

Additions to the oribatid mite fauna of Central Ethiopia, with description of a new species of *Scheloribates* (*Bischeloribates*)

(Acari, Oribatida)

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The present study is based on oribatid mite material (Acari, Oribatida) collected from two dry forests in Central Ethiopia. A list of identified taxa is provided. It includes 26 species from 21 genera and 20 families; of these, *Cosmochthonius lanatus* (Michael, 1885) and the genus *Cosmochthonius* Berlese, 1910 are recorded in Ethiopia for the first time, and the species *Oribatula interrupta* (Willmann, 1939) is recorded in the Ethiopian region for the first time. A new species, *Scheloribates* (*Bischeloribates*) *munesaensis* spec. nov. (Scheloribatidae), are described from leaf litter of Munesa forest (dominated with *Croton macrostachys*). It differs from all species of *S.* (*Bischeloribates*) by the different number of leg claws (legs I monodactylous, legs II–IV bidactylous vs. all legs bidactylous). An identification key to known species of *S.* (*Bischeloribates*) is given.

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Introduction

Oribatid mites (Acari, Oribatida) of Central Ethiopia is poorly known (Ermilov et al. 2012, 2014, Ermilov & Rybalov 2013a). The present work is based on the material collected during Russian-Ethiopian expedition in October–November 2014 from two forest areas (Menagesha Park and Munesa forest), where so far oribatid fauna are not studied. The primary goal of the paper is to present a list of the identified taxa with their localities and notes on new records.

In the course of taxonomic identification, I found one new species, belonging to *Scheloribates* (*Bischeloribates*) Mahunka, 1988 (Mahunka 1988; see also Ermilov 2013 for explanations on type species and the subgeneric status) of the family Scheloribatidae. The secondary goal of the paper is to describe and illustrate it. The subgenus *S.* (*Bischeloribates*) comprises eight species (Ermilov & Friedrich 2016; Subías 2004, updated 2016), which are distributed in tropics (Subías 2004, updated 2016). The new sub-

generic diagnosis is present by Ermilov & Friedrich (2016).

Additionally a key to identify the known species of *Scheloribates* (*Bischeloribates*) is provided.

Material and methods

Material examined

Oribatid mites collected from two dry forests in Central Ethiopia:

Et-2014–Me: 8°57'17.7" N, 38°33'4.0" E, Menagesha Park (forest with *Juniperus procera* as a dominant and also with *Podocarpus gracilior* and *Olea* sp.), leaf litter, Winkler extraction, 26.X.2014 (E. Kuzmicheva and B. Hasanov).

Et-2014–Mu: 7°26'01.3" N, 38°51'57.5" E, Munesa forest (dominated with *Croton macrostachys* and also with *Podocarpus gracilior*, *Prunus africana*, *Galiniera saxifraga*, *Bersama abyssinica*), leaf litter, Winkler extraction, 05.XI.2014 (E. Kuzmicheva and B. Hasanov).

Methods

Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect behind pteromorphs. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulas for leg setation are given in parentheses according to the sequence trochanter-femur-genu-tibia-tarsus (femulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu-tibia-tarsus.

Morphological terminology used in this paper follows that of F. Grandjean: see Travé & Vachon (1975) for references, Norton (1977) for leg setal nomenclature, and Norton & Behan-Pelletier (2009), for overview.

Drawings were made with a camera lucida using a Carl Zeiss transmission light microscope "Axioskop-2 Plus".

A list of identified oribatid mite taxa¹

This list indicates the specific localities where oribatid mites were collected, and notes new records and overall known distribution².

Cosmochthoniidae

Cosmochthonius lanatus (Michael, 1885). Locality: Et-2014–Me. Distribution: Cosmopolitan.

Nothriidae

Nothrus crassisetus Mahunka, 1982. Locality: Et-2014–Mu. Distribution: Ethiopia.

Crotoniidae

Camisia tryphosa Colloff, 1993. Locality: Et-2014–Me. Distribution: Kenya and Ethiopia.

Hermanniellidae

Hermanniella congoensis Balogh, 1958. Localities: Et-2014–Me, Et-2014–Mu. Distribution: Ethiopian region.

Plasmobatidae

Plasmobates foveolatus Ermilov, Sidorchuk & Rybalov, 2011. Localities: Et-2014–Me, Et-2014–Mu. Distribution: Ethiopia.

Licnodamaeidae

Pedrocortesella africana Pletzen, 1963. Locality: Et-2014–Me. Distribution: Ethiopian region.

Aleurodamaeidae

Aleurodamaeus recenfesevpi Ermilov & Rybalov, 2012. Localities: Et-2014–Me, Et-2014–Mu. Distribution: Ethiopia.

Damaeidae

Metabelba (Pateribelba) glabriseta Mahunka, 1982. Locality: Et-2014–Mu. Distribution: Ethiopia and Angola.

Oppiidae

Lasiobelba (Lasiobelba) kuehmelti (Csiszár, 1961). Locality: Et-2014–Mu. Distribution: Tropics.

Neoamerioppia polygonata (Mahunka, 1982). Locality: Et-2014–Mu. Distribution: Ethiopia.

Suctobelbidae

Suctobelbella (Flagrosuctobelba) penicillata (Balogh & Mahunka, 1966). Locality: Et-2014–Mu. Distribution: Ethiopian region and Panama.

Carabodidae

Austrocarabodes (Uluguroides) kluttzi Ermilov, Winchester, Lowman & Wassie, 2012. Locality: Et-2014–Mu. Distribution: Ethiopia.

Tectocephidae

Tectocephus velatus sarekensis Trägårdh, 1910. Locality: Et-2014–Me. Distribution: Cosmopolitan.

Phenopelopidae

Eupelops torulosus (Koch, 1839). Locality: Et-2014–Me. Distribution: Palaearctic region and Ethiopia.

Caloppiidae

Zetorchella vargai (Balogh, 1959). Locality: Et-2014–Mu. Distribution: Tanzania, South Africa and Ethiopia.

Schelorbitidae

Schelorbitates (Schelorbitates) aethiopicus Mahunka, 1982. Locality: Et-2014–Mu. Distribution: Ethiopian region and Canary Islands.

Schelorbitates (Schelorbitates) praeincisus (Berlese, 1910). Locality: Et-2014–Me. Distribution: Tropics.

Schelorbitates (Bischelorbitates) lizelhugae Ermilov & Rybalov, 2013. Locality: Et-2014–Mu.

1 Ptyctimous mites not included. All specimens are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

2 See mostly Subías (2004, updated 2016).

Scheloribates (Bischeloribates) munesaensis spec. nov.

Locality: Et-2014–Mu.

Zetomotrichidae

Zetomotrichus lacrimans Grandjean, 1934. Locality: Et-2014–Me. Distribution: Tropics.

Mochlozetidae

Unguizetes atypicus (Mahunka, 1982). Locality: Et-2014–Mu. Distribution: Ethiopian region.

Oribatulidae

Oribatula interrupta (Willmann, 1939). Locality: Et-2014–Me. Distribution: Holarctic region.

Punctoribatidae

Allozetes africanus Balogh, 1958. Locality: Et-2014–Mu. Distribution: Tropics.

Galumnidae

Galumna incisa Mahunka, 1982. Locality: Et-2014–Mu. Distribution: Ethiopia.

Galumna lanceosensilla Ermilov, Sidorchuk & Rybalov, 2011. Locality: Et-2014–Me. Distribution: Ethiopia.

Galumna nuda Engelbrecht, 1972. Locality: Et-2014–Mu. Distribution: South Africa and Ethiopia.

Thus, 26 species from 21 genera and 20 families were found in the course of taxonomic identification. Of these, one species is new for science, one species (*Cosmochthonius lanatus*) and one genus (*Cosmochthonius*) are recorded in Ethiopia for the first time, and the species *Oribatula interrupta* is recorded in the Ethiopian region for the first time.

Description

Scheloribates (Bischeloribates) munesaensis
spec. nov.
Figs 1–8

Diagnosis. Body size: 448–464 × 265–298. Rostrum rounded. Prolamellae absent, but their basal parts developed. Translamellar line represented by two long, rudimentary parts. Rostral, lamellar and interlamellar setae long, setiform, erect, ciliate. Bothridial setae of medium size, fusiform, barbed. Notogastral setae p_1 short, other setae minute. Epimeral and anogenital setae setiform, barbed. Circumpedal carinae comparatively short. Legs I monodactylous, legs II–IV bidactylous.

Description

Measurements. Body length: 448 (holotype: female), 448, 464 (two paratypes: two females); notogastral width: 265 (holotype), 265, 298 (two paratypes).

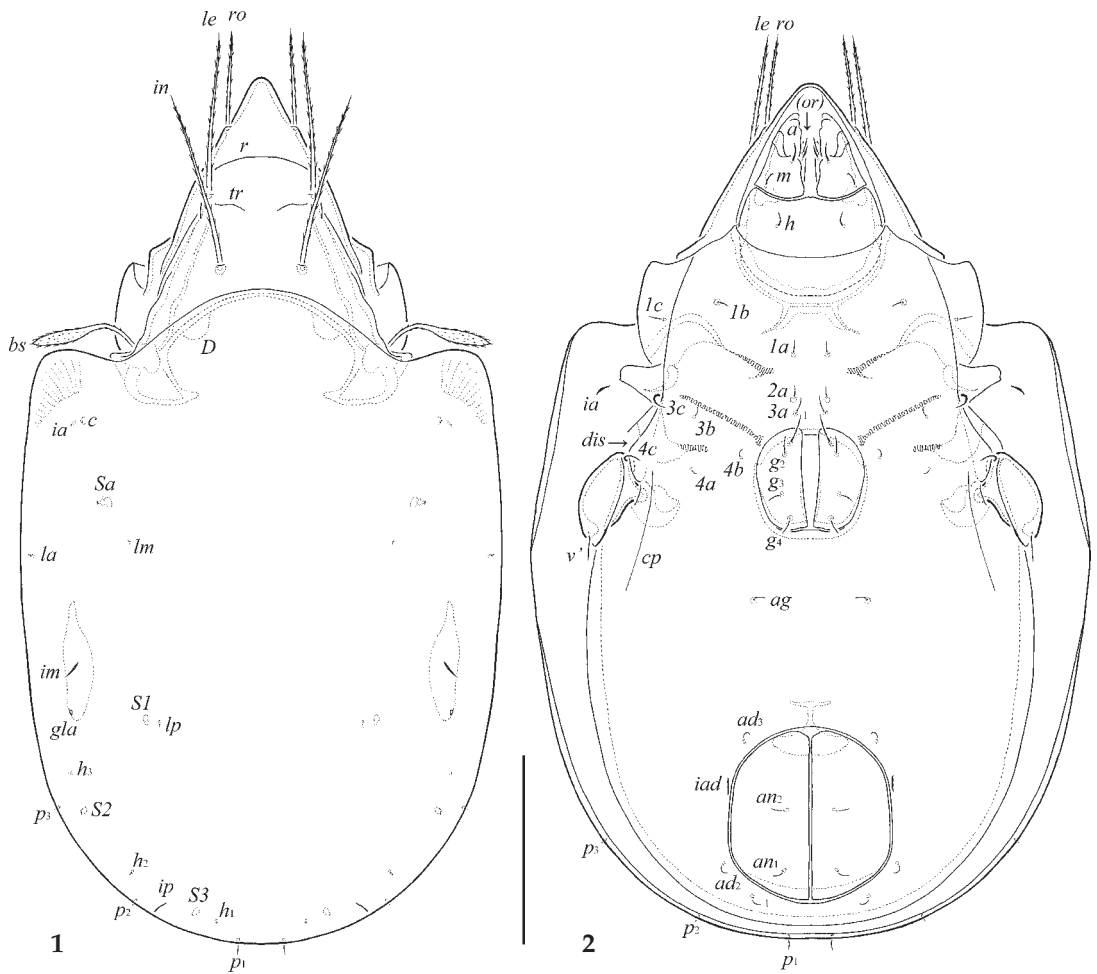
Integument. Body colour light yellow (holotype) to brown (paratypes). Body surface punctate (visible under high magnification, ×1000). Lateral parts of prodorsum with microgranulate cerotegument. Pteromorphs with slight, radiate ornamentation.

Prodorsum (Figs 1, 3). Rostrum narrowly rounded. Lamellae (*lam*, 82–90) located dorso-laterally, longer than half of prodorsum (measured in lateral view). Prolamellae (*plam*, 8) very short, represented basal parts only. Sublamellae (*slam*, 73–82) thin, shorter than lamellae. Translamellar line (*tr*, 18–20) represented by two long (but well separated medially), rudimentary parts near lamellae. Sublamellar porose areas (*Al*, 6) rounded. Rostral (*ro*, 53–65), lamellar (*le*, 90–102) and interlamellar (*in*, 98–106) setae setiform, erect, ciliate. One paratype have one additional rostral seta (it shorter, 41, and thinner) on right side, inserted medial to true *ro*. Keel-shaped ridges (*kf*) and transverse ridge (*r*) between *ro* and *le* well visible. Exobothridial setae (*ex*, 12) thin, smooth. Bothridial setae (*bs*, 73–86) fusiform, with long (41–45), slightly barbed stalks and shorter (32–41), barbed heads. Sejugal porose areas band-like, diffuse.

Notogaster (Figs 1, 3, 4). Anterior notogastral margin convex medially. Dorsophragmata (*D*) semioval. Ten pairs of notogastral setae present, p_1 short (8), thin, smooth, other setae minute (1). Four pairs of saccules (*Sa*, *S1*, *S2*, *S3*) with small openings and oval channels. Setae *lp* inserted medially to *S1*. Lyrifissures (*la*, *im*, *ip*, *ih*, *ips*) and opisthonotal gland openings (*gla*) clearly visible.

Gnathosoma (Figs 2, 3). Morphology of subcapitulum, palps and chelicerae generally typical for *Scheloribates (Bischeloribates)* (Ermilov 2013, Ermilov & Friedrich 2016). Subcapitulum longer than wide (98–106 × 73–82). Subcapitular setae setiform, slightly barbed, *a* and *m* (both pairs 16–20) shorter and slightly thinner than *h* (24–28). Two pairs of adoral setae (*or*₁, *or*₂, 8) setiform, indistinctly barbed. Palps (length 61–65) with setation 0–2–1–3–9(+ω). Postpalpal setae (*ep*, 6) spiniform. Chelicerae (length 102–106) with two barbed setae, *cha* (36) longer than *chb* (20). Trägårdh's organ tapered.

Epimeral and lateral podosomal regions (Figs 2, 3). Apodemes 2 and 3 shorter than sejugal apodemes. Epimeral setal formula: 3–1–3–3. Setae thin, barbed, *1a*, *1c*, *2a* and *3a* (12) shorter than other setae (16–20). Setae *1c* inserted ventrally on pedotecta I. Pedotecta I and II represented by small laminae, Pd II trapezoid. Discidia (*dis*) elongate triangular. Circumpedal carinae (*cp*) comparatively



Figs 1-2. *Schelorbates (Bischeloribates) munesaensis* spec. nov., adult: **1.** Dorsal view (legs not illustrated). **2.** Ventral view (legs except trochanters IV not illustrated). Scale bar = 100 μ m.

short, distally reaching discidia and basally clearly not reaching margins of the ventral plate.

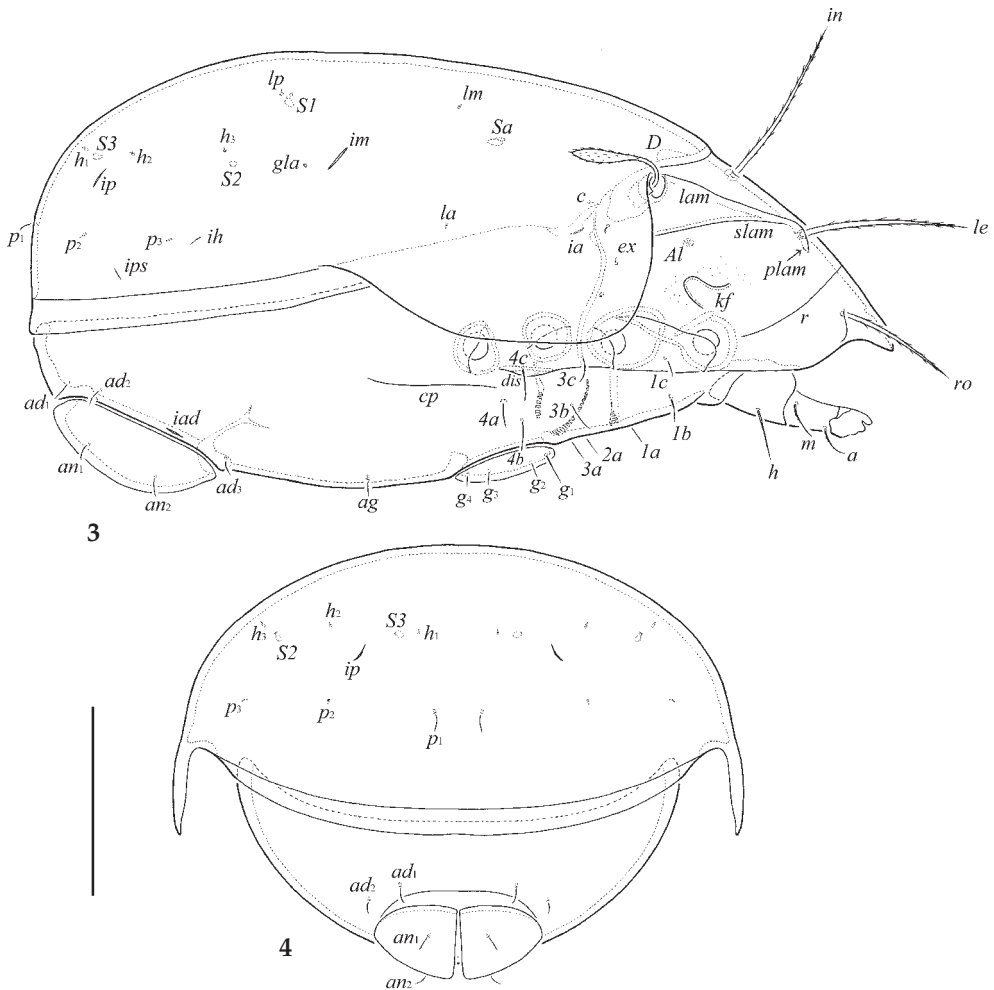
Anogenital region (Figs 2-4). Four pairs of genital ($g_1, 16$; $g_2-g_5, 8$), one pair of aggenital ($ag, 8$), two pairs of anal ($an_1, an_2, 8$) and three pairs of adanal

($ad_1-ad_3, 8$) setae setiform, slightly barbed. Adanal lyrifissures (iad) located close and parallel to anal plates.

Legs (Figs 5-8). Morphology of leg segments, setae and solenidia generally typical for *Schelori-*

Table 1. Leg setation and solenidia of adult *Schelorbates (Bischeloribates) munesaensis* spec. nov. [Roman letters refer to normal setae, Greek letters to solenidia (except ϵ = famulus). Single prime (') marks setae on the anterior and double prime (") setae on the posterior side of a given leg segment. Parentheses refer to a pair of setae.

Leg	trochanter	femur	genu	tibia	tarsus
I	v'	$d, (l), bv'', v''$	$(l), v', \sigma$	$(l), (v), \phi_1, \phi_2$	$(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), \epsilon, \omega_1, \omega_2$
II	v'	$d, (l), bv'', v''$	$(l), \sigma$	$(l), (v), \phi$	$(ft), (tc), (it), (p), (u), (a), s, (pv), \omega_1, \omega_2$
III	l', v'	d, l', ev'	l', σ	$l', (v), \phi$	$(ft), (tc), (it), (p), (u), (a), s, (pv)$
IV	v'	d, ev'	d, l'	$l', (v), \phi$	$ft'', (tc), (p), (u), (a), s, (pv)$



Figs 3-4. *Schelorbates (Bischeloribates) munesaensis* spec. nov., adult. **3.** Lateral view (legs and palp not illustrated). **4.** Posterior view. Scale bar = 100 μ m.

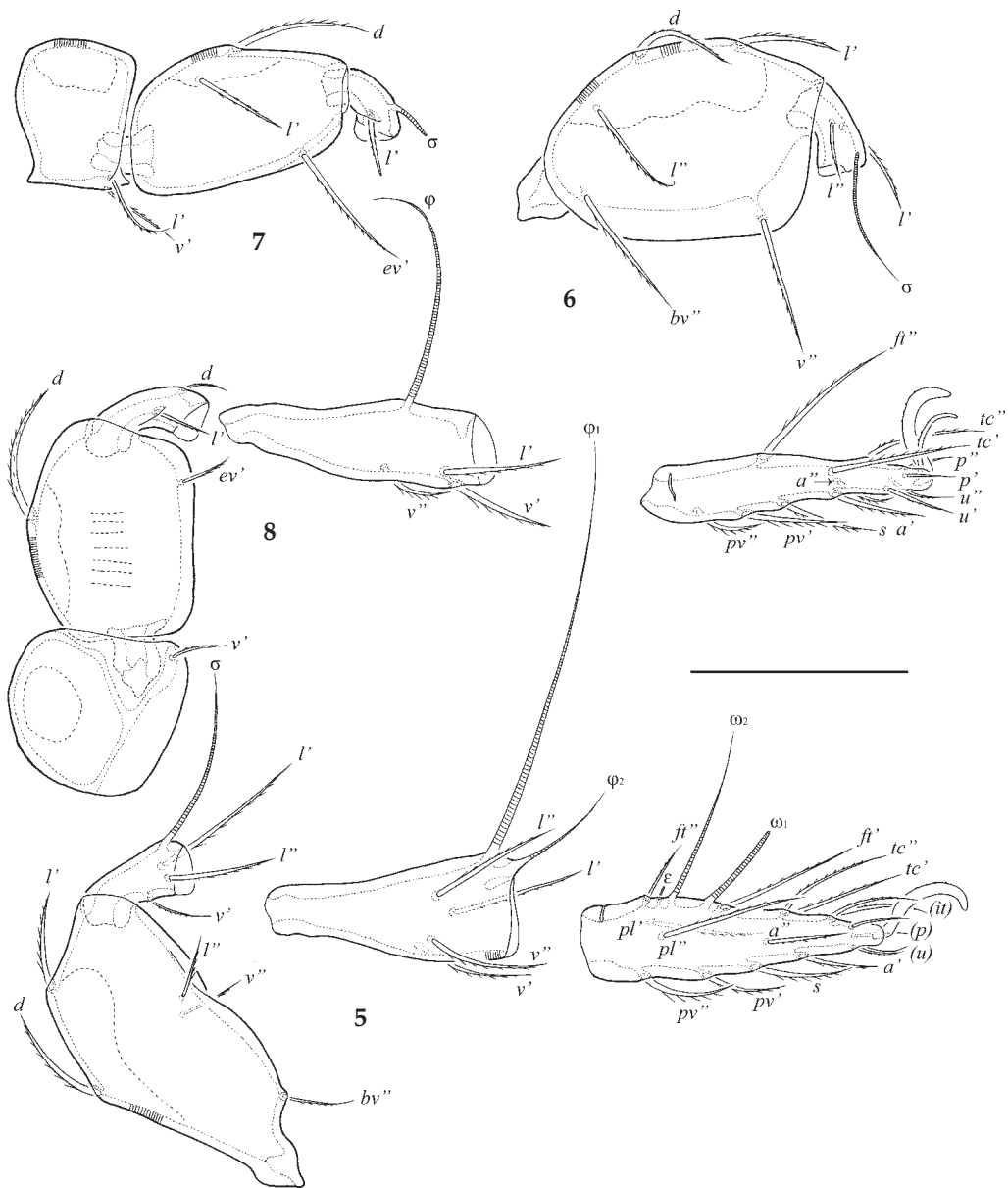
bates (Bischeloribates) (Ermilov 2013, Ermilov & Rybalov 2013b, Ermilov & Friedrich 2016). Legs I monodactylous, legs II-IV bidactylous. All claws serrate on dorsal side. Porose areas on all femora and trochanters III and IV well visible. Formulas of leg setation and solenidia: I (1-5-3-4-18) [1-2-2], II (1-5-2-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology of setae and solenidia indicated in Table 1. Famuli short, straight, dilated distally, inserted posterior to solenidia ω_2 . Solenidia ω_1 on tarsi I, ω_1 and ω_2 on tarsi II and σ on genua III thickened, blunt-ended, other solenidia setiform.

Material examined. Holotype (female) and two paratypes (two females): Et-2014-Mu (see “Material and methods” section).

Type deposition. The holotype is deposited in the collection of the Senckenberg Institution Frankfurt, Germany; two paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology. The specific name *munesaensis* refers to the place of origin, Munesa forest.

Comparison. The new species differs from all species of the subgenus *Schelorbates (Bischeloribates)* by the monodactylous legs I (vs. legs I bidactylous in other species).



Figs 5–8. *Scheloribates (Bischeloribates) munesaensis* spec. nov., adult: **5.** Leg I, except trochanter, right, antiaxial view. **6.** Femur and genu of leg II, right, antiaxial view. **7.** Trochanter, femur and genu of leg III, left, antiaxial view. **8.** Leg IV, left, antiaxial view. Scale bar = 50 μ m.

Remarks. Ermilov & Friedrich (2016) updated subgeneric diagnosis of *Scheloribates (Bischeloribates)*, having listed all main morphological characters. The most important character is the presence of legs with two claws. However, *Scheloribates (Bischeloribates)*

munesaensis spec. nov. has one claw on legs I (other legs are bidactylous). Hence, this addition has to be considered in diagnosis for *Scheloribates (Bischeloribates)* in the future.

**Key to known species of *Scheloribates*
(*Bischeloribates*)**

1. Legs I monodactylous, legs II–IV bidactylous; body size: 448–464 × 265–298.
..... *Scheloribates* (*Bischeloribates*) *munesaensis* spec. nov. Distribution: Ethiopia.
- All legs bidactylous 2
2. Notogastral setae *c* and *la* of medium length, distinctly longer than diameter of bothridia; antero-lateral part of notogaster bordered by transverse, thin, light furrow; body size: 282–365 × 182–232.
.... *Scheloribates* (*Bischeloribates*) *wachteli* Ermilov & Friedrich, 2016 (see Ermilov & Friedrich, 2016). Distribution: Peru.
- Notogastral setae *c* and *la* short (or represented by alveoli), not longer than diameter of bothridia; antero-lateral part of notogaster without transverse furrow. 3
3. Interlamellar setae longer than prodorsum; bothridial setae short, two or three time as length of bothridia; body size: 498–531 × 315–332.
Scheloribates (*Bischeloribates*) *lizelhugoe* Ermilov & Rybalov, 2013 (see Ermilov & Rybalov 2013b). Distribution: Ethiopia.
- Interlamellar setae shorter than prodorsum; bothridial setae long, five or more time as length of bothridia. 4
4. Rostrum narrowly conical, near pointed; body size: 303–318 × 212–225
..... *Scheloribates* (*Bischeloribates*) *conirostris* Corpuz-Raros, 1980 (see Corpuz-Raros 1980). Distribution: Philippines.
- Rostrum clearly rounded. 5
5. Bothridial setae spindle-form, with long, thin, attenuate apex; body length: 550.
..... *Scheloribates* (*Bischeloribates*) *elegantulus* Hammer, 1961 (see Hammer 1961). Distribution: Neotropical region.
- Bothridial setae clavate or fusiform, long and attenuate apex absent. 6
6. Rudimentary parts of translamellar line near lamellae present. 7
- Rudimentary parts of translamellar line near lamellae absent. 8
7. Rudimentary parts of translamellar line very short, shorter than diameter of bothridia; body size: 303–333 × 164–177.
..... *Scheloribates* (*Bischeloribates*) *dalawaesus* Corpuz-Raros, 1980 (see Corpuz-Raros 1980). Distribution: Philippines.
- Rudimentary parts of translamellar line distinctly longer than diameter of bothridia, slightly separated medially; body size: 282–431 × 182–249.
.. *Scheloribates* (*Bischeloribates*) *mahunkai* Subías, 2010 (see Mahunka 1988; Ermilov 2013). Distribution: Oriental region.
8. Bothridial setae fusiform, with narrow tip; body length: 350.
..... *Scheloribates* (*Bischeloribates*) *bidactylus* Hammer, 1961 (see Hammer 1961). Distribution: Neotropical region.
- Bothridial setae clavate, with broadly rounded tip; body length: 420 × 270.
.. *Scheloribates* (*Bischeloribates*) *biunguis* (Berlese, 1920) (see Berlese 1920; Mahunka & Mahunka-Papp 1995). Distribution: Java.

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