

**On some larval Microtrombidiidae (Acari: Prostigmata)
parasitic on Phlebotomine Sandflies
(Diptera: Psychodidae)**

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Summary

The larva of Trombidium hindustanicum HIRST, 1926 is redescribed and becomes the type of a new genus, Phlebotrombium (Microtrombidiinae). In addition 2 new species are described in this genus: P. lewisi, from Sergentomyia clydei from Saudi Arabia, and P. nigeriense, from an unidentified sandfly from Nigeria and from Phlebotomus martini from Kenya. A new genus and species are described: Kenyatrombium macfarlanei (Microtrombidiinae) from Phlebotomus martini from Kenya.

Résumé

La larve de Trombidium hindustanicum HIRST, 1926 est redécrite, et devient le type d'un nouveau genre Phlebotrombium (Microtrombidiinae) et 2 nouvelles espèces sont décrites dans ce genre: P. lewisi, de Sergentomyia clydei d'Arabie Saoudite, et P. nigeriense, d'un phlébotome non identifié du Nigeria et de Phlebotomus martini du Kenya. Kenyatrombium macfarlanei n.g., n.sp. (Microtrombidiinae) sont décrits de Phlebotomus martini, du Kenya.

Introduction

LEWIS & MACFARLANE (1982) have shown that phlebotomine sandflies (Psychodidae) harbour a rich fauna of mites, either phoretic or parasitic. Mites of 14 families and at least 16 genera and 21 species were recorded from a total of 39 species of sandflies. Two families of mites, Stigmaeidae and Trombidiidae, were particularly well represented, both being harmful to the sandflies.

A large number of these mites were collected and identified by D. MACFARLANE (International Institute of Entomology, London) from phlebotomes deposited in the British Museum (Natural History) (now The Natural History Museum, London). Other records of sandfly mites were found in the literature or personally communicated to these authors by sandfly specialists.

New records of sandfly mites were supplemented by BÜTTIKER & LEWIS (1983), raising the number of mite families involved in this association up to 15 and that of genera and species to 20 and 21 respectively. Among this material, these authors found specimens from Sudan and Saudi Arabia that they included in the genus *Ettmuelleria* OUDEMANS, and others from Palestine, Namibia and Saudi Arabia that belonged to unidentified genera of trombidids.

In 1986, LEWIS & BÜTTIKER recorded *Microtrombidium* sp. (Microtrombidiidae) from *Lutzomyia furcata* from Brazil and *Bochartia* sp. (Erythraeiidae) from *Sergentomyia fallax*, from Saudi Arabia.

Until now only 2 species of microtrombidiid mites have been described from phlebotomine sandflies, i.e. *Trombidium hindustanicum* HIRST, 1926, from a sandfly in Pakistan and *Biskratrombium coineau* FAIN & IZRI, 1993, from *Phlebotomus papatasi*, from Algeria.

Through the kindness of M.D. MACFARLANE, we had the opportunity to examine a part of the collection of trombidiid mites recorded by him and deposited in The Natural History Museum, London.

In this material we found several specimens of *Trombidium hindustanicum* HIRST, one of which was from the typical locality (Peshawar, in Pakistan). *Trombidium hindustanicum* is redescribed and designated the type species of the new genus *Phlebotrombium*. Two new species are described in this genus: *Phlebotrombium lewisi* from *Sergentomyia clydei* from Saudi Arabia and *P. nigeriense* from an unidentified sandfly from Nigeria and from *Phlebotomus martini* from Kenya. In addition we found a new genus and species from *Phlebotomus martini* from Kenya: *Kenyatrombium macfarlanei* n.g., n.sp. This material is described herein.

All our measurements are in micrometers. Standard data following mainly SOUTHCOFF (1986).

Abbreviations: NHM: Natural History Museum, London; IRSNB: Institut royal des Sciences naturelles de Belgique, Bruxelles.

Family Microtrombidiidae THOR
Subfamily Microtrombidiinae THOR
 Genus *Phlebotrombium* n.g.

Definition: This genus is close to *Microtrombidium* HALLER, 1882. It differs from it (in larvae) by the following characters: gnathosoma well developed, retractable into the body (in some specimens the gnathosoma is almost completely terminal, in others it is deeply withdrawn in the body), anterior extremity of body slightly produced into a rounded tectum, anterior median shield finely punctate without lines, not covering the tectum, the anterolateral parts of this shield extend slightly to the ventral surface of the body. Peribuccal ring completely lacking. Apical prong of tarsus III (the dumala DU of SOUTHCOFF, 1993) very long. Solenidion ω I relatively very long and situated close to the base of the tarsus. Other characters as in *Microtrombidium*: presence of 2 dorsal median shields, the anterior with 3 pairs of setae and one pair of sensillae, the posterior shield with one pair of setae; behind these shields there are two pairs of small rounded platelets each bearing a seta. Legs with 6 segments, tarsi I and II with 3 normal claws, tarsus III strongly modified and enlarged, with 3 claws, the anterior very short and ventral, the middle thin and either longer or shorter than the posterior claw which is shortly setulose. Urstigma small, oval. Uropore small.

Type species: Trombidium hindustanicum HIRST, 1926

***Phlebotrombium hindustanicum* (HIRST, 1926) n.comb.**

***Trombidium hindustanicum* HIRST, 1926**

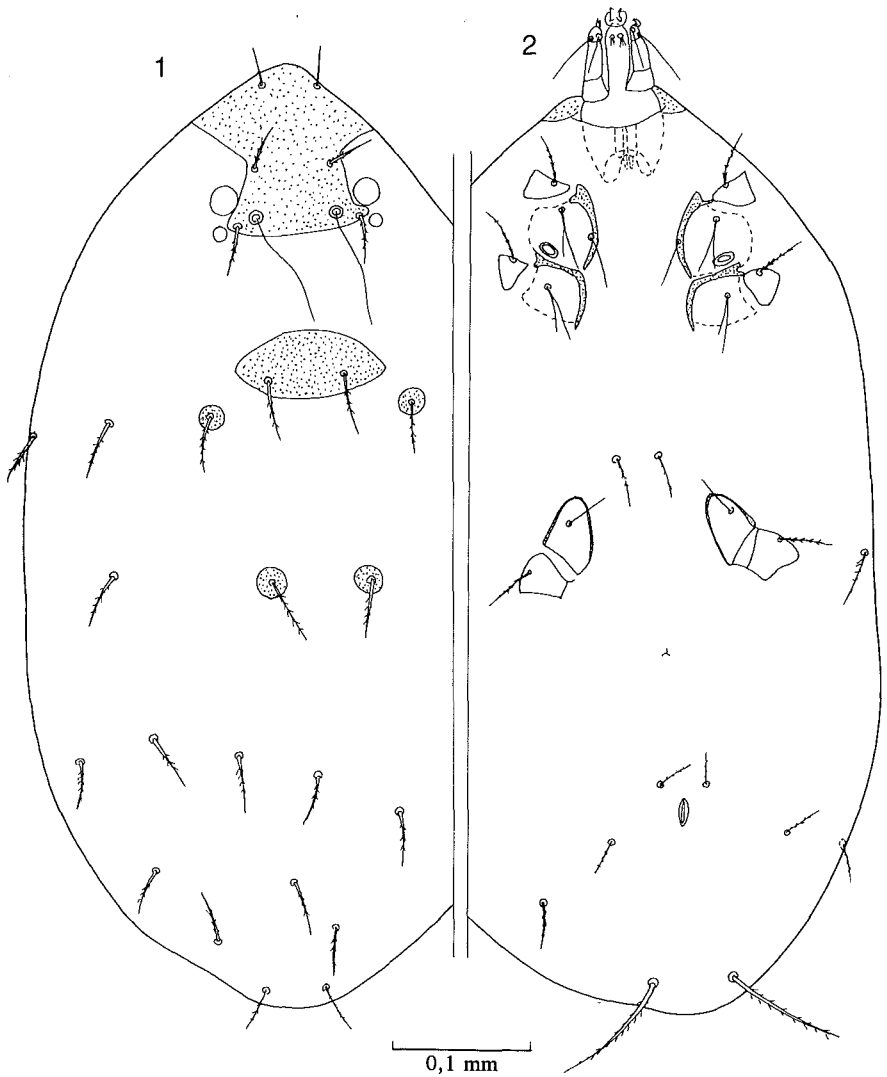
***Microtrombidium hindustanicum* FAIN & IZRI, 1993**

The holotype could not be located; it is not in the NHM. Our description is based on specimens from sandflies from Pakistan and India.

Larva (Figs 1-8): The standard data are listed in table I. Idiosoma (length x width) in 4 specimens: 300 x 205; 615 x 340 (specimen strongly flattened, partly crushed, from Pakistan); 295 x 190 and 285 x 130 (from India). *Dorsum*: anterior scutum finely punctate, devoid of lines, abruptly widens in front of setae AL. Setae AM very thin and smooth, AL and PL thicker and barbed. Posterior median shield bearing 1 pair of barbed setae. Behind this shield there are 5 rows of 6-4-6-4-2 shortly barbed setae 35 to 55 long, among them 2 pairs are situated on small rounded platelets. Diameter of eye-lenses: anterior 16, posterior 8-9. *Venter*: coxae I-III with 2-1-1 very thin setae all smooth except the external I and that of II which bear 1 long setule. Opisthogaster with 3 rows of 2-4-2 thin, shortly barbed setae 18 to 25 long except the posterior paramedian and subterminal pair which are stronger and longer (90 long). *Gnathosoma*: length of chelicerae 70, of palps 50. Base of gnathosoma extends into the body by thick and long sclerotized structures. Palptarsus very small and ventral bearing 6

Table 1. Standard data for *Phlebotrombium hindustanicum* (HIRST) larvae.

No & origin of larva	1, Peshawar, Pakistan	2, Mir Muham-mad, Pakistan	3, Mangowol, Pakistan	4, Dehra Dun, India	Mean
<i>Anterior shield</i>					
AM	21	25	27	22	23,7
AL	33	36	39	33	35,2
PL	30	38	30	37	33,7
SENS	90	93	90	-	91
AMB	36	33	38	33	35
AW	60	57	59	63	59,7
PW	83	90	91	96	90
MA	57	60	60	59	59
AP	-	45	40	45	43
SA	34	33	39	33	34,7
SP	20	18	18	19	18,7
SB	62	59	54	60	58,7
L	125	120	130	120	123,7
W (in front of AL)	100	105	-	90	98
LN	15	14	18	13	15
ASB	110	106	115	105	109
PSB	-	14	15	15	14,7
<i>Posteromedian shield</i>					
PSW	110	108	90	78	96,5
PSL	64	60	51	48	55,7
PLN	38	31	30	36	33,7
QW	63	58	57	48	56,5
QL	42	48	49	50	47,2
<i>Legs</i>					
Ta1	101	100	99	96	99
Ta2	69	74	69	66	69,5
Ta3	60	60	69	60	62,2
Ti1	39	42	36	36	38,2
Ti2	37	39	34	36	36,5
Ti3	37	42	36	42	39,2
Ge1	20	16	19	21	19
Ge2	18	18	18	16	17,5
Ge3	17	19	20	19	18,7
Fe1	60	60	54	60	58,5
Fe2	54	57	51	54	54
Fe3	67	65	60	63	63,7
<i>Solenidions</i>					
ωI	45	48	44	49	46,5
ωII	22	21	22	21	21,5
φI apic. or poster.	60	58	57	50	56,2
φI basal or anter.	54	54	58	54	55
φII apical	20	15	18	-	17,6
φII basal	32	36	37	-	35
σI anterior	60	66	60	60	61,5
σI posterior	60	66	63	55	61
σII	59	65	60	61	61,2
σIII	60	66	60	68	63,5

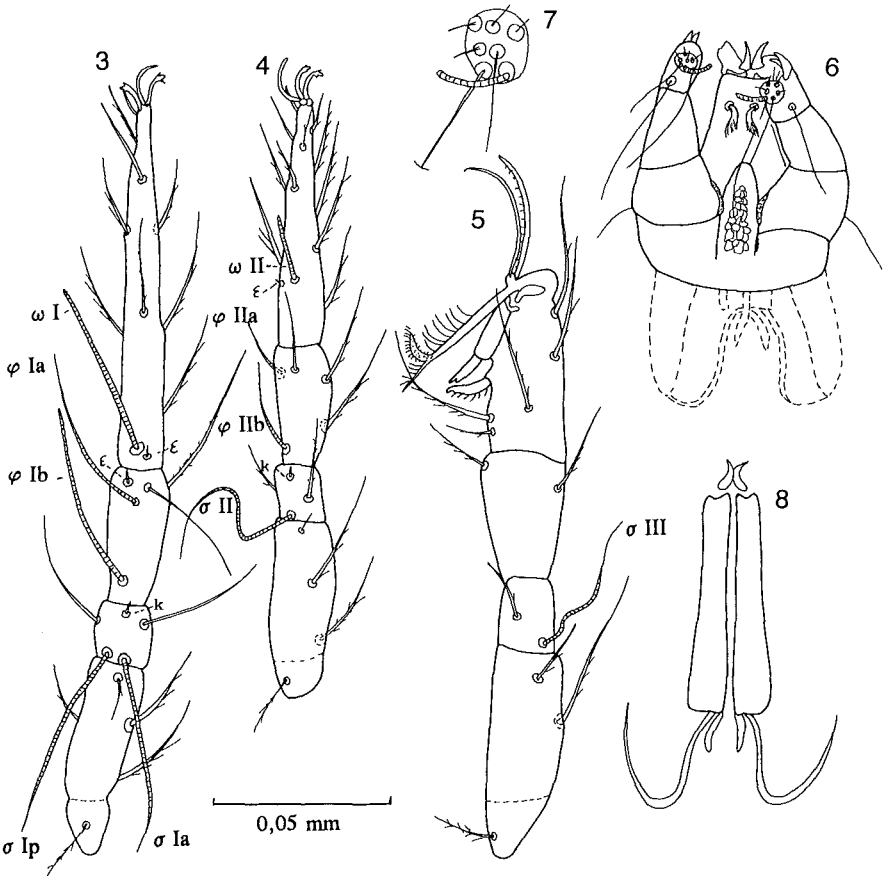


Figs 1-2. *Phlebotrombium hindustanicum* (HIRST) larva: in dorsal (1) and ventral (2) view.

thin setae and a relatively long curved solenidion. Hypostomal setae short, inflated and barbed apically. Leg chaetotaxy (not including the specialized setae): trochanters 1-1-1, femora 6-5-4, genua 4-2-2, tibiae 6-6-5. Most of these setae are thin with few thin barbs except 1 dorsal setae of tarsus II which is thick and bears very thick barbs. Solenidia: tarsi 1-1-0, tibiae 2-2-0, genua 2-1-1. Famuli present on tarsi I-II and tibia I. Tarsi I and II

with 2 and 1 eupathidia ζ respectively. Microseta k present on genua I and II.

Host and locality: Location of holotype unknown. The specimens described herein are deposited in the NHM. They were removed by D. MACFARLANE from the following hosts and localities: 1 larva from *Phlebotomus papatasi* (ζ), Peshawar, Pakistan (coll. H.C. BARNETT, 17.VI.1959); 1 larva from *P. sergenti* (ζ), Mir Muhammad area, W. Pakistan (coll. W.A. McDONALD, 3.V.1963); 2 larvae from *Sergentomyia indica* ($\zeta\zeta$), Mangowol, W. Pakistan (coll. W.A. McDONALD, 9.VI.1964); 3 larvae from *Phlebotomus babu*, Dehra Dun, India.

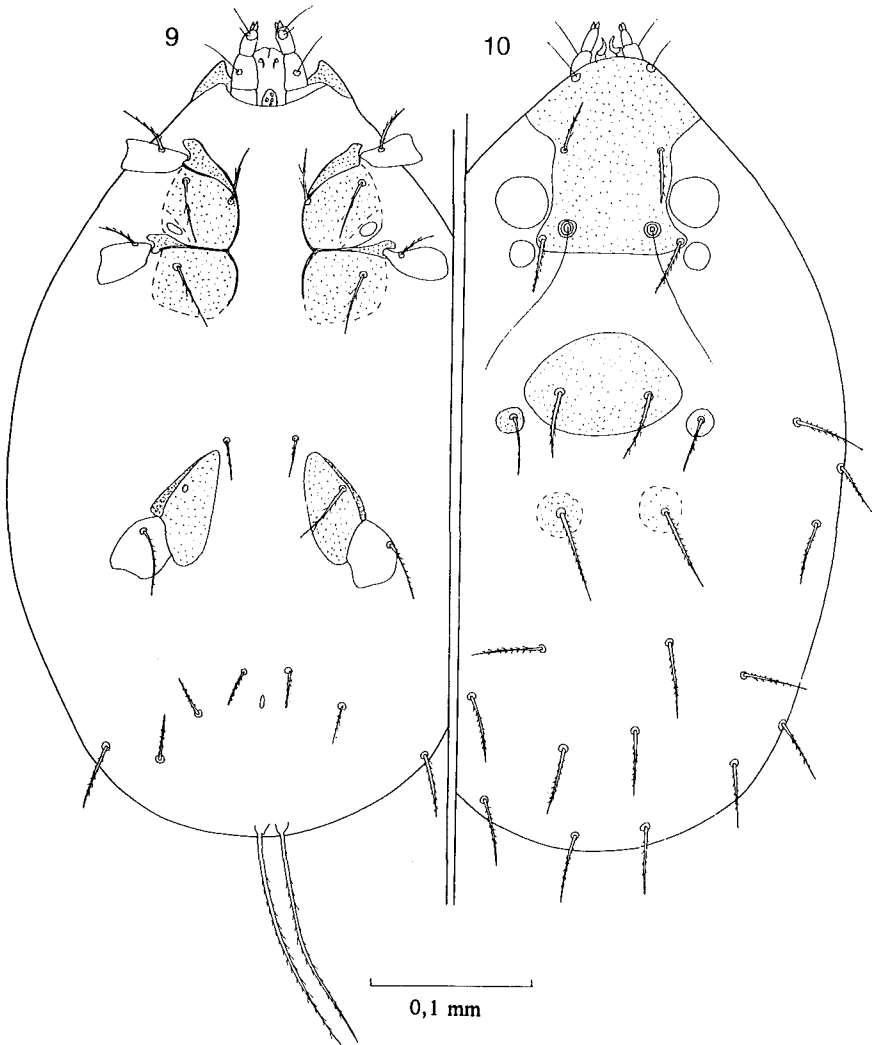


Figs 3-8. *Phlebotrombium hindustanicum* (HIRST) larva: leg I (3), leg II (4), leg III (5) in dorsal or dorsolateral view; gnathosoma, ventrally (6); palptarsus (7); chelicerae (8).

Phlebotrombium lewisi n.sp.

This species is named for the late Dr. D.J. LEWIS in recognition for his important contribution to our knowledge on phlebotomine sandflies.

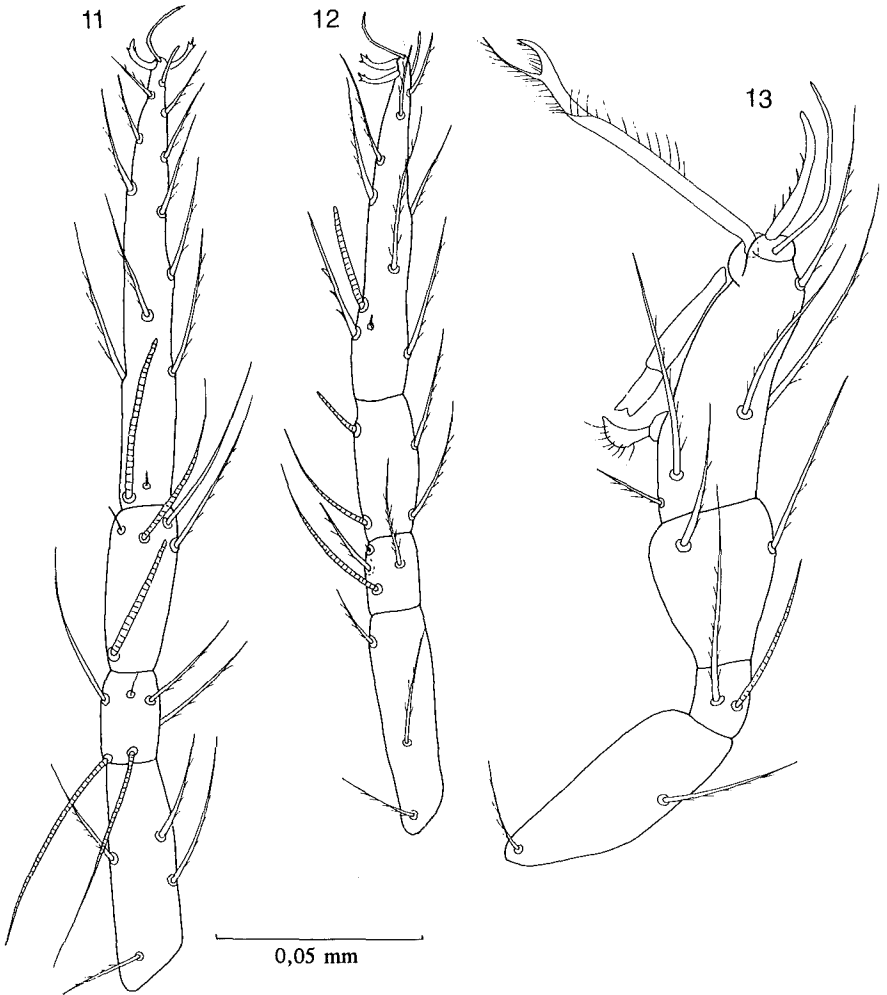
Larva (Figs 9-13): This species is only represented by the holotype. Idiosoma 480 long and 320 wide. General aspect as in *P. hindustanicum* but differing from it by the following characters (see table 2): AP, SA, Ta2 and ω II distinctly longer, ϕ I basal, thicker and shorter. Eyes much larger



Figs 9-10. *Phlebotrombium lewisi* n.sp. larva: in ventral (9) and dorsal (10) view.

(diameter of anterior lens 30-32, of posterior lens 15). All the coxal setae with 3 to 4 short setulae. Hysteronotal setae thicker and longer (30 to 60), opisthogastric setae longer (18 to 35), subterminal ventral pair of setae longer (125). Famulus of tarsus I more apical than ω I.

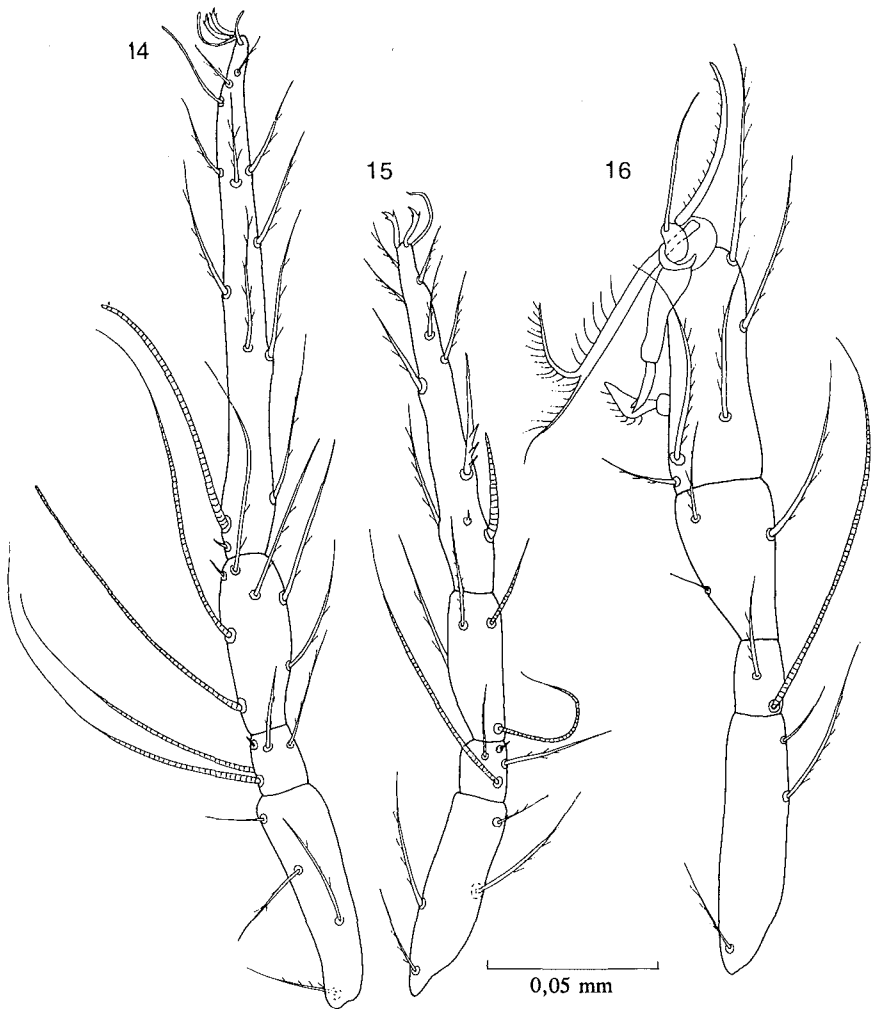
Host and locality: Holotype and only known specimen (larva) from *Sergentomyia clydei*, Dhiyhan, Saudi Arabia (coll. W. BÜTTIKER, 7.III. 1984). Holotype in NHM (1984-194 Ent.)



Figs 11-13. *Phlebotrombium lewisi* n.sp. larva: leg I (11), leg II (12), leg III (13) in dorsal or dorsolateral view.

Table 2. Standard data for *Phlebotrombium lewisi* n.sp. and *P. nigeriense* n.sp.

Origin of larva	<i>P. lewisi</i> n.sp.	<i>Phlebotrombium nigeriense</i> n.sp.				Mean
	Saudi Arabia Holotype	Nigeria Holotype	Nigeria Paratype 1	Kenya Paratype 2	Kenya Paratype 3	
<i>Anterior shield</i>						
AM	27	27	27	24	20	24,5
AL	39	33	36	32	39	35
PL	33	43	42	42	42	42,2
SENS	90	110	140	90	105	111,2
AMB	32	36	39	39	42	39
AW	60	72	90	70	75	76,7
PW	86	93	93	99	112	99,2
MA	63	67	60	66	63	64
AP	57	45	48	40	45	44,5
SA	47	36	36	30	36	37
SP	18	18	18	21	23	20
SB	51	58	57	59	75	62,2
L	135	117	123	127	141	127,5
W	100	-	-	-	105	105
LN	16	15	15	20	29	19,7
ASB	120	102	-	117	129	116
PSB	15	15	-	10	12	12,3
<i>Posteromedian shield</i>						
PSW	87	117	115	-	120	117
PSL	63	45	45	-	54	48
PLN	44	28	33	-	39	33,3
QW	54	45	46	-	50	47
QL	52	58	60	60	51	57,2
<i>Legs</i>						
Ta1	108	138	135	130	132	133,7
Ta2	84	93	90	93	96	93
Ta3	69	75	74	-	70	73
Ti1	43	45	43	45	46	47,7
Ti2	39	45	42	40	42	42,2
Ti3	42	44	45	41	42	43
Ge1	24	18	15	18	18	17,2
Ge2	19	18	16	18	18	17,5
Ge3	20	21	19	21	21	20,5
Fe1	58	63	60	69	69	65,2
Fe2	54	60	54	60	61	58,7
Fe3	66	69	64	68	68	67,2
<i>Solenidions</i>						
ω I	45	68	66	67	66	66,7
ω II	30	28	24	28	30	27,5
ϕ I apic. or poster.	50	90	84	80	75	82
ϕ I basal or anter.	30	81	80	75	75	77,7
ϕ II apical	15	36	38	26	28	32
ϕ II basal	36	50	50	45	-	48
σ I anterior	58	105	100	90	92	96,7
σ I posterior	58	120	100	100	90	102,5
σ II	60	100	95	105	90	97,5
σ III	33	110	110	95	105	105



Figs 14-16. *Phlebotrombium nigeriense* n. sp. larva: leg I (14), leg II (15), leg III (16) in dorsal or dorsolateral view.

***Phlebotrombium nigeriense* n.sp.**

Holotype larva (Figs 14-16): Idiosoma 295 long and 200 wide, in paratype (specimen with legs III overlapping), strongly flattened, 420 x 320. This species is clearly separated from the two other species by the following characters: PSW, QL, tarsi I-III, tibia I and femur I distinctly longer (tarsi I 133,7 long instead of 108 maximum in the other species); solenidia ω I and II, ϕ I (a and b), σ I to III much longer (σ III is about 3 times longer than in *P. lewisi* and about twice as long as in *P. hindustanicum*). Eyes as in *P. hindustanicum* (16 and 9 respectively). Coxal setae as in *P. hindusta-*

nicum. Dorsal and ventral setae as in *P. lewisi*, median claw of tarsus III very thin and shorter than posterior claw.

Tribe BISKRATROMBIINI FAIN & IZRI, 1993

This tribe was created for the monotypic genus *Biskratrombium* FAIN & IZRI, 1993, type species: *Biskratrombium coineau* FAIN & IZRI, 1993 found on *Phlebotomus papatasi* in Biskra, Algeria.

We describe now a new genus and species from *Phlebotomus martini*, from Kenya.

Genus *Kenyatrombium* n.g.

Definition: Eyes lacking. with only 1 small median dorsal shield bearing only 2 pairs of setae (AM and AL) and 1 pair of sensillae. Cuticle of dorsum and venter with numerous very small pale lines or dots. Setae PL situated on soft cuticle far from the scutum. Leg segments 6-6-6. Urstigma oval, attached to coxa I. Uropore lacking. Chaetotaxy of legs: trochanters 1-1-1, femora 6-6(5)-4, genua 4-2-2, tibiae 6-5-5. Coxae with 2-1-2 very thin setae with 2 to 5 thin relatively long divergent setulae. Solenidia: tarsi 1-1-0, tibiae 2-2-0, genua 2-1-1. A famulus is present on tarsi I and II and on tibia I. One seta k on genu I. Tarsal claws: 2-2-3 (median claw lacking on tarsi I-II). Tarsus III normal, with normal claws. Gnathosoma small, without a peribuccal ring. Palptarsus longer than wide, almost terminal, bearing 2 solenidia. Palptibia with a subapical dorsal forked spine.

Type species: *Kenyatrombium macfarlanei* n.sp.

By the absence of eyes, the shape of the legs, claws and gnathosoma, this genus resembles closely the genus *Biskratrombium*. It differs, clearly from the latter, however, by the complete absence of the second median shield, the lateral situation of the PL setae far from the shield, the coxal chaetotaxy (2-1-1 in *Biskratrombium*).

Kenyatrombium macfarlanei n.sp.

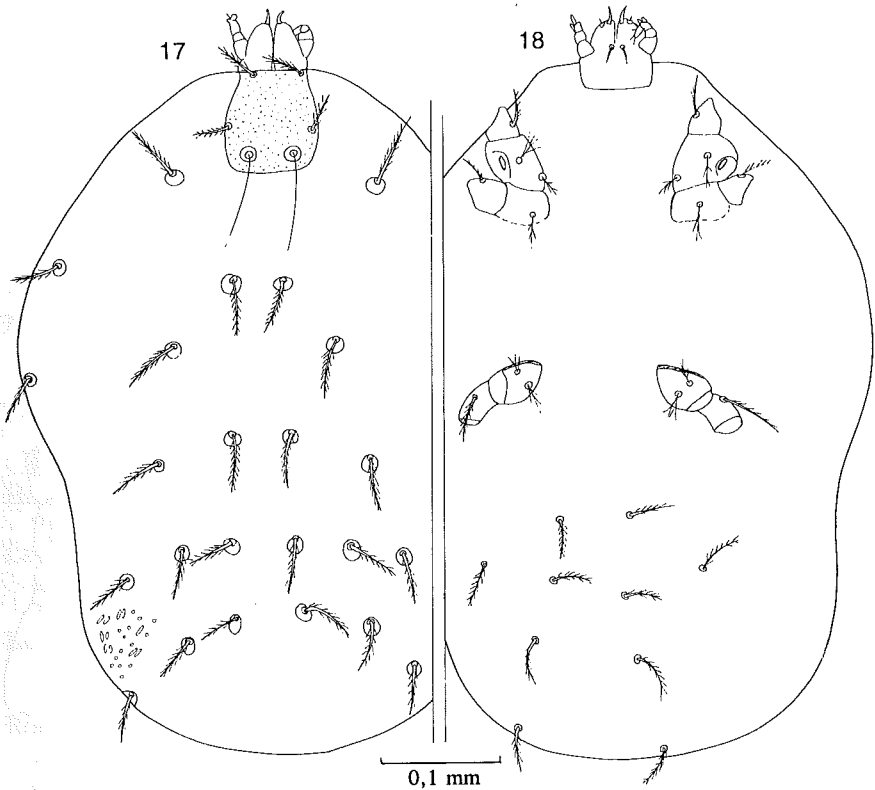
This species is named for M.D. MACFARLANE (International Institute of Entomology) who collected the mites which are described in this paper.

Larva (Figs 17-23): Idiosoma in holotype 570 long and 450 wide. Length and width in 3 paratypes 540 x 390, 670 x 480 and 480 x 395. **Dorsum:** anterior shield poorly sclerotized. Setae PL lacking on the shield. AM and AL setae barbed. The lateral (? PL) setae 45 long. Hysteronotum with 5 transverse rows of 4-4-4-6-6 barbed setae 35 to 50 long. All these setae are set in the anterior part of small rounded or oval slightly punctate areas. **Venter:** coxae with 2-1-2 setae 15 to 20 long. Opisthogaster with 4 transverse rows of 2-4-2-2 setae 25 to 40 long. **Gnathosoma:** its base is 60 wide; hypostome bearing 1 pair of short simple setae. Palptarsus 6 long and 4,5 wide, almost apical, bearing 2 solenidia and 1 long and thin ventral seta. Chaetotaxy of legs: most of the setae are bipectinate, generally with long barbs. Anterior and posterior claws with 2 preapical teeth. Tarsus I with 2 eupathidia ♂.

Table 3. Standard data for *Kenyatrombium macfarlanei* n.sp. larvae

	Holotype	Paratype 1	Paratype 2	Paratype 3	Mean
<i>Anterior shield</i>					
AM	32	28	31	30	30,2
AL	28	27	29	26	27,5
PL	-	-	-	-	-
SENS	75	-	-	45	-
AMB	52	51	48	45	49
AW	59	66	59	51	58,7
PW	135	105	140	106	121,1
MA	46	45	48	46	46,2
AP	-	-	-	-	-
SA	22	21	24	24	22,7
SP	-	-	-	-	-
SB	31	33	33	28	31,2
L	90	93	90	70	85,7
W	62	66	68	63	64,7
LN	-	-	-	-	-
ASB	78	78	75	60	72,7
PSB	12	15	15	10	13
<i>Posteromedian shield</i>					
PSW	-	-	-	-	-
PSL	-	-	-	-	-
PLN	-	-	-	-	-
QW	45	42	57	36	45
QL	45	45	46	40	44
<i>Legs</i>					
Ta1	53	49	51	49	50,5
Ta2	46	45	48	45	46
Ta3	54	51	53	54	53
Ti1	39	39	38	39	38,7
Ti2	31	30	33	30	31
Ti3	40	42	42	42	41,5
Ge1	19	19	18	18	18,5
Ge2	16	18	13	14	15,2
Ge3	17	16	15	16	16
Fe1	62	60	63	63	62
Fe2	60	60	60	60	60
Fe3	60	62	62	61	61,2
<i>Solenidions</i>					
ωI	24	23	24	24	23,7
ωII	18	16	18	17	17,5
φI apic. or poster.	16	15	14	16	15,2
φI basal or anter.	16	15	16	16	15,5
φII apical	12	11	12	13	12
φII basal	11	12	12	14	12,5
σI anterior	12	11	12	14	12,2
σI posterior	14	12	12	14	13
σII	13	12	13	14	13
σIII	15	13	14	15	14,2

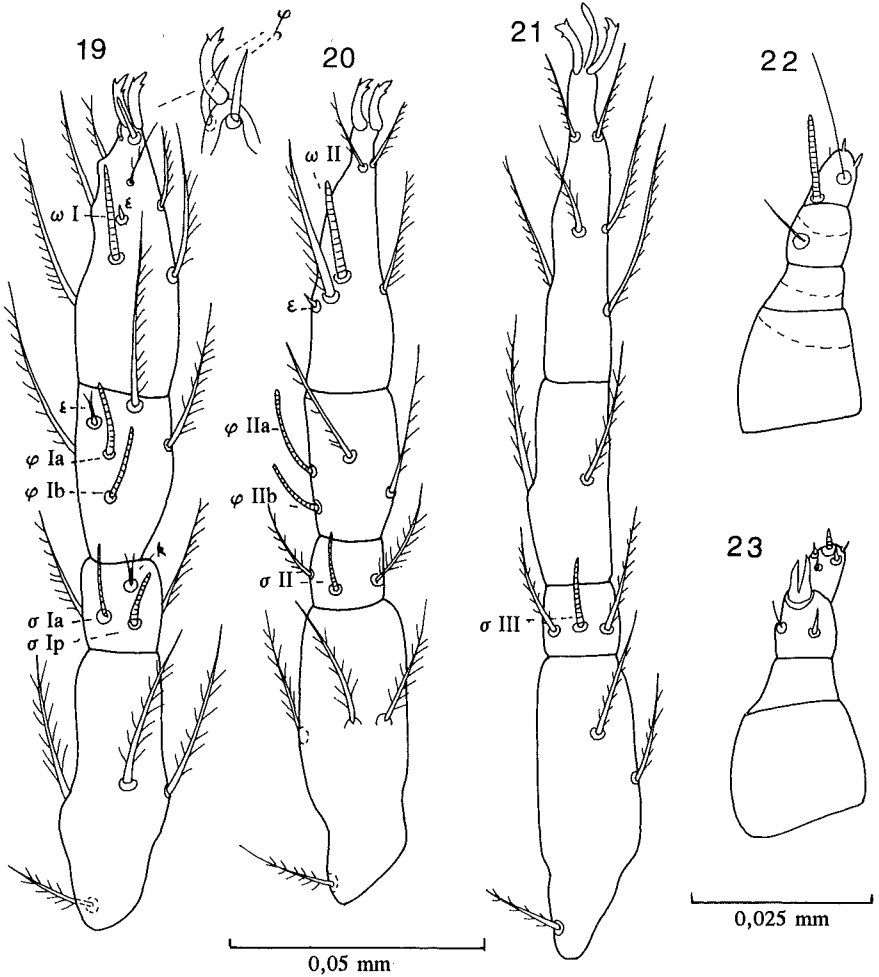
Host and locality: Holotype and 5 paratypes from *Phlebotomus martini*, from Marigat, Kenya (coll. D.M. MINTER, 2.V.1962). Holotype and 4 paratypes in the NHM, 1 paratype in the IRSNB.



Figs 17-18. *Kenyatrombium macfarlanei* n.sp. larva: in dorsal (17) and ventral (18) view.

Key to the trombidioid larval genera without eyes

- 1. Coxae I and II separated. Leg segmentation 7-6-6. Tarsal claws 2-2-2. With only 1 median dorsal shield (from a Scorpion, Malaya) *Audyana* WOMERSLEY, 1954
- Coxae I and II contiguous. Leg segmentation 6-6-6. Tarsal claws never 2-2-2. With either one or more than one dorsal median shields 2
- 2. Dorsum with 5 median shields. Claws 3-3-2. Tarsus III modified with modified claws (from cavernicolous Coleoptera, Morocco) *Beronium* SOUTHCOTT, 1986
- Dorsum with either 1 or 2 median shields. Tarsi with either 2-2-3 or 3-3-3 normal claws, tarsi III not modified. Coxal setae 2-2-1, 2-1-2 or 2-1-1 3



Figs 19-23. *Kenyatrombium macfarlanei* n. sp. larva: leg I (19); leg II (20), leg III (21) in dorsal view; palp in ventral (22) and dorsal (23) view.

- 3. Tarsi with 2-2-3 claws (on tarsi I-II the median claw is lacking). Dorsum with 1 or 2 median shields. Coxae with 2-1-1 or 2-1-2 setae. Setae PL situated behind the sensillae or on the soft cuticle (from African phlebotomine sandflies) 4
- Tarsi with 3-3-3 claws. Dorsum with 2 median shields. Coxal setae 2-2-1. Setae PL distinctly in front of the sensillae 5
- 4. Dorsum with 1 small median shield bearing only 2 pairs of setae and 1 pair of sensillae (the PL are lacking). Coxal setae 2-1-2 (from *Phlebotomus martini*, Kenya) *Kenyatrombium* n.g.

- Dorsum with 2 median shields, the anterior with 3 pairs of setae and 1 pair of sensillae, the posterior with 1 pair of setae. Coxal setae 2-1-1 (from *Phlebotomus papatasi*, Algeria) *Biskratrombium* FAIN & IZRI, 1993
- 5. Posterior median shield with 2 pairs of setae. Sensillae short, inflated apically. Uropore lacking (from Australian Centipedes) *Wondeclia* SOUTHCOTT, 1987
- Posterior median shield with 1 pair of setae. Sensillae long, attenuated apically. Uropore present (from cavernicolous Orthoptera) *Ceuthotrombium* ROBAUX *et al.*, 1976

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