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Article

Notes on *Atractothrombium* and *Fissitrombium* (Acari: Trombidiformes: Microtrombidiidae) with description of a new species of *Atractothrombium* from Iran

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ABSTRACT
Atractothrombium joharchii **sp. nov.** ectoparasitic on an unknown Tachinidae (Insecta: Diptera) is described from Alborz province, Iran. A re-definition of the genus *Atractothrombium* is presented. A key to the larval genera of Microtrombidiinae of the world with two median scuta and anterior scutum with longitudinal striations is given. Leg setal formula of two species of *Fissitrombium* described by Southcott (1994) are given.

KEYWORDS: Diptera, Dizin, key, larva, Microtrombidiinae.

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INTRODUCTION

Family Microtrombidiidae Thor, 1935 is a large family of parasitengone mites (Acari: Trombidiformes). It includes three subfamilies namely Eutrombidiinae Thor, 1935; Microtrombidiinae Thor, 1935, Valgothrombiinae Gabryś, 1999 (Gabryś 1999), but 11 genera remained microtrombidiids *incertae sedis* (Mąkol and Wohltmann 2012, 2013). The subfamily Microtrombidiinae has the greatest number of genera (about 90 genera described from larval and post-larval stages) (Mąkol and Wohltmann 2012, 2013; Noei *et al*. 2015). Southcott (1994) prepared a key to genera of Microtrombidiinae (based on larva) of the world. In that key, microtrombidiids were separated by the number of scuta into two groups: the first group has three median dorsal scuta, and the second has only two median dorsal scuta. The second group was separated into two subgroups as follows: **A. Genera with anterior dorsal shield with longitudinal striations (partly, partially, or wholly)** including: 1. *Ambilothrombium* Haitlinger, 1998; 2. *Atractothrombium* Feider, 1952; 3. *Buandikia* Southcott, 1994; 4. *Camerotrombidium* Thor, 1936; 5. *Campylothrombium* Krausse, 1916; 6. *Echinothrombium* Womersley, 1937; 7. *Fissitrombium* Southcott, 1994; 8. *Foliotrombidium* Womersley, 1945; 9. *Gonothrombium* Feider, 1950; 10. *Platytrombidium* Thor, 1936; 11. *Stirlitrombidium* Haitlinger, 1998; 12. *Trichotrombidium* Kobulej, 1951; 13. *Trischidothrombium* Feider, 1952; 14. *Willmannella* Feider, 1952; 15. *Kamitrombidium* Haitlinger, 2001; 16.

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Yemenitrombium Saboori, Ueckermann & van Harten, 2005 and **B. Genera with anterior dorsal scutum without longitudinal striations** (species described after 1994 are also added), namely 1. *Alexothrombium* Gabryś & Wohltmann, 2001; 2. *Atractothromboides* Feider, 1975; 3. *Dactylothrombium* Feider, 1952; 4. *Ettmuelleria* Oudemans, 1911; 5. *Microtrombidium* Haller, 1882; 6. *Milandanielia* Gabryś, 1999; 7. *Odilina* Robaux, 1967; 8. *Parawillungella* Gabryś & Wohltmann, 2001; 9. *Patagonella* Southcott, 1994; 10. *Ronaldvernonia* Gabryś, 1999; 11. *Sucidothrombium* Feider, 1973; 12. *Uncithrombium* Gabryś, 1999; 13. *Willungella* Southcott, 1994. Among Microtrombidiidae *incertae sedis*, the genera: 1. *Biskratrombium* Fain & Izri, 1993; 2. *Empitrombium* Southcott, 1994; 3. *Lomboktrombium* Haitlinger, 2005; 4. *Panamatrombidium* Gabryś, 1999; 5. *Robauxia* Southcott, 1994; 6. *Thormicrella* Southcott, 1994; 7. *Yucothrombium* Haitlinger, 2000 have two dorsal scuta and scutum of *Empitrombium* and *Lomboktrombium* with striations. Among subgroup (A) *Atractothrombium, Trichotrombidium* and *Willmannella* and among Microtrombidiidae *incertae sedis*, *Empitrombium*, have been reported from Iran. Some important characters of the genera of subgroup (A) and of *Empitrombium* and *Lomboktrombium* are given in Table 1.

In this paper, we describe a new species of *Atractothrombium* collected on an undetermined Tachinidae (Insecta: Dip.) from Dizin, Chalous Road, Alborz province, Iran. Also, we studied the holotype of *Fissitrombium keasti* Southcott, 1994 and the lectotype and paralectotype of *F. clarki* (Womersley 1937) deposited in the South Australian Museum (SAM) and provide additional meristic data.

Table 1. Important differential diagnosis of some Microtrombidiinae mites [According to Southcott (1994); Wohltmann *et al.* (2003); Gabryś *et al.* (2005); Wohltmann *et al.* (2006) and Mąkol *et al.* (2003, 2008, 2010)].

Character	*Atractothrombium*	*Platytrombidium*	*Echinothrombium*
Stephanostome	Present and internal horseshoe-like sclerite bearing 35–40 prominent lateral teeth	Present and internal horseshoe-like sclerite bearing 35–40 prominent lateral teeth	Present and internal horseshoe-like sclerite inconspicuous, devoid of lateral teeth and inserted between dorsally extended cuticular membrane (forming outer and inner sheath
Size of palp femorala and genuala	Minute	Minute	Minute
Shape of *bs*	Distally with finger-like projections	Distally with finger-like projections	Distally with finger-like projections
Stolascutum	Present	Present	Present
c_2 and d_1 plates	c_2 plates slightly enlarged oval, d_1 plates much larger than c_2 and almost round	c_2 plates slightly enlarged oval, d_1 plates much larger than c2 and almost round	Pates of c_2 and d_1 enlarged (d_1 plates larger than c_2 plates)
Shape of coxalae I	Smooth or bifid	With more than 3 setules	With at least one setule
Shape of coxalae II and III	With 3–4 small setules	With more than 3 setules	With at least one setule
Shape of tarsal claws III	With modified inner claw (smilum), empodium, trifid outer claw, scopa and lophotrix small with few setules, which is smaller than the smilum	With smilum, empodium, distally serrate outer claw, scopa and lophotrix prominent with numerous long setules, which is longer than the smilum	With smilum, empodium, serrate outer claw, scopa and a prominent setulated lophotrix

Table 1. Continued.

Character	*Atractothrombium*	*Platytrombidium*	*Echinothrombium*
Dorsal idiosomal scuta	Scutum with longitudinal striations which it is visible in central, posterior and posterolateral parts, scutellum with longitudinal striations	Scutum and scutellum with longitudinal striations which it is visible in central, posterior and posterolateral parts	Scutellum without longitudinal striations
Location of solenidia on Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I
	Fissitrombium	***Camerotrombidium***	***Campylothrombium***
Stephanostome	Present and internal horseshoe-like sclerite bearing prominent lateral teeth	Present and internal horseshoe-like sclerite bearing 35–40 prominent lateral teeth	Present, dentate
Size of palp femorala and genuala	Minute	Minute	Spine-like
Shape of *bs*	Distally with finger-like projections	Distally with finger-like projections	Distally with finger-like projections
Stolascutum	Present	Present	Present
c_2 and d_1 plates	Normal*	c_2 plates slightly enlarged, d_1 plates larger than c_2 and paralellsided at their inner margins **Other character:** Postero-lateral dorsal setae much smaller than the median ones	c_2 plates normal and d_1 plates enlarged
Shape of coxalae I	With 1 setula (*1a*) or 1 or 2 setules (*1b*)	Smooth (*1a*) and with more than 3 setules (*1b*)	Smooth or with few setules (*1a*) or bifid (*1b*)
Shape of coxalae II and III	With 1–2 small setules	With more than 3 setules	With 1–3 small setules
Shape of tarsal claws III	With smilum, empodium, trifid outer claw, scopa large with many setules and lophotrix large with setulated branches	With smilum, empodium, smooth trifid outer claw, scopa and a prominent setulated lophotrix	Anterior and posterior claws of tarsi I and II and posterior claw of Ta III trifid (except *C. lumberti* that we guess position of specimen on slide is not good to see); possesses smilum, lophotrix and scopa
Dorsal idiosomal scuta	Scutum with numerous fine striations over whole of scutum, scutellum with longitudinal striations	Striation of the scutum visible in central, posterior and postero-lateral parts; scutellum without striae but with distinct and irregular reticulate pattern	Scutum and scutellum with longitudinal striations
Location of solenidia on Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	Both solenidia located on the distal half
	Trichotrombidium	***Trischidothrombium***	***Willmannella***
Stephanostome	Present (with horseshoe-like mouth that bearing large denticled membranes outside)	Present and internal horseshoe-like sclerite distinct, but without lateral teeth	Present (outer ring margin with ~30 teeth, while inner ring margin finely dentate)

Table 1. Continued.

Character	*Trichotrombidium*	*Trischidothrombium*	*Willmannella*
Size of palp femorala and genuala	Minute	Minute	Minute
Shape of *bs*	Distally with finger-like projections	Distally with finger-like projections	Distally with finger-like projections
Stolascutum	Present	Present	Present
c_2 and d_1 plates	c_2 plates slightly enlarged oval, d_1 plates larger than c_2 and round	Plates of c_2 and d_1 distinctly enlarged	c_2 plates enlarged oval, d_1 plates larger than c_2 and round
Shape of coxalae I	Barbed (*1a*) and with long setules (*1b*)	With at least one setula	Nude (*1a*) and barbed (*1b*)
Shape of coxalae II and III	With long setules (*2b*) and barbed (*3b*)	With at least one setula	Sparsely barbed (*2b*), finely barbed (*3b*)
Shape of tarsal claws III	Claws I and II normal and smooth Tarsus III with smilum, empodium, simple outer claw, scopa and a setulated lophotrix	One claw at Ta III is strongly deformed (although not a typical smilum); Each claw subtended with spine-like splinter, located close to the claw termination. Inner claw at tarsus III reduced to a spine. Scopa and lophotrix absent	With smilum, empodium, trifid outer claw, scopa and a setulated lophotrix
Dorsal idiosomal scuta	Scutum and scutellum with longitudinal striations confined to lateral parts of each scutum	Scutum surface with longitudinal cuticular folds, the anterior most part of the sclerite punctuated Scutellum punctuate and without striation	Scutum with longitudinal striations Scutellum punctate but with a pair of longitudinal striate strips (of not more than three lines) laterad of insertions of c_1
Location of solenidia on Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	Both solenidia located on the proximal half	Both solenidia located on the distal half

	Yemenitrombium	*Foliotrombidium*	*Ambilothrombium*
Stephanostome	Present	Present	Present and internal horseshoe-like sclerite with lateral teeth
Size of palp femorala and genuala	Absent	Absent	Minute
Shape of *bs*	Setiform with long setules	Distally with finger-like projections	Distally with finger-like projections
Stolascutum	Present	Present	Absent
c_2 and d_1 plates	Plates of c_2 and d_1 distinctly enlarged	c_2 plates enlarged oval, d_1 plates larger than c_2 and round	Normal
Shape of coxalae I	*1b* with long barbs, seta *1a* bifid	With long setules	Setules
Shape of coxalae II and III	With distinct setules	With long setules	Setules
Shape of tarsal claws III	Inner claw at tarsus III reduced. Scopa and lophotrix absent	With smilum, empodium, simple outer claw, scopa and a lophotrix, which is broomlike, spreading with 4 major branches each with long setules total c. 20	Normal

Table 1. Continued.

Character	*Yemenitrombium*	*Foliotrombidium*	*Ambilothrombium*
Dorsal idiosomal scuta	Scutum covered with punctations, and striae medially on anterior half, lateral striations gradually fade, extending posteriorly towards AL setae, weak striations surround bases of S, scutellum punctate, with two barbed setae	Scutum with fine longitudinal striations and scutellum with clear areas around scutalae and elsewhere with a few coarse, curved, more or less longitudinal striations	Longitudinal striations at its posterior border and lateral parts and in its center punctated
Location of solenidia on Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	One solenidion located on the proximal half and the other one located on distal half of Ti I	Both solenidia located on the distal half

	Buandikia	*Gonothrombium*	*Stirlitrombidium*	*Empitrombium*
Stephanostome	Present and internal horseshoe-like sclerite	Unknown	Present and internal horseshoe-like sclerite with lateral teeth	Present
Size of palp femorala and genuala	Minute	Unknown	Unknown	Small and spine-like
Shape of *bs*	Truncate with distal end brush-like	Small, conical, nude	Distally with finger-like projections	Distally with finger-like projections
Stolascutum	Present	Unknown	Absent	Present
c_2 and d_1 plates	c_2 plates enlarged, d_1 plates larger than c_2	Normal	Normal	c_2 and d_1 plates enlarged oval
Shape of coxalae I	Smooth (*1a*) and with one setula (*1b*)	Unknown	Smooth (*1a*) and with about 3 distinct setules (*1b*)	With long setules
Shape of coxalae II and III	With one setula (*2b*) and smooth (*3b*)	Unknown	Smooth (*2b*) and with one setula (*3b*)	With long setules
Shape of tarsal claws III	Normal	3,3,3 normal; lateral claws apically trifurcate	Normal, claws I and II apically trifurcate	With 2 falciform claws and a slender claw-like empodium
Dorsal idiosomal scuta	Scutum without special markings with striations in lateral parts only scutellum not striate	Scutum and scutellum with longitudinal striations scutellum with about 10–18 setae	Scutum with longitudinally striate and without scutellum	Scutum and scutellum with fine longitudinal striations
Location of solenidia on Ti I	At least one solenidion located on the proximal half	Unknown	At least one solenidion located on the proximal half	One solenidion located on the proximal half and the other one located on the distal half of Ti I

	Lomboktrombium	*Kamitrombidium*
Stephanostome	Absent	Present and internal horseshoe-like sclerite bearing about 23 prominent lateral teeth
Size of palp femorala and genuala	Short and nude	Absent
Shape of *bs*	Long and nude	Distally with finger-like projections
Stolascutum	Absent	Present
c_2 and d_1 plates	Normal	c_2 plate enlarged and longitudinal d_1 plate normal
Shape of coxalae I	Barbed	lateral coxala I with 4 long setules
Shape of coxalae II and III	Barbed	medial coxala I nude; coxala II and coxala III with four short setules
Shape of tarsal claws III	With 2 falciform claws	Tarsus III with two claws and empodium, not truncate and with scopa relatively strong with small distally setules; lophotrix with some long setules. Lateral claws of tarsi I and tarsi II each with two lateral spines; all tarsi with empodium.

Table 1. Continued.

Character	*Lomboktrombium*	*Kamitrombidium*
Dorsal idiosomal scuta	Scutum and scutellum with partly longitudinal striations, scutellum with 4 setae	Scutum and scutellum porose, anterior scutum weakly striated only at sensillary bases, posterior scutum not striate
Location of solenidia on Ti I	One solenidion located on the proximal half and the other one located on the distal half of Ti I	Both solenidia located on the distal half

* c_2 and d_1 plates of about the same size as those of lateral and more posterior idiosomal setae and not enlarged

MATERIAL AND METHODS

Two mite larvae attached to the wings of an undetermined Tachinidae (Insecta: Dip.) were detached by an insect pin and two others were collected off-host, then preserved in 75% ethanol, cleared in Nesbitt's fluid and finally mounted on microscope slides using Faure's medium (Krantz 1978; Walter and Krantz 2009). Figures were drawn and measurements were taken using a BX-51 Olympus microscope equipped with a drawing tube and a magnification changer. The holotype of *Fissitrombium keasti* Southcott, 1994 (accession number: ACB 1264) and lectotype (accession number: ACB 1262 A) and paralectotype (accession number: ACB 1262 B) of *F. clarki* (Womersley 1937) were studied in the SAM (South Australian Museum) by the authors. The number of normal and specialized setae on legs, idiosoma, and gnathosoma were presented. The terminology and abbreviations are adapted from Wohltmann *et al*. (2006), Mąkol (2007) and Saboori *et al*. (2009) and measurements are given in micrometers (µm).

RESULTS

Genus *Atractothrombium* Feider, 1952

Atractothrombium Feider, 1952: 609.
Atractothrombium: Gabryś *et al*. 2005: 485

Type species: *Microtrombidium* (*Enemothrombium*) *fusicomum* Berlese, 1910, by original designation.

Definition of larva (based on Gabryś *et al.* (2005) with modifications)

Gnathosoma with stephanostome and internal horseshoe-like sclerite bearing prominent lateral teeth, tritorostral (*bs*) setae distally with finger-like projections; palpal femur and genu each with one minute seta (spine-like); dorsal scutum of idiosoma with stolascutum bearing three pairs of peripheral setae plus one pair of trichobothria; scutellum with two c_1 setae; scutum with longitudinal striations visible in central, posterior and posterolateral parts, scutellum with longitudinal striations, c_2 plates slightly enlarged, oval in shape, d_1 plates much larger than c_2 and almost round; coxal setal formula: 2-1-1; setae on coxa I smooth or bifid, setae on coxae II and III with 3–4 small setules; tarsal claws: 3–3–3; tarsus III with a modified inner claw (smilum), and a trifid outer claw; scopa and lophotrix with few setules, lophotrix smaller than smilum in length.

Atractothrombium joharchii sp. nov. (Figs. 1–10)

http://zoobank.org/urn:lsid:zoobank.org:act:1EC3A479-9D7E-47A7-AB54-96F5A77C1E67

Diagnosis

SD 168–178, W 154–166, h_2/h_1 setae (1.22–1.29), length of solenidia on Ge I–III less than 50,

hypostomal setae (*bs*) with 7–8 finger-like protrusions distally, AL and PL setae barbed, solenidia on Ge I–III less than 50 and Cx formula: NB–B–B.

Description (n = 4)

Dorsum – Dorsal surface of idiosoma with a scutum, a scutellum and 26 (+2) barbed setae, each arising from a smooth sclerite except c_1 setae. There is a cuticular line at the base of each seta; setae c_2 and d_1 with larger sclerite than other hysterosomal setae, c_2 plates slightly enlarged and oval, d_1 plates larger than c_2 plates and oval (Fig. 1). Dorsal idiosomal setal formula: $c_{1–3}$, $d_{1–3}$, $e_{1–3}$, $f_{1–3}$, $h_{1–2}$ (6-6-6-6-4). Scutum rounded anteriorly and completely deflexed; lateral borders convex near AL bases and concave between AL and PL; and slightly convex at the posterior border; anterolateral angles rounded, bent ventrally (stolascutum-type) (Figs. 1, 2); scutum punctate and conspicuously with longitudinal striae (Fig. 2); bearing three pairs of setae (AM, AL and PL) and one pair of trichobothria (S). AM (30–39) filiform and nude, AL (25–33) and PL (50–55), both slightly thicker than AM and barbed. S filiform and smooth. Boat-shaped scutellum posterior to scutum and wider than long, with striation and punctation (Fig. 2) and two barbed setae on posterior half, with straight anterior and lateral borders, posterior one convex. Ocular sclerites striated, 27 long and 10 wide, situated in the concavity of lateral borders of scutum; with two lenses, anterior 7, and posterior 4 in diameter (Figs. 1, 2).

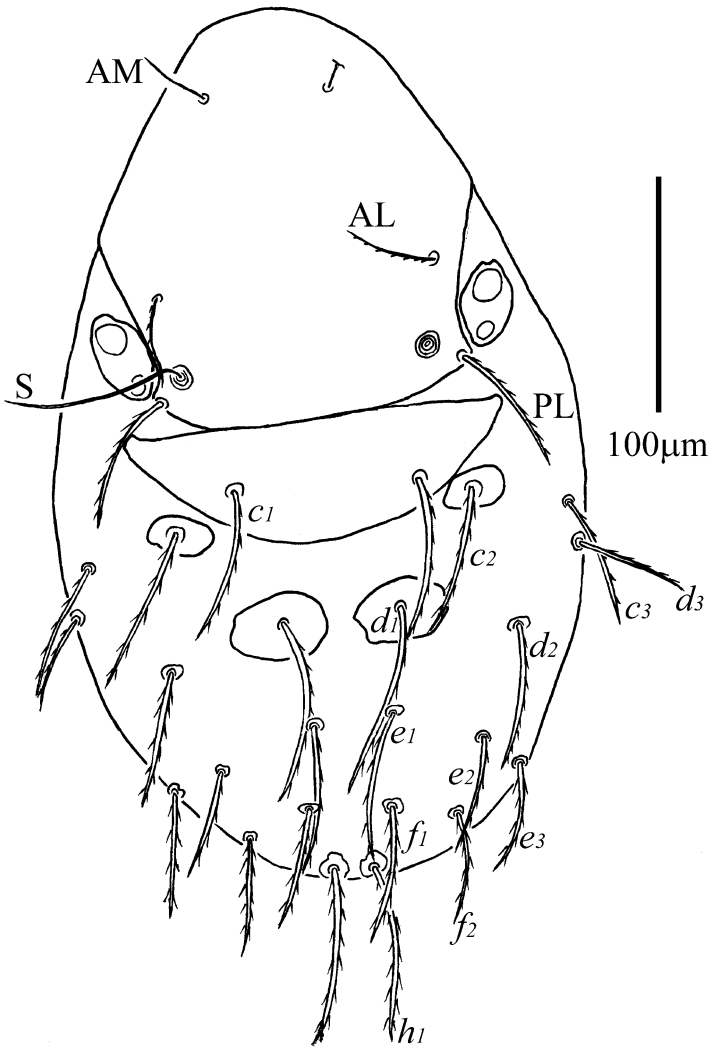


Figure 1. *Atractothrombium joharchii* **sp. nov.** (larva) – Dorsal view of idiosoma.

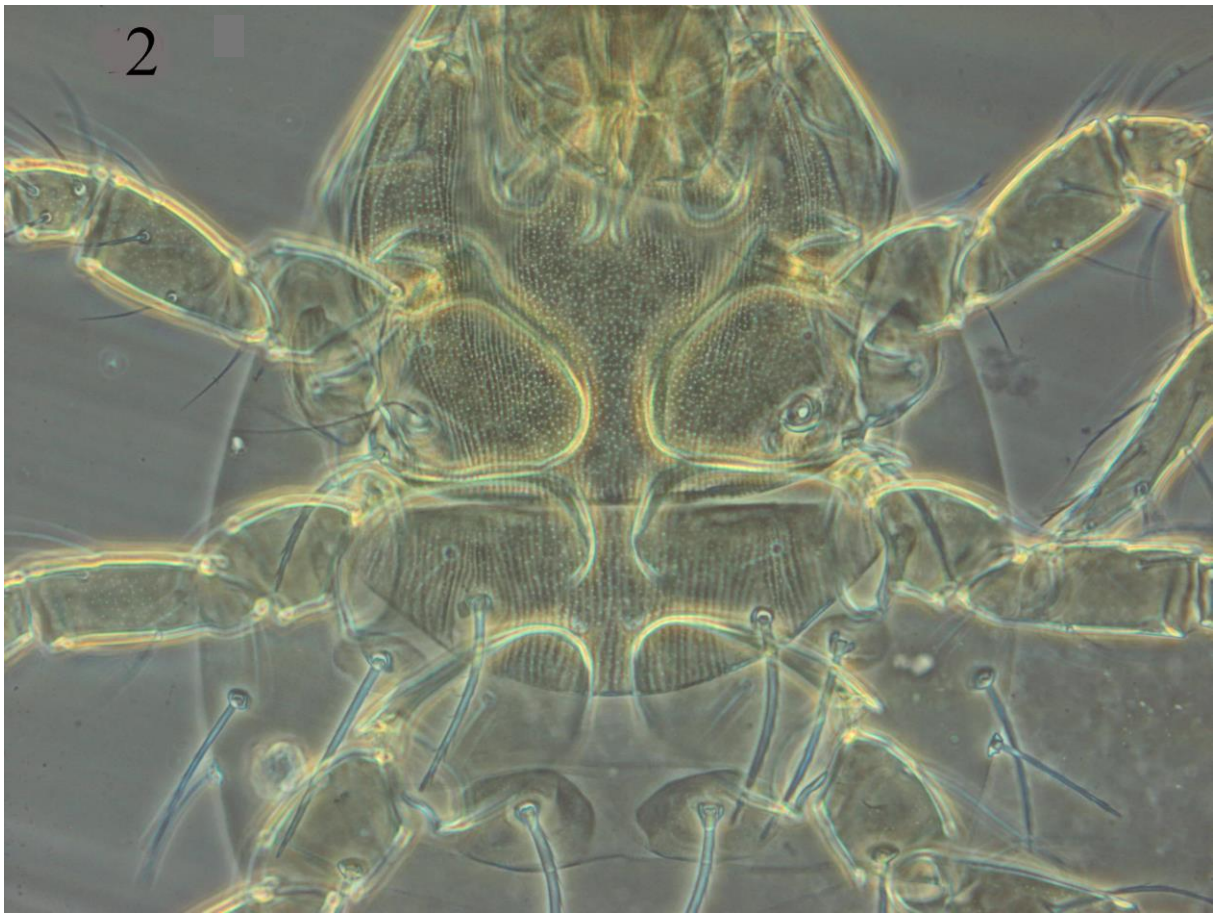


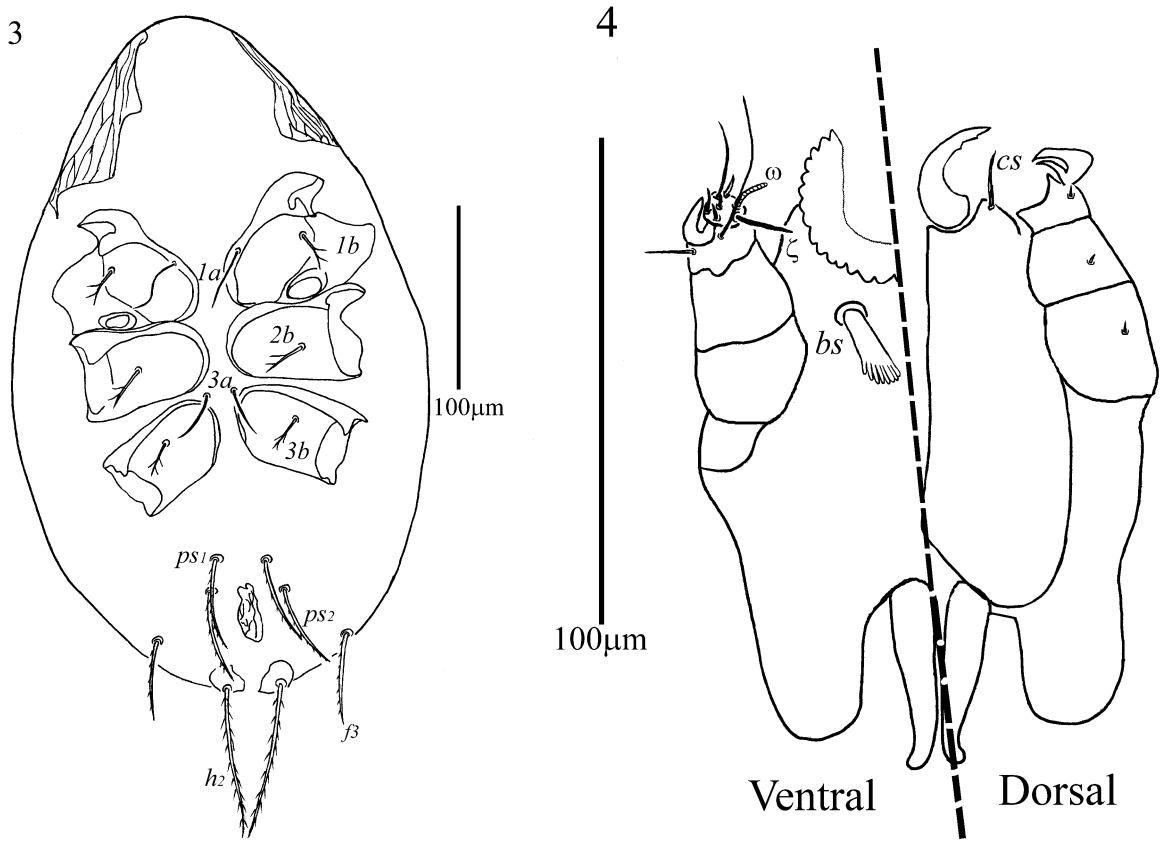
Figure 2. *Atractothrombium joharchii* **sp. nov.** (larva) – Photography of dorsal view of idiosoma (anterior part).

Venter – Ventral surface of idiosoma with one pair of nude intercoxal setae (*3a*), 2 pairs of ventral setae located on smooth sclerites and an anus. All setae on ventral idiosoma with distinct barbs. Coxa I with nude proximal seta *1a*; antero-median setulose seta *1b*. Coxa II and III with setulose setae *2b* and *3b* respectively (Fig. 3). Claparède's organs between coxae I and II, oval, distinctly elevated, 12 in diameter. NDV = 26 (+ 2) + 4 = 30 (+2).

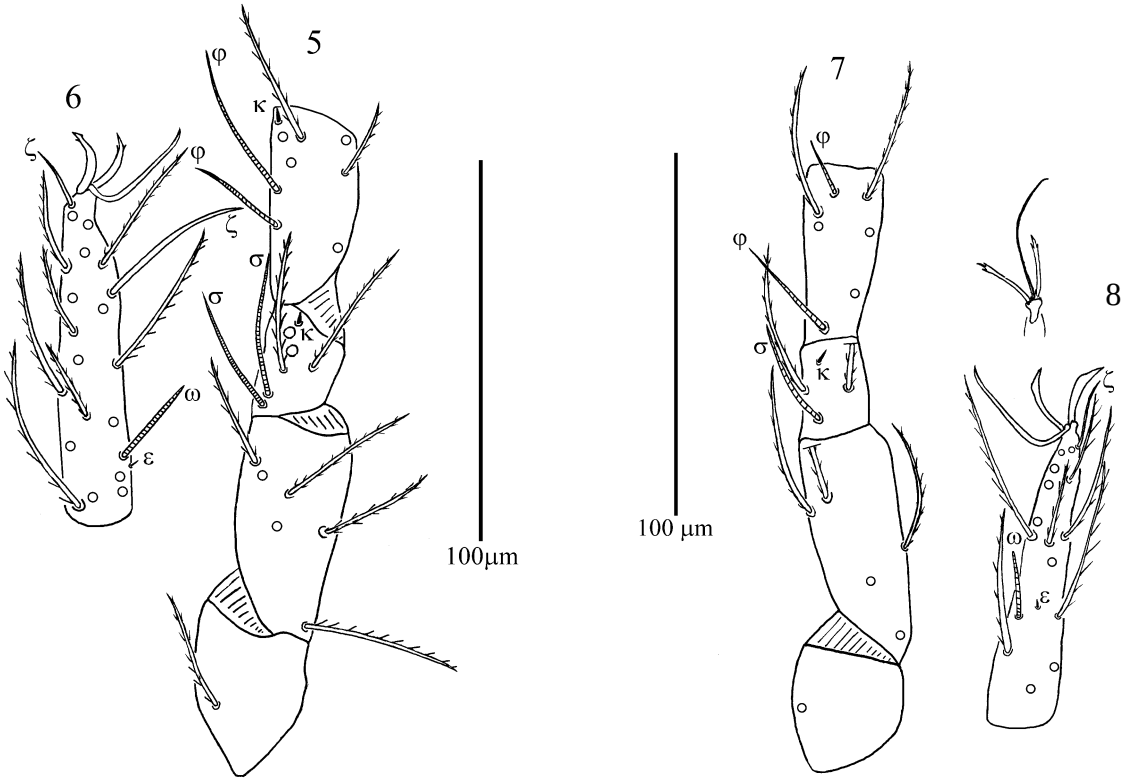
Gnathosoma – Gnathosoma with a pair of adoral setae (*cs*) nude. One pair of hypostomal setae (*bs*) short and thick, with 8 blunt digitations distally. Cheliceral base 82–92 long; cheliceral blade 25–27 long, curved with two minute subterminal teeth. Sclerotized oral ring (stephanostome) not closed dorsally, with large denticled membranes (more than 30 teeth) outside it, and small denticles inside it. Palpal femur and genu each with 1 small spine-like seta. Tibia with 3 nude setae of which 1 long and 1 shorter and the other one spine-like (Fig. 4); palpal tibial claw bifid. Palpal tarsus with 5 nude setae and a solenidion (8–9) and an eupathidium (18–19). fPp = 0-N-N-NNN$_2$-5Nωζ.

Leg segmentation formula – 6–6–6. Leg setal formula: Leg I: Tr – 1n; Fe – 6n; Ge – 2σ, 1κ, 4n; Ti – 2φ, 1κ, 6n; Ta – 1ω, 1ε, 2ζ, 18n (Figs. 5–6). Leg II: Tr – 1n; Fe – 5n; Ge – 1σ, 1κ, 2n; Ti – 2φ, 5n; Ta – 1ω, 1ε, 1ζ, 14n (Figs. 7–8). Leg III: Tr – 1n; Fe – 4n; Ge – 1σ, 2n; Ti – 5n; Ta – 13n (Figs. 9–10). Tarsi I and II with two trifid falciform claws and a slender claw-like empodium; Ta III deformed with a modified inner claw (smilum), a trifid outer claw and a long and slender empodium; scopa with few setules, and lophotrix with 6 setules.

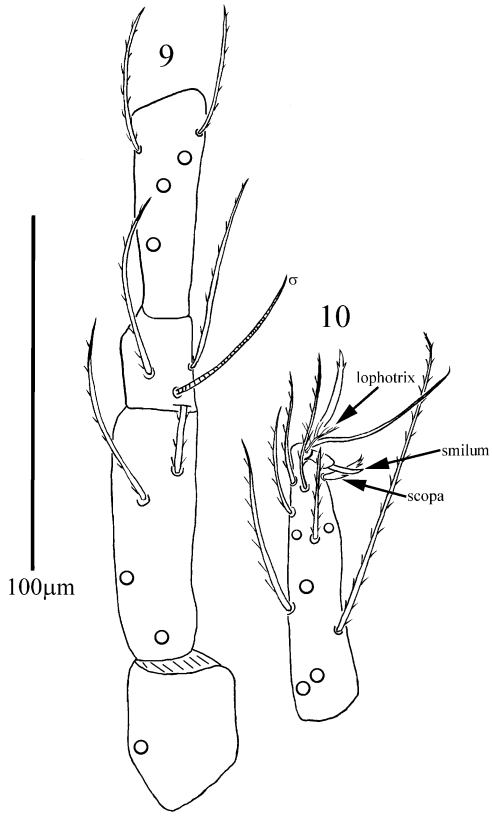
Measurements are given in Table 2.



Figures 3–4. *Atractothrombium joharchii* **sp. nov.** (larva) – 3. Ventral view of idiosoma; 4. Dorsal view (right) and ventral view (left) of gnathosoma.



Figures 5–8. *Atractothrombium joharchii* **sp. nov.** (larva) – 5. Tr-Ti I; 6. Ta I. 7. Tr-Ti II; 8. Ta II.



Figures 9–10. *Atractothrombium joharchii* **sp. nov.** (larva) – 9. Tr-Ti III; 10. Ta III.

Table 2. Metric data for *Atractothrombium joharchii* **sp. nov. (**larva). 1a, holotype; 1b–1d, paratypes.

Character	1a	1b	1c	1d	Character	1a	1b	1c	1d
SD	178	176	168	173	*2b*	25	25	26	24
W	164	163	166	154	*3a*	28	31	30	-
AW	121	120	114	125	*3b*	21	21	25	25
PW	134	138	129	136	Ta I	87	94	87	85
AA	54	56	59	58	Ti I	54	54	50	54
SB	107	108	99	108	Ge I	30	25	25	30
ASB	153	156	150	155	Fe I	59	62	59	64
PSB	25	24	25	25	Tr I	45	50	45	50
MA	89	82	82	88	Cx I	84	86	79	74
AP	47	48	47	45	Leg I	359	371	345	357
AL	30	30	25	33	Ta II	82	87	79	84
PL	50	52	50	55	Ti II	50	52	50	50
AM	32	32	37	39	Ge II	25	25	22	25
S	67	–	74	70	Fe II	67	74	64	74
HS	54	58	50	57	Tr II	42	50	42	50
LSS	163	152	144	156	Cx II	82	70	69	72
SS	79	76	71	84	Leg II	348	358	326	355
SL	57	58	52	64	Ta III	79	84	74	82
DS Max	65	69	62	69	Ti III	60	64	59	62
DS Min	37	40	37	42	Ge III	27	27	25	28
h_1	62	65	–	62	Fe III	74	74	69	74
h_2	77	84	–	76	Tr III	49	52	50	54
cs	14	14	14	–	Cx III	67	57	64	62
bs	18	18	17	–	Leg III	356	358	341	362
1a	34	30	28	31	IP	1063	1087	1012	1074
1b	21	22	24	26	Host	Off host	Tachinidae	Off host	Tachinidae

* excluding h_1 and h_2.

Type material and deposition

The holotype (ARS−20221025−1a) and three paratype (ARS−20221025−1b to 1d) larvae were collected by M. Hakimitabar and O. Joharchi, 23 July 2009, near the Velayat river, Dizin region, Chalous road, Karaj city, Alborz province, Iran (36° 3.085' N, 51° 24.925' E, 2665 m a.s.l.), ectoparasitic on an undetermined Tachinidae (Insecta: Dip.) (paratypes 1b and 1d) or off host (holotype and paratype 1c). The holotype and paratypes (ARS−20220208−1b to 1d) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran.

Etymology

The species is named in honor of Dr. Omid Joharchi (Johann-Friedrich-Blumenbach Institute of Zoology and Anthropology, Germany), a famous Iranian acarologist, for his great contribution to the taxonomy of Mesostigmata especially the family Laelapidae in Iran and other countries.

Remarks

There are 14 species of *Atractothrombium*, of which four species (see discussion) are based on larvae [L] or post-larval stages and larvae [P, L] as follows: *A. sylvaticum* (C.L. Koch, 1835) [P, L]) from Austria, France, Germany, Hungary, Ireland, Italy, Norway, Poland, Romania, Switzerland, The Netherlands, and Türkiye; *A. tectocervix* (Oudemans, 1903) [L] from Germany; *A. amirkabiri* Noei, Saboori & Hajizadeh, 2015 [L] from Iran and *A. brevisetosum* Karakurt & Sevsay, 2015 from Türkiye (Southcott 1994; Gabryś *et al.* 2005; Mąkol and Wohltmann 2012; Adil and Sevsay 2014; Noei *et al.* 2015; Karakurt and Sevsay 2015). *Atractothrombium joharchii* **sp. nov.** differs from *A. tectocervix* in a stout conical seta at the end of Ta III (absent vs. present) (there is not enough information on this species for further comparisons); from *A. sylvaticum* in the normal setae on Ta I (18 vs. 17), Ta II (14 vs. 13), Ta III (13 vs. 12), shorter h_2/h_1 setae (1.22–1.29 vs. ~ 2) and SD/W (1.01–1.12 vs. 1.56–1.90), from *A. amirkabiri* in the longer SD (168–178 vs. 126–141), W (154–166 vs. 121–131), AL (25–30 vs. 12–20), shorter solenidia on Ge I–III (less than 50 vs. more than 100) and seta *1a* (nude vs. barbed), and differs from *A. brevisetosum* in the normal setae on Ta II (14 vs. 13), Ta III (13 vs. 11) and shorter SD/W (1.01–1.12 vs.1.67–1.91), longer h_2 (76–84 vs. 31–39) and h_1 (62–65 vs. 30–37), DS Max (62–69 vs. 33–40), *1a* (28–34 vs. 16–22), AM/AL (1.06–1.48 vs. more than 2 times) and AL setae (barbed vs. nude).

Key to species of *Atractothrombium* of the world (larva)

1. Number of normal setae on Ta I–III 18-14-13, SD/W ⩽ 1.12 2
– Number of normal setae on Ta I–III 17-13-12 or 18-13-11, SD/W > 1.55 3
2. SD 168–178; W 154–166; length of solenidia on Ge I–III less than 50 ..... *A. joharchii* **sp. nov.**
– SD 126–141; W 121–131; length of solenidia on Ge I–III more than 100 ..... *A. amirkabiri*
3. Length of posterior dorsal setae in the range c. 40–60, the length of h_2 setae about twice the length of h_1 setae, Ta I–III 17-13-12 ..... *A. sylvaticum*
– Length of posterior dorsal setae in the range of 20–40, the length of h_2 setae almost equal to the length of h_1 setae, Ta I–III 18-13-11 ..... *A. brevisetosum*

Concerning *A. tectocervix* – Originally described by Oudemans (1903; Entomol. Berichten 1(IX) p. 92) as *Hydrarachna* [sic!] *tectocervix*, Oudemans published some additional remarks and details in 1904 (“Acariden von Borkum und Wangerooge”, in “Abhandlungen vom naturwissenschaftlichen Verein zu Bremen 18: 77–98”) about the species, meanwhile renamed as *Thrombidium tectocervix*. The species is described form northern Germany from a habitat typical for *A. sylvaticum.* In the text Oudemans (1904) wrote: Tarsus of the third pair of legs (Plate VITI, Fig. 93) long 73 µm, with 3 claws, the inner one needle-like, converted and directed inwards. Near this needle a second one inside

and on the dorsal side. On the ventral side between the two strong claws there is a small, comb-shaped hair with 4 teeth.

From the general habitus it is clear that the larva is a microtrombiid species of the "A" group, most likely representing *Atractothrombium*. Considering the restrictions for microscopical analysis in 1903/1904, the comb shaped hair is obviously the lophotrix, the inner "needle-like claw" the smilum and the more dorsally located second "needle like" seta most likely the scopa. The poor condition of the holotype deposited in the Berlese Acaroteca does not allow to solve the problem. So, the species is excluded from the key.

Based on the definition of *Atractothrombium*, *A. transsylvanicum* (Feider, 1950) and *A. fusicomum* (Berlese, 1910), do not fit in this genus. The most important character is the feature of Ta III which both of them have tarsus III with a pair of normal (undeformed) claws and an empodium. Since type material is apparently missing, the identity of *A. transsylvanicum* and *A. fusicomum* larvae cannot be resolved (for more explanation see Gabryś *et al*. 2005).

Genus *Fissitrombium* Southcott, 1994

Fissitrombium Southcott, 1994: 35.
Trombidium Womersley, 1937: 97 (part), non *Trombidium* Fabricius, 1775.
Microtrombidium (?) Haller, 1882- Thor and Willmann, 1947: 93 (part).

Type species: *Fissitrombium keasti* Southcott, 1994, by original designation.

Definition (based on Southcott, 1994 with modifications)

Gnathosoma with stephanostome and internal horseshoe-like sclerite bearing prominent lateral teeth, tritorostral (*bs*) setae distally with finger-like projections; palpal femur and palpal genu each with one minute setae (spine-like); dorsal scutum of idiosoma with stolascutum bearing three pairs of setae and one pair of trichobothria; scutellum with two c_1 setae; scutum and scutellum with longitudinal striations, dorsal setae arising from small plates; coxal setae: 2-1-1; setae on coxa I with one or two setules, setae on coxae II and III with 1–2 small setules; famulus on Ta I placed before the most proximal normal seta; tarsal claws: 3-3-3 (deformed); tarsi I and II with trifid claws, tarsus III with a modified inner claw (smilum), a trifid outer claw; scopa large with many setules and lophotrix large and setulated.

Southcott (1994) described two species of *Fissitrombium* but he ignored the number of normal setae on Leg I-III and stated just specialized setae, so we re-examined species and complete leg setal formula as follows:

Fissitrombium clarki (Womersley, 1937)

Distribution – Australia
Specimens examined – ACB 1262 A (lectotype) and ACB 1262 B (paralectotype).
Leg setal formula (corrected data) – Leg I: Ta – 1ω, 1ε, 2ζ, 17n; Ti – 2φ, 1κ, 6n; Ge – 2σ, 1κ, 4n; Fe – 6n; Tr – 1n; Cx – 2n. Leg II: Ta – 1ω, 1ε, 1 ζ, 14n; Ti – 2φ, 5n; Ge – 1σ, 1κ, 2n; Fe – 5n; Tr – 1n; Cx – 1n. Leg III: Ta – 13n; Ti – 5n; Ge – 1σ, 2n; Fe – 4n; Tr – 1n; Cx – 1n.

Fissitrombium keasti Southcott, 1994

Distribution – Australia
Specimens examined – ACB 1264 (holotype)
Leg setae formula (corrected data) – Leg I: Ta – 1ω, 1ε, 2ζ, 17n; Ti – 2φ, 1κ, 6n; Ge – 3σ, 1κ, 3n; Fe – 6n; Tr – 1n; Cx – 2n. Leg II: Ta – 1ω, 1ε, 1ζ, 14n; Ti – 2φ, 5n; Ge – 2σ, 1κ, 2n; Fe – 5n; Tr – 1n; Cx – 1n. Leg III: Ta – 13n; Ti – 5n; Ge – 2σ, 2n; Fe – 4n; Tr – 1n; Cx – 1n.

Key to genera of Microtrombidiinae of the world with two median scuta and anterior dorsal shield with longitudinal striations (larva)

1. Tarsal claws 2-2-3 or 2-2-2 2
– Tarsal claws 3-3-3 3
2. Tarsal claws 2-2-3, scutellum with 2 setae ..... *Empitrombium*
– Tarsal claws 2-2-2, scutellum with 4 setae ..... *Lomboktrombium*
3. Tarsal claws 3-3-3, deformed (with scopa, smilum and lophotrix) 4
– Tarsal claws 3-3-3, undeformed (without scopa, smilum and lophotrix) 13
4. c_2 and d_1 plates normal (not enlarged) ..... *Fissitrombium*
– c_2 and d_1 plates enlarged 5
5. Both solenidia located on the proximal or distal half of Ti I 6
– One solenidion located on the proximal half and the other one located on the distal half of Ti I 8
6. Both solenidia located on the proximal half of Ti I ..... *Willmannella*
– Both solenidia located on the distal half of Ti I 7
7. Scutellum with longitudinal striation ..... *Campylothrombium*
– Scutellum without longitudinal striation ..... *Kamitrombidium*
8. Scutellum without longitudinal striation 9
– Scutellum with longitudinal striation 10
9. Scutellum with distinct and irregular reticulate pattern ..... *Camerotrombidium*
– Scutellum punctate ..... *Echinothrombium*
10. Scutum and scutellum with longitudinal striations confined to lateral parts ..... *Trichotrombidium*
– Longitudinal striations of scutum occupying its whole area 11
11. Longitudinal striations of scutellum few and broad ..... *Foliotrombidium*
– Longitudinal striations of scutellum numerous and fine 12
12. Outer claw of Ta III distally serrate, scopa and lophotrix prominent with numerous long setules, which are longer than smilum ..... *Platytrombidium*
– Outer claw of Ta III trifid, scopa and lophotrix small with few setules, which are shorter than smilum ..... *Atractothrombium*
13. Scutellum with ≥ 10 setae ..... *Gonothrombium*
– Scutellum with 2 setae 14
14. Both solenidia located on the proximal or distal half of Ti I 15
– One solenidion located on the proximal half and the other one located on distal half of Ti I 16
15. Both solenidia located on the proximal half of Ti I, c_2 and d_1 plates enlarged, one claw at Ta III is strongly deformed (although not a typical smilum) ..... *Trischidothrombium*
– Both solenidia located on the distal half of Ti I, c_2 and d_1 plates not enlarged ..*Ambilothrombium*
16. c_2 and d_1 plates normal (not enlarged) ..... *Stirlitrombidium*
– c_2 and d_1 plates enlarged 17
17. *bs* barbed ..... *Yemenitrombium*
– *bs* truncate with distal end brush-like ..... *Buandikia*

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نکاتی در مورد *Atractothrombium* و *Fissitrombium* (Acari: Trombidiformes: Microtrombidiidae) همراه با توصیف گونهٔ جدیدی از *Atractothrombium* از ایران

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چکیده

گونهٔ جدید ***Atractothrombium joharchii* sp. nov.** انگل خارجی مگس ناشناخته‌ای از خانوادهٔ Tachinidae (Insecta: Diptera) از استان البرز ایران توصیف می‌شود. بازتعریفی از جنس *Atractothrombium* ارایه شده است. کلید شناسایی برای مرحلهٔ لاروی جنس‌های Microtrombidiinae جهان دارای دو سپر میانی و سپر جلویی با خطوط طولی داده شده است. فرمول ساق پای دو گونه از *Fissitrombium* توصیف شده توسط ساوتکات (۱۹۹٤) ارایه شده است.

واژگان کلیدی: راستهٔ دوبالان، دیزین، کلید، لارو، زیرخانوادهٔ Microtrombidiinae.

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