2003. The Howard and Moore Complete Checklist of the Birds of the World. Revised and enlarged 3rd Edition. Christopher Helm, London, 1040 pp.

Fain A. 1979. Idiosomal and leg chaetotaxy in the Cheyletidae. *International Journal of Acarology*, 5, 305–310.

Fain A., Bochkov A.V., Mironov S.V. 2000. New genera and species of quill mites of the family Syringophilidae (Acari: Prostigmata). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique* (*Entomology*), 70, 33–70.

Glowska E., Skoracki M., Khourly F. 2007. A new species and new records of syringophilid mites (Acari: Prostigmata: Syringophilidae) from birds of Jordan. *Zootaxa*, 1635, 63–68.

Grandjean F. 1944. Observations sur les acariens de la famille des Stigmaeidae. *Archives des Sciences Physiques et Naturelles*, 26, 103–131.

Kethley J.B. 1970. A revision of the family Syringophilidae (Prostigmata: Acarina). *Contributions of the American Entomological Institute*, 5, 1–76.

Probs J.R. 1979. Oak forest bird communities. In: (Eds. R.M. DeGraff and K.E. Evans) *Management of north central and northeastern forests for nongame birds*. *Proceedings of the Workshop*, *January 23–25*, *1979*, *Minneapolis*, 80–88.

Pyle P. 1997. Identification guide to North American birds. Part I. Columbidae to Plociedae. Slate Creek Press, Bolinas, California, 732 pp.

Skoracki M. 2004. A review of quill mites of the genus *Syringophiloidus* Kethley, 1970 (Acari: Prostigmata: Syringophilidae) parasitizing quills of passeriform birds, with descriptions of four new species. *Genus*, 15, 281–300.

Skoracki M., Sikora B. 2002. New ectoparasitic mites of the family Syringophilidae (Acari: Prostigmata: Cheyletoidea) associated with birds from Argentina. *Zootaxa*, 27, 1–8.

(Accepted October 10, 2008)