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Syringophilid quill mites (Acari: Syringophilidae) parasitizing passerines (Aves: Passeriformes) in Brazil

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ABSTRACT

Two new quill mite species collected from passerine birds in Brazil are described: *Torotroglia synallaxis* **sp. nov.** from *Synallaxis spixi* Sclater (Funariidae) and *Syringophilopsis bonariensis* **sp. nov.** from *Molothrus bonariensis* (Gmelin) (Icteridae). Additionally, three syringophilid species were recorded from new host species captured in Minas Gerais, Brazil: *Syringophilopsis tyranni* Bochkov and Galloway, 2004 from *Satrapa icterophrys* (Vieillot) (Tyrannidae); *Syringophiloidus stawarczyki* Skoracki, 2004 from *Dacnis cayana* (Linnaeus) (Thraupidae) and *Syringophiloidus parapresentalis* Skoracki, 2011 from *Turdus rufiventris* Vieillot (Turdidae). The syringophilid fauna presently recorded from Brazil is summarized.

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Birds; ectoparasites; Brazil; quill mites; Syringophilidae

Introduction

The mite family Syringophilidae (Acari: Prostigmata: Cheyletoidea) presently comprises 334 described species grouped in 60 genera. These mites have been recorded from over 480 bird species representing 95 families and 24 orders and are found in all zoogeographical regions, except Antarctica (Skoracki et al. 2012b; Glowaska et al. 2015). As permanent and obligate ectoparasites, syringophilids are specialized for living inside the cavities of quills and exhibit a high level of host specificity, being mostly represented by mono- or stenoxenous parasites (Skoracki 2011; Skoracki et al. 2012b).

In Brazil, the fauna of Syringophilidae is extremely poorly known and currently is represented by only 16 species in 10 genera (including the taxa described herein) recorded from birds of the orders Charadriiformes, Columbiformes, Passeriformes, Piciformes, Psittaciformes and Tinamiformes (Table 1). It is worth noting that 21 avian species recorded as hosts of syringophilid mites constitute merely 1% of the whole avian biodiversity of Brazil (1919 bird species – Piacentini et al. 2015).

In the present paper, two new syringophilid species, belonging to the genera *Torotroglia* Kethley, 1970 and *Syringophilopsis* Kethley, 1970, are described. New host records for three quill mite species, *Syringophilopsis tyranni* Bochkov et Galloway, 2004, *Syringophiloidus parapresentalis* Skoracki, 2011 and *Syringophiloidus stawarczyki* Skoracki, 2004, are also reported. Additionally, all previous records of quill mites from birds in Brazil are summarized.

Material and methods

The material used in the present study was collected by S.V. Mironov, F.A. Hernandez and M.P. Valim from live birds in the course of the field expedition to Minas Gerais (Brazil) in 2010. Birds were captured by mist nets and after a manual examination of them under a dissecting microscope for the presence of ectoparasitic mites were released to the wild. Mites were stored in 96% ethanol and mounted in the Hoyer's medium according to the

standard technique for these mites. Slide-mounted mites were examined under a light microscope (ZEISS Axioscope2™) with differential interference contrast optics. Drawings were made with the drawing attachment. All measurements are given in micrometres. Measurements (ranges) of paratypes are given in brackets following data for a holotype. In the descriptions, the idiosomal setation follows Grandjean (1939) as adapted for Prostigmata by Kethley (1990). The nomenclature of leg chaetotaxy follows that proposed by Grandjean (1944). The morphological terminology follows Skoracki (2011). The scientific names of the birds follow Clements et al. (2014). Specimen depositories and reference numbers are displayed using the following abbreviations: AMU, Adam Mickiewicz University, Department of Animal Morphology, Poznan, Poland; MZUSP, Museu de Zoologia da Universidade de São Paulo, São Paulo, SP, Brazil; ZISP, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

Results

Family **Syringophilidae** Lavoipierre, 1953
Subfamily **Syringophilinae** Lavoipierre, 1953
***Torotroglia synallaxis* sp. nov.**
(Figures 1(a,b) and 2(a–e)).

Description

Female, holotype. Total body length 725 (725–750 in four paratypes). *Gnathosoma*. Hypostomal apex with pair of short, wide and blunt-ended protuberances. Each medial branch of peritremes with four chambers, each lateral branch with five chambers. Stylophore constricted posteriorly, 205 (200–205) long. *Idiosoma*. Propodonal shield punctate, deeply concave on anterior and posterior margins, bearing bases of setae *vi*, *ve*, *si* and *c1*. Length ratio of setae *vi:ve:si* 1:1.5:3.2. Setae *se* situated anterior to level of setae *c1*. Pair of hysteronotal shields punctate, bearing on anterior margin bases of setae *d1*. Pygidial shield well sclerotized, punctate, with rounded anterior margin. All coxal fields punctate. *Legs*. Setae *tc'* and *tc''* of legs III and IV subequal in length. Fan-like setae *p'* and *p''* of legs III and IV with 10 tines. *Lengths of setae: vi*

Table 1. Quill mites of the family Syringophilidae parasitizing birds in Brazil.

Quill mite species	Host species	Host order and family	Distribution in Brazil	References
Subfamily Syringophilinae				
<i>Castosyringophilus mucuya</i> (Casto, 1980)	<i>Brotogeris versicolurus</i> (St. Müller)	Psittaciformes: Psittacidae	Unknown locality	Bochkov and Fain (2003)
"	<i>Columbina squammata</i> (Lesson)	Columbiformes: Columbidae	Unknown locality	Bochkov and Fain (2003)
"	<i>Columbina talpacoti</i> (Temminck)	Columbiformes: Columbidae	Bahia	Skoracki and Glowska (2008)
<i>Charadriphilus vanelli</i> Bochkov, Fain et Skoracki, 2004	<i>Vanellus chilensis</i> (Molina)	Charadriiformes: Charadriidae	Unknown locality	Bochkov et al. (2004)
<i>Megasyringophilus kethleyi</i> Fain, Bochkov et Mironov, 2000	<i>Aratinga jandaya</i> (Gmelin)	Psittaciformes: Psittacidae	Unknown locality	Fain et al. (2000)
"	<i>Eupsittula pertinax</i> (Linnaeus)	Psittaciformes: Psittacidae	Unknown locality	Bochkov and Fain (2003)
"	<i>Brotogeris versicolurus</i> (St. Müller)	Psittaciformes: Psittacidae	Unknown locality	Bochkov and Fain (2003)
<i>Neoaulobia aratingae</i> Fain, Bochkov et Mironov, 2000	<i>Aratinga jandaya</i> (Gmelin)	Psittaciformes: Psittacidae	Unknown locality	Fain et al. (2000)
<i>Psittaciphilus amazonae</i> Fain, Bochkov et Mironov, 2000	<i>Amazona aestiva</i> (Linnaeus)	Psittaciformes: Psittacidae	Unknown locality	Bochkov and Fain (2003)
<i>Syringophiloides microcerculus</i> Sikora et Skoracki, 2012	<i>Microcerculus marginatus</i> (Sclater)	Passeriformes: Troglodytidae	Pará	Sikora et al. (2012)
<i>Syringophiloides stawarczyki</i> Skoracki, 2004	<i>Euphonia cyanocephala</i> (Vieillot)	Passeriformes: Fringillidae	Unknown locality	Skoracki (2004a)
"	<i>Tachyphonus rufus</i> (Boddaert)	Passeriformes: Thraupidae	Unknown locality	Skoracki (2004a)
"	<i>Dacnis cayana</i> (Linnaeus)	Passeriformes: Thraupidae	Minas Gerais	Present paper
<i>Syringophilopsis bonariensis</i> sp. nov.	<i>Molothrus bonariensis</i> (Gmelin)	Passeriformes: Icteridae	Minas Gerais	Present paper
<i>Syringophiloides parapresentalis</i> Skoracki 2011	<i>Turdus rufigiventris</i> Vieillot	Passeriformes: Turdidae	Minas Gerais	Present paper
<i>Syringophilopsis tyranni</i> Bochkov et Galloway, 2004	<i>Satrapa icterophrys</i> (Vieillot)	Passeriformes: Tyrannidae	Minas Gerais	Present paper
<i>Tinamiphilopsis ariconte</i> Skoracki, Sikora et Ozminski, 2012	<i>Nothura minor</i> (Spix)	Tinamiformes: Tinamidae	Minas Gerais	Skoracki et al. (2012a)
<i>Torotroglia synallaxis</i> sp. nov.	<i>Synallaxis spixi</i> Sclater	Passeriformes: Funariidae	Minas Gerais	Present paper
Subfamily Picobiinae				
<i>Neopicobia ea</i> Skoracki et Unsoeld, 2014	<i>Celeus elegans</i> (St. Müller)	Piciformes: Picidae	Bahia	Skoracki et al. (2014)
<i>Neopicobia ictericus</i> (Skoracki et Glowska, 2010)	<i>Cacicus chrysopterus</i> (Vigors)	Passeriformes: Icteridae	Unknown locality	Skoracki et al. (2010)
	<i>Pseudoleistes guirahuro</i> (Vieillot)	Passeriformes: Icteridae	Unknown locality	Skoracki et al. (2010)
<i>Picobia brotogeris</i> Fain, Bochkov et Mironov, 2000	<i>Brotogeris jugularis</i> (St. Müller)	Psittaciformes: Psittacidae	Upper Amazonia	Fain et al. (2000)
<i>Picobia dryobatis</i> (Fritsch, 1958)	<i>Veniliornis maculifrons</i> (Spix)	Piciformes: Picidae	Unknown locality	Skoracki et al. (2014)
"	<i>Veniliornis passerinus</i> (Linnaeus)	Piciformes: Picidae	North Brazil	Skoracki et al. (2014)

50 (55), *ve* 75 (70), *si* 160 (170), *se* 155, *c2* 170 (170), *d1* 140 (160), *d2* 145 (140), *e2* 140 (150), *f1* 70 (55), *f2* > 390, *h1* 125 (105), *ps1* and *ps2* 25 (25), *g1* and *g2* 35 (30–45), *3b* 55, *3c* 75, *4b* 50 (50), *4c* 85 (115), *tc'''III–IV* and *tc'''''III–IV* 55 (60), *I'RIII* and *I'RIV* 40 (40–60).

Male. Unknown.

Type material

Female holotype and four female paratypes from *Synallaxis spixi* Sclater (Passeriformes: Funariidae), BRAZIL, Minas Gerais, Nova Lima, APP do Condomínio Miguelão, 20°07'17.2" S 43°58'03.1" W, 6 September 2010, coll. S.V. Mironov, F.A. Hernandez & M.P. Valim (field no. SVM-10-0906-8/2).

Types deposition

Female holotype and two female paratypes are deposited in MZUSP, one female paratype in the AMU and one female paratype in the ZISP.

Differential diagnosis

Torotroglia synallaxis sp. nov. is morphologically similar to *T. rubeculi* Skoracki, 2004 described from *Erithacus rubecula* (Linnaeus) (Muscicapidae) in Poland (Skoracki 2004b). In females of both species, the total body length is less than 1000 µm, the hypostomal protuberances are short and wide, setae *d1* are situated on the hysteronotal shields and setae *l'* of trochanters III do not extend beyond respective genua. The new species differs from *T. rubeculi* by the following features: in females of *T. synallaxis*, the hypostomal protuberances are blunt-ended; the propodonotal, hysteronotal and pygidial shields, as well as all coxal fields, are punctate; the length ratio of setae *vi:ve:si* is 1:1.5:3.2. In females of *T. rubeculi*, the hypostomal protuberances are sharp-ended; the propodonotal, hysteronotal and pygidial shields as

well as all coxal fields are apunctate; the length ratio of setae *vi:ve:si* is 1:1.2:2–2.5.

Etymology

The specific epithet *synallaxis* is taken from the generic name of the type host.

Syringophilopsis bonariensis sp. nov.

(Figures 2(f–h) and 3(a,b)).

Description

Female, holotype. Total body length 1135 (1100–1150 in 10 paratypes). *Gnathosoma*. Infracapitulum apunctate. Hypostomal apex with one pair of minute and sharp-ended protuberances. Each medial branch of peritremes with three chambers, each lateral branch with 14 chambers. Stylophore 260 (260–265) long, apunctate. *Idiosoma*. Propodonotal shield with deeply concave anterior margin, sculptured laterally and sparsely punctate at lateral margins, bearing bases of setae *vi*, *ve*, *si* and *c1*, setae *se* on or near this shield. Length ratio of setae *vi:ve:si* 1:2–2.3:3.6–3.9. Setae *se* situated slightly anterior to level of setae *c1*. Hysteronotal shield absent. Pygidial shield well sclerotized with rounded anterior margin, apunctate. Agenital setae *ag1–3* about five times longer than genital setae *g1–2*. Coxal fields I–IV apunctate. Setae *3c* 1.4 times longer than *3b*. *Legs*. Fan-like setae *p'* and *p''* of legs III and IV with 10–11 tines. Setae *tc'''III–IV* 1.4 times longer than *tc'''III–IV*. Apodemes I fused with anterior part of apodemes II. *Lengths of setae: vi* 95 (90–110), *ve* 150 (190–215), *si* 340 (355), setae *c1*, *se*, *d1*, *d2*, *e2*, *f1*, *f2*, *h1*, *h2* longer than 300, setae *ag1*, *ag2*, *ag3* longer than 260, *ps1* and *ps2* 30 (25–30), *I'RI–II* 20 (20), *I'RIII–IV* 35 (30–40), *g1* (40–65), *g2* (45–60), *tc'''III–IV* (65–70), *tc'''''III–IV* 90 (100), *3b* 90 (80–90), *4b* 115 (95–115), *3c* (130), *4c* 150 (150–160).

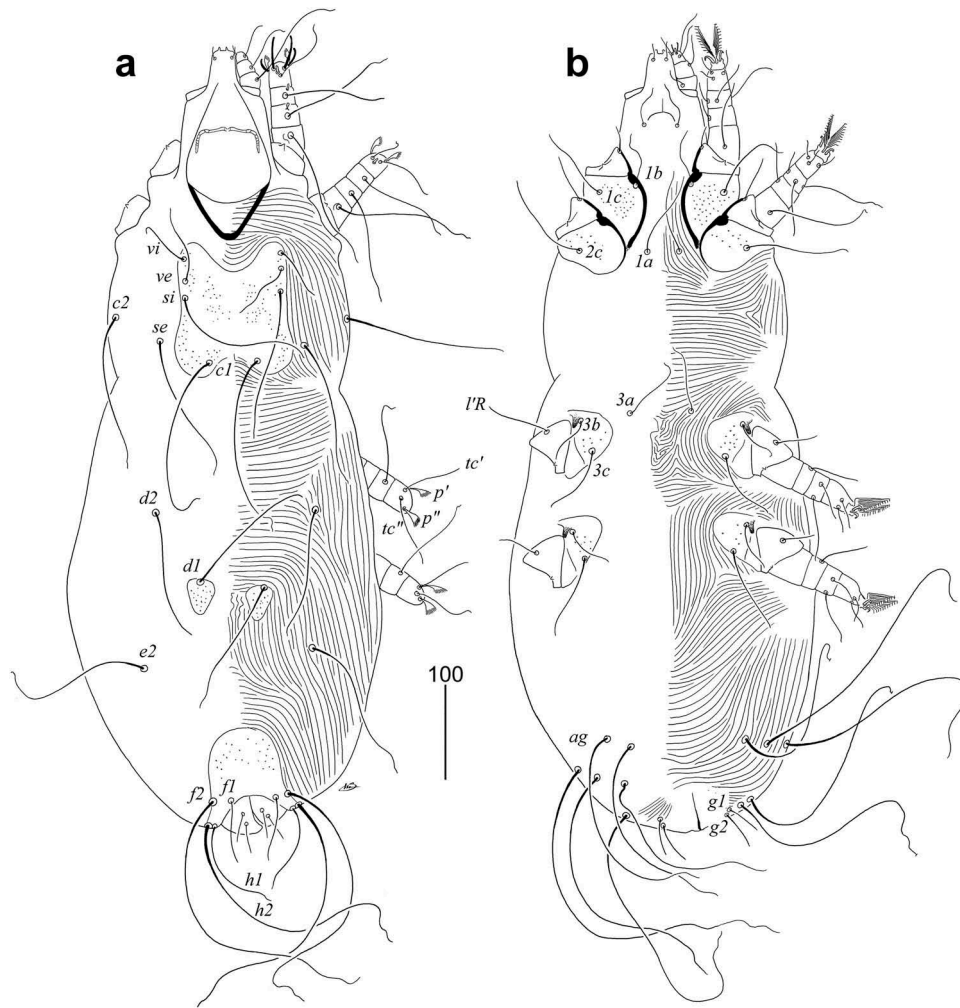


Figure 1. *Torotrogla synallaxis* sp. nov., female: (a) dorsal view; (b) ventral view.

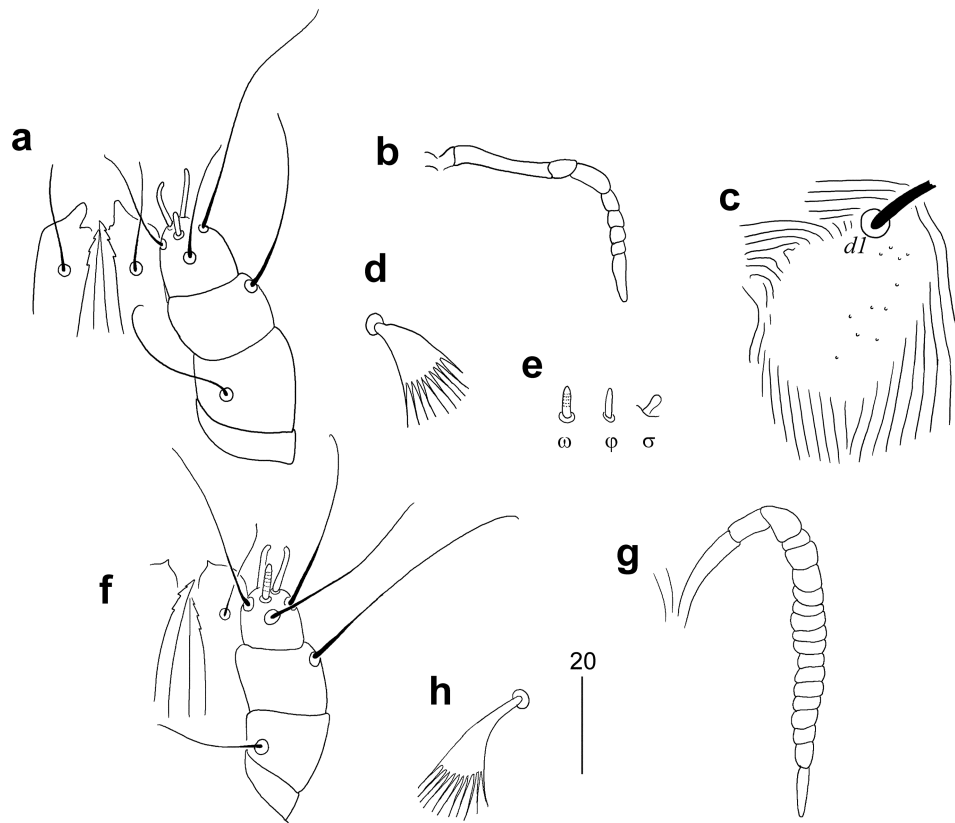


Figure 2. *Torotrogla synallaxis* sp. nov., female (a–e): (a) gnathosoma in ventral view; (b) peritreme; (c) hysteronotal shield; (d) fan-like seta $p'III$; (e) solenidia of leg I. *Syringophilopsis bonariensis* sp. nov., female (f–h): (f) gnathosoma in ventral view; (g) peritreme; (h) fan-like seta $p'III$.

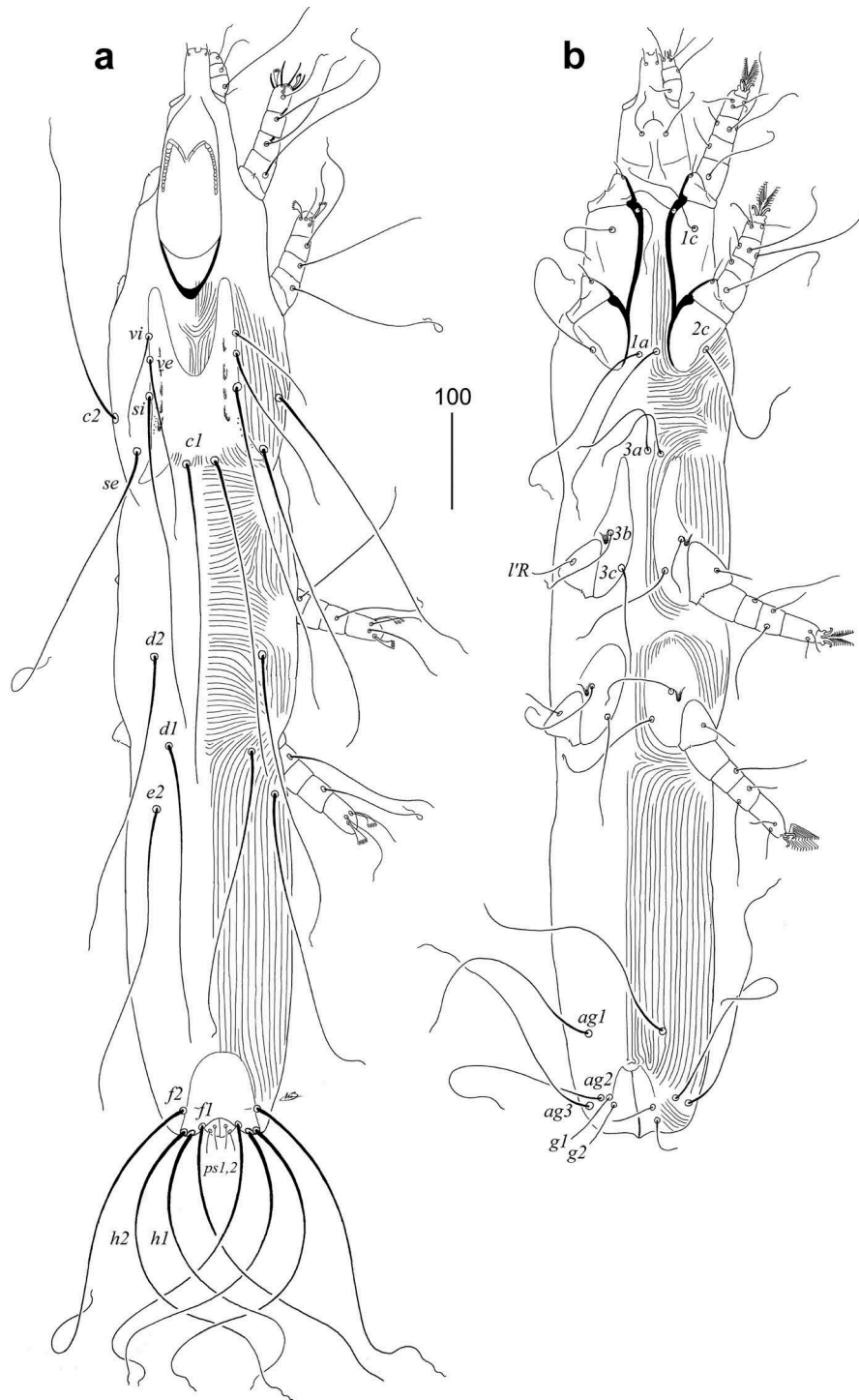


Figure 3. *Syringophilopsis bonariensis* sp. nov., female: (a) dorsal view; (b) ventral view.

Male. Unknown.

Type material

Female holotype and 18 female paratypes from *Molothrus bonariensis* (Gmelin) (Icteridae), BRAZIL, Minas Gerais, Nova Lima, Água Limpa, 20°13'05.07"S 43°57'00.2" W, 9 September 2010, coll. S.V. Mironov, F.A. Hernandez & M.P. Valim (field no. SVM 10-0909-05).

Types deposition

Female holotype and 10 paratypes are deposited in MZUSP, 4 female paratypes in the AMU and 4 female paratypes in the ZISP.

Differential diagnosis

Syringophilopsis bonariensis sp. nov. belongs to the *elongatus* species group and is morphologically similar to *S. tyranni* Bochkov and Galloway, 2004 known from the tyrant flycatchers (Tyrannidae) in the Nearctic and Neotropical regions (see below). In females of both species, setae *vi* are shorter than 160 µm, the hysteronotal shields are absent and genital setae are short (two to five times shorter than agenital setae *ag2*). The new species is distinguishable from *S. tyranni* by the following features: in females of *S. bonariensis*, setae *se* are situated slightly anterior to the level of setae *c1*; the punctate area near bases of setae *d1* is absent; the pygidial shield is well sclerotized, with well-marked rounded anterior margin. In females of *S. tyranni*, setae *se* are

situated distinctly anterior to the level of setae *c1*; the punctate area near bases of setae *d1* is present; the pygidial shield is weakly sclerotized, with indistinct anterior margin.

Etymology

The name *bonariensis* is taken from the specific name of the type host.

Syringophilopsis tyranni Bochkov et Galloway, 2004

This species is associated with passerines of the family Tyrannidae and up to now it was recorded from *Tyrannus tyrannus* (Linnaeus) (type host) in Canada (Bochkov and Galloway 2004), *T. dominicensis* (Gmelin), *T. forficatus* (Gmelin), *T. verticalis* Say, *Myiarchus crinitus* (Linnaeus) and *M. cinerascens* (Lawrence), all hosts from the USA (Skoracki et al. 2008, 2016), and from *Myiopagis subplacens* (Sclater) in Peru (Glowska 2014). Below, we report a new host for this mite – *Satrapa icterophrys* (Vieillot); this is also the first record of this quill mite species in Brazil.

Material examined

Eight females and one male from *Satrapa icterophrys* (Vieillot) (Tyrannidae), BRAZIL, Minas Gerais, Nova Lima, Água Limpa, 20° 13'05.07" S 43°57'00.2"W, 31 August 2010, coll. S.V. Mironov, F.A. Hernandez & M.P. Valim (field no. SVM 10-0831-7-2). Two females and one male are deposited in the AMU, three females in the ZISP and three females in the MZUSP.

Syringophiloidus stawarczyki Skoracki, 2004

Up to now, this species was recorded from the two avian hosts, *Euphonia cyanocephala* (Vieillot) (Fringillidae) (type host) and *Tachyphonus rufus* (Boddaert) (Thraupidae), both from Brazil (Skoracki 2004a). Below, we give a new host record for this quill mite species, *Dacnis cayana* (Linnaeus).

Material examined

Eleven females and two males from *Dacnis cayana* (Linnaeus) (Thraupidae), BRAZIL, Minas Gerais, Nova Lima, APP do Condomínio Miguelão, 20°07'17.2" S 43°58'03.1" W, 8 September 2010, coll. S.V. Mironov, F.A. Hernandez & M.P. Valim (field no. SVM 10-0908-1-2). Three females and one male are deposited in the AMU, four females in the ZISP and four females and one male in the MZUSP.

Syringophiloidus parapresentalis Skoracki, 2011

This species is widely distributed on birds of the genus *Turdus* Linnaeus, and to this date it was recorded from *Turdus atrogularis* Jarocki (Turdidae) in Kazakhstan, *T. iliacus* Linnaeus in Russia, *T. merula* Linnaeus in Jordan, Kazakhstan and Poland, *T. pilaris* Linnaeus in Poland, Russia and Slovakia (Skoracki 2011) and *T. migratorius* Linnaeus in the USA (Skoracki et al. 2009, 2016). Below, we give a new host record – *Turdus rufiventris* Vieillot; it is also the first record of this species in the Neotropical region.

Material examined

Thirteen females and seven males from *Turdus rufiventris* (Turdidae), BRAZIL, Minas Gerais, Nova Lima, Água Limpa, 20° 13'05.07" S 43°57'00.2" W, 31 August 2010, coll. S.V. Mironov, F. A. Hernandez & M.P. Valim (field no. SVM 10-0831-4-2). Five females and two males are deposited in the AMU, four females and two males in the ZISP and four females and three males in the MZUSP.

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