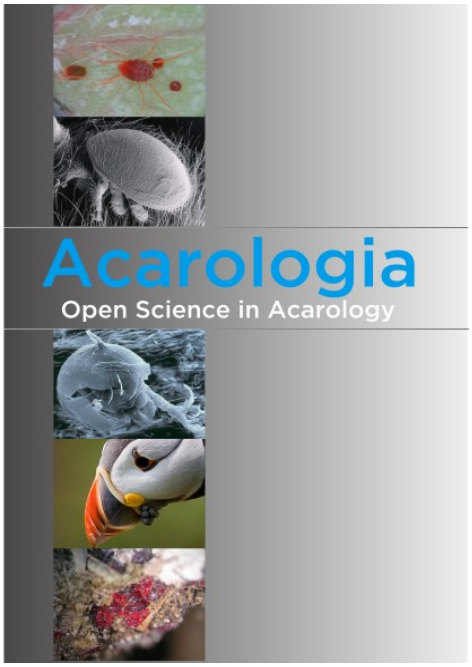

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Additions to the chigger mite fauna (Acariformes: Trombiculidae) of Saudi Arabia, with the description of a new species

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Original research

ABSTRACT

Collections of chigger mites from murid rodents were performed in two bordering provinces of southwestern Saudi Arabia, Al Bahah and 'Asir. A total of 561 chiggers belonging to 19 species were collected in 2020 and 2021 from 54 rodents of two species, *Acomys dimidiatus* (Cretzchmar) and *Mus musculus* L. One new species is described: *Odontacarus thesigeri* **n. sp.** Five species are recorded in Saudi Arabia for the first time: *Microtrombicula abyssinica* (Radford, 1947), *Microtrombicula felis* (Vercammen-Grandjean, 1965), *Microtrombicula saperoi* (Radford, 1954), *Schoengastiella hypoderma* Vercammen-Grandjean, 1956, and *Schoutedenichia originalis* Kudryashova, 1976. Among them, *M. abyssinica* and *M. saperoi*, are re-described based on type specimens and new materials.

Keywords chiggers; taxonomy; Western Asia; Arabian Peninsula; parasites of rodents
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Introduction

Stekolnikov *et al.* (2019a) published the first data on chigger mites from Saudi Arabia, including descriptions of four new species and 15 new records. The paper was based on a material collected in 2016 and 2017 in the territory of 'Asir Province, in the mountainous southwestern part of the country. Subsequently, we performed additional collections in the same sites and investigated the chigger fauna in Al Bahah Province situated northwest of 'Asir. In August and September 2020, the first author performed a preliminary exploration in Al Bahah (near Thee Ain village) and noted a high abundance of chiggers on four species of rodent hosts. In October 2020 and August 2021, extensive collections took place in 'Asir (in two previously sampled locations) and in several locations in Al Bahah, respectively. The main task of that latter investigation was a pathogen screening in chigger mites. Therefore, most of the mites were pooled for DNA extraction and only a limited number of them was used for a detailed morphological examination. Based on this material, we present a description of a new species and five new country records. Since the mites used for the molecular analysis were also examined using bright-field or autofluorescence microscopy and were presumptively identified, a detailed analysis of the ecological characteristics of chiggers in the study area

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(prevalence and intensity of infestation, and the co-occurrence of different chigger species on one host individual) is also possible. This will be the subject of a separate contribution.

Two of the species we recorded in Saudi Arabia were incompletely described by Radford (1947, 1954). Fortunately, we had a previous opportunity to examine type materials of these species, which allowed us to prepare their re-descriptions based on both the types and new specimens.

Material and methods

Collection sites comprised two locations in 'Asir Province [near the villages of Al Ous' and Wosanib, described in Stekolnikov *et al.* (2019a)] and six locations in Al Bahah Province (Table 1). The capital of Al Bahah Province, Al Bahah city, is situated ~210 km northwest of our previous chigger sampling sites in 'Asir Province (Stekolnikov *et al.*, 2019a), lying on the Hijaz Mountain range at an elevation of ~2,200 m a.s.l. The collection sites in Al Bahah Province spanned elevations in the range of ~530 – 2,300 m a.s.l., extending in a ~10 km radius south (Al Makhwah), north (Bani Sar), and northwest (Khairah Forest Park) of Al Bahah city (Table 1). One more site, where chiggers were not found (Qarn Dhabi, 20.044443 N, 41.418212 E, 2,434 m a.s.l.) was not included in the table. The terrain is mostly mountainous, composed of granite peaks protruding through basalt, and strewn with scrubby vegetation composed of tamarisk (*Tamarix* spp.), acacias (*Vachellia* spp.) and Christ's thorn jujube (*Ziziphus spina-christi*) up to ~1,600 m; with replacement by wild olive (*Olea europaea* subsp. *cuspidata*) and African juniper (*Juniperus procera*) at higher elevations (Thesiger 1947). Some sampling locations included agricultural fields bordering mountain slopes (Table 1).

Rodents were trapped overnight and euthanized by inhaled anaesthetic overdose as previously described (Stekolnikov *et al.* 2019a). Identification of hosts was by morphological features in the preliminary surveys (August/September 2020), with confirmation by molecular methods for the definitive study in each province (October 2020 and August 2021). Molecular barcoding was based on amplification of a cytB gene fragment (Kocher *et al.* 1989) and

Table 1 Collection sites.

Province	Nearest settlement or other feature	Terrain	Geographical coordinates	Altitude (m a.s.l.)	Collection dates
Al Bahah	Thee Ain village	Montane	19.921832 N, 41.430178 E	719	Aug. 2021
Al Bahah	Thee Ain village	Montane	19.940103 N, 41.444666 E	803	Aug. 2021
Al Bahah	Thee Ain village	Montane, agricultural	19.929457 N, 41.441700 E	745	Aug. 2021
Al Bahah	King Fahd Road, Al Makhwah	Montane	19.864027 N, 41.452468 E	538	Aug. 2021
Al Bahah	King Fahd Road, Al Makhwah	Montane	19.875530 N, 41.446767 E	563	Aug. 2021
Al Bahah	Al Bahah city	Montane	20.058881 N, 41.512811 E	2,113	Aug. 2021
Al Bahah	Al Bahah city	Agricultural	20.071957 N, 41.545462 E	2,028	Aug. 2021
Al Bahah	Alhijaz district	Montane	20.077497 N, 41.469903 E	2,229	Aug. 2021
Al Bahah	Bani Sar town	Montane	20.103946 N, 41.443762 E	2,213	Aug. 2021
Al Bahah	Khairah Forest Park	Montane	20.055361 N, 41.397430 E	2,320	Aug. 2021
'Asir	Al Ous'	Montane	18.278101 N, 42.323713 E	1,496	Oct. 2020
'Asir	Al Ous'	Montane	18.283613 N, 42.334035 E	1,614	Oct. 2020
'Asir	Al Ous'	Montane	18.291748 N, 42.334587 E	1,800	Oct. 2020
'Asir	Al Ous'	Montane	18.292415 N, 42.336740 E	1,744	Oct. 2020
'Asir	Wosanib	Montane	18.304602 N, 42.216909 E	913	Oct. 2020
'Asir	Wosanib	Montane, agricultural	18.324115 N, 42.215869 E	892	Oct. 2020
'Asir	Wosanib	Montane	18.324761 N, 42.199175 E	828	Oct. 2020
'Asir	Wosanib	Montane	18.328347 N, 42.219233 E	906	Oct. 2020

comparisons with existing nucleotide sequences using the Basic Local Alignment Search Tool at the National Center for Biotechnology Information website. Sequences were deposited in the Barcode of Life Data System database under project code HAK. Chiggers were removed from predilection sites on the rodents and fixed in 70% ethanol.

For morphological identification, chigger specimens were cleared in Berlese fluid (TCS Bioscience Ltd, Buckingham, UK) and incubated for two days at 50 °C prior to microscope examination. Initial measurements (not given in the present paper) and preliminary identifications were performed at the University of Liverpool on an Axio Imager M2 microscope with ZEN 2011 imaging software (Carl Zeiss AG, Oberkochen, Germany). For definitive species confirmation and photography, a portion of the mounted specimens were shipped to the Zoological Institute of the Russian Academy of Sciences (ZIN, Saint Petersburg, Russia), where the slides were examined under a Leica DM 2500 compound microscope (Leica Microsystems GmbH, Wetzlar, Germany) using differential interference contrast (DIC). Microphotographs were taken by means of a Leica DMC 4500 digital camera, and morphological drawings were prepared using a drawing tube. Measurements were taken using an ocular micrometre, on an MBI-3 microscope (LOMO plc, Saint Petersburg, Russia) with phase contrast optics.

A few microscope slides prepared by the first author from her collections in Thee Ain, in August and September 2020, were by the same way examined and identified in ZIN; they were not included in the total count of materials, but the results of identification are specially noted below.

Type specimens of *Microtrombicula abyssinica* (Radford, 1947) and *Microtrombicula saperoi* (Radford, 1954) were examined by AAS in 2017 and 2019 in the Natural History Museum (NHM, London, UK) using a Zeiss Axiophot microscope (Carl Zeiss AG, Oberkochen, Germany) and an Olympus BH-2 microscope (Olympus Corporation, Tokyo, Japan) with DIC. Measurements were taken using ocular micrometre with prior calibration by a stage micrometre. Morphological drawings were prepared using a drawing tube.

Holotype and paratypes of the new species, as well as a part of other materials, are deposited in ZIN; remaining specimens are currently stored in the Institute of Infection, Veterinary & Ecological Sciences, University of Liverpool (Liverpool, UK).

Results

Subfamily Leeuwenhoekiinae Womersley, 1944

Genus *Odontacarus* Ewing, 1929

Odontacarus thesigeri Stekolnikov n. sp.

Zoobank: 09416F5A-C589-40CC-B6E5-D826CE5C4961

(Figs 1A, B, 2, 3)

Diagnosis

SIF = 7B-B-3-2111.0000; fPp = B/B/BBB; fsp = 6.6.6; fCx = 2.1.1; fSt = 0.2; fD = [11-21]-22-19-13-9-5-4; DS = 80–110, V = 87–110, Hv = 13; NDV = 181–233; Ip = 850–884; AM > PL > AL; eyes absent; sensillary bases posterior to PL; sensilla branched in distal part; scutal and dorsal idiosomal setae with long barbs; nude parasubterminala present; tarsala II longer than tarsala I; mastitarsala absent.

Standard measurements

Given in Table 2.

Description of larva

Idiosoma — (Figs 1A, 2, 3D, E). Eyes absent; 80–110 sharply-pointed dorsal idiosomal setae covered with long thin barbs; in holotype 1st row (C) nearly triple (11 + 21 setae; two marginal

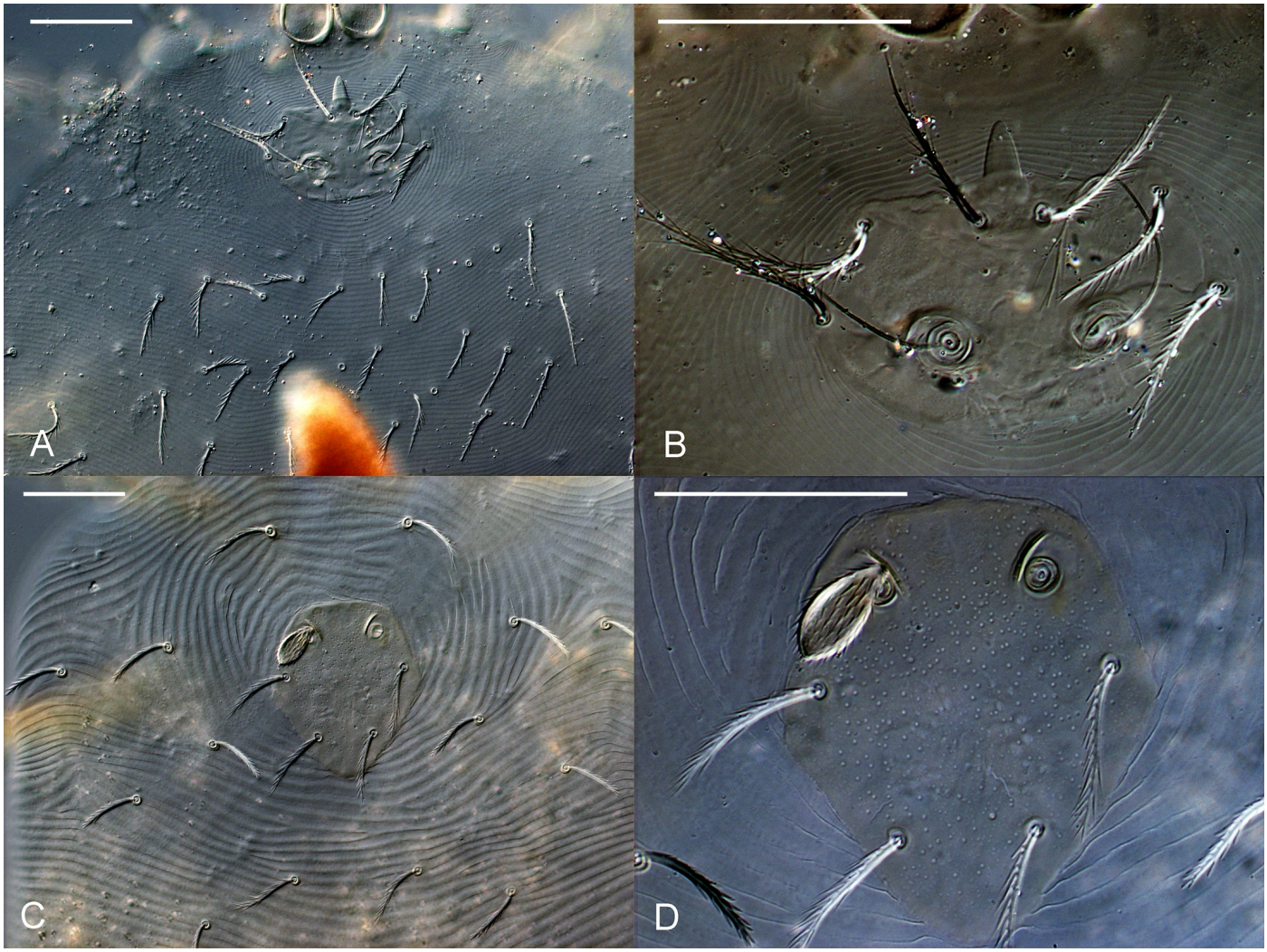

Figure 1 *Odontacarus thesigeri* **n. sp.**, paratype 1: A – anterior part of idiosoma with scutum; B – scutum. *Schoengastiella hypoderma* Vercammen-Grandjean, 1956, specimen ZIN 17821, R40CH5: C – anterior part of idiosoma with scutum; D – scutum (one sensillum lost). Scale bars: 50 µm.

setae can be defined as humeral), 2nd row (D) with 22 setae, 3rd row (E) with 19 setae, 4th row (F) with 13 setae, distribution of remaining caudal setae by rows 9-5-4; two sternal setae between coxae III; 13 (6 + 7) ventro-humeral setae between coxae II and III on each side; 87–110 ventral setae; NDV = 181–233. Stigmata (spiracles) large, funnel-shaped, situated between gnathocoxa and leg I coxae; tracheae extend to caudal end of idiosoma.

Gnathosoma — (Figure 3B, C). Cheliceral blade with dorsal row of 4 large blunt teeth and ventral row of 6–7 smaller pointed teeth; cheliceral base punctate; gnathobase (infracapitulum) without evident puncta, bears one pair of branched gnathocoxal (tritorostral) setae; galeal (deutorostral) seta heavily branched; palpal claw (odontus) with 3 prongs; palpal femoral, genual, and tibial setae branched; palpal tarsus with 7 branched setae and basal tarsala (ω).

Scutum — (Figures 1B, 3A). Wider than long, lightly punctate, posterior margin almost straight in middle part; nasus triangular; AM placed at level of AL or slightly posterior; sensillary (trichobothrial) bases placed posterior to level of PL (P-PL – PSB = 5–7 µm); AM > PL > AL; all scutal setae barbed similarly to dorsal idiosomal setae; sensilla (trichobothria) flagelliform, with ca. 5 long branches in distal part.

Legs — (Figure 3F – H). All legs 6-segmented (with undivided femur), with 1 pair of

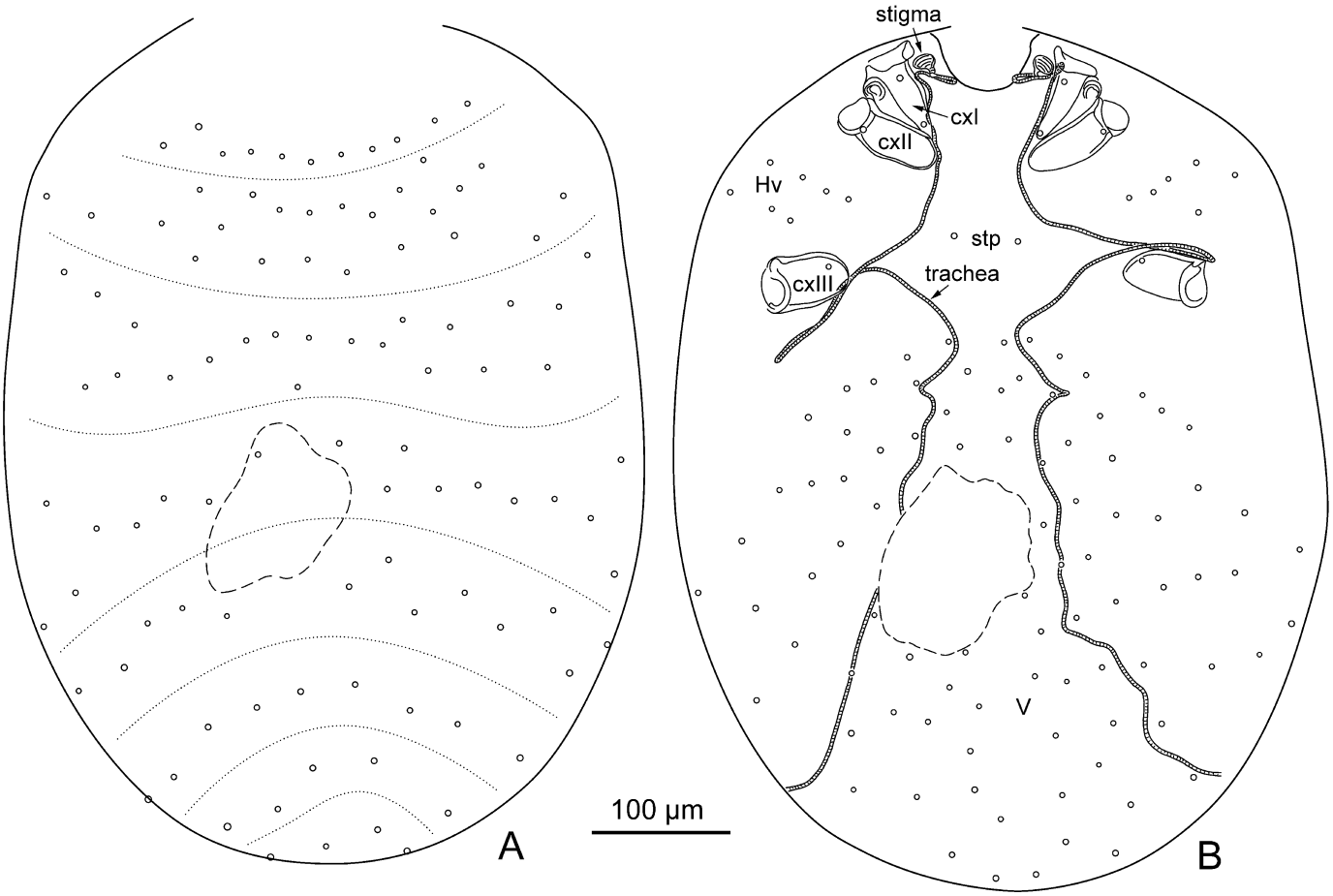

Figure 2 *Odontacarus thesigeri* **n. sp.**, holotype: A – dorsal aspect of idiosoma; B – ventral aspect of idiosoma. Abbreviations: cxI – leg I coxa; cxII – leg II coxa; cxIII – leg III coxa; Hv – ventro-humeral setae; stp – sternal setae; V – ventral idiosomal setae. Borders between rows of setae showed by dotted lines. An opaque inclusion in midgut outlined by dashed line. Uropore (anus) invisible.

claws and claw-like empodium, one pair of onychotriches present on claws. Leg I: coxa with 2 branched setae (2B); trochanter 1B; femur 6B; genu 4B, 2 genualae (σ) in proximal part of segment, microgenuala (κ) in distal part of segment; tibia 8B, 2 tibialae (φ) in tandem, long setiform microtibiala (κ) near distal tibiala; tarsus 27B, tarsala (ω), setiform famulus (ε) distal to tarsala, subterminala (ζ), nude parasubterminala (z), pretarsala (ζ). Leg II: coxa 1B; trochanter 1B; femur 5B; genu 4B, genuala (σ), microgenuala (κ) distal to genuala; tibia 6B, 2 tibialae (φ) in tandem; tarsus 17B, tarsala II (ω), setiform famulus (ε) distal to tarsala, pretarsala (ζ). Leg III: coxa 1B; trochanter 1B; femur 4B; genu 4B, genuala (σ); tibia 6B, tibiala (φ); tarsus 15B.

Type material

Larval holotype (ZIN 17830, R52CH11) and paratype 1 (ZIN 17831, R52CH7), on back of *Acomys dimidiatus* (Cretzchmar) (Rodentia: Muridae) No. AR52, SAUDI ARABIA, Al Bahah Province, King Fahd Road, Al Makhwah, 19.864027 N, 41.452468 E, 538 m a.s.l., August 2021, coll. H. Alkathiry; paratype 2 (ZIN 17834, R58CH1), on back of *A. dimidiatus* No. AR58, other data same.

Etymology

The species is named in honor of Sir Wilfred Patrick Thesiger (1910 – 2003), a British military officer, explorer, and writer famous for his travel books covering his expeditions across the

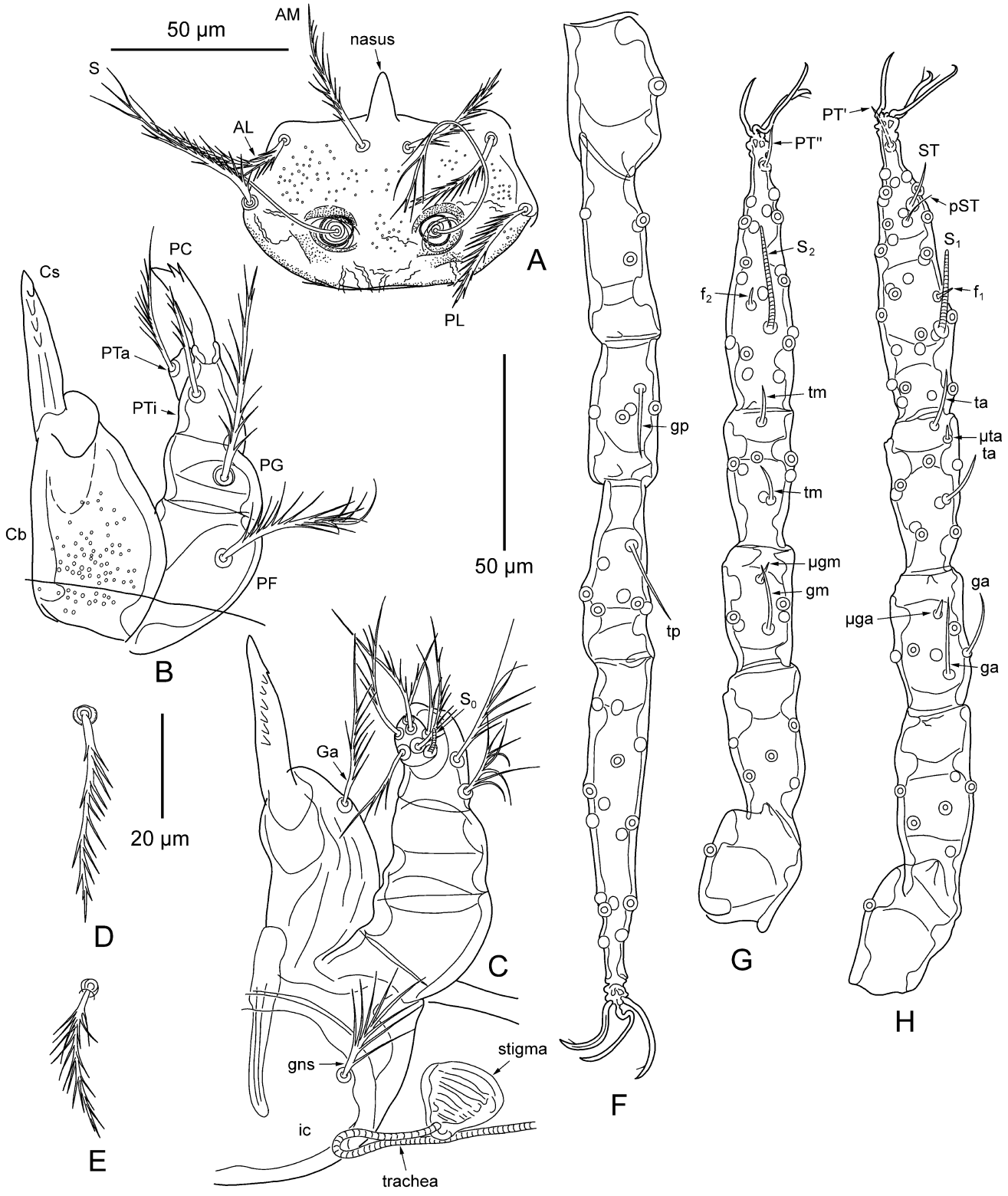

Figure 3 *Odontacarus thesigeri* **n. sp.**, paratype 1 (A), holotype (B – H): A – scutum; B – dorsal aspect of gnathosoma; C – ventral aspect of gnathosoma; D – dorsal idiosomal seta; E – preanal idiosomal seta; F – leg III (trochanter – tarsus); G – leg II (trochanter – tarsus); H – leg I (trochanter – tarsus). Abbreviations: AL – anterolateral scutal seta; AM – anteromedian scutal seta; Cb – cheliceral base; Cs – cheliceral blade; f_1 – famulus I (ε); f_2 – famulus II (ε); Ga – galeal (deutorostral) seta; ga – genuala I (σ); gm – genuala II (σ); gns – gnathocoxal (tritorostral) seta; gp – genuala III (σ); ic – infracapitulum (gnathobase, gnathocoxa); µga – microgenuala I (κ); µgm – microgenuala II (κ); µta – microtibiala I (κ); PC – palpal claw (odontus); PF – palpal femur; PG – palpal genu; PL – posterolateral scutal seta; pST – parasubterminala (z); PT′ – pretarsala I (ζ); PT" – pretarsala II (ζ); PTa – palpal tarsus; PTi – palpal tibia; S – sensillum (trichobothrium); S_0 – palpal tarsala (ω); S_1 – leg tarsala I (ω); S_2 – leg tarsala II (ω); ST – subterminala (ζ); ta – tibiala I (φ); tm – tibiala II (φ); tp – tibiala III (φ). Scale bars: A – 50 µm; B – E – 20 µm; F – H – 50 µm.

Arabian Peninsula and other regions of Asia.

Differential diagnosis

The new species differs from all other *Odontacarus* by the absence of eyes. It is similar to *Odontacarus dignus* Kudryashova, 1976 by the number of ventrohumeral setae (12 – 15, according to the original description), NDV (191 – 220), and by fPp = B/B/BBB, but differs in the absence of mastitarsala and mastitibiala, presence of genualae II and III, nude parasubterminala (vs. branched), position of sensillary bases posterior to PL (vs. anterior), AM > PL > AL vs. AM ≥ AL > PL, number of branched setae on leg I tarsus (27 vs. 31), on leg I genu (4 vs. 5), on leg III tibia (6 vs. 5), shorter scutum (SD 49 – 51 vs. 62 – 64, AP 21 – 23 vs. 28 – 34), shorter legs (Ip 850 – 884 vs. 1171, TaIIIL 86 – 90 vs. 109 – 112), and by longer S_2 (25 – 26 vs. 18 – 22).

Subfamily Gahrliepiinae Womersley, 1952

Genus *Schoengastiella* Hirst, 1915

Schoengastiella hypoderma Vercammen-Grandjean, 1956

(Fig. 1C, D)
Schoengastiella (*Jadiniella*) *hypoderma* Vercammen-Grandjean, 1956: 354.
Gahrliepia (*Jadiniella*) *hypoderma*: Zumpt 1961: 173.
Schoengastiella hypoderma: Stekolnikov 2018: 30.

Diagnosis — SIF = 5B-N-3-2110.0000; fPp = B/N/NNB; fsp = 7.6.6; fCx = 1.1.1; fSt = 2.2; fD = 2AL-4-4-6-6-(5–6)+(3–5); DS = 31–32, V = 44–46, NDV = 76–77; Ip = 590–646; AL ≥ PL ≥ PPL; eyes absent; ALs extrascutal.

Table 2 Morphometric (AW–S_2, µm) and meristic (DS–NDV) traits of *Odontacarus thesigeri* **n. sp**. Abbreviations: AW – distance between anterolateral scutal setae; PW – distance between posterolateral scutal setae; SB – distance between sensillary (trichobothrial) bases; ASB – distance from the level of sensillary bases to extreme anterior margin of scutum; PSB – distance from the level of sensillary bases to extreme posterior margin of scutum; SD – length of scutum (ASB + PSB); P-PL – distance from the level of posterolateral scutal setae (PL) to extreme posterior margin of scutum; AA – distance between anteromedian scutal setae (AM); NL – length of nasus; NW – width of nasus; AP – distance between antero- and posterolateral scutal seta on one side; AM – length of anteromedian scutal seta; AL – length of anterolateral scutal setae; PL – length of posterolateral scutal setae; S – length of sensilla (trichobothria); H – length of humeral setae; D_{min} – length of the shortest dorsal idiosomal seta; D_{max} – length of the longest dorsal idiosomal seta; V_{min} – length of the shortest ventral idiosomal seta; V_{max} – length of the longest ventral idiosomal seta; pa – length of leg I (including coxa, excluding claws); pm – length of leg II (including coxa, excluding claws); pp – length of leg III (including coxa, excluding claws); Ip – sum of leg lengths (pa + pm + pp); TaIIIL – length of leg tarsus III; TaIIIW – width of leg tarsus III; S_1 – length of leg I tarsala (ω); S_2 – length of leg II tarsala (ω); DS – number of dorsal idiosomal setae (excluding scutal); V – number of ventral idiosomal setae (excluding coxal and sternal); Hv – number of ventrohumeral setae; NDV = DS + V + Hv.

	Holotype	Paratype 1	Paratype 2
AW	64	59	63
PW	83	77	83
SB	33	28	31
ASB	31	32	32
PSB	18	17	19
SD	49	50	51
P-PL	25	23	23
AA	13	13	12
NL	16	12	18
NW	5	6	7
AP	21	21	23
AM	47	36	39
AL	37	29	34
PL	37	34	38
S	-	-	86
H	-	41	45

	Holotype	Paratype 1	Paratype 2
D_{min}	24	23	29
D_{max}	38	36	38
V_{min}	27	20	23
V_{max}	34	33	37
pa	293	286	302
pm	266	259	268
pp	310	304	313
Ip	869	850	884
TaIIIL	88	86	90
TaIIIW	14	14	15
S_1	19	21	-
S_2	26	25	-
DS	104	80	110
V	87	88	110
Hv	13	13	13
NDV	204	181	233

Standard measurements — (mean and range, n = 6) — PW 60 (57 – 63), SB 33 (32 – 35), ASB 17 (16 – 19), PSB 75 (70 – 79), SD 92 (88 – 95), P-PL 56 (50 – 61), AL 38 (34 – 41), PL 36 (34 – 39), PPL 34 (32 – 37), S (length) 29 (25 – 32), S (width) 11 (10 – 13), D_{min} 26 (23 – 27), D_{max} 33 (32 – 36), V_{min} 16 (14 – 17), V_{max} 29 (28 – 31), pa 219 (205 – 229), pm 191 (180 – 200), pp 211 (198 – 221), Ip 621 (590 – 646), TaIIIL 56 (52 – 59), TaIIIW 15 (14 – 15), S_1 17 (16 – 18), S_2 14 (14 – 14), DS 31 (31 – 32), V 45 (44 – 46), NDV 76 (76 – 77).

Distribution and hosts — This species was described from Bukavu and Lwiro (Belgian Congo; currently, Democratic Republic of the Congo), ex *Lophuromys aquilus* (True), *Lophuromys flavopunctatus* Thomas, *Mastomys natalensis* (Smith), and *Stochomys longicaudatus* (Tullberg) (Rodentia: Muridae) (Stekolnikov 2018). Here it is for the first time recorded outside Africa, in Saudi Arabia, and on *Mus musculus* L. (Rodentia: Muridae).

Material examined — Seven larvae (ZIN 17817 – 17823, R40CH1 – 7), on back of *Mus musculus* No. AR40, SAUDI ARABIA, Al Bahah Province, Al Bahah city, 20.058881 N, 41.512811 E, 2,113 m a.s.l., August 2021, coll. H. Alkathiry.

Subfamily Trombiculinae Ewing, 1929

Genus *Microtrombicula* Ewing, 1950

Microtrombicula abyssinica (Radford, 1947)

(Figs 4A, B, 5, 6)
Trombicula abyssinica Radford, 1947: 590; Audy & Vercammen-Grandjean 1961: 131; Zumpt 1961: 137.
Trombicula (*Trombicula*) *abyssinica*: Wharton & Fuller 1952: 61.
Eltonella (*Eltonella*) *abyssinica*: Vercammen-Grandjean 1965a: 66; 1965b: 41.
Microtrombicula abyssinica: Stekolnikov 2018: 145.

Diagnosis

SIF = 6B-N-3-3111.1000; fPp = B/B/Bb(N)B; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fD = 2H-8-8-8(7)-4-4-2(4); DS = 36 – 37, V = 35 – 41, NDV = 72 – 77; Ip = 778 – 794; PL > AM > AL; posterior scutal margin angulate; sensilla with branches in distal half; sternal and coxal setae branched.

Standard measurements

Given in Table 3.

Re-description of larva

(based on holotype and one additional specimen)

Idiosoma — (Figs 4A, 5A, B, D, E, I – K). Eyes 2 + 2; distribution of dorsal idiosomal setae by rows in holotype 2H-8-8-8-4-4-2, in additional specimen 2H-8-8-7-4-4-4; total 36 – 37 dorsal idiosomal setae, including two humeral setae, densely covered with well-developed barbs; four branched sternal setae; number of ventral idiosomal setae in holotype 41, in additional specimen 35; NDV = 72 – 77.

Gnathosoma — (Figure 6A, B). Cheliceral base with dense puncta in basal part; cheliceral blade with tricuspid cap; gnathobase (infracapitulum) with moderate puncta and one pair of branched gnathocoxal (tritorostral) setae; galeal (deutorostral) seta nude; palpal claw (odontus) with 3 prongs; palpal femur with sparse puncta; palpal femoral and genual setae branched, dorsal and ventral palpal tibial seta branched; lateral palpal tibial seta with one branch or nude; palpal tarsus with 6 branched setae and basal tarsala (ω).

Scutum — (Figures 4B, 5C). Nearly pentagonal, with dense puncta and distinct anterolateral shoulders, anterior scutal margin sinuous, lateral margins straight and parallel, posterolateral scutal angles bearing PL projected laterally, posterior margin angulate; AM situated slightly anterior to level of AL, sensillary (trichobothrial) bases situated far anterior to level of PL (PSB

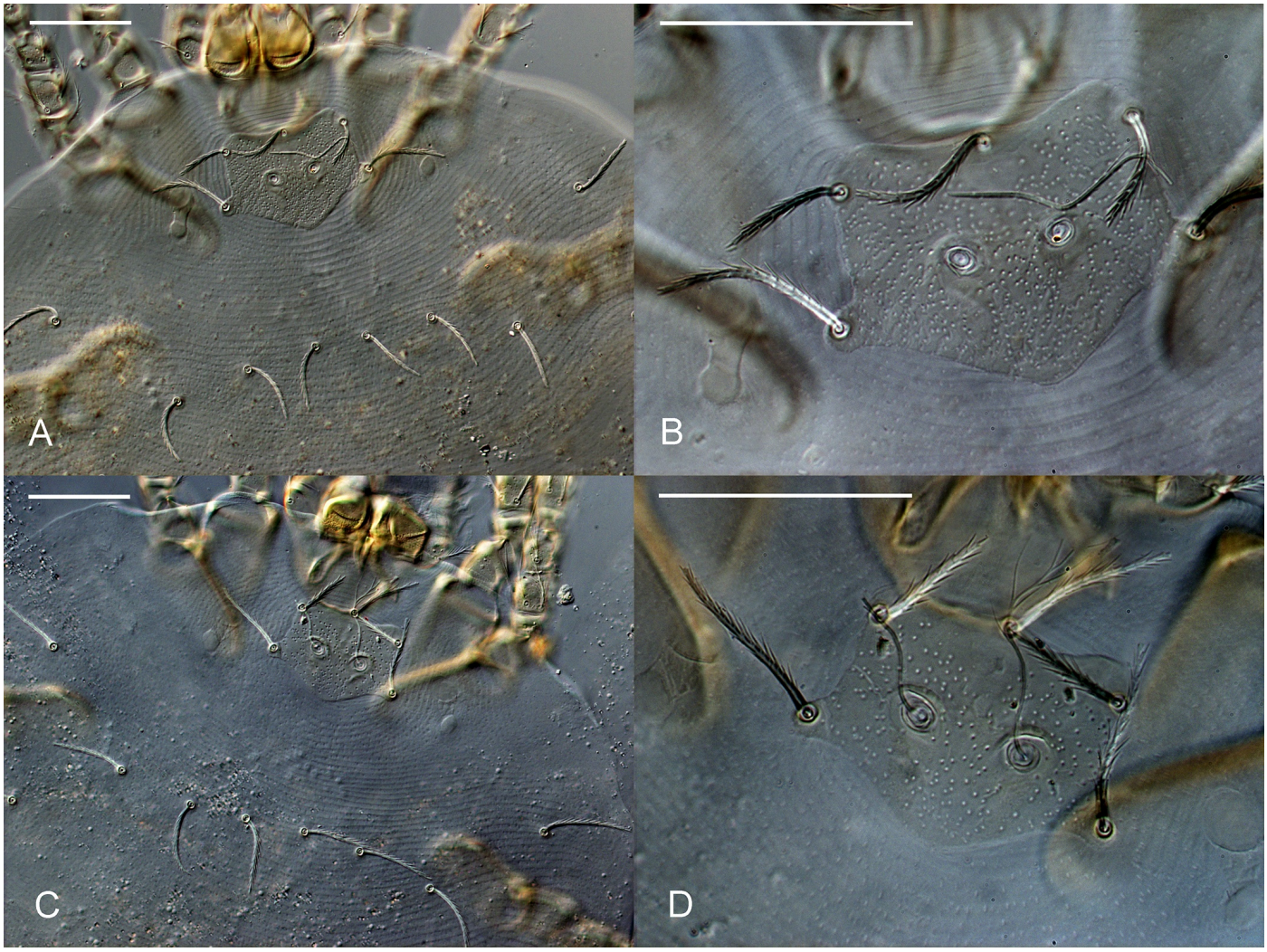

Figure 4 *Microtrombicula abyssinica* (Radford, 1947), additional specimen: A – anterior part of idiosoma with scutum; B – scutum (only one broken sensillum present). *Microtrombicula saperoi* (Radford, 1954), additional specimen: C – anterior part of idiosoma with scutum; D – scutum (one sensillum broken). Scale bars: 50 µm.

– P-PL = 7 µm); PL > AM > AL; all scutal setae barbed similarly to dorsal idiosomal setae; flagelliform sensilla with branches in distal half.

Legs — (Figures 5F – H, 6C – E). All legs 7-segmented (with divided femur), with 1 pair of claws and claw-like empodium, coxal setae branched. Leg I: coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae (σ), microgenuala (κ); tibia 8B, 2 tibialae (φ), microtibiala (κ); tarsus 22B, tarsala (ω), famulus (ε) distal to tarsala, subterminala (ζ), parasubterminala (z), pretarsala (ζ). Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala (σ); tibia 6B, 2 tibialae (φ) in tandem; tarsus 16B, tarsala II (ω), famulus (ε) proximal to tarsala, pretarsala (ζ). Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala (σ); tibia 6B, tibiala (φ); tarsus 13B, mastitarsala in medial part of segment.

Distribution and hosts

This species was described from Ethiopia (Dire Dawa), from a single specimen (holotype) ex *Vidua fischeri* (Reichenow) (Aves: Passeriformes). Here it is for the first time recorded outside Africa, in Saudi Arabia, and on *Acomys dimidiatus*.

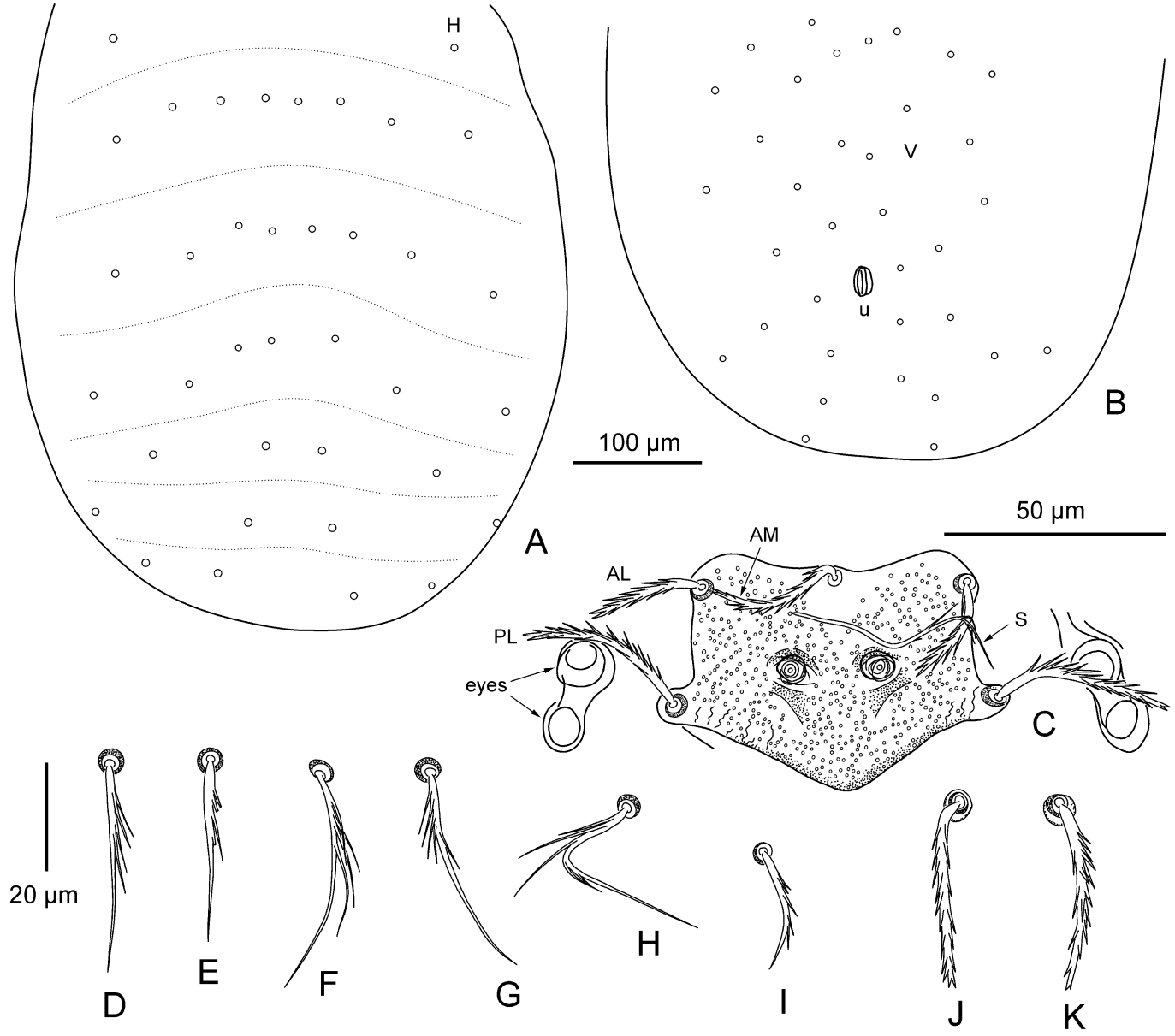

Figure 5 *Microtrombicula abyssinica* (Radford, 1947), additional specimen: A – dorsal aspect of idiosoma; B – ventral idiosomal setae; C – scutum (only one broken sensillum present); D – anterior sternal seta; E – posterior sternal seta; F – coxal seta I; G – coxal seta II; H – coxal seta III; I – preanal idiosomal seta; J – humeral seta; K – dorsal idiosomal seta of 1st posthumeral row. Abbreviations: AL – anterolateral scutal seta; AM – anteromedian scutal seta; H – humeral seta; PL – posterolateral scutal seta; S – sensillum; u – uropore (anus); V – ventral idiosomal setae. Scale bars: A, B – 100 µm; C – 50 µm; D – K – 20 µm.

Type material examined

Holotype larva, NHM (1948.2.3.28), ex *Vidua fischeri*, ABYSSINIA, Dire Daua (ETHIOPIA, Dire Dawa), 27 July 1942, coll. Meneghetti.

Additional material examined

One larva (ZIN 17799, R10CH13), near anus of *A. dimidiatus* No. MR10, SAUDI ARABIA, 'Asir Province, Wosanib, 18.304602 N, 42.216909 E, 913 m a.s.l., October 2021, coll. H. Alkathiry.

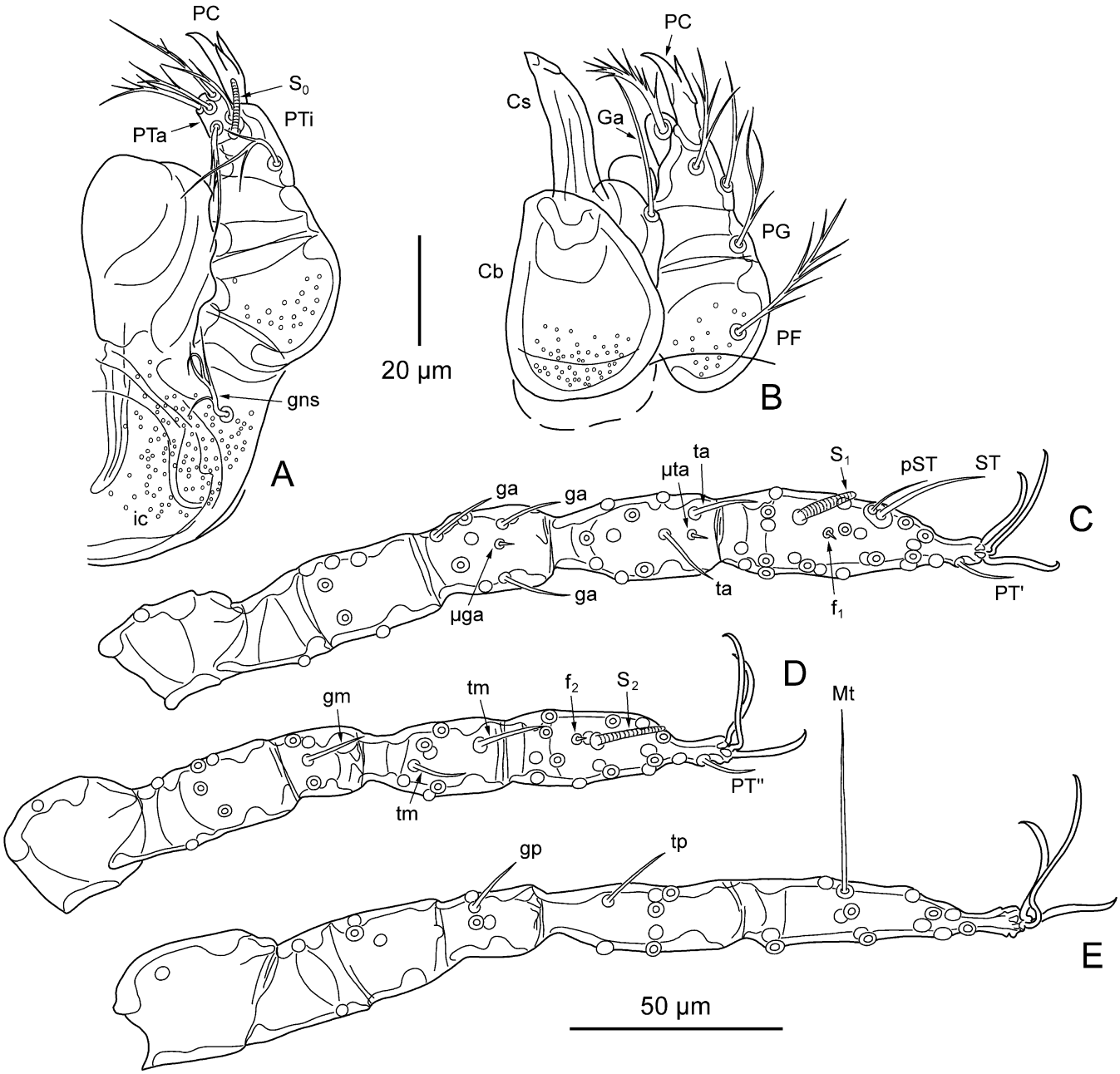

Figure 6 *Microtrombicula abyssinica* (Radford, 1947), additional specimen: A – ventral aspect of gnathosoma; B – dorsal aspect of gnathosoma; C – leg I (trochanter – tarsus); D – leg II (trochanter – tarsus); E – leg III (trochanter – tarsus). Abbreviations: Mt – mastitarsala. Other abbreviations as on Figure 3. Scale bars: A, B – 20 µm; C – E – 50 µm.

Remarks

Original description of this species (Radford 1947) did not include characters of gnathosoma and legs. The numbers of dorsal idiosomal setae by rows were erroneous (fD = 2H-9-9-7-4-4-2 vs. 2H-8-8-8-4-4-2 after our examination). Vercammen-Grandjean (1965a) presented a supplemented diagnosis of *M. abyssinica*, with the correct fD; however, he included in his re-description only the measurements taken by Radford, except for the corrected ASB and PSB (Table 3). The re-description was illustrated by a drawing of the scutum. Both Radford (1947)

and Vercammen-Grandjean (1965a) drew the AM seta of the holotype as intact, although this seta is broken.

Microtrombicula saperoi (Radford, 1954)

(Figs 4C, D, 7, 8)
Neotrombicula saperoi Radford, 1954: 296.
Eltonella (*Eltonella*) *saperoi*: Vercammen-Grandjean 1965a: 66; 1965b: 42.
Microtrombicula (*Microtrombicula*) *saperoi*: Nielsen *et al.* 2021: 155.

Diagnosis

SIF = 6B-N-3-3111.1000; fPp = B/B/BBB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fD = 2H-6(8)-7(8)-6-4(6)+(6–9); DS = 34 – 36, V = 42, NDV = 78; Ip = 757 – 781; PL > AM > AL; posterior scutal margin angulate, rounded; sensilla with cilia in basal part and ca. 5 branches in distal half; sternal and coxal setae heavily branched.

Standard measurements

Given in Table 4.

Re-description of larva

(based on paratype and one additional specimen)

Idiosoma — (Figs 4C, 7B – I). Eyes 2 + 2; distribution of dorsal idiosomal setae by rows in paratype 2H-6-7-6-4+9, in additional specimen 2H-8-8-6-6-4-2; total 34 – 36 dorsal idiosomal setae, including two humeral setae, densely covered with well-developed barbs; four heavily branched sternal setae; number of ventral idiosomal setae in paratype unclear, in additional specimen 42 ventral idiosomal setae and NDV = 78.

Gnathosoma — (Figure 8D, E). Cheliceral base with dense puncta in basal part; cheliceral blade with tricuspid cap; gnathobase (infracapitulum) with moderate puncta and one pair of branched gnathocoxal (tritorostral) setae; galeal (deutorostral) seta nude; palpal claw (odontus) with 3 prongs; palpal femoral and genual setae heavily branched, dorsal palpal tibial seta

Table 3 Morphometric (AW–S_2, µm) and meristic (DS–NDV) traits of *Microtrombicula abyssinica* (Radford, 1947). Abbreviations: dmt – distance between the base of leg III tarsus and base of mastitarsala. Other abbreviations as in Table 2.

	Holotype	Original description*	Re-description**	Additional specimen
AW	62	65	65	61
PW	72	68	68	74
SB	22	25	25	22
ASB	23	17	21	26
PSB	-	34	30	29
SD	-	51	51	55
P-PL	-	-	-	22
AP	26	30	30	27
AM	-	34	34	29
AL	31	34	34	24
PL	46	51	51	40
S	-	55	55	-
H	-	-	-	33
D_{min}	-	-	-	28
D_{max}	-	38/36	38/36	34
V_{min}	-	-	-	22
V_{max}	-	-	-	32
pa	270	-	-	277
pm	239	-	-	236
pp	285	-	-	265
Ip	794	-	-	778
TaIIIL	76	-	-	70
TaIIIW	19	-	-	14
dmt	-	-	-	27
S_1	15	-	-	14
S_2	14	-	-	15
DS	36	37	36	37
V	41	ca. 33	34	35
NDV	77	ca. 70	70	72

Notes. * After Radford (1947); ** after Vercammen-Grandjean (1965a).

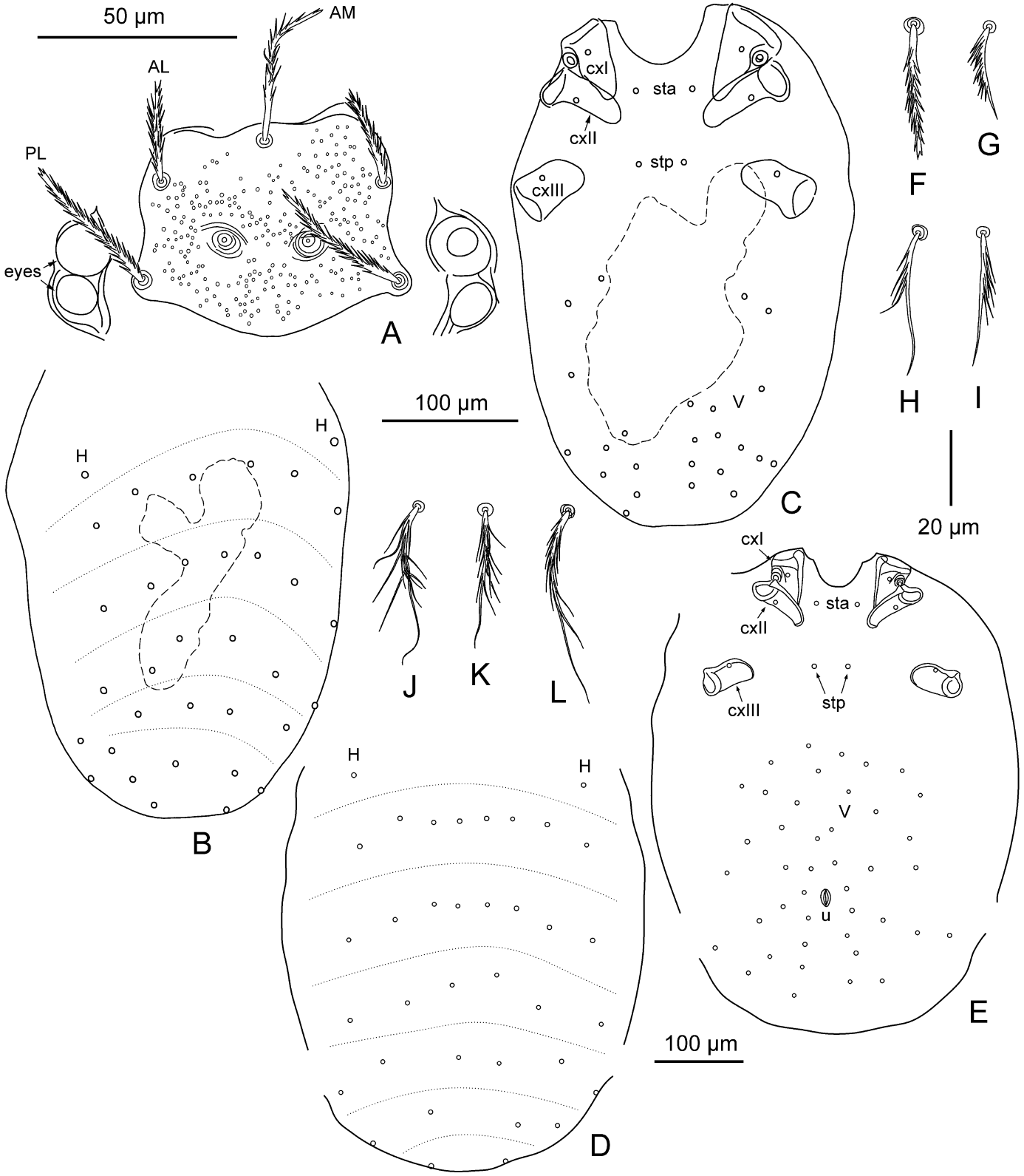

Figure 7 *Microtrombicula saperoi* (Radford, 1954), paratype (A – C, F – L) and additional specimen (D, E): A – scutum (sensilla lost); B, D – dorsal aspect of idiosoma; C, E – ventral aspect of idiosoma; F – dorsal idiosomal seta; G – preanal idiosomal seta; H – anterior sternal seta; I – posterior sternal seta; J – coxal seta I; K – coxal seta II; L – coxal seta III. Abbreviations: cxI – leg I coxa; cxII – leg II coxa; cxIII – leg III coxa; sta – anterior sternal setae; stp – posterior sternal setae. Other abbreviations as on Figure 5. Scale bars: A – 50 µm; B, C – 100 µm; D, E – 100 µm; F – L – 20 µm.

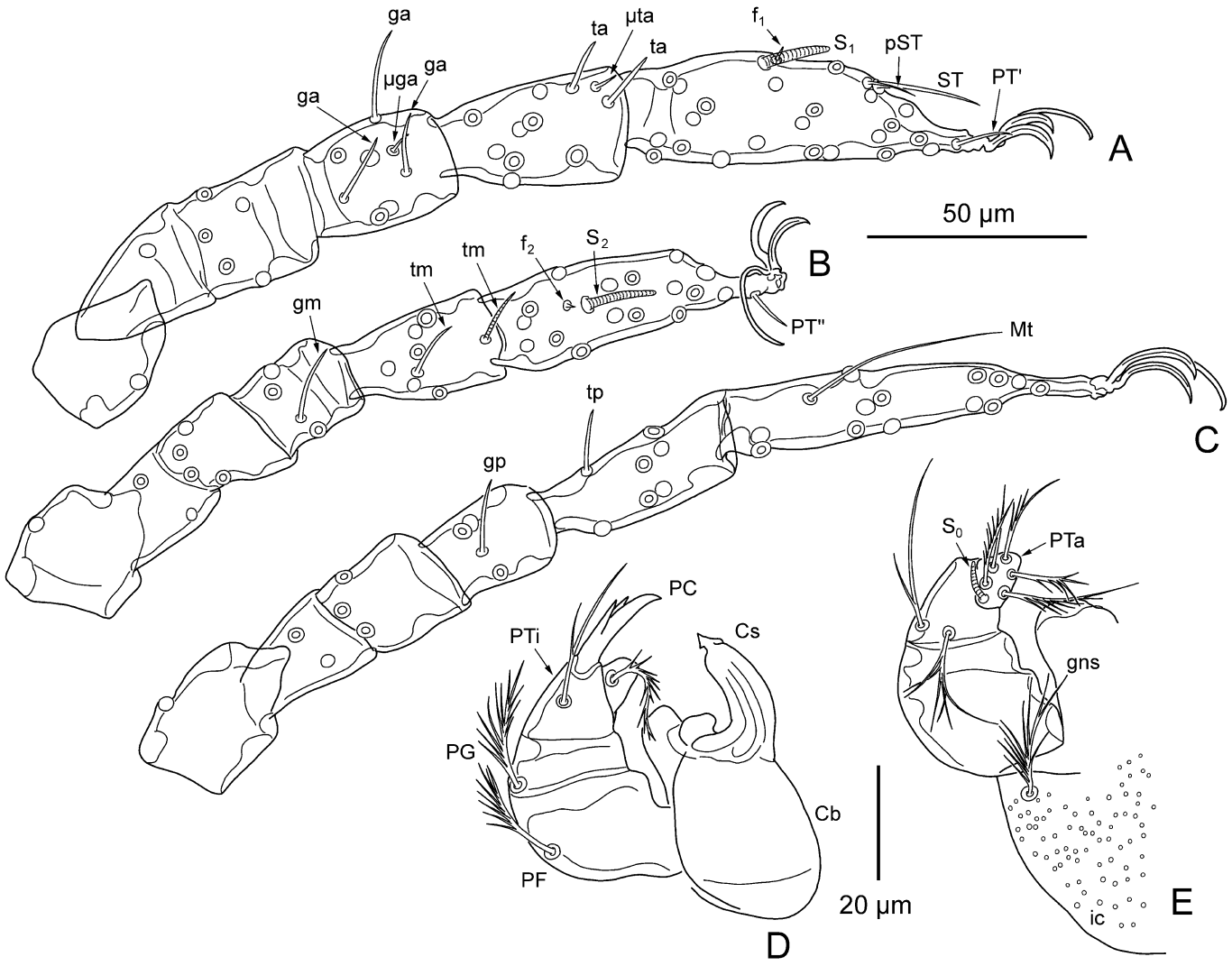

Figure 8 *Microtrombicula saperoi* (Radford, 1954), paratype: A – leg I (trochanter – tarsus); B – leg II (trochanter – tarsus); C – leg III (trochanter – tarsus); D – dorsal aspect of gnathosoma; E – ventral aspect of gnathosoma. Abbreviations as on Figure 6. Scale bars: A – C – 50 μm; D, E – 20 μm.

branched; lateral palpal tibial seta with one branch, ventral palpal tibial seta branched; palpal tarsus with 6 branched setae and basal tarsala (*ω*).

Scutum — (Figures 4D, 7A). Nearly pentagonal, with moderate puncta and large anterolateral shoulders, anterior scutal margin sinuous, lateral margins concave, posterolateral scutal angles bearing PL projected laterally, posterior margin projected, more or less angulate, rounded; AM situated far anterior to level of AL, sensillary (trichobothrial) bases situated far anterior to level of PL (PSB – P-PL = 9 – 11 μm); PL > AM > AL; all scutal setae barbed similarly to dorsal idiosomal setae; sensilla in paratype lost, in additional specimen flagelliform, with 5 long branches in distal half.

Legs — (Figures 7J – L, 8A – C). All legs 7-segmented (with divided femur), with 1 pair of claws and claw-like empodium, coxal setae heavily branched. Leg I: coxa with 1 branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae (*σ*), microgenuala (*κ*); tibia 8B, 2 tibialae (*φ*), microtibiala (*κ*); tarsus 22B, tarsala (*ω*), famulus (*ε*) slightly distal to tarsala, subterminala (*ζ*), parasubterminala (*z*), pretarsala (*ζ*). Leg II: coxa 1B; trochanter

1B; basifemur 2B; telofemur 4B; genu 3B, genuala (σ); tibia 6B, 2 tibialae (φ) in tandem; tarsus 16B, tarsala II (ω), famulus (ε) proximal to tarsala, pretarsala (ζ). Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala (σ); tibia 6B, tibiala (φ); tarsus 13B, mastitarsala.

Distribution and hosts

This species was described from Yemen (Taiz), ex *Rattus rattus* (L.). Here it is for the first time recorded in Saudi Arabia and on *Acomys dimidiatus*.

Type material examined

Paratype larva, NHM (1952.7.23.11), ex *Rattus r. rattus*, YEMEN, Ta'izz, coll. K.L. Knight.

Additional material examined

One larva (ZIN 17800, R10CH16), near anus of *A. dimidiatus* No. MR10, SAUDI ARABIA, 'Asir Province, Wosanib, 18.304602 N, 42.216909 E, 913 m a.s.l., Oct. 2021, coll. H. Alkathiry.

Remarks

Original description of this species (Radford 1954) was incomplete and illustrated only by a drawing of the scutum. Vercammen-Grandjean (1965a) reproduced the original description of *M. saperoi*. The specimen collected by us in Saudi Arabia differs from the paratype deposited in NHM by the arrangement of dorsal idiosomal setae (fD = 2H-8-8-6-6-4-2 vs. 2H-6-7-6-4+9); however, the former formula is more similar to that included in the original description (2H-8-8-6-6-4-4-2). We believe that this character is variable in *M. saperoi*. Our measurements of the scuta of both examined specimens (AW, PW, ASB, PSB, and AP) are definitely smaller than those in the original description (Table 4). Although this difference could be explained by inaccuracy of Radford's measurements, examination of the holotype, which is deposited in USNM (Bassini-Silva *et al.* 2021), is desirable to confirm the identity of this species.

Microtrombicula saperoi differs from *M. abyssinica* by the shape of the scutum, primarily, by its less projected posterior margin (P-PL = 14 vs. 22). To establish other possible metric and meristic differences, examination of additional material is required.

Table 4 Morphometric (AW–S_2, µm) and meristic (DS–NDV) traits of *Microtrombicula saperoi* (Radford, 1954). Abbreviations as in Table 2.

	Paratype	Additional specimen	Original description*
AW	57	51	65
PW	64	63	80
SB	21	23	20
ASB	26	23	30
PSB	25	23	30
SD	51	46	60
P-PL	14	14	-
AP	25	25	30
AM	37	35	33
AL	26	27	34
PL	39	39	40
S	-	-	70
H	46	43	-
D_{min}	30	31	-
D_{max}	41	39	40

	Paratype	Additional specimen	Original description*
V_{min}	25	24	-
V_{max}	33	36	-
pa	278	275	-
pm	228	214	-
pp	275	268	-
Ip	781	757	-
TaIIIL	86	81	-
TaIIIW	15	14	-
S_1	14	17-18	-
S_2	16	16	-
DS	34	36	40
V	24+?	42	58
NDV	-	78	98

Notes. * After Radford (1954).

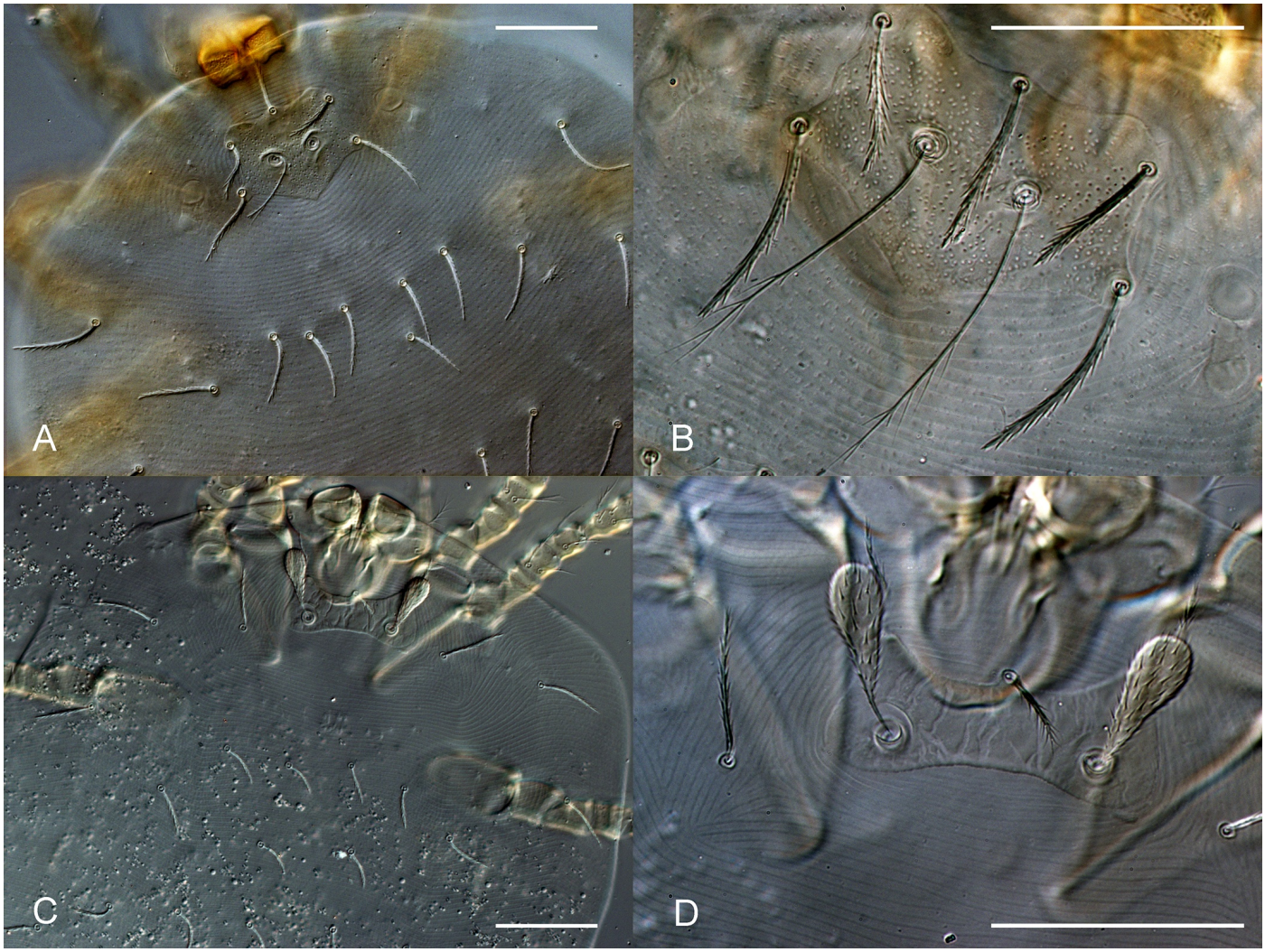

Figure 9 *Microtrombicula felis* (Vercammen-Grandjean, 1965): A – specimen ZIN 17813, R20CH16, anterior part of idiosoma with scutum; B – specimen ZIN 17931, R20CH19, scutum. *Schoutedenichia originalis* Kudryashova, 1976, specimen ZIN 17791, R3CH9: C – anterior part of idiosoma with scutum; D – scutum. Scale bars: 50 µm.

Microtrombicula felis (Vercammen-Grandjean, 1965)

(Fig. 9A, B)

Eltonella (*Eltonella*) *ugandae felis* Vercammen-Grandjean, 1965a: 70; Kolebinova & Vercammen-Grandjean 1980: 69.

Microtrombicula felis: Stekolnikov 2018: 151.

Diagnosis — SIF = 6B-N-3-3111.1000; fPp = B/B/BN(b)B; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fD = 2H-10-8-(6 – 8)-4-4-2(4); DS = 36 – 42, V = 37 – 52, NDV = 74 – 91; Ip = 729 – 783; PL > AM > AL; posterior scutal margin pointed; sensilla with ca. 6 branches in distal half; sternal and coxal setae branched.

Standard measurements — given in Table 5.

Distribution and hosts — This species was described from Democratic Republic of the Congo (Luvungi), ex *Leptailurus serval* (Schreber) (Carnivora: Felidae) and later recorded in Uganda (Buhugu, Mount Elgon), ex *Crocidura olivieri occidentalis* (Pucheran) (Eulipotyphla: Soricidae) (Kolebinova & Vercammen-Grandjean 1980). Here it is recorded outside Africa, in Saudi Arabia, and on *Acomys dimidiatus* for the first time.

Type deposition — Vercammen-Grandjean (1965a) declared deposition of the holotype and "nymph-type" of *E. ugandae felis* in MRAC. However, Stekolnikov (2018) did not find any material of this subspecies in this museum. Four paratypes of *E. ugandae felis* are deposited in MHNG (Stekolnikov 2019, fig. 9). We assume, in addition, that two specimens from MHNG labeled as the holotype and a paratype of *Eltonella* (*Eltonella*) *polymorpha servalis* (*nomen nudum*) (Stekolnikov 2019) could belong to the same species. The collection data for this holotype coincide with that for the holotype of *E. ugandae felis*, except for the number (23554/O/1 vs. 23554/T/I) (Vercammen-Grandjean 1965a). Re-examination of this material is required.

Material examined — Two larvae (ZIN 17929, R10CH21 and ZIN 17930, R10CH22), near anus of *A. dimidiatus* No. MR10, SAUDI ARABIA, 'Asir Province, Wosanib, 18.304602 N, 42.216909 E, 913 m a.s.l., October 2021, coll. H. Alkathiry; two larvae (ZIN 17813, R20CH16 and ZIN 17931, R20CH19), on back of *A. dimidiatus* No. MR20, SAUDI ARABIA, 'Asir Province, Wosanib, 18.328347 N, 42.219233 E, 906 m a.s.l., October 2020, coll. H. Alkathiry.

Remarks — *Microtrombicula felis* differs from *M. saperoi* and *M. abyssinica* by the pointed (vs. rounded) posterior margin of the scutum and by the presence of 10 setae in the 1st posthumeral row vs. 6 – 8. A study of intraspecific variability of all three species by the metric and meristic traits is required to establish their differences in more detail.

Genus *Schoutedenichia* Jadin & Vercammen-Grandjean, 1954

Schoutedenichia originalis Kudryashova, 1976

(Fig. 9C, D)

Schoutedenichia originale Kudryashova, 1976: 275; Kudryashova *et al.*, 1978: 148.

Schoutedenichia (*Schoutedenichia*) *originalis*: Kudryashova 1998: 251; Stekolnikov *et al.* 2019b: 33.

Table 5 Morphometric (AW–S_2, µm) and meristic (DS–NDV) traits of *Microtrombicula felis* (Vercammen-Grandjean, 1965). Abbreviations as in Tables 2 and 3.

	Original description*	New material (n = 4)	
		Range	Mean
AW	57	54-61	59
PW	63	61-71	68
SB	21	21-23	22
ASB	25	23-25	24
PSB	29	27-31	29
SD	54	50-56	53
P-PL	-	18-21	20
AP	25	25-27	26
AM	40	36-37	36
AL	26	23-30	27
PL	41	39-42	41
S	65	66-66	66
H	41	39-43	42
D_{min}	30	28-32	30
D_{max}	38	38-40	39

	Original description*	New material (n = 4)	
		Range	Mean
V_{min}	25	22-23	23
V_{max}	30	33-34	34
pa	260	261-279	266
pm	224	218-234	227
pp	254	250-288	264
Ip	738	729-783	757
TaIIIL	-	64-79	70
TaIIIW	-	13-17	15
dmt	-	18-29	26
S_1	-	14-18	15
S_2	-	13-16	14
DS	36	39-42	41
V	38	37-52	45
NDV	74	79-91	85

Notes. * After Vercammen-Grandjean (1965a).

Diagnosis — SIF = 4B-N-3-2000.0000; fPp = B/B/NNB; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fD = 6H-4-4-10-8-4-(4)-2; DS = 38–42; VS = 30–32; NDV = 70–72; Ip = 655–664; PL > AM > AL; PLs extrascutal; eyes 2 + 2. Measurements of type series given by Stekolnikov *et al.* (2019b).

Distribution and hosts — This species was described from Iran (Shushtar) ex *Nesokia indica* (Gray) (Rodentia: Muridae) and later recorded by Kudryashova *et al.* (1978) from the same country (Iran, Chabahar) ex *Tatera indica* (Hardwicke) (Rodentia: Muridae), then by Kudryashova (1998) from Turkmenistan (10 km SW Ashgabat) ex unknown host. Stekolnikov *et al.* (2019b) included *Meriones hurrianae* Jordon in the list of hosts of *S. originalis* by mistake. Here it is for the first time recorded in Saudi Arabia and on *Acomys dimidiatus*.

Material examined — SAUDI ARABIA, Al Bahah province: 4 larvae on back of *A. dimidiatus* Nos AR65, AR70, and AR71, Al Makhwah, 19.864027 N, 41.452468 E, 538 m a.s.l., Aug. 2021, coll. H. Alkathiry; 1 larva on back of *A. dimidiatus* No. AR51, Thee Ain village, 19.921832 N, 41.430178 E, 719 m a.s.l., Aug. 2021, coll. H. Alkathiry; 1 larva on back of *A. dimidiatus* No. AR49, Thee Ain village, 19.940103 N, 41.444666 E, 803 m a.s.l., Aug. 2021, coll. H. Alkathiry; SAUDI ARABIA, 'Asir province: 6 larvae on back of *A. dimidiatus* Nos MR3, MR16, and MR18, Wosanib, 18.324115 N, 42.215869 E, 892 m a.s.l., Oct. 2020, coll. H. Alkathiry; 1 larva on back of *A. dimidiatus* No. MR19, Wosanib, 18.328347 N, 42.219233 E, 906 m a.s.l., Oct. 2020, coll. H. Alkathiry; 1 larva on back of *A. dimidiatus* No. MR15, Al Ous', 18.283613 N, 42.334035 E, 1,614 m a.s.l., Oct. 2020, coll. H. Alkathiry.

Part of the specimens previously identified as *Schoutedenichia zarudnyi* Kudryashova, 1976 (Stekolnikov *et al.* 2019a): three specimens (ZIN 10311, 10312, 10518) ex *A. dimidiatus*, SAUDI ARABIA, 'Asir province, Al Ous', 4, 9, and 16 Nov. 2016, coll. S. Alghamdi, det. A.A. Stekolnikov; three specimens (ZIN 11111, 11112, 11115) ex *A. dimidiatus*, SAUDI ARABIA, 'Asir province, Wosanib, 23 and 25 Oct. 2017, coll. S. Alghamdi, det. A.A. Stekolnikov.

Remarks — According to our data, *S. originalis* is sympatric with a closely related species, *S. zarudnyi*. Both species were recorded on *A. dimidiatus* Nos AR71 (Al Makhwah), MR3, MR18, and MR19 (Wosanib), and MR15 (Al Ous'). These two species are similar by the presence of peniscutum (extrascutal PLs), a rare character for *Schoutedenichia*. However, *S. originalis* can be easily discriminated from *S. zarudnyi* by the absence of genualae II, III, and tibiala III, and by shorter scutum (SD = 28 vs. 34 – 39) (Kudryashova 1976).

In general, we prepared and identified by morphological features a total of 561 chigger mites collected in 2020 and 2021 from 54 rodents (Table 6). One rodent host caught near Al Bahah city (2,113 m a.s.l.) identified as *M. musculus* was parasitized by seven specimens of *S. hypoderma*. Most other infested hosts (53) were identified as *A. dimidiatus*. We also examined four specimens of *Dipodillus dasyurus* (Wagner) from Khairah Forest Park and Bani Sar (Al Bahah Province) for chiggers. Only one of these gerbils bore chiggers (three specimens), but the poor quality of slides prevented identification. The set of slides sent by the first author to ZIN (accession numbers 17496 – 17507) included eight specimens of *Microtrombicula hoogstraali* (Radford, 1954), one *Microtrombicula peltifera* Stekolnikov & Schmidt, 2021, and three unidentified specimens of poor quality, collected from nine rodent hosts of four species [*A. dimidiatus*, *Meriones rex* Yerbury & Thomas, *R. rattus* and *Ochromyscus yemeni* (Sanborn & Hoogstraal)] from Thee Ain.

Discussion

The chigger fauna of Saudi Arabia, with our current additions, comprises 25 species. *Odontacarus thesigeri* **n. sp.** is the first species of the genus *Odontacarus* and second species of Leeuwenhoekiinae recorded on the Arabian Peninsula. Previously, one species of this subfamily, *Matacarus arabicus* (Radford, 1954), was described in Yemen. Two species, *M. felis* and *S. hypoderma*, supplement the set of Saudi Arabian species that were previously known only in Central Africa, namely, *Gahrliepia lawrencei* Jadin & Vercammen-Grandjean,

1952 and *Microtrombicula centropi* (Vercammen-Grandjean, 1965). *Microtrombicula saperoi* was described from the bordering Yemen, like *Microtrombicula hoogstraali* (Radford, 1954), which was recorded in Saudi Arabia recently (Stekolnikov *et al.* 2019a); and *M. abyssinica* was described from nearby Ethiopia. *Schoutedenichia originalis* was previously known from southern and western Iran (Stekolnikov *et al.* 2019b). Noteworthy is the large number of *Microtrombicula* species in Saudi Arabia—nine of 25 known species. We can consider this as a character of African chigger fauna, where this genus dominates by the number of species (Stekolnikov 2018).

The most striking difference between our collections from the two provinces in terms of chigger species composition is the absence of *Ericotrombidium kazeruni* (Kudryashova, 1976) in Al Bahah, whereas this species is one of the most common in 'Asir (Table 6). In addition, four species of *Microtrombicula* and one *Schoutedenichia* collected in 'Asir were not recorded in Al Bahah—*M. abyssinica*, *M. felis*, *Microtrombicula hyracis* (Vercammen-Grandjean, 1965), *M. saperoi*, and *Schoutedenichia asirensis* Stekolnikov, Al-Ghamdi, Alagaili & Makepeace, 2019. The species *M. hoogstraali* was collected in Al Bahah only during the preliminary survey of August 2020 before sampling methods were standardized; therefore, this record is not included in the table. We also found two species in Al Bahah, *Microtrombicula traubi* (Muljarskaja & Verdieva, 1974) and *M. peltifera*, which were not collected in 'Asir in 2020; however, they were recorded there previously (Stekolnikov *et al.* 2019a). A more detailed comparison of the chigger faunas in Al Bahah and 'Asir, providing full data on the species abundance, will be published in our forthcoming paper.

Table 6 Sample sizes (specimens selected for morphological examination) of chigger species by provinces.

	Al Bahah		'Asir	
	Hosts	Chiggers	Hosts	Chiggers
Ascoschoengastia browni Taufflieb *et al.*, 1972	1	15	2	3
Ericotrombidium caucasicum (Schluger, 1967)	1	2	20	70
Ericotrombidium kazeruni (Kudryashova, 1976)	0	0	19	119
Helenicula lukshumiae Nadchatram & Traub, 1971	1	1	8	21
Microtrombicula abyssinica (Radford, 1947)	0	0	1	1
Microtrombicula felis (Vercammen-Grandjean, 1965)	0	0	2	4
Microtrombicula hoogstraali (Radford, 1954)	0	0	1	1
Microtrombicula hyracis (Vercammen-Grandjean, 1965)	0	0	2	2
Microtrombicula muhaylensis Stekolnikov *et al.*, 2019	5	16	14	45
Microtrombicula peltifera Stekolnikov & Schmidt, 2021*	1	1	0	0
Microtrombicula saperoi (Radford, 1954)	0	0	1	1
Microtrombicula traubi (Muljarskaja & Verdieva, 1974)	1	1	0	0
Odontacarus thesigeri **n. sp.**	2	3	0	0
Pentidionis agamae (André, 1929)	13	58	4	9
Schoengastiella hypoderma Vercammen-Grandjean, 1956	1	7	0	0
Schoutedenichia asirensis Stekolnikov *et al.*, 2019	0	0	1	1
Schoutedenichia originalis Kudryashova, 1976	5	6	5	8
Schoutedenichia saudi Stekolnikov *et al.*, 2019	12	28	14	39
Schoutedenichia zarudnyi Kudryashova, 1976	17	71	11	28
Sum		209		352

Notes. * New name proposed to replace *Microtrombicula microscuta* Stekolnikov *et al.*, 2019, a junior homonym of *M. microscuta* Zhao, Liang & Qu, 1989 (Stekolnikov & Schmidt 2021).

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