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A new genus and four new species of chigger mites (Acari Trombiculidae) from Madagascar

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Abstract

A new genus of chigger mites, *Brygoovia* gen. n., with the species *B. opluri* sp. n. is described from an Iguanid lizard collected on Madagascar. Three new species of Schoengastiine chiggers, *Schoengastia murina* sp. n., *Sch. anguina* sp. n., and *Schoutedenichia subterranea* sp. n. are also described from Madagascarian mammals and reptiles. A new host genus is reported for *Schoutedenichia tiptoni* VERCAMMEN-GRANDJEAN et WATKINS, 1965.

Keywords : chigger mites, Madagascar, parasites, taxonomy

Introduction

Chigger mites of Madagascar were studied only occasionally. To the time five species are reported from this territory, *Trisetica aethiopica* (HIRST, 1926), *Schoengastia madagascariensis* SAMBON, 1928, *Sch. madecassa* ANDRE, 1949, *Schoutedenichia gigantica* VERCAMMEN-GRANDJEAN et WATKINS, 1965, and *Sch. tiptoni* VERCAMMEN-GRANDJEAN et WATKINS, 1965. Of these species only *T. aethiopica* had been found outside the island. Thus, one can expect a revealing of an abundant new chigger fauna having a high level of endemism on Madagascar. An examination of a small collection of chiggers come from Madagascar and preserved in the Royal Belgian Institute of Natural Sciences provide us with a new genus and four new species, as well as a new faunistic record.

Material and methods

Mites were mounted in Faure-Berlese's medium. All measurements are given in micrometres (μm). In the formulas of dorsal idiosomal setae arrangement (fD) the double rows are given in square brackets. Terminology follows that of GOFF *et al.* (1982), with some adaptation: "ventral setae" (V) -

setae on the ventral surface of the 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. Type specimens are deposited in the Royal Belgian Institute of Natural Sciences, Bruxelles, Belgium (IRSNB), and the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN).

Results

Brygoovia gen. n.

Type species : *Brygoovia opluri* sp. n.

Description : Trombiculinae with palpal tarsus 7BS; nude galeala; cheliceral blade with tricuspid cap and few dorsal hooks; palpal claw 2-pronged; chelicerae and palpi elongated; scutum near trapezoidal, with very prominent, widely rounded posterior margin, without anterolateral shoulders; sensillary bases are about equidistant from each other and from lateral scutal margins; sensilla flagelliform, with distal barbs; legs 7-segmented, very long (Ip > 1300); coxae unisetose; multiple genualae on all legs; two tibialae III; mastitarsala present.

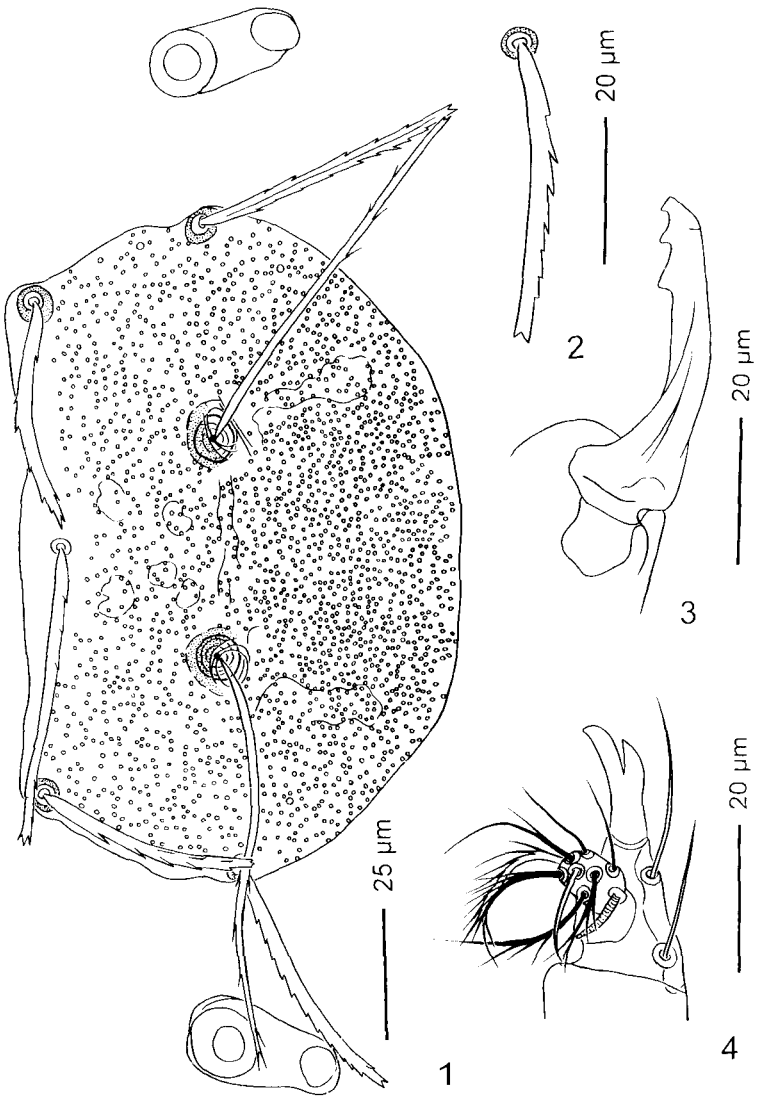
Hosts : Iguanidae.

Remarks : The new genus is close to the genus *Vatacarus* SOUTHCOTT, 1957 s.s., in having palpal tarsus 7BS, nude galeala, cheliceral blade with dorsal hooks (one hook in *Vatacarus)*, palpal claw 2-pronged, scutum with very prominent posterior margin, multiple genualae on all legs, and mastitarsala present, but differs in the absence of neosomy during engorgement, sensillary bases not widely separated (scutum not telostigmal), anterolateral shoulders of scutum absent, AW < PW versus AW >= PW, sensilla barbed in distal part only versus sensilla barbed from near their bases, and presence of two tibialae on leg III. The form of scutum in *Brygoovia* is like that of *Eutrombicula* EWING, 1938, which confirmes the intuition of VERCAMMEN-GRANDJEAN (1960), who brought together the genera *Eutrombicula* and *Vatacarus*.

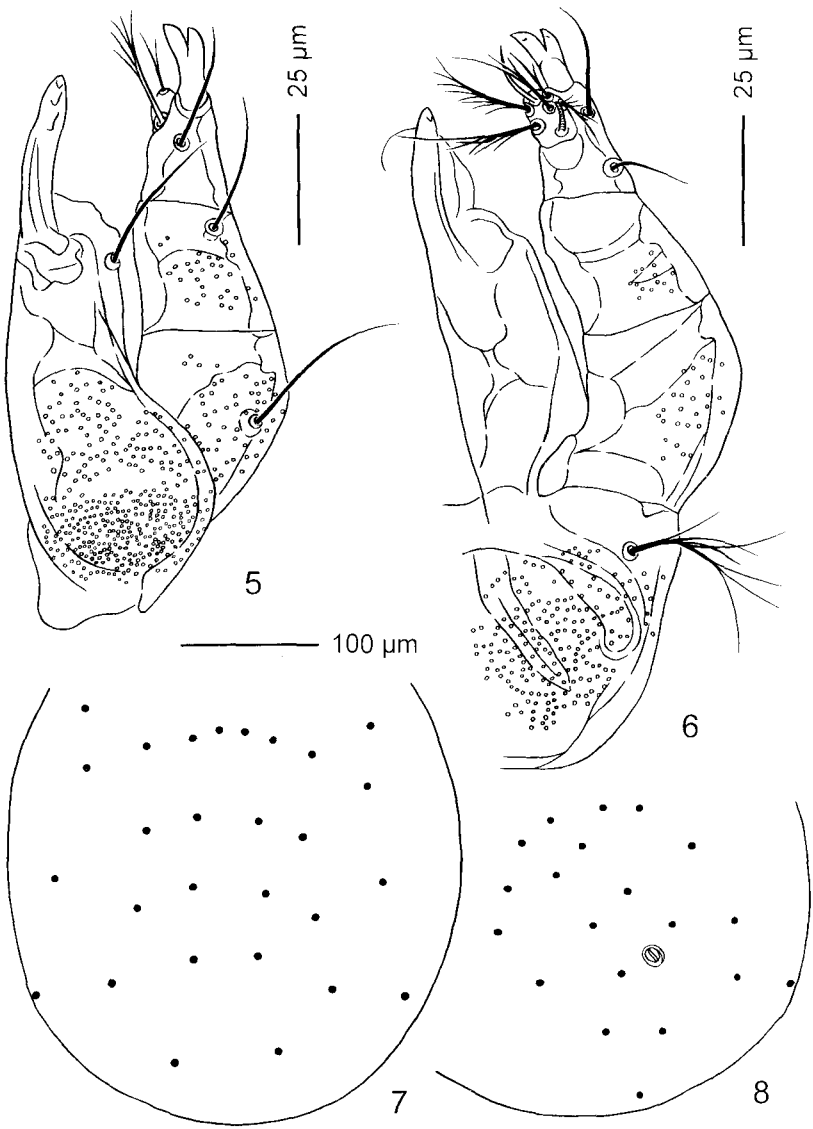
Brygoovia opluri sp. n.

Diagnosis : SIF = 7BS-N-2-4562.1000; fPp = N/N/NNN; fCx = 1.1.1; fSt = 2.2; fSc: AM > PL >AL; Ip = 1331; fD = 2H-8-6-6-4-2; fV = 6-2-4-6-2; DS = 28; VS = 20; NDV = 48.

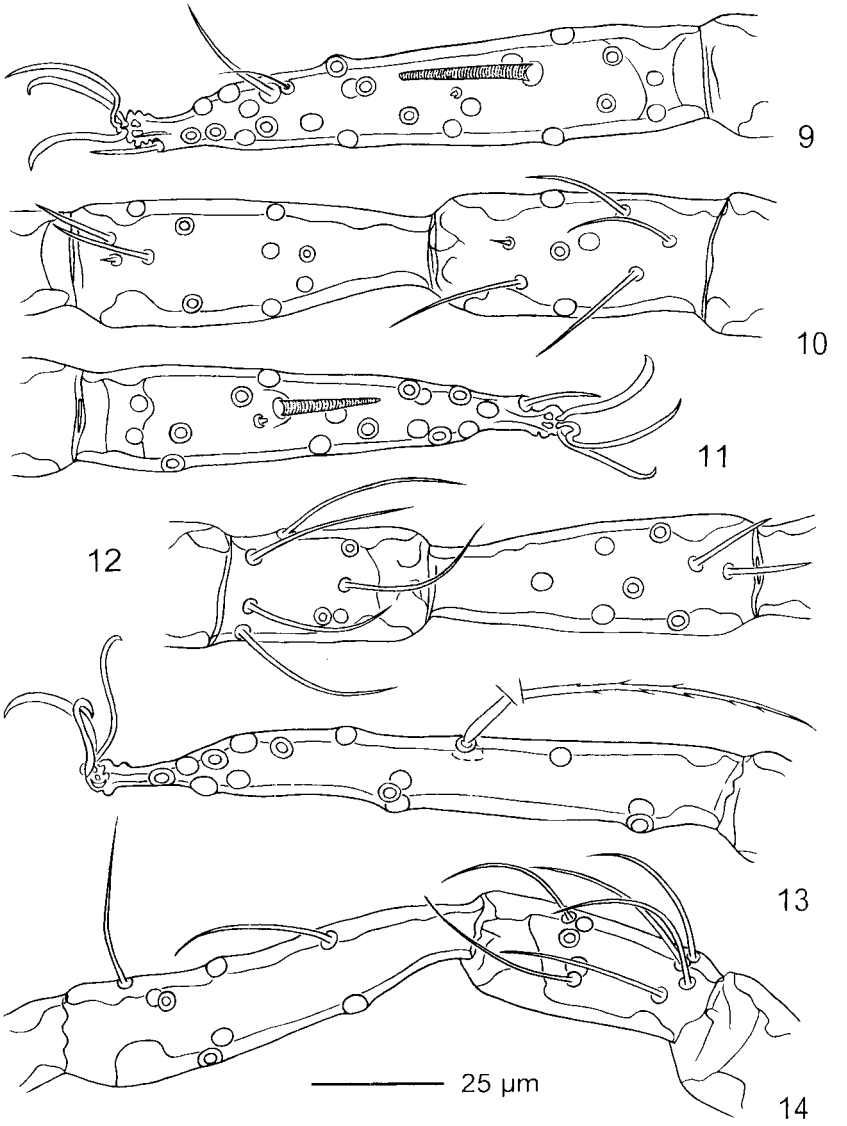
Description : *Larva* (Figs 1-14). Idiosoma. Eyes 2+2. One pair of humeral setae; 26 dorsal idiosomal setae, arranged 8-6-6-4-2 (7-6-6-4-2 in holotype), rather thick, with two rows of sparse short barbs; 2 pairs of sternal setae and 20 ventral setae; total idiosomal setae 47-49. Gnathosoma. Chelicerae and palpi elongated; gnathobase, cheliceral base, palpal femur and genu densely punctate; cheliceral blade with tricuspid cap and two large dorsal hooks; gnathobase with transverse striations and a pair of branched setae; galeala nude; palpal claw 2-pronged; setae on palpal femur, genu, and tibia nude;



Figs 1-4. *Brygoovia opluri* gen. et sp. n., larva. 1 : scutum. 2 : anterior dorsal idiosomal seta. 3 : lateral aspect of cheliceral blade. 4 : palpal tarsus and tibia.



Figs 5-8. *Brygoovia opluri* gen. et sp. n., larva. 5 : dorsal aspect of gnathosoma. 6 : ventral aspect of gnathosoma. 7 : arrangement of dorsal idiosomal setae. 8 : arrangement of ventral idiosomal setae.



Figs 9-14. *Brygoovia opluri* gen. et sp. n., holotype larva. 9 : tarsus of leg I. 10 : tibia and genu of leg I. 11 : tarsus of leg II. 12 : genu and tibia of leg II. 13 : tarsus of leg III. 14 : tibia and genu of leg III.

palpal tarsus with 7 non-specialized setae, branched or nude, nude subterminala and curved tarsala. Scutum. Large, densely punctate, near trapezoidal, with posterior margin very prominent, widely rounded; scutal setae similar to dorsal idiosomal setae; AM > PL > AL; AM base slightly posterior to level of ALs; SB on level of PLs or slightly anterior; sensilla flagelliform, with few small distal barbs. Legs. Very long, 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, 4 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala 22-25 μm long, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, 5 genualae; tibia 6B, 2 tibialae; tarsus 16B, tarsala 18 μm long, microtarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, 6 genualae; tibia 6B, 2 tibialae; tarsus 14B, outstanding barbed mastitarsala in middle part of segment.

Standard measurements of the type series (N = 4) :

	AW	PW	SB	ASB	PSB	SD	P-PL	AP	AM	AL	PL	S	H
Holotype	96	121	40	41	45	86	41	39	53	46	50	79	50
Minimum	94	117	37	40	41	82	41	35	53	41	49	72	49
Maximum	96	123	41	41	46	86	46	40	56	49	52	81	51
Mean	94	119	40	41	44	85	43	38	54	44	50	77	50

D	V	pa	pm	pp	Ip	DS	VS	NDV	TaIII	TaW
38-45	27-45	457	392	475	1325	27	20	47	121	16
38-43	27-43	457	392	437	1325	27	20	47	113	16
40-45	31-46	468	403	475	1341	28	21	49	121	17
38-44	29-44	461	398	463	1331	28	20	48	118	16

Host : *Oplurus quadrimaculatus* DUMERIL et BIBRON, 1851 (Reptilia, Squamata, Iguanidae).

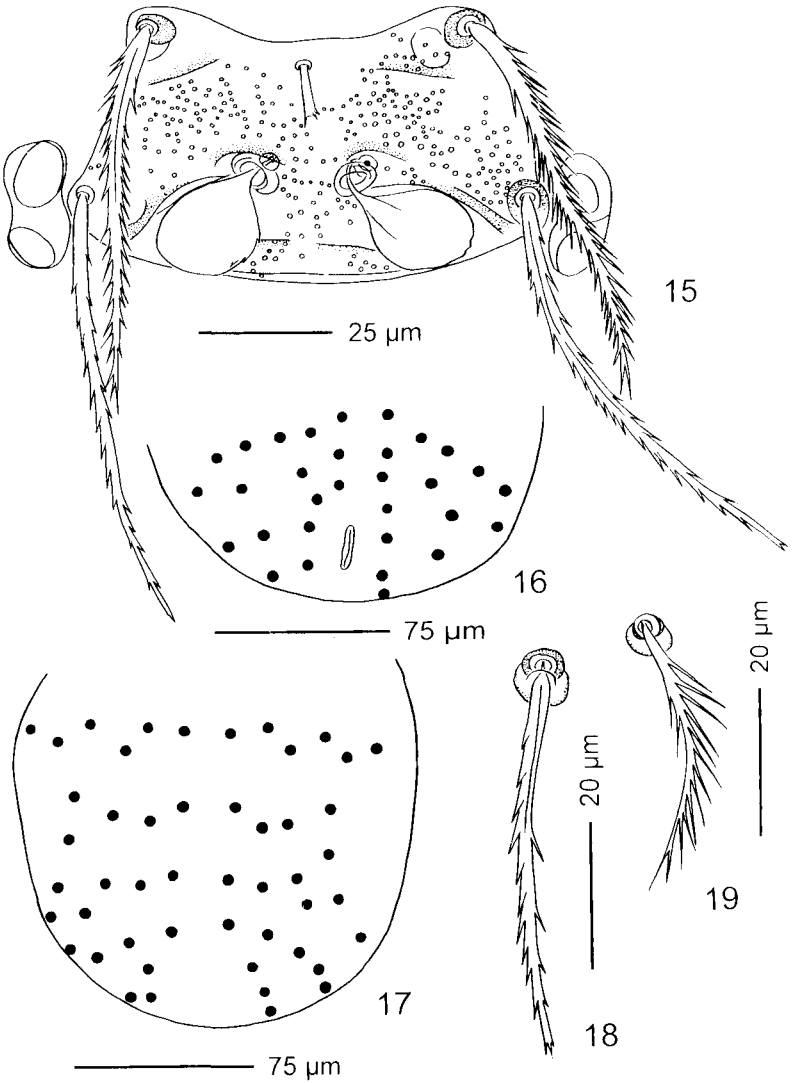
Type data : Holotype larva from *O. quadrimaculatus,* Zazafotsi, Madagascar, March 1973, collector E.R. BRYGOO. 3 paratypes larvae, same data. Holotype and 2 paratypes will be deposited in IRSNB, 1 paratype will be deposited in ZIN.

Etymology : Specific epithet derives from generic name of the host.

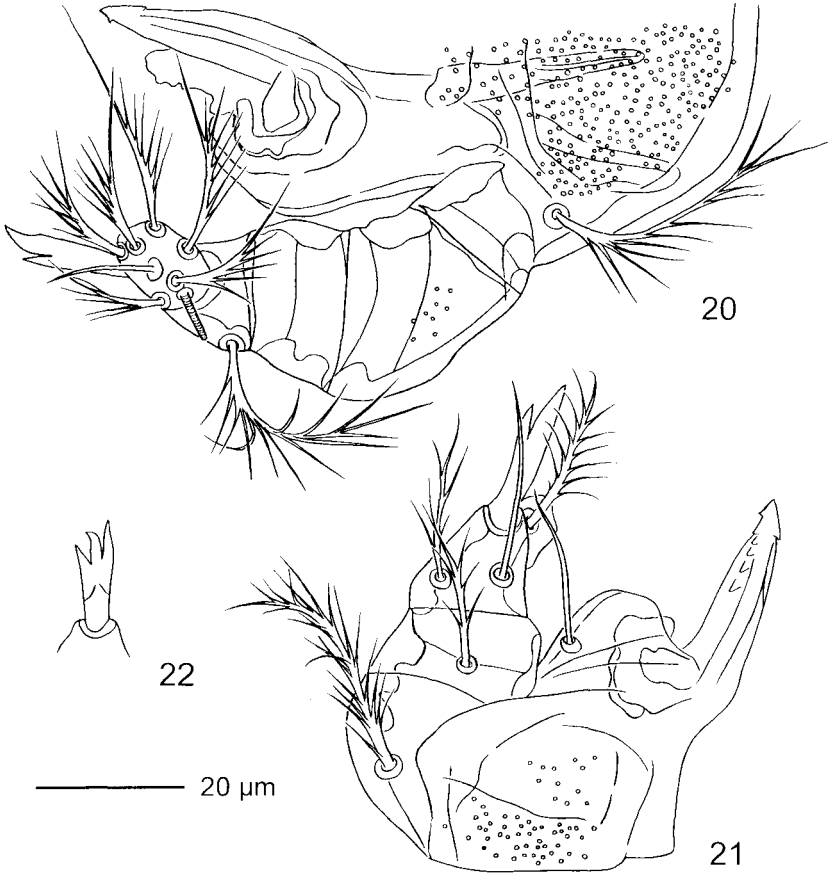
Schoengastia murina sp. n.

Diagnosis : SIF = 7BS-N-3-3111.2000; fPp = B/B/NBB; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL >> AM; Ip = 965; fD = 2H-10-8-8-8-...; DS = 44; VS = 36; NDV = 80.

Description : *Larva* (Figs 15-25). Idiosoma. Eyes 2+2. One pair of humeral setae; 36-47 dorsal idiosomal setae, arranged 10-8-8-8-..., covered with rather short barbs; 2 pairs of sternal setae and 31-41 ventral setae; total idiosomal setae 79-80. Gnathosoma. Cheliceral blade with tricuspid cap and dorsal row



Figs 15-19. *Schoengastia murina* sp. n., holotype larva. 15 : scutum. 16 : arrangement of ventral idiosomal setae. 17 : arrangement of dorsal idiosomal setae. 18 : anterior dorsal idiosomal seta. 19 : anterior (preanal) ventral idiosomal seta.



Figs 20-22. *Schoengastia murina* sp. n., larva. 20 : ventral aspect of gnathosoma. 21 : dorsal aspect of gnathosoma. 22 : palpal claw of paratype.

of 5 hooks; gnathobase densely punctate, with a pair of branched setae; galeala nude; palpal claw 3-pronged (3rd prong are not seen in holotype); setae on palpal femur and genu branched, dorsal palpal tibial seta nude, lateral and ventral palpal tibial setae branched; palpal tarsus with 7 branched setae, nude subterminala and tarsala. Scutum. Moderately punctate, near trapezoidal, with concave anterior margin and widely rounded posterior margin; PLs similar to dorsal idiosomal setae but longer, ALs densely covered with long thin barbs, PL longer than AL, AM about 2.5 times shorter; AM base posterior to level of ALs; SB slightly anterior to level of PLs; sensilla pyriform. Legs. 7-segmented, terminating in a pair of wide claws and clawlike empodium. Leg I: coxa 1B; trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala 14-15 µm long, microtarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa

Figs 23-25. *Schoengastia murina* sp. n., holotype larva. 23 : leg I. 24 : leg II. 25 : leg III.

1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala 14-15 µm long, microtarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 13B, 2 nude mastitarsalae.

Standard measurements of the type series:

	AW	PW	SB	ASB	PSB	SD	P-PL	AP	AM	AL	PL	S
Holotype	58	83	16	31	22	53	16	34	-	75	86	29x16
Paratype	65	81	18	29	23	52	20	29	25	68	78	32x16

H	D	V	pa	pm	pp	Ip	DS	VS	NDV	TaIII	TaW
66	40-53	-	333	297	335	965	49	31	80	86	19
58	43-54	29-43	-	288	331	-	38	41	79	81	20

Host: *Nesomys rufus* (PETERS, 1870) (Mammalia, Rodentia, Muridae).

Type data : Holotype larva from *N. rufus,* Madagascar, 15 January 1895, preserved in IRSNB, collector unknown. Chiggers were collected by A. FAIN. 1 paratype larva, same data. Holotype and paratype will be deposited in IRSNB.

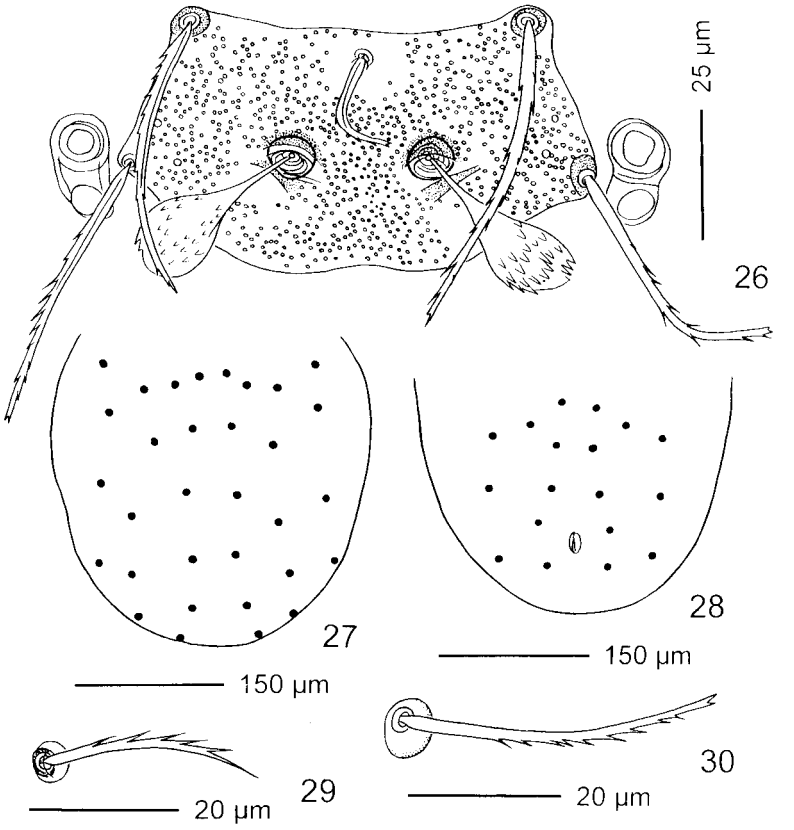
Etymology : Specific epithet refers to the taxonomic belonging of the host.

Differential diagnosis : The new species is similar to *Sch. radfordi nottei* VERCAMMEN-GRANDJEAN, 1958, but differs in fPp = B/B/NBB versus B/N/NNB, longer PL (78-86 versus 60), AP = 29-34 versus 24, and longer legs (Ip = 965 versus 784). *Sch. murina* also resembles *Sch. mozambica* KOLEBINOVA, 1984, and differs from this species in having nude mastitarsalae, fPp = B/B/NBB versus B/N/NNB, longer setae (PL = 78-86 versus 52, H = 58-66 versus 45), longer legs (Ip = 965 versus 857), and much shorter tarsala I (14-15 versus 30).

Schoengastia anguina sp. n.

Diagnosis : SIF = 7BS-N-3-3111.1000; fPp = N/N/NNN; fCx = 1.1.1; fSt = 2.2; fSc: AL >= PL >> AM; Ip = 860; fD = 2H-8-6-6-4-4-2; fV = 6-2-4-2-4; DS = 32; VS = 18; NDV = 50.

Description : *Larva* (Figs 26-36). Idiosoma. Eyes 2+2. One pair of humeral setae; 30 dorsal idiosomal setae, arranged 8-6-6-4-4-2, rather thin, with sparse short barbs; 2 pairs of sternal setae and 18 ventral setae; total idiosomal setae 50. Gnathosoma. Gnathobase, cheliceral base, palpal femur and genu moderately punctate; cheliceral blade with tricuspid cap and dorsal row of 5-6 large hooks; gnathobase with transverse striations and a pair of branched setae; galeala nude; palpal claw 3-pronged; setae on palpal femur, genu, and tibia nude; palpal tarsus with 7 branched setae, nude subterminala and tarsala. Scutum. Densely punctate, near trapezoidal, with slightly biconvex posterior margin; scutal setae similar to dorsal idiosomal setae, AL the longest, PL almost as long as AL, AM about 2.5 times shorter; AM base posterior to level of ALs; SB slightly anterior to level of PLs; sensilla clavate, covered with scales. Legs. 7-segmented, terminating in a pair of claws and clawlike empodium, coxae with indistinct longitudinal striations. Leg I: coxa 1B; trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala 15 μm 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 11 μm long, microtarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 14B, mastitarsala with few barbs.



Figs 26-30. *Schoengastia anguina* sp. n., larva. 26 : scutum. 27 : arrangement of dorsal idiosomal setae. 28 : arrangement of ventral idiosomal setae. 29 : anterior (preanal) ventral idiosomal seta. 30 : anterior dorsal idiosomal seta.

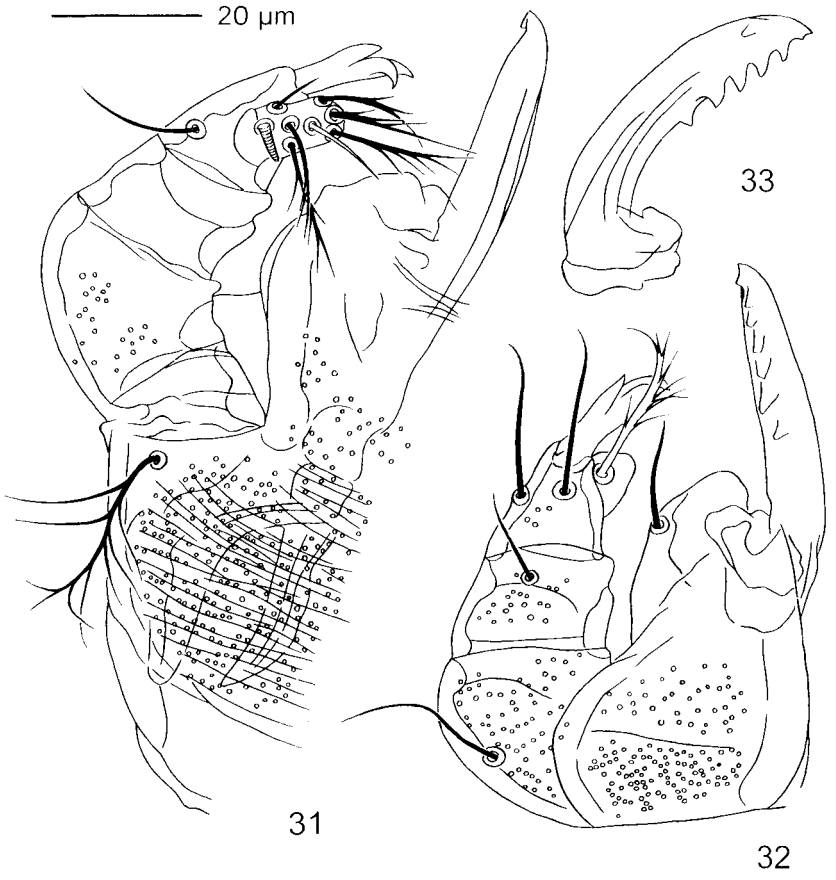
Standard measurements of the type series:

	AW	PW	SB	ASB	PSB	SD	P-PL	AP	AM	AL	PL	S
Holotype	64	86	25	27	24	51	20	31	22	56	55	36x12
Paratype	61	85	26	29	23	52	19	31	22	57	55	34x13

H	D	V	pa	pm	pp	Ip	DS	VS	NDV	TaIII	TaW
51	33-42	26-41	311	274	284	869	32	18	50	74	15
52	32-43	26-40	302	265	283	850	33	16	49	74	17

Host : *Liopholidophis stumpffi* (BOETTGER, 1881) (Reptilia, Squamata, Colubridae).

Type data : Holotype larva from *L. stumpffi*, Madagascar. Identification number of the host in IRSNB: No 330 (1879). Collector and date unknown.

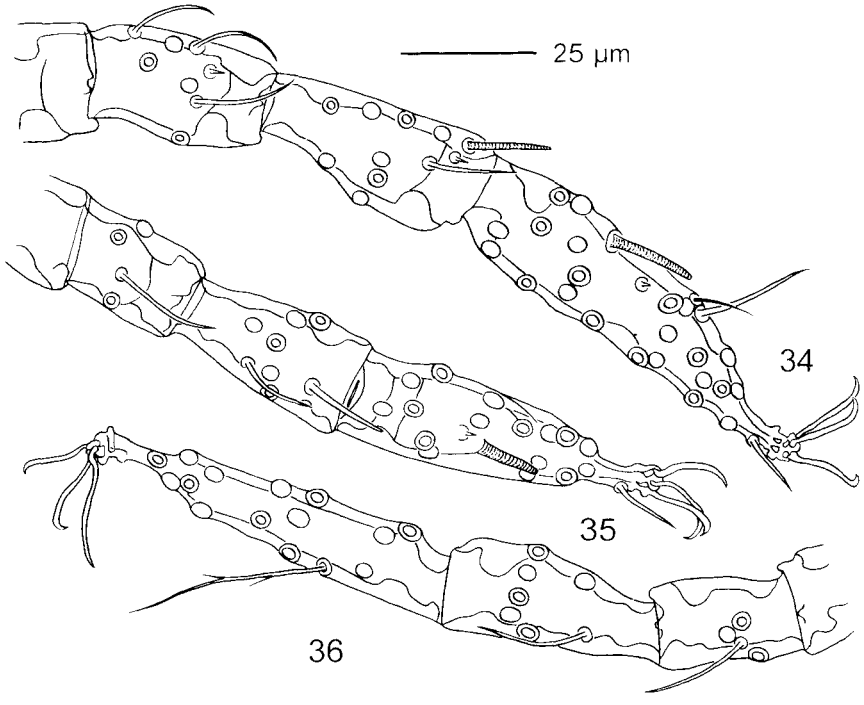


Figs 31-33. *Schoengastia anguina* sp. n., larva. 31 : ventral aspect of gnathosoma. 32 : dorsal aspect of gnathosoma. 33 : lateral aspect of cheliceral blade.

Chiggers were collected by A. FAIN. 1 paratype larva, same data. Holotype and paratype will be deposited in IRSNB.

Etymology : Latin word "anguina" means "snaky" and refers to the taxonomic belonging of the host.

Differential diagnosis : The new species resembles *Sch. madecassa* ANDRE, 1949, which was described from Madagascarian reptiles too, but differs in having palpal femoral and genual setae nude (fPp = N/N/NNN versus B/B/NNN), and in somewhat different form of scutum (sensillary bases not so close to each other, scutum relatively wider, its posterior margin biconvex versus rounded in *Sch. madecassa).* Apparently, additional differences between these species will be revealed after the examination of the type material on *Sch. madecassa,* since the original description of the latter is rather incomplete.

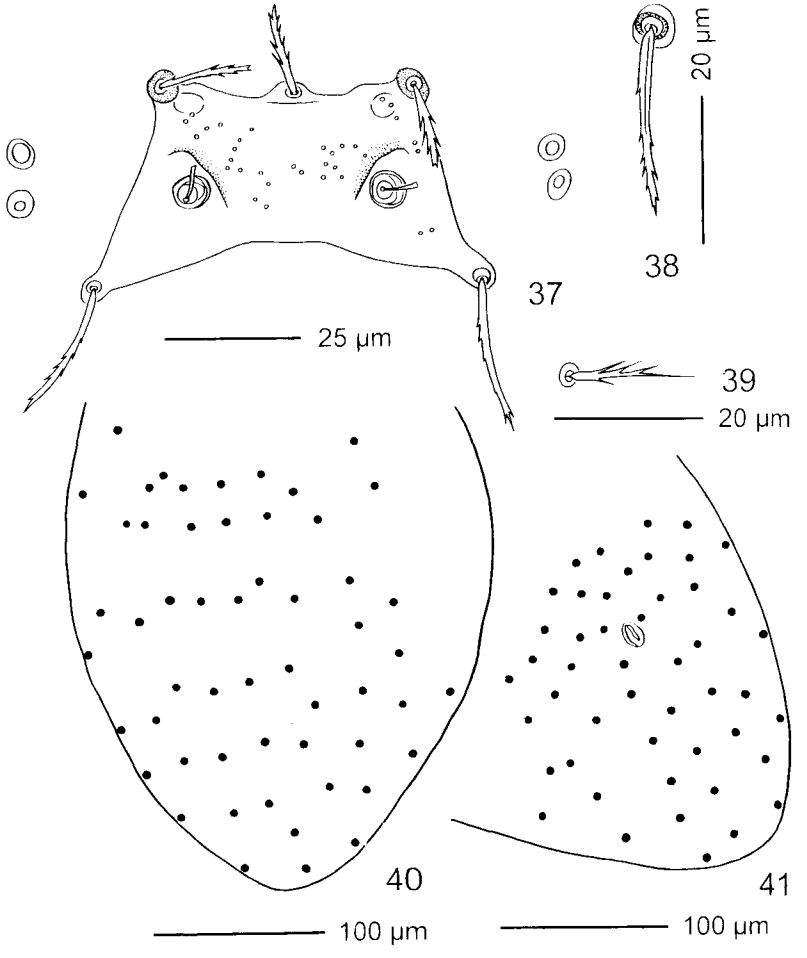


Figs 34-36. *Schoengastia anguina* sp. n., holotype larva. 34 : leg I. 35 : leg II. 36 : leg III.

Schoutedenichia subterranea sp. n.

Diagnosis : SIF = 4BS-N-3-2111.0000; fPp = B/B/NNB; fCx = 1.1.1; fSt = 2.2; fSc: PL > AL >= AM; Ip = 625; fD = 4H-[6-6]-12-10-7-5-4; DS = 55; VS = 50; NDV=105.

Description : *Larva* (Figs 37-47). Idiosoma. Cordiform in engorged larva. Eyes 2+2, reduced. Two pairs of humeral setae; 52-54 dorsal idiosomal setae, arranged [6-6]-12-10-7-5-4, small, with few short barbs; 2 pairs of sternal setae and 48-51 ventral setae; total idiosomal setae 102-107. Gnathosoma. Cheliceral blade with tricuspid cap; gnathobase sparsely punctate, with a pair of branched setae; galeala nude; palpal claw 3-pronged (prongs are not seen in holotype); setae on palpal femur and genu branched, dorsal and lateral palpal tibial setae nude, ventral palpal tibial seta branched; palpal tarsus with 4 branched setae, nude subterminala and tarsala. Scutum. Sparsely punctate, near trapezoidal, with biconcave anterior margin and concave posterior margin; scutal setae similar to dorsal idiosomal setae, PL the longest, AM as long as AL or slightly shorter; AM base on level of ALs; SB clearly anterior to level of PLs and are widely separated; sensilla lost in both specimens examined. Legs. 7-segmented, terminating in a pair of claws and clawlike empodium. Leg I: coxa 1B; trochanter 1B; basifemur 1B; telofemur 5B; genu

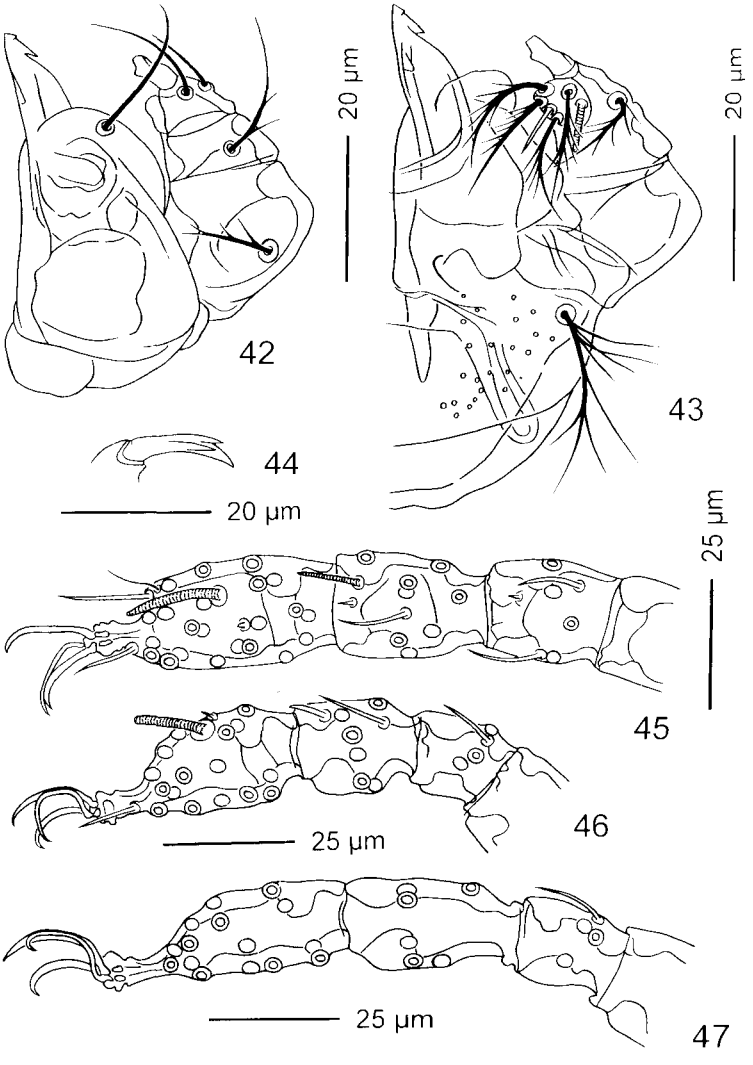


Figs 37-41. *Schoutedenichia subterranea* sp. n., larva. 37 : scutum of holotype. 38 : anterior dorsal idiosomal seta. 39 : anterior (preanal) ventral idiosomal seta. 40 : arrangement of dorsal idiosomal setae. 41 : arrangement of ventral idiosomal setae.

4B, 2 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala 18 µm 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 13 µm long, microtarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B; tarsus 15B.

Standard measurements of the type series:

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	H
Holotype	46	72	36	25	16	41	40	16	16	30	29
Paratype	45	70	37	23	19	42	40	18	22	29	28



Figs 42-47. *Schoutedenichia subterranea* sp. n., holotype larva. 42 : dorsal aspect of gnathosoma. 43 : ventral aspect of gnathosoma. 44 : palpal claw. 45 : leg I. 46 : leg II. 47 : leg III.

D	V	pa	pm	pp	Ip	DS	VS	NDV	TaIII	TaW
18-25	14-23	214	194	214	622	56	51	107	49	14
19-25	14-23	225	191	212	628	54	48	102	49	15

Host : *Oryzorictes talpoides* GRANDIDIER et PETIT, 1930 (Mammalia,

Insectivora, Tenrecidae).

Type data : Holotype larva from *O. talpoides,* Madagascar, preserved in IRSNB. Collector and date unknown. Chiggers were collected by A. FAIN. 1 paratype larva, same data. Holotype and paratype will be deposited in IRSNB.

Etymology : Specific epithet refers to the mode of life of the host.

Differential diagnosis : The new species resembles *Sch. paraxeri* VERCAMMEN-GRANDJEAN, 1958, but differs in having nude galeala, lesser number of idiosomal setae (NDV = 102-107 versus 130), shorter setae (AM = 16-18, AL = 16-22, PL = 29-30, H = 28-29 versus 28, 30, 43, and 44 respectively), and shorter legs (Ip = 622-628 versus 781).

***Schoutedenichia tiptoni* VERCAMMEN-GRANDJEAN & WATKINS, 1965**

Distribution : Madagascar.

Hosts : *Rattus rattus* L. (Mammalia, Rodentia, Muridae), *Hemicentetes semispinosus* (CUVIER, 1798) (Mammalia, Insectivora, Tenrecidae). *Microgale* THOMAS, 1882 (Tenrecidae) is a new host genus.

Material examined : Two larvae from *Microgale* sp. (label "*Nesogale* sp."), Madagascar, preserved in IRSNB. Collector and date unknown. Chiggers were collected by A. FAIN.

Acknowledgements

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