

African chiggers (Acariformes: Trombiculidae) in the collection of Alex Fain, with a description of a new genus and three new species

Alexandr A. Stekolnikov^a

^a Zoological Institute, Russian Academy of Sciences, Universitetskaya embankment 1, St. Petersburg 199034, Russia.

ABSTRACT

A series of African chigger mites from the collection donated by Alex Fain (1912–2009) to the Royal Belgian Institute of Natural Sciences is revised. One new genus and species, *Makwacarus petrodromi* n. gen., n. sp. from an elephant shrew *Petrodromus tetradactylus tordayi* Thomas and two new species, *Herpetacarus junkeri* n. sp. from a snake *Boaedon fuliginosus* (Boie) and *Microtrombicula livingstonei* n. sp. from a lizard *Holaspis guentheri* Gray, are described from DR Congo. One new subjective synonym is proposed: *Schoutedenichia musaranei* Taufflieb, 1966 (= *Schoutedenichia tanzaniaensis* Goff, 1983, n. syn). Nineteen species have been recorded in new countries and/or on new hosts for the first time. Nine of them have been found outside their type localities for the first time. In total, the examined collection now includes 27 species belonging to 14 genera and collected from rodents, bats, tenrecs, elephant shrews, primates, birds, lizards and snakes of DR Congo, Rwanda, Kenya, Cameroon, Côte d'Ivoire, Senegal and South Africa.

Keywords chigger mites, Africa, fauna, taxonomy

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Introduction

Chigger mites attract the attention of parasitologists since the beginning of last century, as a very diverse and ecologically flexible group of temporary parasites with a significant medical and veterinary importance. Until now, trombiculids provide a wide field for elementary taxonomic investigations including descriptions of new genera and species, as well as inventory of chigger fauna in previously unexplored countries or regions. My recent review of African chiggers (Stekolnikov 2018) outlines the current state of knowledge on this subject more than half a century after previous survey (Zumpt 1961). According to my work, 443 chigger mite species belonging to 61 genera were found previously in Africa, but 73% of this number is still known from their type localities only. It means that we know little about chigger fauna of the continent beyond an approximate data of species composition. Geographic ranges of species, faunistic complexes of different biomes, such as savannah, tropical rain forests or deserts, and true number of endemic species remain unknown.

In these circumstances, any identification of enough diverse new material could contribute greatly to the knowledge on African chigger fauna. Such opportunity was provided to me by the examination of a chigger collection kindly granted me by Alex Fain many years ago. Previous results based on this collection were obtained on chiggers of Australia (Fain & Stekolnikov 2004), Madagascar (Stekolnikov & Fain 2004) and Europe (Stekolnikov *et al.* 2014). Now, with a complete summary of chigger species described from Africa (Stekolnikov 2018), I am

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Corresponding author

Alexandr A. Stekolnikov:

Alexandr.Stekolnikov@zin.ru

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able to finish my work with this source. During this investigation I also had an opportunity to compare unidentified materials with type specimens borrowed by me from the Royal Museum of Central Africa (RMCA, Tervuren, Belgium) in 2016.

Alexander Fain (1912-2009) was an outstanding Belgian acarologist who described more than 2300 species, 441 genera and 19 families of mites (Fain 2004). At first stage of his scientific activity (1939-1957) he worked as a director of the medical hospital in Belgian Congo and later as a director of the medical laboratory of the Belgian Congo and Rwanda (Bochkov *et al.* 2009). During this period he made collections of trombiculids that were identified partly by P.H. Vercammen-Grandjean, one of the leading experts in chigger mite taxonomy in 1950s-70s who also worked in Belgian Congo, as a head of the biological section in the medical laboratory directed by Fain. Fain published some papers on African chiggers in collaboration with Vercammen-Grandjean (Jadin *et al.* 1954, 1955; Vercammen-Grandjean & Fain 1957a, b, 1958). Since 1957, he was a professor of the Institute of Tropical Medicine in Antwerp, Belgium, and his mite collection was extended with samples collected in the Natural History Museum of London from ethanol preserved mammals and with specimens received from colleagues (Bochkov *et al.* 2009).

After his retirement in the early 1980s, Fain donated his collection to the Royal Belgian Institute of Natural Sciences (IRSNB, Brussels, Belgium) and worked in the Institute as a volunteer. In 2003 Fain offered me to identify chiggers preserved in his collection and then he sent the specimens through my Russian colleagues who visited Brussels at that time. Besides other materials, that shipment included 89 slides with chiggers collected from hosts captured in Africa. The territories covered by this collection include DR Congo, Rwanda, Kenya, Cameroon, Côte d'Ivoire, Senegal and South Africa, while the host spectrum includes rodents, bats, tenrecs, elephant shrews, primates, birds, lizards and snakes. Especially valuable is the presence of chiggers extracted from nasal cavities of hosts in Fain's collection, since this ecological group of parasites is not collected frequently during parasitological surveys. By now I have identified the main part of chigger specimens in the collection; the results of my work are given in the present paper. Since exact identification of the rest would require an examination of additional materials, I intend to finish now my investigation and return all slides to IRSNB.

Materials and methods

The present work was based on the examination of 89 microscope slides borrowed from IRSNB and originating from the collection of A. Fain. All slides contained unidentified specimens of chigger mites and had the labels containing logo of the Institute of Tropical Medicine in Antwerp ("Inst. Méd. Trop. Anvers") and the name of A. Fain. The name of IRSNB was printed or handwritten on a few labels. These slides were a part of two parcels: 1) 27 Mar. 2003, IRSNB loan No. Ent 03/52, 82 slides, transported by A.V. Bochkov; 2) 9 May 2003, without a loan form, 51 slides, transported by I.V. Shamshev. All slides will be returned to IRSNB after examination.

Some of slide labels were incomplete, *i.e.* without data on exact locality, date of collection or name of collector. Specimens collected before 1939 or after 1957 (time span over which Fain was not in Africa) were presumably found on ethanol preserved mammals in a museum. The collection has no accession numbers and a catalogue; thus, all collection data are restricted to the information containing in slide labels.

Type specimens of chigger mites were borrowed from RMCA (loan No. 2429f, 22.09.2016) during my visit to this museum. Note that types of many trombiculid species deposited in RMCA are unsuitable for examination, as described in my review of this collection (Stekolnikov 2018); such specimens were not included in the present work.

Coordinates of collection localities were obtained from the database of US National Geospatial Intelligence Agency (<http://geonames.nga.mil/namesgaz/>). Names of mammalian hosts are given after Wilson & Reeder (2005); avian hosts – after the online

database Zoonomen (Zoological Nomenclature Resource): Birds of the World (<http://www.zoonomen.net/avtax/frame.html>); reptilian hosts – after the Reptile Database (<http://www.reptile-database.org>). Host names originally given in slide labels are cited in brackets in case they are different from the modern ones, e.g. *Gerbilliscus (Taterona) kemp* (Wroughton) (= *Tatera dichrura*). The same way of citation is used for the names of localities, e.g. Mbandaka (= Coq'ville). Slide labels are translated from French.

All slides were examined in the Zoological Institute of the Russian Academy of Sciences (ZIN, Saint Petersburg, Russia) using a compound microscope MBI-3 (LOMO plc, Saint Petersburg, Russia) supplied with phase-contrast optics. Measurements were made with an ocular micrometer and converted to micrometres. Drawings were prepared using a drawing tube. I used also a Leica DM5000B microscope (Leica Microsystems GmbH, Wetzlar, Germany) with differential interference contrast to confirm the results of examination for most obscure morphological characters. I use diagnostic formulas and abbreviations for morphological traits following the standards generally accepted in chigger mite taxonomy (Goff *et al.* 1982). Their explanation may be obtained from many sources including those published in open access (Stekolnikov & Kar 2015; Stekolnikov 2018).

Identification was carried out on the base of my key for chigger mite genera and a checklist of African chigger species (Stekolnikov 2018), using original descriptions of species and revisions of the genera *Schoutedenichia* Jadin et Vercammen-Grandjean, 1954, *Schoengastia* Oudemans, 1910, *Microtrombicula* Ewing, 1950 and *Herpetacarus* Vercammen-Grandjean, 1960 published by Vercammen-Grandjean (1958a, b, 1965, 1966), revision of sub-Saharan *Gahrlepiea* Oudemans, 1912 (Tauflieb 1965b) and revision of the genus *Leptotrombidium* s.l. of the world (Vercammen-Grandjean & Langston 1976). For nine species, the identification was confirmed by a comparison with type specimens.

Results

Identified African chigger specimens from the collection of IRSNB belong to two subfamilies (Gahrlepieinae and Trombiculinae, including tribes Schoengastiini and Trombiculini), 14 genera and 27 species listed below. Subfamily Leeuwenhoeekiinae is represented in the collection by one specimen of *Acomatacarus*, which was not identified due to unsuitable quality of the slide. Species of the subfamily Apoloniinae are absent in the collection. Several species of *Schoengastia* could be identified only roughly (*S. cf. equina* from South Africa and *S. cf. andrei* from DR Congo). Their exact identification requires a complete revision of the genus including examination of types preserved in different museums of Africa and Europe (Stekolnikov 2018). Two specimens of *Microtrombicula* (*M. cf. viverida* from Cote d'Ivoire and *M. sp.* from DR Congo) and one *Schoutedenichia* (*S. sp.* from DR Congo) cannot be identified exactly without examination of an additional material. Two specimens of *Afrotrombicula* will be included in my forthcoming revision of this genus. A minor part of slides was leaved without identification due to their unsuitable condition.

Systematics

Subfamily Gahrlepieinae Womersley, 1952

Gahrlepiea Oudemans, 1912

Gahrlepiea brennani (Jadin et Vercammen-Grandjean, 1952)

Material examined — 2 larvae (IRSNB) from *Gerbilliscus (Taterona) kemp* (Wroughton) (= *Tatera dichrura*) (Rodentia: Muridae), DR CONGO, Ituri Province, Jiba (= Djiba), 1°52'17"N, 30°42'00"E, collected by A. Fain.

Remarks — This species was found on many species of small mammals in Rwanda and DR Congo (Stekolnikov 2018). Here it is recorded on *G. (T.) kempi* for the first time.

***Gahrlepiea grenieri* Taufflieb, 1965**

Material examined — 1 larva (IRSNB) from *Lophuromys sikapusi* (Temminck) (Rodentia: Muridae), CÔTE D'IVOIRE, unknown locality, collected by V.D.A. Thys and W. Verheyen, mites collected by A. Fain.

Remarks — This species was known from two specimens (holotype and paratype) collected from *Crociodura* sp. in Bangui, Central African Republic. Here it is recorded outside the type locality, in Côte d'Ivoire and on *L. sikapusi* for the first time.

***Gahrlepiea lawrencei* Jadin et Vercammen-Grandjean, 1952**

Type material examined — larva holotype (RMCA 76131) from *Dasymys incommutus* (Sundevall) (Rodentia: Muridae) (= *Dasymys bentleyae*), RWANDA, Butare (= Astrida), 2°36'S, 29°45'E, 28 Mar. 1952, collected by J. Jadin and P.H. Vercammen-Grandjean.

Additional material examined — 2 larvae (IRSNB) from *Desmodillus auricularis* (Smith) (Rodentia: Muridae) No. 489.96, SW Africa (probably, Namibia), Kaokoveld, unknown locality, 28 Sep. 1911, mites collected by A. Fain.

Remarks — This species was known only from its holotype. Here it is recorded outside the type locality and on *Desmodillus auricularis* for the first time.

***Gahrlepiea nana* (Oudemans, 1910)**

Material examined — 1 larva (IRSNB) from *Cryptomys hottentotus* (Lesson) (Rodentia: Bathyergidae), SOUTH AFRICA, Natal, Durban, 29°51'28"S, 31°01'45"E, collected by A. Fain.

Remarks — This species was described from a bat *Hipposideros caffer* (Sundevall) (Chiroptera: Hipposideridae) and *C. hottentotus* in Durban, and later it was recorded in Johannesburg and Sierra Leone from two more rodent species (Stekolnikov 2018).

***Schoengastiella* Hirst, 1915**

***Schoengastiella caeca* André, 1951**

Material examined — 1 larva (IRSNB) from *Lophuromys sikapusi* (Temminck) (Rodentia: Muridae), CÔTE D'IVOIRE, unknown locality, collected by V.D.A. Thys and W. Verheyen; 1 larva (IRSNB) from *Uranomys ruddi* Dollman (Rodentia: Muridae), DR CONGO, Garamba National Park, 4°11'44"N, 29°28'51"E, 3 Mar. 1951, collected by A. Fain.

Remarks — This species was found in Central African Republic, Congo, DR Congo, Uganda and Angola on many species of small mammals (Stekolnikov 2018). Here it is recorded in Côte d'Ivoire, on *L. sikapusi* and *U. ruddi* for the first time.

***Schoengastiella (Audya) nasicola* (Vercammen-Grandjean, 1956)**

Type material examined — larva holotype (RMCA 82444), No. L:22154/A/1, from nasal cavity of *Rattus rattus* (L.) (= *Rattus rattus frugivorus*) (Rodentia: Muridae), DR CONGO, Mbandaka (= Coq'ville), 0°02'52"N, 18°15'21"E, 22 Jan. 1954, collected by Ch. Lucasse; larva paratype (RMCA 82448), No. L:22154/A/32, with the same data.

Additional material examined. 5 larvae (3 slides, IRSNB) from nasal cavity of *Potamogale velox* (Du Chaillu) (Afrosoricida: Tenrecidae), DR CONGO, unknown locality, 1960, collected by W. Verheyen, mites collected by A. Fain.

Remarks — This species was also recorded on *P. velox* in Angola (Dundo) (Tauflieb 1965a). The specimens from IRSNB constitute third known sample of this species.

Subfamily Trombiculinae Ewing, 1929

Tribe Schoengastiini Vercammen-Grandjean, 1960

Elianella Vercammen-Grandjean, 1956

Elianella anomaluri Vercammen-Grandjean, 1956

Material examined — 6 larvae (3 slides, IRSNB) in ears, on neck and legs of *Zenkerella insignis* Matschie (Rodentia: Zenkerellidae), CAMEROON, Foulassi, 10 Jun. 1960, collected by A. Fain.

Remarks — This species was previously recorded on *Anomalurus derbianus* (Gray) (Rodentia: Anomaluridae), *Cricetomys gambianus* Waterhouse (Rodentia: Nesomyidae), and *Nandinia binotata* (Gray) (Carnivora: Nandiniidae) in DR Congo, Congo, and Angola. Here it is recorded in Cameroon and on *Z. insignis* for the first time.

According to the database of US National Geospatial Intelligence Agency, there are four populated places in Cameroon with the name Foulassi; thus, exact coordinates of the collection locality remain unknown.

Herpetacarus Vercammen-Grandjean, 1960

Herpetacarus (Herpetacarus) causicolus (Jadin et Vercammen-Grandjean, 1952)

Type material examined. larva holotype (RMCA 76143) from *Boaedon lineatus* Duméril, Bibron et Duméril (Squamata: Lamprophiidae), RWANDA, Butare (= Astrida), 2°36'S, 29°45'E, 17 Apr. 1952, collected by J. Jadin and P.H. Vercammen-Grandjean.

Additional material examined — 2 larvae (IRSNB) from *Prosymna ambigua* Bocage (Squamata: Lamprophiidae), DR CONGO, Garamba National Park, 4°11'44"N, 29°28'51"E, 1945, mites collected by A. Fain; 4 larvae (IRSNB) from *Gonionotophis savognani* (Mocquard) (= *Mehelya capensis savognani*) (Squamata: Lamprophiidae) No. 18081, DR CONGO, South Kivu Province, Itula, 14 May 1950, collected by A. Fain; 1 larva (IRSNB) under ventral plates of *G. savognani* No. 14272, DR CONGO, North Kivu Province, Sake, Apr. 1932, mites collected by A. Fain; 1 larva (IRSNB) from *Mochlus sundevalli* (Smith) (Squamata: Scincidae), DR CONGO, Garamba National Park, collected by A. Fain; 4 larvae (IRSNB) behind legs of *Lepidothyris fernandi* (Burton) (Squamata: Scincidae), DR CONGO, Tshuapa Province, Bokuma, 0°40'S, 21°01'E, collected by A. Fain.

Remarks — This species was previously recorded on four species of snakes in Butare (Rwanda) and Bukavu (DR Congo) (Stekolnikov 2018). Here *H. causicolus* is recorded on *P. ambigua*, *G. savognani*, *M. sundevalli*, and *L. fernandi* for the first time.

The material from IRSNB differs from holotype in the presence of 6 setae in 2nd dorsal row vs. 8 setae. Moreover, according to the original description, AM = PL in *H. causicolus*, while AM > PL in the additional material. Since all other characters in this material, including measurements (Table 1), do not expose significant dissimilarities with the type series, I regard these differences as an example of intraspecific variation.

According to the database of US National Geospatial Intelligence Agency, there are three populated places in South Kivu Province with the name Itula and two places in North Kivu Province with the name Sake; thus, exact coordinates of these collection localities remain unknown.

Table 1 Standard measurements of *Herpetacarus causicolus*

	IRSNB range	(n = 6) mean	Holotype*	Mean (n = 11)**
AW	76-82	79	-	83
PW	89-99	95	-	98
SB	42-50	46	-	46
ASB	29-32	31	-	28
PSB	26-30	28	-	26
SD	57-62	59	-	54
P-PL	23-27	25	-	-
AP	31-34	32	-	31
AM	48-56	51	45	46
AL	32-38	37	39	38
PL	44-51	46	49	46
H	52-59	56	-	58
S	50-59	54	-	35
D _{min}	29-38	33	-	40
D _{max}	41-51	47	45	48
V _{min}	16-20	18	-	22
V _{max}	42-49	45	-	46
pa	292-329	304	-	316
pm	243-261	250	-	254
pp	263-292	277	-	284
lp	812-882	831	-	854
DS	28-33	29	30	34
VS	25-42	36	-	24
NDV	58-70	65	-	58
TaIIIL	67-76	72	-	-
TaIIIW	16-18	17	-	-

* - original; ** - After Vercammen-Grandjean (1966).

***Herpetacarus (Herpetacarus) junkeri* n. sp. (Figures 1-2)**Zoobank: [8CA6F6DB-F04A-4C6C-A063-7DE803AD3A4D](https://doi.org/10.21203/rs.3.rs-265286/v1)

Diagnosis — SIF = 7BS-N-3-3111.0000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = B/N/NNN; fSc: PL > AM > AL; Ip = 885 – 943; fD = 2H-10(11)-10-6(7)-2-4-...; DS = 34 – 40; VS = 29 – 36; NDV = 69 – 71. Standard measurements of type series are given in Table 2.

Description (larva)

Idiosoma — Eyes not visible in all specimens examined. One pair of humeral setae, 32 – 38 dorsal idiosomal setae arranged 10(11)-10-6(7)-2-4-..., in holotype 10-10-6-2-4; four sternal setae; 29 – 36 ventral setae; total number of idiosomal setae excluding coxal and sternal 69 – 71. Humeral, caudal, ventral postanal, anterior sternal and coxal setae I-II with sparse long barbs; dorsal idiosomal setae with bulbous base and sparse long barbs; posterior sternal, preanal ventral and coxal setae III very short, with bulbous base, their barbs broken in all specimens examined.

Table 2 Standard measurements of *Herpetacarus junkeri* n. sp. (n = 3)

	Range	Mean	Holotype
AW	92-96	93	92
PW	115-125	121	122
SB	49-52	50	52
ASB	30-32	31	30
PSB	27-45	35	32
SD	57-77	65	62
P-PL	32-50	39	34
AP	25-29	27	29
AM	53-59	57	58
AL	37-41	39	41
PL	65-68	67	68
H	65-69	66	69
S	66-72	69	70
D _{min}	45-49	47	46
D _{max}	62-65	63	65
V _{min}	21-23	22	23
V _{max}	61-62	62	61
pa	302-344	327	344
pm	279-295	287	295
pp	304-304	304	304
Ip	885-943	918	943
DS	34-40	37	34
VS	29-36	33	36
NDV	69-71	70	70
TaIIIL	73-76	74	73
TaIIIW	16-18	17	16

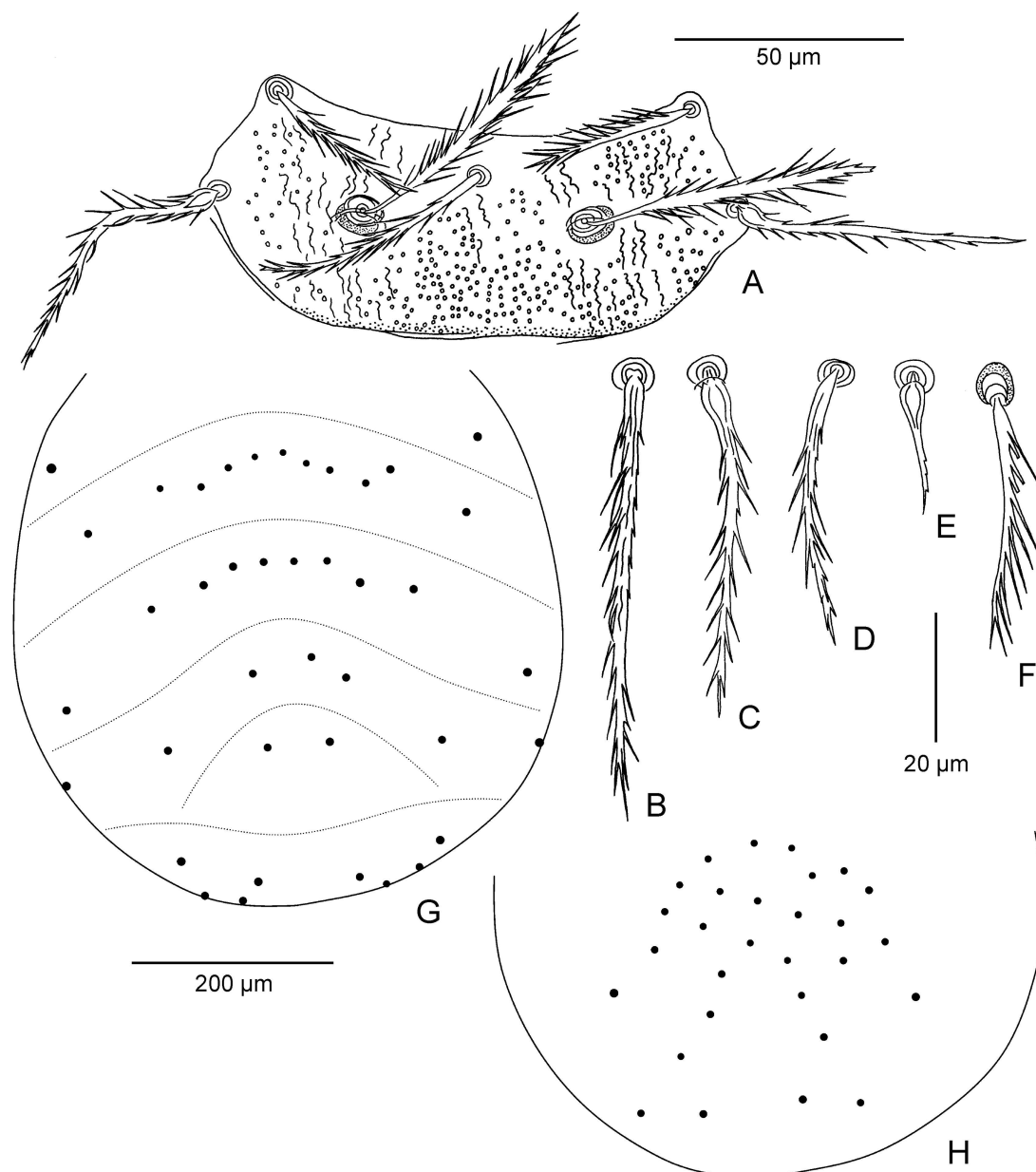


Figure 1 *Herpetacarus junkeri* n. sp., larva: A – scutum; B – humeral seta; C – dorsal idiosomal seta of 2nd row; D – ventral postanal idiosomal seta; E – ventral preanal idiosomal seta; F – anterior sternal seta; G – arrangement of dorsal idiosomal setae; H – arrangement of ventral idiosomal setae (excretore pore invisible). Scale bars: A – 50 µm; B-F – 20 µm; G-H – 200 µm.

Gnathosoma — Cheliceral blade with tricuspid cap; cheliceral base with one lateral and one dorsal angular projection; gnathobase with one pair of branched setae, series of transverse folds and sparse puncta (puncta not visible in holotype); galeal setae nude; palpal claw with 3 prongs; palpal femoral seta with few branches, palpal genual and tibial setae nude; palpal tarsus with 7 branched setae, nude subterminala, and basal tarsala.

Scutum — Nearly hexagonal, much wider than long, with concave anterior margin, with longitudinal cracks in all specimens examined, with small puncta, posterior margin almost straight medially; AM situated far posterior to level of ALs; SB situated posterior to level of PLs (P-PL – PSB = 2 – 5); PL > AM > AL; AM and ALs similar to caudal idiosomal setae,

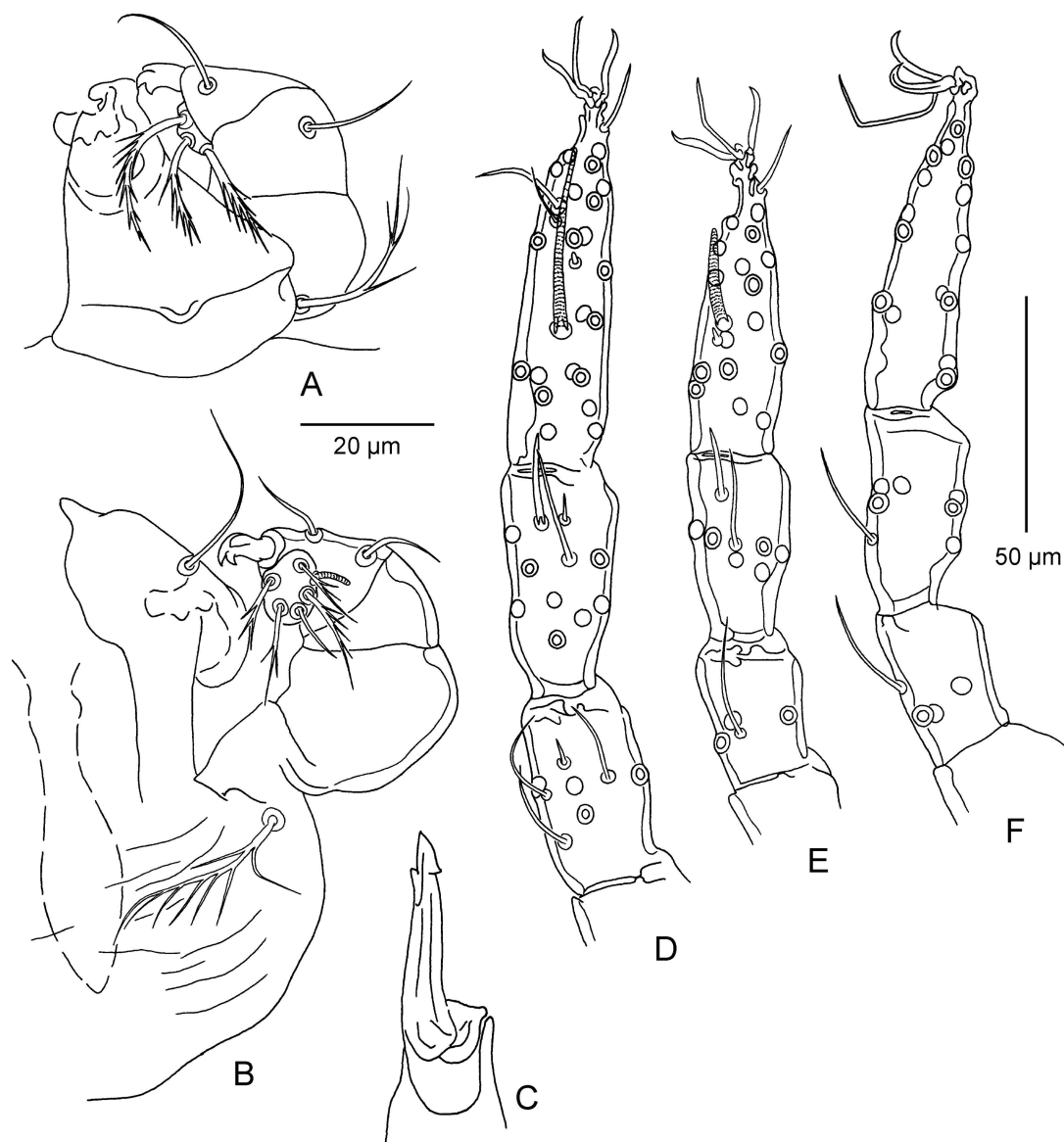


Figure 2 *Herpetacarus junkeri* n. sp., larva: A – dorsal aspect of gnathosoma; B – ventral aspect of gnathosoma; C – cheliceral blade; D – tarsus, tibia, and genu of leg I; E – tarsus, tibia, and genu of leg II; F – tarsus, tibia, and genu of leg III. Scale bars: A–C – 20 µm; D–F – 50 µm.

PLs similar to dorsal idiosomal setae, with bulbous base; sensilla slightly expanded, fusiform, 3–4 µm wide, covered by long barbs.

Legs — All legs 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 non-specialized branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibialae; tarsus 21B, tarsala elongated (38 µm), extends far beyond the base of subterminala, microtarsala distal to tarsala, subterminala, parsubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala 18 long, microtarsala behind tarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 15B.

Host — *Boaedon fuliginosus* (Boie) (Squamata: Colubridae).

Type material — larva holotype (IRSNB) under ventrolateral scales of *B. fuliginosus*, DR CONGO, Nord-Ubangi Province, Bosobolo, 4°11'23"N, 19°53'00"E, 2 Jul. 1955 (1956?), collected by A. Fain; 2 larvae paratypes with same data.

Etymology — The species named after Wilhelm Junker (1840-1892), a famous Russian explorer of Africa.

Differential diagnosis — The new species is similar to *Herpetacarus* (*Herpetacarus*) *aspidelaps* Vercammen-Grandjean, 1966 and differs from it in PLs having bulbous base and in larger number of idiosomal setae [$fD = 2H-10(11)-10-6(7)-2-4-\dots$, $DS = 34 - 40$, $VS = 29 - 36$, and $NDV = 69 - 71$ vs. $fD = 2H-8-6-6-4-4$, $DS = 30$, $VS = 22$, and $NDV = 52$ in *H. aspidelaps*]. Scutal measurements in the new species are also larger, but it could be caused by a deformation of scutum in all specimens examined, due to numerous small cracks. Shape of setae was not described for *H. aspidelaps*, but according to figures, at least setae on coxae III and ventral setae have bulbous bases in this species, while PLs are similar to ALs and AM.

The new species differs from another species having setae with bulbous bases, *H. causicolus*, in the absence of mastitarsala, less expanded sensilla (3–4 vs. 4–7 μm wide), different formula of dorsal idiosomal setae [$fD = 2H-10(11)-10-6(7)-2-4-\dots$ vs. $fD = 2H-8-8(6)-6-4-\dots$ in *H. causicolus*], $PL > AM$ vs. $AM \geq PL$, SB situated posterior to level of PLs vs. anterior to level of PLs ($P-PL - PSB = 2 - 5$ vs. $PSB - P-PL = 2 - 4$), longer setae ($PL = 65 - 68$, $H = 65 - 69$, $D_{max} = 62 - 65$, and $V_{max} = 61 - 62$ vs. 44–51, 52–59, 41–51, and 42–49, respectively), and in longer legs ($Ip = 885 - 943$ vs. 812–882).

Makwacarus n. gen.

Zoobank: [ED846F2D-8D28-400F-BFDF-F9F87D05D950](https://zoobank.org/ED846F2D-8D28-400F-BFDF-F9F87D05D950)

Diagnosis — $SIF = 6B-B-3-2111.0000$; $fsp = 7.7.7$; $fCx = 1.1.1$; $fSt = 2.2$; $fPp = B/B/BBB$; fSc : $AL \geq PL \gg AM$. Cheliceral blade with tricuspid cap; galeal setae branched; palpal claw with 3 prongs; palpal femoral, genual, and tibial setae branched; palpal tarsus with 6 branched setae and basal tarsala. Scutum nearly pentagonal, wider than long, with broadly rounded posterior margin, bearing 1 anteromedian, 2 anterolateral and 2 posterolateral scutal setae; anterolateral scutal setae longest; sensilla globose, sensillary bases posterior to level of PLs; eyes 2 + 2. Legs 7-segmented, with 1 pair of claws and claw-like empodium; tibialae II situated in distal half of segment, not in tandem; mastisetæ absent.

Type species — *Makwacarus petrodromi* n. sp.

Host — four-toed elephant shrew (Macroscelidea: Macroscelididae: *Petrodromus tetradactylus*).

Etymology — The name of the new genus is combined from the name of type locality (Makwa) and the new Latin word acarus meaning “mite”.

Differential diagnosis — By the shape of scutum with broadly rounded, protruded posterior margin, globose sensilla, and by the relation between lengths of scutal setae ($AL \geq PL \gg AM$), the new genus is similar to *Helenicula* Audy, 1954, *Schoengastia* Oudemans, 1910, some species of *Herpetacarus* (*Abonnencia*) Vercammen-Grandjean, 1960, and some species of *Guntheria* (*Phyllacarus*) Vercammen-Grandjean, 1967, first of all, *Guntheria innisfailensis* (Womersley et Heaslip, 1943) from Australia. The position of tibialae II in distal half of segment and not in tandem is one more trait common for the new genus, *Helenicula*, and *Schoengastia equina* Vercammen-Grandjean, 1971. The relation of lengths of leg tarsalae

with tarsala II longer than tarsala I and the position of tarsala I distal to microtarsala are also characteristic for the new genus and for *Helenicula* (Nadchatram & Traub 1971).

The new genus, however, differs from *Helenicula* in the presence of six setae on palpal tarsus vs. 4-5 and in the sensillary bases situated far apart (distance between sensillary bases is roughly equal to the distance between a sensillary base and a base of posterolateral seta) vs. situated close together (with the gap being less than the diameter of either base). The new genus differs from *Schoengastia* in having cheliceral blade with usual tricuspid cap only, without longitudinal row of teeth, in the palpal tarsus 6B vs. 7BS, and in having branched galeal setae vs. always nude. The new genus differs from *Herpetacarus* (*Abonnencia*) in having palpal tarsus 6B vs. 7B, galeal setae branched vs. nude and scutum not telostigmal (sensillary bases are not significantly closer to the bases of posterolateral setae than to each other). The new genus differs from a very speciose and heterogeneous subgenus *Guntheria* (*Phyllacarus*) in the palpal tarsus 6B vs. 5B (Domrow & Lester 1985).

***Makwacarus petrodromi* n. sp. (Figure 3)**

Zoobank: [B86036E9-29DB-4F68-867B-E65139D64BC0](https://zoobank.org/B86036E9-29DB-4F68-867B-E65139D64BC0)

Diagnosis — SIF = 6B-B-3-2111.0000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = B/B/BBB; fSc: AL >= PL >> AM; Ip = 729 – 733; fD = 2H-8-6-6(9)-6(8)-7-...; DS = 42 – 45; VS = 42 – 45; NDV = 87. Standard measurements of holotype and paratype: AW 59, 57; PW 65, 60; SB 22, 23; ASB 27, 26; PSB 16, 18; SD 43, 44; P-PL 22, 23; AP 18, 18; AM -, 29; AL 59, 59; PL 57, 54; S 27, 25; H 51, 50; D_{min} 32, 32; D_{max} 47, 46; V_{min} 22, 18; V_{max} 36, 31; pa 256, 261; pm 214, 214; pp 263, 254; Ip 733, 729; DS 42, 45; VS 45, 42; NDV 87, 87; TaIII 69, 70; TaIIW 16, 15.

Description (larva)

Idiosoma — Eyes 2 + 2. One pair of humeral setae, 40 – 43 dorsal idiosomal setae arranged in holotype 8-6-6-6-7-4-3, in paratype 8-6-9-8-7-5; four sternal setae; 42 – 45 ventral setae; total number of idiosomal setae excluding coxal and sternal 87. All idiosomal setae covered by large protruding barbs, barbs of preanal ventral setae thinner.

Gnathosoma — Cheliceral blade with tricuspid cap; gnathobase with one pair of branched setae and sparse puncta; galeal setae with long branches; palpal claw with 3 prongs; palpal femoral, genual, and tibial setae with long branches; palpal tarsus with 6 branched setae and basal tarsala.

Scutum — Nearly pentagonal, wider than long, without puncta, with broadly rounded posterior margin; AM situated slightly posterior to level of ALs; SB situated clearly posterior to level of PLs (P-PL – PSB = 5 – 6); AL > PL >> AM; all scutal setae similar to dorsal idiosomal setae; sensilla globose, covered by small cilia.

Legs — All legs 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 non-specialized branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 2 genualae in distal half of segment, microgenuala at level of genualae; tibia 8B, 2 tibialae, microtibialae; tarsus 22B, tarsala 13 long, microtarsala near and slightly posterior to tarsala, subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae in distal half of segment, not in tandem; tarsus 16B, tarsala 16 long, microtarsala behind tarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 15B.

Host — *Petrodromus tetradactylus tordayi* Thomas (Macroscelidea: Macroscelididae).

Type material — larva holotype (IRSNB) from *P. tetradactylus tordayi*, DR CONGO, Makwa, 3°28'52"S, 17°31'47"E, collected by A. Fain; larva paratype with same data.

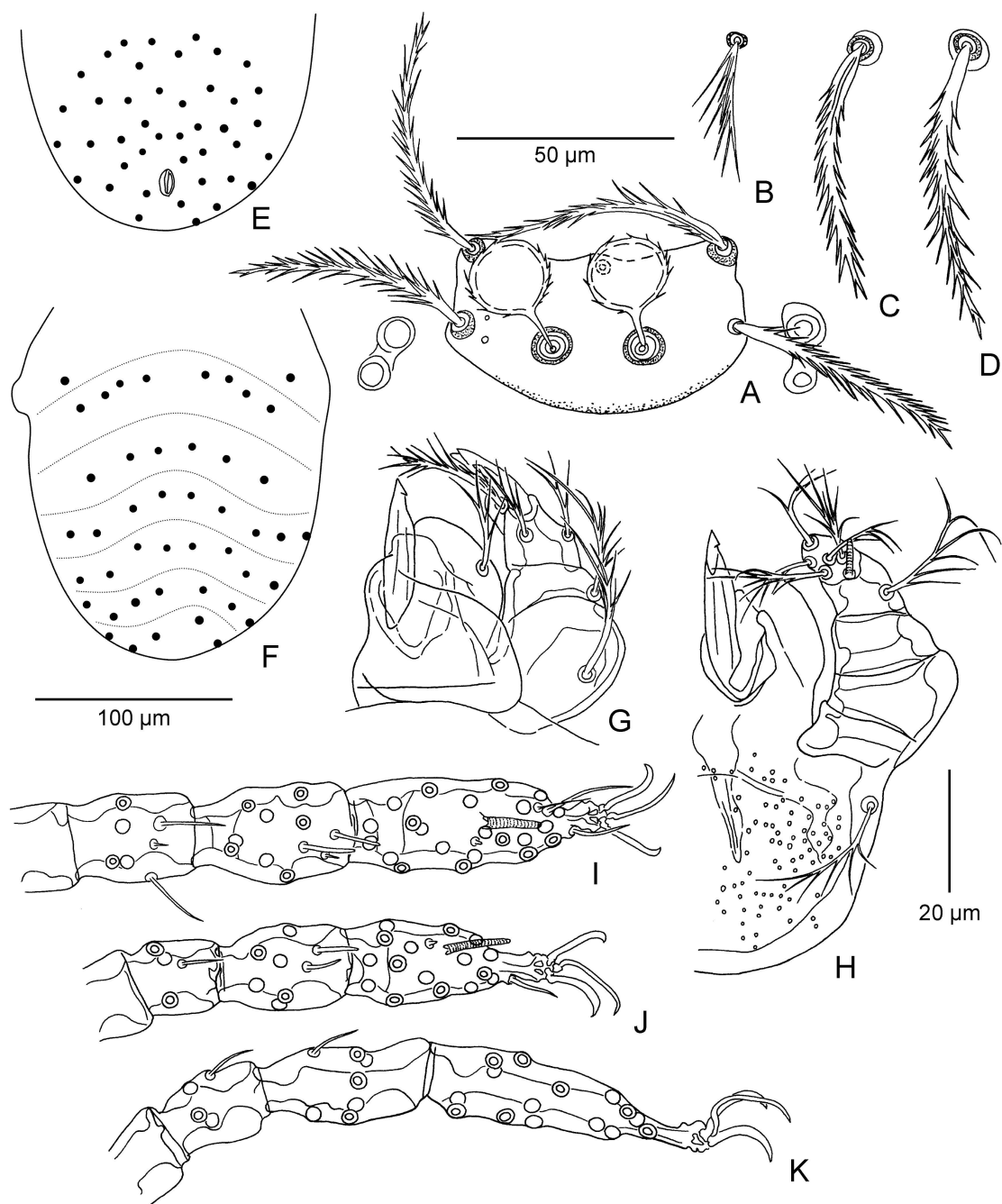


Figure 3 *Makwacarus petrodromi* n. gen., n. sp., larva: A – scutum and eyes; B – ventral preanal idiosomal seta; C – dorsal idiosomal seta of 1st row (marginal); D – humeral seta; E – arrangement of ventral idiosomal setae; F – arrangement of dorsal idiosomal setae; G – dorsal aspect of gnathosoma; H – ventral aspect of gnathosoma; I – tarsus, tibia, and genu of leg I; J – tarsus, tibia, and genu of leg II; K – tarsus, tibia, and genu of leg III. Scale bars: A, I-K – 50 µm; B-D, G-H – 20 µm; E-F – 100 µm.

Etymology — Species epithet derives from generic name of the host.

Remarks — Date of collection is unknown. There are two populated places with the name Makwa in DR Congo, according to the database of US National Geospatial Intelligence Agency, but the second one (4°16'20"N, 28°07'00"E) does not fall within the known distribution range of *P. tetradactylus* according to the IUCN Red List of Threatened Species (<http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T42679A21290893.en>).

***Ornithogastia* Vercammen-Grandjean, 1960**

***Ornithogastia pastoriana* (Taufflieb, 1958)**

Material examined — 3 larvae (IRSNB) from *Tachymarptis melba maximus* (Ogilvie-Grant) (= *Apus maximus*) (Apodiformes: Apodidae), DR CONGO, Kivu Province, unknown locality, 21 Jul. 1956, collected by A. Fain.

Remarks — This species was known only from its type series collected from *Tarentola mauritanica* (L.) (Squamata: Phyllodactylidae) in Morocco, Oued Cherrat, 33°48'55"N, 7°06'36"W. Here it is recorded outside the type locality, in DR Congo and on a bird host for the first time.

***Schoengastia* Oudemans, 1910**

***Schoengastia avis* Vercammen-Grandjean, 1958**

Type material examined — larva paratype (RMCA 113917), No. L:151257/S/1, from *Centropus superciliosus* Hemprich et Ehrenberg (Cuculiformes: Cuculidae), DR CONGO, Bukavu, 2°30'S, 28°52'E, 15 Dec. 1957, collected by P.H. Vercammen-Grandjean.

Additional material examined — 1 larva (IRSNB) from *Trachylepis perrotetii perrotetii* Duméril et Bibron (= *Mabuya p. perrotetii*) (Squamata: Scincidae) No. 32.34, DR CONGO, Garamba National Park, 4°11'44"N, 29°28'51"E, 10 Nov. 1954, collected by A. Fain; 7 larvae (4 slides, IRSNB) behind forelegs of *Trachylepis maculilabris* (Gray) (= *Mabuya maculilabris*), DR CONGO, Nyonga, 8°35'35"S, 26°17'35"E, 17 Mar. 1954, collected by A. Fain.

Remarks — This species was previously recorded on two species of birds in Bukavu and Kamaniola (DR Congo) (Stekolnikov 2018). Here it is recorded on reptiles for the first time.

***Schoengastia bicalcar* Vercammen-Grandjean, 1958**

Type material examined — larva paratype (RMCA 113902), No. L:22554/1, from ear of *Dasymys incommisus* (Sundevall) (= *Dasymys bentleyae*) (Rodentia: Muridae), DR CONGO, Bukavu, 2°30'S, 28°52'E, 22 May 1954, collected by Timmermans.

Additional material examined — 1 larva (IRSNB) from ear of *Oenomys hypoxanthus* (Pucheran) (Rodentia: Muridae) No. 34, DR CONGO, Ituri Province, Kawa, 1°34'N, 30°32'E, Jul. 1956, collected by A. Fain.

Remarks — This species was previously found on many species of rodents, including *O. hypoxanthus*, on *Crocidura* sp. and two bird species in DR Congo (Stekolnikov 2018).

***Schoutedenicchia* Jadin et Vercammen-Grandjean, 1954**

***Schoutedenicchia gilleti* Jadin, Vercammen-Grandjean et Herman, 1954**

Type material examined — larva paratype #3 (RMCA 80560), No. L:2353/79/5, from nasal cavity of *Pelomys fallax* (Peters) (Rodentia: Muridae), DR CONGO, Luberizi, 2°59'44"S, 29°05'43"E, 2 Mar. 1953, collected by Gillet.

Additional material examined — 2 larvae (IRSNB) from nasal cavity of *P. fallax*, RWANDA, Gakoma, Apr. 1955, collected by A. Fain; 1 larva (IRSNB) from nasal cavity of *Dasymys incommutus* (Sundevall) (= *Dasymys bentleyae*) (Rodentia: Muridae), RWANDA, Musha, 2°31'43"S, 29°51'54"E, Jul. 1955.

Remarks — This species was known only from its type series collected from *Oenomys hypoxanthus* (Pucheran) (Rodentia: Muridae) and *P. fallax* in Luberizi. Here it is recorded outside the type locality, in Rwanda and on *D. incommutus* for the first time.

According to the database of US National Geospatial Intelligence Agency, there are 30 geographic objects (populated places and streams) in Rwanda with the name Gakoma; thus, exact coordinates of this collection locality remain unknown.

***Schoutedenichia musaranei* Taufflieb, 1966**

***Schoutedenichia tanzaniaensis* Goff, 1983, n. syn.**

Type material examined — larva paratype (RMCA 128390), No. 3302, from *Crocidura* sp., CENTRAL AFRICAN REPUBLIC, Bangui, 4°22'N, 18°35'E, 1965, collected by R. Taufflieb; larva paratype (RMCA 128391), No. 2383, from *Mastomys* sp., CENTRAL AFRICAN REPUBLIC, Bangui, 1965, collected by R. Taufflieb.

Additional material examined — 1 larva (IRSNB) from *Lophuromys sikapusi* (Temminck) (Rodentia: Muridae), DR CONGO, Ituri Province, Wago Mt (= Wago), 1°45'N, 30°40'E, collected by A. Fain.

Distribution — Central African Republic (Bangui, Boukoko), DR Congo (Wago), Tanzania (Dar es Salaam).

Hosts — *Mastomys* sp., *Mus minutoides*, *Lophuromys sikapusi*, *Crocidura olivieri occidentalis*.

Remarks — This species was found on two species of murid rodents and on a shrew in Central African Republic. Here it is recorded in DR Congo, Tanzania, and on *L. sikapusi* for the first time.

Schoutedenichia tanzaniaensis Goff, 1983 does not differ from *S. musaranei* in non-metric characters including chaetotaxy and shape of scutum. Comparison of our measurements of two paratypes and one specimen from IRSNB with metric data from original descriptions (Taufflieb 1966; Goff 1983) shows that all these specimens obviously belong to one species (Table 3). *Schoutedenichia tanzaniaensis* has somewhat larger scutum (variables AW-AP), but this difference fits the usual range of intraspecific variation in chiggers. A slight difference between our measurements of legs and those given by Taufflieb and Goff (Ip = 607 – 619 vs. 567 – 585) could be caused by a difference in the mode of leg measuring (e.g. inclusion or exclusion of extreme parts of coxae or tips of tarsi, presence or absence of an allowance for the legs' curvature). Therefore, I consider *S. tanzaniaensis* as a synonym of *S. musaranei*.

***Schoutedenichia praomyia* (Radford, 1942)**

Material examined — 1 larva (IRSNB) from *Mus setulosus* Peters (= *Leggada setulosus*) (Rodentia: Muridae), CÔTE D'IVOIRE, unknown locality, collected by V.D.A. Thys and W. Verheyen, mites collected by A. Fain; 1 larva (IRSNB) from *Gerbilliscus boehmi* (Noack) (Rodentia: Muridae), CÔTE D'IVOIRE, unknown locality, collected by V.D.A. Thys and W. Verheyen, mites collected by A. Fain.

Remarks — This species was known only from its holotype collected from *Praomys morio* (Trouessart) (Rodentia: Muridae) in Sierra Leone, George Water Brook, 8°29'12"N,

Table 3 Standard measurements of *Schoutedenichia musaranei* Taufflieb, 1966

	Paratype 128390	Paratype 128391	IRSNB	Type series (mean)*	<i>Sh. tanzaniaensis</i> (range)**
AW	44	45	52	42	49-55
PW	68	66	70	62	75-83
SB	35	32	35	31	36-40
ASB	23	23	20	22	21-24
PSB	15	15	16	16	17-20
SD	38	38	36	32	41
AP	34	34	32	34	35-40
AM	27	-	27	23	24-28
AL	20	20	21	18	16-20
PL	27	25	32	24	22-29
S	-	-	31	28	31-33
H	31	29	32	29	27-29
D _{min}	23	20	20	20	18
D _{max}	29	28	29	24	21
V _{min}	17	15	14	12	13
V _{max}	24	25	23	21	20
pa	214	216	220	200	196-207
pm	184	184	187	170	171-177
pp	209	209	212	197	197-206
Ip	607	609	619	567	568-585
DS	51	50	49	48-50	54
VS	52	45	51	48	52
NDV	103	95	100	91-99	106
TaIIIL	52	50	54	-	48
TaIIIW	19	14	14	-	14

* - After Taufflieb (1966); ** - After Goff (1983).

13°14'28"W. Here *S. praomyia* is recorded outside the type locality, in Côte d'Ivoire, on *M. setulosus* and *G. boehmi* for the first time.

***Schoutedenichia schoutedeni* Vercammen-Grandjean, 1953**

Type material examined — larva holotype (RMCA 76183), No. 71052/2, from *Arvicanthis abyssinicus* (Rüppell) (Rodentia: Muridae), RWANDA, Butare (= Astrida), 2°36'S, 29°45'E, 7 Oct. 1952, collected by P.H. Vercammen-Grandjean; larva paratype #24 (RMCA 76188), No. 31052/52, from *Dasymys incommutus* (Sundevall) (Rodentia: Muridae) (= *Dasymys bentleyae*), RWANDA, Butare, 3 Oct. 1952, collected by P.H. Vercammen-Grandjean.

Additional material examined — 2 larvae (IRSNB) from nasal cavity of *Rattus rattus* (L.) (Rodentia: Muridae), RWANDA, Butare, Mar. 1955, collected by A. Fain.

Remarks — This species was found on many hosts in Rwanda and Congo (Stekolnikov 2018). Here it is recorded on *R. rattus* for the first time.

Tauffliebiella Vercammen-Grandjean, 1960

***Tauffliebiella mailloti* (Tauflieb et Abonnenc, 1957)**

Material examined — 1 larva (IRSNB) from *Heterocephalus glaber* Rüppell (Rodentia: Bathyergidae) No. 52.1437-40, KENYA, probably between Dandu hill (3°26'25"N, 39°52'10"E) and Moyale (3°31'00"N, 039°03'30"E) (slide label: "Dandu – Moyale"), Jun. 1952.

Remarks — This species was described from two larvae collected on *Cricetomys gambianus* Waterhouse (Rodentia: Nesomyidae) in the surroundings of Brazzaville, Congo. Here it is recorded outside the type locality, in Kenya and on *H. glaber* for the first time.

Trombigastia Vercammen-Grandjean et Brennan, 1957

***Trombigastia nycteris* Vercammen-Grandjean et Fain, 1958**

Material examined — 1 larva (IRSNB) from *Nycteris macrotis* Dobson (Chiroptera: Nycteridae), RWANDA, unknown locality (slide label: "Ada"; it could be an abbreviation of "Astrida", currently Butare, 2°36'S, 29°45'E), Oct. 1955; 2 larvae (in 1 slide, IRSNB) from *Nycteris* sp., DR CONGO, unknown locality (slide label: "Grotte Bazase, Congo"; probably a cave near Basase, 5°38'49"S, 24°35'48"E), 12 Jun. 1968.

Remarks — This species was known only from its type series collected from *Nycteris hispida* (Schreber) in the region of Butare, Rwanda, 15 Oct. 1955. Probably, the specimen from *N. macrotis* belongs to the same sample as the type series. Here *T. nycteris* is recorded outside the type locality and on *N. macrotis* for the first time.

Tribe Trombiculini Vercammen-Grandjean, 1960

***Blankaartia* Oudemans, 1911**

***Blankaartia gracilis* Vercammen-Grandjean, 1960**

Material examined — 4 larvae (in 1 slide, IRSNB) from *Actophilornis africanus* (Gmelin) (Charadriiformes: Jacanidae), DR CONGO, North Kivu Province, Vitshumbi, 0°42'18"S, 29°22'18"E, Mar. 1957.

Remarks — This species was known only from its type series collected from *Ardeola ralloides* (Scopoli) (Pelecaniformes: Ardeidae) in Mozambique (near Limpopo River mouth). Here it is recorded outside the type locality, in DR Congo and on *Actophilornis africanus* for the first time.

Blankaartia gracilis is probably identical with *B. ardeae* (Trägårdh, 1905) described from *Ardea cinerea* L. (Pelecaniformes: Ardeidae) in Sudan (White Nile), as one can conclude on the base of its redescription made by Oudemans (1912). However, this redescription is somewhat incomplete (metric data include only length and width of idiosoma and scutum, and lengths of legs). Comparison of type specimens is urgently needed, but places of type deposition are currently unknown for both species (Stekolnikov 2018).

Ericotrombidium Vercammen-Grandjean, 1966

***Ericotrombidium rodhaini* (Vercammen-Grandjean et Langston, 1976)**

Material examined — 1 larva (IRSNB) from *Galago moholi* A. Smith (= *Galago senegalensis moholi*), SENEGAL, unknown locality, collected by A. Fain.

Remarks — This species was known only from its type series collected from *Heliosciurus gambianus rhodesiae* (Wroughton) (Rodentia: Sciuridae) in DR Congo (Bukama). Here it is recorded outside the type locality, in Senegal and on a primate host for the first time.

***Hypotrombidium* Vercammen-Grandjean, 1966**

***Hypotrombidium legaci* (André, 1950)**

Material examined — 1 larva (IRSNB) from *Lophuromys sikapusi* (Temminck) (Rodentia: Muridae), CÔTE D'IVOIRE, unknown locality, collected by V.D.A. Thys and W. Verheyen.

Remarks — This species is widely distributed in West and Central Africa (Central African Republic, DR Congo, Congo, Cameroon, Ghana, Nigeria, Côte d'Ivoire). It was found on many small mammal species, including *L. sikapusi*, on domestic cat and hen (Stekolnikov 2018).

***Microtrombicula* Ewing, 1950**

***Microtrombicula livingstonei* n. sp. (Figure 4)**

Zoobank: [5EE9ED1B-900D-400F-BCB2-6B703CA9386B](https://doi.org/10.5281/zenodo.5599111)

Diagnosis — SIF = 6B-N-2-3111.0000; fsp = 7.7.7; fCx = 1.1.1; fSt = 2.2; fPp = B/B/NNb; fSc: PL >= AM >= AL; Ip = 585 – 694; fD = 2H-8-6-6-4-2; DS = 28; VS = 16 – 22; NDV = 44 – 50. Standard measurements of type series are given in Table 4.

Description (larva)

Idiosoma — Eyes 2 + 2. One pair of humeral setae, 26 dorsal idiosomal setae arranged 8-6-6-4-2; four sternal setae; 16 – 22 (usually 18) ventral setae arranged 6-2-4-4-2; total number of idiosomal setae excluding coxal and sternal 44 – 50 (usually 46). Dorsal and postanal ventral idiosomal setae covered by short squamose barbs, barbs of preanal ventral setae thin, cilium-like, sternal and coxal setae each with two long thin branches.

Gnathosoma — Cheliceral blade with tricuspid cap; cheliceral base with dense puncta basally; gnathobase with one pair of branched setae, transverse striations and puncta of different size; palpal femur and genu with few puncta; galeal setae nude; palpal claw with 2 subequal prongs (dorsal and ventral); palpal femoral seta branched, palpal genual seta with few branches, dorsal and lateral palpal tibial setae nude, ventral palpal tibial seta with one branch; palpal tarsus with 6 non-specialized setae (nude or having few branches) and basal tarsala.

Scutum — Small, pentagonal, wider than long, moderately covered with puncta, posterior scutal margin angulate, anterolateral shoulders present (ALs situated at some distance from anterior scutal margin); AM situated anterior to level of ALs; SB situated far anterior to level of PLs (PSB – P-PL = 4 – 8); PL >= AM >= AL; all scutal setae similar to dorsal idiosomal setae; sensilla flagelliform, with 7 – 8 branches in distal third.

Legs — All legs 7-segmented, with 1 pair of claws and claw-like empodium. Leg I: coxa with 1 non-specialized branched seta (1B); trochanter 1B; basifemur 1B; telofemur 5B; genu 4B, 3 genualae, microgenuala; tibia 8B, 2 tibialae, microtibiala; tarsus 22B, tarsala 12 long, microtarsala near and slightly anterior to tarsala; subterminala, parasubterminala, pretarsala. Leg II: coxa 1B; trochanter 1B; basifemur 2B; telofemur 4B; genu 3B, genuala; tibia 6B, 2 tibialae; tarsus 16B, tarsala thin, 10 long, microtarsala behind tarsala, pretarsala. Leg III: coxa 1B; trochanter 1B; basifemur 2B; telofemur 3B; genu 3B, genuala; tibia 6B, tibiala; tarsus 14B.

Many of non-specialized leg setae nude or with few cilia, but true mastisetae (recognized by shape of setal base) absent.

Host — *Holaspis guentheri* Gray (Squamata: Lacertidae).

Type material — larva holotype (IRSNB) behind leg of *H. guentheri*, DR CONGO, Équateur Province, Eala, 0°04'13"N, 18°18'09"E, 9 May 1955, collected by A. Fain; 5 larvae

Table 4 Standard measurements of *Microtrombicula livingstonei* n. sp. (n = 6)

	Range	Mean	Holotype
AW	52-65	58	58
PW	65-76	69	67
SB	22-26	24	24
ASB	20-25	23	23
PSB	25-30	27	27
SD	45-55	50	50
P-PL	19-23	21	19
AP	18-25	23	24
AM	20-25	23	23
AL	19-23	21	19
PL	23-25	24	25
H	36-43	38	38
S	23-27	25	25
D _{min}	14-22	19	14
D _{max}	23-25	24	23
V _{min}	14-26	15	14
V _{max}	22-27	24	24
pa	205-247	228	223
pm	184-220	202	203
pp	189-238	209	207
Ip	585-694	639	633
DS	28-28	28	28
VS	16-22	19	16
NDV	44-50	47	44
TaIIIL	47-57	51	50
TaIIIW	12-14	14	14

paratypes (in 4 slides, IRSNB) with same data; 5 larvae paratypes (in 3 slides, IRSNB) on sides of *H. guentheri*, DR Congo, Maniema Province, Kindu, 2°56'37"S, 25°55'21"E, 6 Nov. 1955, collected by A. Fain; 4 larvae paratypes (in 2 slides, IRSNB) from *H. guentheri*, DR CONGO, Haut-Uélé Province, Medje, 2°23'21"N, 27°18'00"E, collected by A. Fain.

Etymology — The species named after David Livingstone (1813-1873), a famous British explorer of Africa.

Differential diagnosis — The new species has no evident relatives among *Microtrombicula*. By the shape of scutum, scutal setae and sensilla, it is similar to the group of species described by Lawrence (1949) from reptiles in South Africa and redescribed by Vercammen-Grandjean (1965): *Microtrombicula montensis* (Lawrence, 1949), *M. draconensis* (Lawrence, 1949), *M. rhodesiensis* (Lawrence, 1949) and *M. gerrhosauri* (Lawrence, 1949). But all these species differ from *M. livingstonei* in having mastitarsala and three-pronged palpal claw vs. two-pronged.

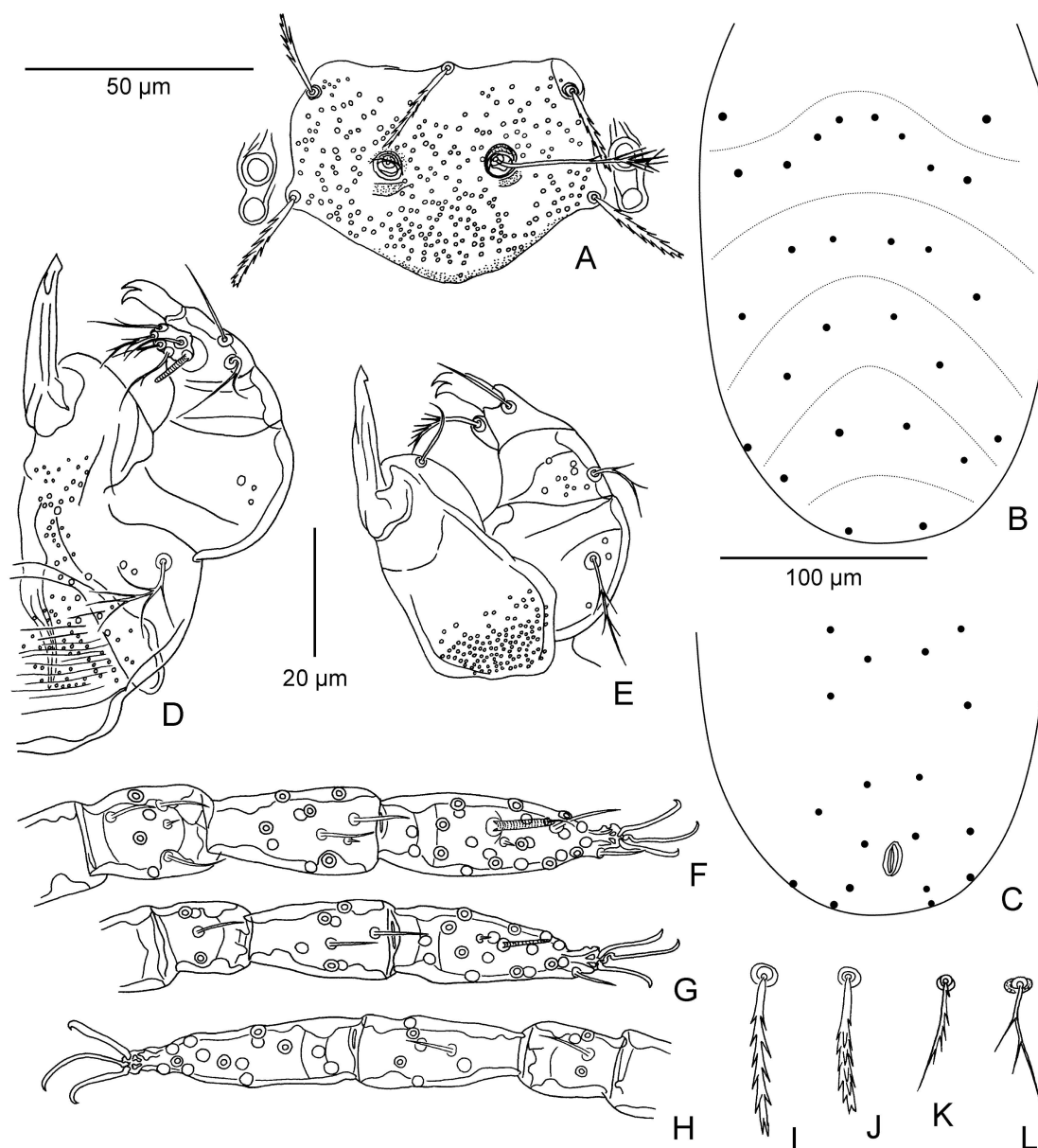


Figure 4 *Microtrombicula livingstonei* n. sp., larva: A – scutum and eyes; B – arrangement of dorsal idiosomal setae; C – arrangement of ventral idiosomal setae; D – ventral aspect of gnathosoma; E – dorsal aspect of gnathosoma; F – tarsus, tibia, and genu of leg I; G – tarsus, tibia, and genu of leg II; H – tarsus, tibia, and genu of leg III; I – humeral seta; J – dorsal idiosomal seta of 1st row; K – ventral preanal idiosomal seta; L – coxal seta I. Scale bars: A, F-H – 50 µm; B-C – 100 µm, D-E, I-L – 20 µm.

Microtrombicula mastomyia (Radford, 1942)

Material examined — 1 larva (IRSNB) from *Arvicanthis abyssinicus* (Rüppell) (Rodentia: Muridae) No. 752, DR CONGO, Ituri Province, Kawa, 1°34'N, 30°32'E, collected by A. Fain; 2 larvae (IRSNB) from *Mastomys coucha* (Smith) (Rodentia: Muridae) No. 43, DR CONGO, Ituri Province, Blukwa, 1°45'28"N, 30°36'37"E, 31 Jul. 1972, collected by A. Fain.

Remarks — This species is widely distributed in Central and West Africa (Sierra Leone, Côte d'Ivoire, DR Congo, Central African Republic, Cameroon and Ghana). It was found on many rodent species and on *Crocidura* sp. (Stekolnikov 2018). Here it is recorded on *A. abyssinicus* and *M. coucha* for the first time.

***Microtrombicula nycteris* (Jadin, Vercammen-Grandjean et Fain, 1955)**

Type material examined — larva holotype (RMCA 82288), No. 3653/A/66, from *Nycteris macrotis* Dobson (Chiroptera: Nycteridae), RWANDA, Butare (= Astrida), 2°36'S, 29°45'E, 3 Jun. 1953, collected by A. Fain; 2 larvae paratypes #2 and #4 (RMCA 82290, 82291), Nos. 3653/A/2 and 3653/A/4, other data the same.

Additional material examined — 2 larvae (in 1 slide, IRSNB) from ears of *N. macrotis*, RWANDA, Butare, Aug. 1954.

Remarks — This species was known only from its type series collected 3 June 1953 from *N. macrotis*. The specimens from IRSNB were probably collected at the same site one year later. In his revision of the genus *Microtrombicula*, Vercammen-Grandjean (1965) gave different data on type locality and collection time: Nyumba caves, Nyanza, 2°21'06"S, 29°45'03"E, 13 Nov. 1955.

***Microtrombicula pembaensis* (Vercammen-Grandjean, 1965)**

Material examined — 4 larvae (in 3 slides, IRSNB) from *Galago moholi* A. Smith (Primates: Galagidae), RWANDA, Akanyaru River, Oct. 1954, collected by A. Fain.

Remarks — This species was known from its type locality only (Pemba Island, Tanzania), where it was collected from unidentified rodents. Here it is recorded from Rwanda and *G. moholi* for the first time.

***Microtrombicula streptopelia* (Vercammen-Grandjean, 1965)**

Material examined — 1 larva (IRSNB) from ear of *Galago demidoffi* G. Fischer (= *Galago demidoffi pusilla*) (Primates: Galagidae), DR CONGO, east, unknown locality, 1950, collected by A. Fain.

Remarks — This species was described from two bird species in DR Congo. Here it is recorded on a primate host for the first time.

Discussion

The present work adds one species to the chigger faunas of Cameroon, Tanzania, Kenya and Senegal, two species to the fauna of Rwanda and three to the fauna of Côte d'Ivoire. Noteworthy is my contribution to the chigger fauna of DR Congo, which includes a new genus, three new species and three new records of species (*Makwacarus petrodromi* n. gen., n. sp., *Herpetacarus junkeri* n. sp., *Microtrombicula livingstonei* n. sp., *Blankaartia gracilis*, *Ornithogastia pastoriana* and *Schoutedenichia musaranei*). This country during many years was a place of residence for Vercammen-Grandjean who conducted intensive studies of its chigger fauna. As a result, DR Congo became a leader in the number of known chigger species among African countries. According to the review of the African chigger fauna (Stekolnikov 2018), 125 species were recorded there, while the fauna of next leading country, the Republic of South Africa, includes only 80 species. And yet, as it turned out, chigger studies in DR Congo cannot be considered completed.

Chigger mite collection of IRSNB now must be regarded as an important addition to the neighbor Belgian collection of African chiggers deposited in RMCA. The following 13 species found in IRSNB are absent in RMCA: *Gahrlepiea grenieri*, *Schoengastiella caeca*, *Elianella anomaluri*, *Herpetacarus junkeri* n. sp., *Makwacarus petrodromi* n. gen., n. sp., *Ornithogastia pastoriana*, *Schoutedenichia praomyia*, *Taufliebiella mailloti*, *Blankaartia gracilis*, *Ericotrombidium rodhaini*, *Microtrombicula livingstonei* n. sp., *Microtrombicula pembaensis* and *Microtrombicula streptopelia*. Moreover, although the IRSNB collection

includes only 27 species, *i.e.* 6% of the actual fauna of African chiggers, while collection of RMCA includes 30% (Stekolnikov 2018), it should be noted that quality of slides generally is much worse in the latter that makes many type specimens unsuitable for examination. Therefore, examination of specimens from IRSNB can be more useful for comparative purposes than examination of practically unavailable types preserved in RMCA, for example, in the case of *Trombigastia nycteris* or *Herpetacarus causicolus*.

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