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THREE NEW SPECIES AND NEW RECORDS OF CHIGGER MITES (ACARI: TROMBICULIDAE) FROM EAST HINDUKUSH, PAKISTAN

by M. DANIEL ¹ and A. A. STEKOL’NIKOV ²

(Accepted October 2005)

INTRODUCTION

Results of the chiggers collection in the First Czechoslovak Expedition to Hindukush (1965) were briefly characterized more than 30 years ago (Daniel 1973). The Expedition visited the Afghan part of the East Hindukush (Vakhan region), where 11 chigger species were collected. This was the first chigger fauna evidence in this Afghan part of the Hindukush range. To the time only findings of Microtrombicula gratiosa Schluger & Kudryashova, 1969 and Montivagum dihumerale (Traub & Nadchatram, 1967) were published (Daniel 1973). The present paper covers results of chigger mites fauna investigations carried out in Tirich Mir region by the Second Czechoslovak Expedition to Hindukush in 1967 (Daniel 1969).

All chiggers were collected by M. Daniel in Pakistan, East Hindukush, Tirich Mir mountains massif in June-August 1967. The collections were realized in two areas including a mosaic of dispersed sampling sites (slightly differing in habitat conditions). In the text these areas are designated as follows. A) “Shekhniyak” — local name of a part of Tirich Gol Valley close to the head of the Tirich Glacier, 3650 m above sea level (36°14’ N; 72°00’ E). This part was covered with numerous islets of bushy willow and birch forming isolated impermeable patches divided from one another by narrow strips of stone debris fields. B) “Basecamp” — Tirich Glacier Valley, the environment at the confluence of the Upper and Lower Tirich Glacier, 4000-4100 m

Material and methods

All chiggers were collected by M. Daniel in Pakistan, East Hindukush, Tirich Mir mountains massif in June-August 1967. The collections were realized in two areas including a mosaic of dispersed sampling sites (slightly differing in habitat conditions). In the text these areas are designated as follows. A) “Shekhniyak” — local name of a part of Tirich Gol Valley close to the head of the Tirich Glacier, 3650 m above sea level (36°14’ N; 72°00’ E). This part was covered with numerous islets of bushy willow and birch forming isolated impermeable patches divided from one another by narrow strips of stone debris fields. B) “Basecamp” — Tirich Glacier Valley, the environment at the confluence of the Upper and Lower Tirich Glacier, 4000-4100 m

SUMMARY: Three new species, Trombicula stoliczkai n. sp., Microtrombicula humeroventrala n. sp., and M. tirichmirensis n. sp. are described from murid rodents collected in East Hindukush, Pakistan. Five species are recorded for the first time in Pakistan.

RéSUMÉ : Trois espèces nouvelles, Trombicula stoliczkai n. sp., Microtrombicula humeroventrala n. sp. et M. tirichmirensis n. sp. sont décrites de rongeurs muridés recueillis en Hindukush Est, Pakistan. Cinq espèces inédites sont signalées du Pakistan.
On the slopes opposite the mountain range leading to the East of the Tirich Mir Massif there were three grass strips winding through rock and stone debris. Small brooks fed from the higher situated snow field were flowing through two of these grass strips, the third one was waterlogged in its upper reaches. The vegetation was favourably influenced by the south exposition of this site.

Chiggers were found on the following species of mammal hosts: *Alticola roylei* (Gray, 1842), *A. argen-tatus* (Severtzov, 1879), *Cricetulus migratorius* (Pallas, 1773), and *Apodemus (Sylvaemus)* sp. The specimens of *Apodemus* originally were identified as *A. sylvaticus* L. However it is probably *Apodemus wardi* (Wroughton, 1908), judging from the data on distribution of different *Apodemus* species in Asia (Wilson & Reeder 1993). Mites were mounted in Swann’s medium. All measurements are given in micrometres (µm). Terminology follows Goff et al. (1982), with some adaptation: “ventral setae” (V) — setae on the ventral surface of idiosoma excluding coxal and sternal setae; VS — number of ventral setae; D — dorsal idiosomal setae; DS — number of dorsal idiosomal and humeral setae; TaIII — length of leg III tarsus; TaW — width of leg III tarsus; m-t — ratio between distance from mastitarsala to the base of leg III tarsus and length of leg III tarsus. Type specimens are deposited in the acarological collections of the Zoological Institute of the Russian Academy of Sciences, Saint-Petersburg (ZIN), the Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice (PaÚ) and in the collection of the senior author.

Results and Discussion

More than 1000 chiggers specimens were collected during the expedition. Their identification revealed 10 species including three new to science. Five species are recorded in Pakistan for the first time. *Montivagum dihumerale* was the most abundant species in this collection (824 specimens), as well as in the material-collected in the Vakhan region. Full data on the field ecology of this and other recorded species will be published later.

**Trombicula stoliczka** n. sp.  
(Figs. 1-9 Table 1)

**Diagnosis:** SIF = 7B-B-3-2100.3100; fPp = B/B/BNB; fCx = 1.1.4(3-6); fSt = 2.2; fSc: PL > AL >= AM; Ip = 816; fD = 2H-8-6-8-6-2; DS = 33; VS = 26; NDV = 58.

**Description:** Larva. Idiosoma. Eyes 2 + 2, anterior 16-19 in diameter, posterior smaller. One pair of humeral setae; 30-33 dorsal idiosomal setae, arranged 8-6-(8-10)-..., with pointed tips, heavily feathered with thin barbs; two pairs of sternal setae and 22-28 ventral setae; total idiosomal setae 54-63.

Gnathosoma. Gnathobase, cheliceral base, and palpal femur sparsely punctate; cheliceral blade with tricuspid cap; gnathobase with a pair of branched setae; galeala heavily branched; palpal claw 3-pronged; setae on palpal femur and genu branched, dorsal and ventral setae on palpal tibia branched, lateral palpal tibial seta nude; palpal tarsus with 7 branched setae and tarsala.

Scutum. Densely punctate with very large puncta (scrobiculate), nearly pentagonal, with rounded posterior margin; scutal setae similar to dorsal idiosomal setae; PL > AL >= AM; AM base on level of ALs; SB anterior to level of PLs and somewhat close together; sensilla flagelliform, barbed from their bases, distal barbs longer.

Legs. 7-segmented, terminating in a pair of claws and clawlike empodium. Leg I: coxa with 1 non-specialized branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae, microgenua; tibia 8B, 2 tibialae, microtibia; tarsus 22B, tarsala 15 long, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala 18 long, microtarsala distal to tarsala, pretarsala. Leg III: coxa 4(3-6)B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala absent; tibia 5B, tibiala replaced with mastitibia; tarsus 13B, 3 mastitarsalae, distal mastitarsala sometimes with few cilia.

**Hosts:** *Alticola roylei*, *Apodemus (Sylvaemus)* sp.
Figs. 1-4. — Trombicula stoliczkai n. sp., larva.
1. — Scutum and eyes. 2. — Ventral aspect of gnathosoma. 3. — Dorsal aspect of gnathosoma. 4. — Dorsal idiosomal seta of 1st row.
Figs. 5-9. — Trombicula stoliczkae n. sp., larva.


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Table 1. — Trombicula stoliczka n. sp.: Standard measurements of the type series (N = 10)

**Type data:** holotype larva (No. T.-Tr.-27, P-44/4) from Alticola roylei, Shekhniyak, 3 August. 65 paratypes larvae from *Alticola roylei*, and 1 from *Aposemus (Sylvaemus)* sp., 3, 8-9 August, other data same. The holotype and 30 paratypes are deposited in ZIN; 20 paratypes are deposited in PaU; 15 paratypes are deposited in the collection of the senior author.

**Etymology:** The species is named after a famous Czech scientist Ferdinand Stoliczka, who made a valuable contribution to the exploration of Asian mountains in nineteenth century.

**Differential diagnosis:** The new species differs from all other Trombicula in having 7B on palpal tarsus (5B in *Trombicula* s.s., 6B in Cotrombicula), coxa III being multisetose, absence of genua III, and the presence of multiple mastitarsalae on leg III (in *Trombicula* s.l. only one mastitarsala is rarely present).

**Remarks:** Mastitibiala III in the new species may be a transformed tibia. There is a tendency in *Trombicula* to the elongation of specialized leg setae, and sometimes tibia and genua III are so elongate, that they look like mastisetae, for example, in *Cotrombicula mitchellensis* Goff, 1983. A study by the electron microscope is need to reveal the true nature of this seta.

The presence of very large puncta on the scutum is one of the main characters of *Trombicula* s.l. These puncta are named ‘‘scrobiculae’’ (Goff et al. 1982) or ‘‘areolae’’ (Domrow & Lester 1985). Previously such scuta were defined as ‘‘ verrucose’’ or ‘‘ reticulate’’ (Vercammen-Grandjean 1968), but modern authors suppose these terms to be incorrect.

**Cotrombicula** Vercammen-Grandjean, 1960 is considered to be a synonym of *Trombicula* Berlese, 1905 by Domrow & Lester (1985), since these genera differ only in their palpal tarsal setation. Our finding of a new species having palpal tarsus 7B confirms the opinion of these authors, that palpal tarsal setation has a limited taxonomic value in this case. The form of scutum and sensilla in the new species, as well as heavily branched galeala, presence of two genualae I, and large eyes are characteristic for the majority of *Trombicula* s.l.

A variation in the numbers of coxal setae III is recorded. 32% of 66 type specimens have 4 setae on coxa III (fCx = 1.1.4), 29% 4 and 3 setae (as in the holotype), 20% 4 and 5 setae (as in the holotype), 20% 4 and 5 setae. Other variants are rare: 3 setae (8%), 3 and 5 setae (6%), 5 setae (3%). One specimen has 6 and 4 setae.

**Microtrombicula humeroventrala** n. sp.
(Figs. 10-20 ; Table 2)

**Diagnosis:** SIF = 6B-N-3-(3-2)111.1000; fPp = B/B/BB; fCx = 1.1.2; fSt = 2.2; fSc: PL > AM > AL; Ip = 834; fD = 2H-8-6-2-4-4; DS = 30; VS = 43; NDV = 74.

**Description:** Larva. Idiosoma. Eyes 2 + 2, anterior 12-13 in diameter, posterior smaller. One pair of humeral setae; 2 or 3 pairs of humeroventral setae between coxae II and III; 25-33 dorsal idiosomal setae, arranged 8(7-9)-6-6-2-, heavily feathered with
Figs. 10-13. — *Microtrombicula humeroventrala* n. sp., larva.

Figs. 14-20: *Microtrombicula humeroventrala* n. sp., larva.
14. — Arrangement of dorsal idiosomal setae. 15. — Arrangement of ventral idiosomal setae. 16, 17. — Variants of the setation of genu I.
18. — Leg I. 19. — Leg II. 20. — Leg III.
thin barbs; two pairs of sternal setae and 39-48 ventral setae; total idiosomal setae except sternal and humeroventral 68-78.

Gnathosoma. Gnathobase, cheliceral base, palpal femur and genu moderately punctate; cheliceral blade with tricuspid cap; gnathobase with a pair of branched setae; galeala nude; palpal claw 3-pronged; setae on palpal femur, genu and tibia branched; palpal tarsus with 6 branched setae and tarsala.

Scutum. Densely punctate, nearly pentagonal, with angulate posterior margin and anterolateral shoulders; scutal setae similar to dorsal idiosomal setae; PL > AM > AL; AM base anterior to level of ALs; SB anterior to level of PLs; sensilla flagelliform, with long branches in distal part and short bars in proximal part.

Legs. 7-segmented, terminating in a pair of claws and clavlike empodium. Leg I: coxa 1B; trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 or 2 genualae, long microgenuala; tibia 8B, 2 tibialae, long microtibiala; tarsus 22B, tarsala 14-15 long, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala 17-18 long, microtarsala, pretarsala. Leg III: coxa 2B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 14B, mastitarsala.

Type data: holotype larva (No. T.-Tr.-28, P-7/15) from *Alticola roylei*, Basecamp, 10 July. 11 paratypes: 9 larvae, 29-30 June, 2, 4, 10 July, other data same; 2 larvae, Shekhniyak, 8 August, other data same. The holotype and 5 paratypes are deposited in ZIN; 4 paratypes are deposited in PaÚ; 2 paratypes are deposited in the collection of the senior author.

HOST: *Alticola roylei*.

ETYMOLOGY: Specific epithet refers to the presence of humeroventral setae.

DIFFERENTIAL DIAGNOSIS: The new species is similar to *Microtrombicula latens* Traub & Nadchatram, 1966 and differs from this species in the presence of the humeroventral setae, posterior scutal margin angulate versus broadly rounded, scutum is relatively broader (PW = 59-67 versus 50-54) and with more prominent posterior margin (PSB = 27-31 versus 22-26, SD = 54-60 versus 49-54, P-PL = 18-20 versus 14-15).

REMARKS: Two specimens have 3 pairs of humeroventral setae and one has 3 + 2 Hv. A half of type specimens have 2 genualae I al least on one genu, other specimens have 3 genualae I. Coxal setal formula is rather constant (1.1.2), only one specimen has 3 and 2 setae on coxae III.

*Microtrombicula tirichmirensis* n. sp.
(Figs. 21-29; Table 3)

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Table 2: Microtrombicula humeroventrala n. sp. Standard measurements of the type series (N = 10)
Figs. 21-23: Microtrombicula tirichmirensis n. sp., larva.
Figs. 24-29: *Microtrombicula tirichmirensis* n. sp., larva.
Holotype 57 66 21 32 32 65 22 28 43 30 52 61 55
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Maximum 58 68 21 32 32 65 23 29 43 32 52 61 57
Mean 55 66 20 31 31 62 22 26 39 30 49 61 49

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**Description:** Larva. Idiosoma. Eyes 2 + 2, 12-13 in diameter. Two pairs of humeral setae; one pair of humeroventral setae between coxae II and III; 27-36 dorsal idiosomal setae, arranged 8(8-9)-6-6-2-..., heavily feathered with thin barbs; two pairs of sternal setae and 47-54 ventral setae; total idiosomal setae except sternal and humeroventral 78-90.

Gnathosoma. Gnathobase, cheliceral base, and palpal femur moderately punctate; cheliceral blade with tricuspid cap; gnathobase with a pair of branched setae; galeala nude; palpal claw 3-pronged; setae on palpal femur, genu and tibia branched; palpal tarsus with 6 branched setae and tarsala.

Scutum. Densely punctate, nearly pentagonal, with angulate posterior margin and anterolateral shoulders; scutal setae similar to dorsal idiosomal setae; PL > AM > AL; AM base anterior to level of ALs; SB anterior to level of PLs; sensilla flagelliform, with long branches mainly in distal part and short barbs in proximal part.

Legs. 7-segmented, terminating in a pair of claws and clawlike empodium. Leg I: coxa 1B; trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, long microgenualae; tibia 8B, 2 tibialae, long microtibialae; tarsus 22B, tarsala 14-15 long, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 1B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala 18-19 long, microtarsala, pretarsala. Leg III: coxa 3B or 2B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibialae; tarsus 14B (13B in holotype), mastitarsala.

**Hosts:** Alticola roylei, Apodemus (Sylvaemus) sp.

**Type data:** holotype larva (No. T.-Tr.-29, P-1/4) from Alticola roylei, Basecamp, 30 June. 10 paratypes: 7 larvae, 30 June, 10, 14 July, other data same; 2 larvae from Alticola roylei and 1 from Apodemus (Sylvaemus) sp., Shekhniyak, 3, 9 August, other data same. The holotype and 5 paratypes are deposited in ZIN; 3 paratypes are deposited in PAU; 2 paratypes are deposited in the collection of the senior author.

**Etymology:** Specific epithet refers to the type locality (Tirich Mir mountains massif).

**Differential diagnosis:** The new species is similar to Microtrombicula altens Fernandes & Kulkarni, 2003, but differs from this species in the presence of the humeroventral setae, palpal claw 3-pronged versus 2-pronged, usually 3 setae on coxa III versus 2 (F5 = 1.1.3), and scutum relatively broader (PW = 64-68 versus 54-60).

**Remarks:** Three specimens have 3 and 2 setae on coxa III, one specimen has 2 setae, and 7 specimens have 3 setae. A variation in the number of humeral setae takes place: one specimen has 5 and one 6 humeral setae, other specimens have 4H. In contrast to the previous species, no variation in the numbers of humeroventral setae and genualae I is recorded.

**Neotrombicula monticola** Schluger & Davidov, 1967

**Material examined:** 29 larvae, Alticola roylei, Basecamp, 29 June-22 July.
DISTRIBUTION: Tadjikistan, Kyrgyzstan. Recorded in Pakistan for the first time.

**Neotrombicula tianshana** Shao & Wen, 1984

**Material examined:** 13 larvae, *Alticola roylei, A. argentatus*, Shekhniyak, 8-12 August.

**Distribution:** China (Xinjiang Uygur Autonomous Region, Xizang Autonomous Region), Tadjikistan (Western Pamirs), Kyrgyzstan, Kazakhstan, Azerbaijan, Russia (Krasnoyarsk Territory, Khakassia, Altai Territory, Tuva Republic, Kirov Region, Bashkortostan, North Ossetia, Stavropol Territory, Karachay-Cherkess Republic, Krasnodar Territory), Ukraine (Eastern Carpathians), Moldova (Stecklenkov 1999). Recorded in Pakistan for the first time.

**Remarks:** *Neotrombicula lubrica* is closely related to *N. anax* Audy & Womersley, 1957, but the latter species has fD = 2H-6-6-6-4-... (judging from the figure in the original description), while in *N. lubrica* fD = 2H-6-6-6-2-... So, the question whether *N. lubrica* is a synonym of *N. anax* remain undecided.

**Shunsennia oudemani** (Schluger, 1955)


**Distribution:** Tadjikistan, Kyrgyzstan. Recorded in Pakistan for the first time.

**Remarks:** *Shunsennia wissemannii* (Traub & Nadchatram, 1966), which was described from Pakistan, is a probable synonym of this species (Kudryashova 1998).

**Cheladonta ikaeensis**

(Sasa, Sawada, Kano et al., 1951)

**Material examined:** 4 larvae: 1 from *Alticola roylei* and 1 from *Apodemus (Sylvaemus)* sp., Shekhniyak, 9 August; 1 from *Cricetulus migratorius*, Shekhniyak, 30 July; 1 from *A. roylei*, Basecamp, 30 June.

**Distribution:** Japan, South Korea, Russia (Primorskij Territory), Armenia (Kudryashova 1998). Recorded in Pakistan for the first time.

**Brunealdia** sp.

**Material examined:** 1 larva in bad condition, *Alticola roylei*, Shekhniyak, 11 August.

**Remarks:** Judging from fPp=B/B/BNB and fCx = 1.1.1, it may be *Brunehaldia lucida* (Schluger, 1966) previously recorded in Kyrgyzstan by Kharadov (1996).

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