

A NEW SPECIES AND NEW RECORDS OF ORIBATID MITES (ACARI, ORIBATIDA) FROM THE OROMIA REGION (ETHIOPIA)

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ABSTRACT: The present study is based on oribatid mite material (Oribatida) collected from the Oromia Region in Ethiopia. A new species of the genus *Allogalumna* (Galumnidae) is described. *Allogalumna oromiaensis* Ermilov sp.n. differs from *A. abrupta* (Hammer, 1972) in having lanceolate bothridial setae and in having a complete dorsosejugal suture. *Allogalumna oromiaensis* also differs from *A. bipartita* (Aoki et Hu, 1993) in having three pairs of notogastral porose areas and in having a complete dorsosejugal suture. A list of new records of Ethiopian fauna, which includes seven species, is provided. Of these, *Malaconothrus aureopunctatus* Hammer, 1979 and *Tectocephus minor* Berlese, 1903 are recorded for the first time in the Ethiopian region. The other five species, as well as the genera *Ululohmannia* Mahunka, 1987, *Hammerabates* Balogh, 1970 and *Heterogalumna* Balogh, 1960, are recorded for the first time in Ethiopia.

KEY WORDS: Oribatid mites, systematics, new species, morphology, Ethiopian region.

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INTRODUCTION

This work, based on the oribatid mite material collected in the Oromia Region during the Russian-Ethiopian expedition in 2017, is a part of our continuing study of oribatid mites (Acari, Oribatida) of Ethiopia (e.g., Ermilov *et al.* 2012; Ermilov 2014; Ermilov and Rybalov 2018). During taxonomic identification, we found one new species belonging to the genus *Allogalumna* Grandjean, 1936 (family Galumnidae). The main goal of the paper is to describe and illustrate this new species and to present new taxonomic records of Ethiopian oribatid fauna. At present, *Allogalumna* comprises two subgenera (Ermilov and Klimov 2017) and about 50 species (Ermilov and Klimov 2017; Ermilov and Leong 2018; Ermilov and Starý 2018). All representatives of this genus are characterized by a cosmopolitan distribution. The generic and subgeneric diagnoses have been summarized by Ermilov and Klimov (2017). An identification key to many species of *Allogalumna* has been presented by Akrami (2015).

At present, the oribatid mite fauna of Ethiopia is briefly investigated, and only two species of *Allogalumna* are known from this country (e.g., Ermilov *et al.* 2012; Ermilov and Rybalov 2013, 2018): *A. machadoi* (Balogh, 1960) and *A. vojnit-si* Mahunka, 1993.

MATERIAL AND METHODS

Material. Material was collected on November 7, 2017, in the Kelam Welega Zone, Oromia region, Ethiopia, near the Dembidollo-Gambela road, 08°36'02.1"N, 034°36'47.9"E, 1,612 m a.s.l. in a

deciduous evergreen forest patch with coffee plant undergrowth, on the slope of a mountain, from litter and upper part of soil that was situated on mollic Nitisols soil type (L.B. Rybalov).

Methods. Litter and fallen leaves were collected by using a stainless steel frame (50×50 cm) with a sieve (mesh size 2×2 cm). The mites were extracted into 75% ethanol using Berlese's funnels with electric lamps in laboratory conditions.

The specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. Their body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the notogaster. Notogastral width refers to the maximum width of the notogaster in dorsal view (behind pteromorphs). The lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers (μm). The 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.

Drawings were made with a camera lucida using a Leica transmission light microscope “Leica DM 2500”. Images were obtained with an Axio-Cam ICc3 camera using a Carl Zeiss transmission light microscope “Axio Lab.A1”.

Morphological terminology used in this paper follows that of F. Grandjean (see Ermilov and Klimov 2017 for review and application).

The following abbreviations are used: *L*—lamellar line; *S*—sublamellar line; *N*—prodorsal

leg niche; *E*, *T*—lateral ridges of prodorsum; *ro*, *le*, *in*, *bs*—rostral, lamellar, interlamellar and bothridial setae, respectively; *bo*—bothridium; *Ad*—dorsosejugal porose area; *D*—dorsophragma; *P*—pleurophragma; *c*, *la*, *lm*, *lp*, *h*, *p*—notogastral setae; *Aa*, *Al*, *A3*—notogastral porose areas; *ia*, *im*, *ip*, *ih*, *ips*—notogastral lyrifissures; *gla*—opisthonotal gland opening; *h*, *m*, *a*—subcapitular setae; *or*—adoral seta; *v*, *l*, *d*, *cm*, *acm*, *ul*, *sul*, *vt*, *lt*—palp setae; ω —palp and leg solenidion; *sac*—axillary saccule; *cha*, *chb*—cheliceral setae; *Tg*—Trägårdh's organ; *Pd I*, *Pd II*—pedotecta I, II, respectively; *1a*, *3b*, *4a*, *4b*—epimeral setae; *dis*—discidium; *cp*—circumpedal carina; *g*, *ag*, *an*, *ad*—genital, aggenital, anal and adanal setae, respectively; *iad*—adanal lyrifissure; *p.o.*—preanal organ; *Tr*, *Fe*, *Ge*, *Ti*, *Ta*—leg trochanter, femur, genu, tibia, tarsus, respectively; *p.a.*—leg porose area; σ , ϕ —leg solenidia; *e*—leg famulus; *v*, *ev*, *bv*, *l*, *d*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl*—leg setae.

SYSTEMATICS

Superfamily **Galumnoidea**

Family **Galumnidae**

Genus ***Allogalumna* Grandjean, 1936**

Type species ***Galumna alamellae* Jacot, 1935**

***Allogalumna oromiaensis* Ermilov sp.n.**

(Figs. 1–18)

Diagnosis. Body size: 796–879×581–630. Rostrum rounded. Rostral, lamellar and interlamellar setae long, setiform, *ro* and *le* smooth, *le* shortest, *in* longest and barbed. Bothridial setae with long stalk and small, lanceolate, barbed head. Dorsosejugal suture complete. Notogaster with 10 pairs of microsetae and three pairs of small, rounded porose areas (*A2* absent). Median pore and postanal porose area absent. Epimeral and anogenital setae short, setiform, thin, slightly barbed.

Description. Measurements. Large species. Body length: 830 (holotype, female), 796–879 (five paratypes, three females and two males); notogaster width: 597 (holotype), 581–630 (five paratypes). No distinct differences between females and males in body size.

Integument (Figs. 13–16). Body color light brown. Body surface punctate (visible under high magnification). Lateral parts of prodorsum (posterior to insertions of rostral setae), lateral parts of epimere I and dorsoantial part of all leg femora and trochanters III, IV with rounded or elongated tubercles. In addition, leg trochanters III, IV striate.

Regions between bothridia and acetabula I, II slightly microgranulate.

Prodorsum (Figs. 1, 2, 17). Rostrum rounded. Sublamellar lines thin, curving backwards. Lateral structures *N* and ridges *E* and *T* well-developed. Rostral (57–57) and lamellar (32–36) setae setiform, smooth. Interlamellar setae (110–123) setiform, barbed. Bothridial setae (123–131) with long stalk and small, lanceolate, barbed head. Exobothridial setae and their alveoli absent. Dorsosejugal porose areas present, diffuse, directed posterolateral to interlamellar setae. Dorsophragmata slightly elongated longitudinally.

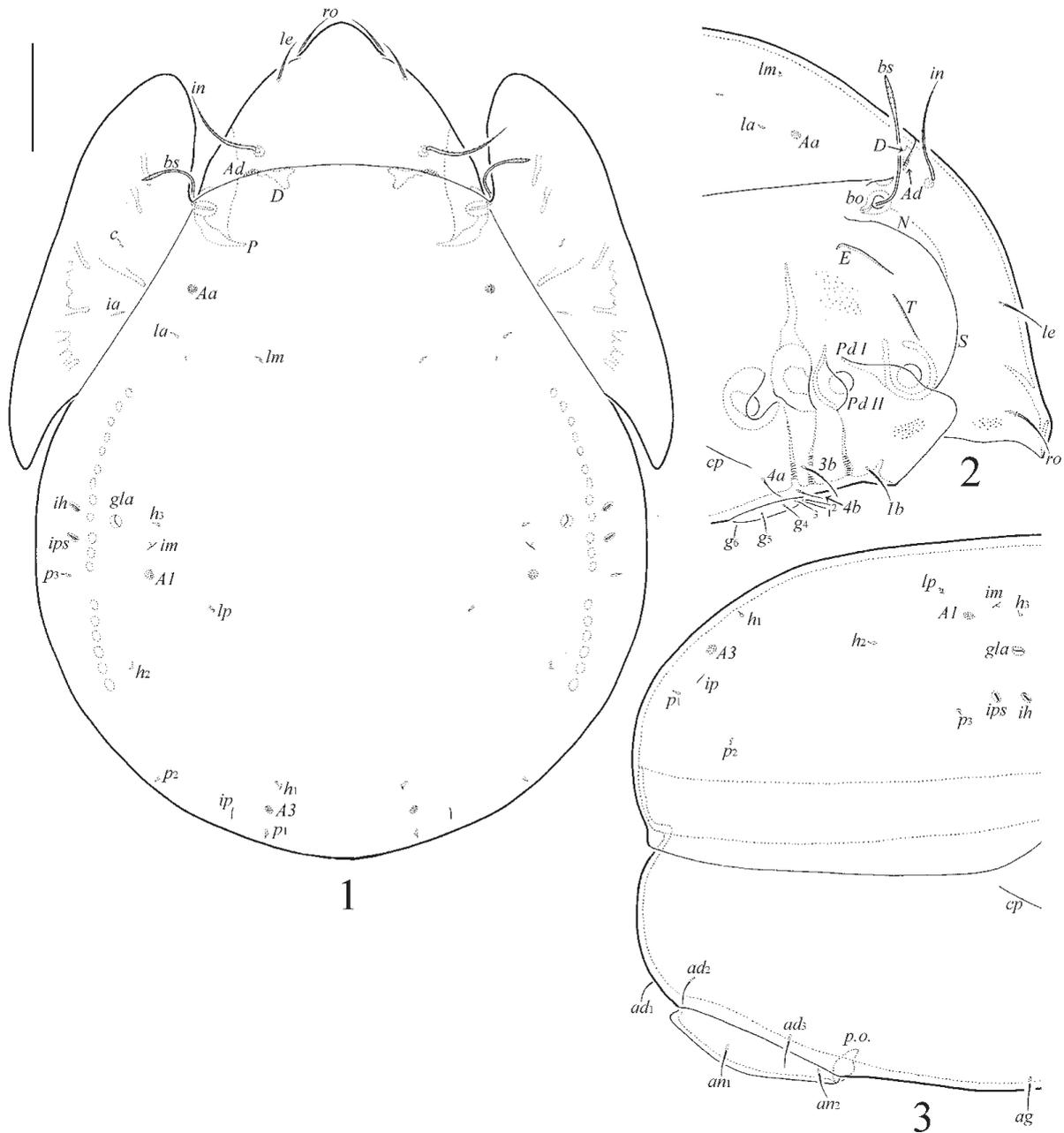
Notogaster (Figs 1–3, 5, 18). Dorsosejugal suture complete. With 10 pairs of microsetae (1–2) and three pairs of small, rounded porose areas (*Aa*, *Al*, *A3*, 10–16). Porose areas *Aa* located close to pteromorphical hinges, anterior to *la*. Median pore absent in females and males. Opisthonotal gland openings and all lyrifissures distinct; *gla* located anterolateral to *Al*, *im* anterior and close to *Al*, *ip* lateral to *p*₁, *ih* and *ips* close to each other, anterior to *p*₃.

Gnathosoma (Figs. 6–8). Subcapitulum size: 164–168×131–135. Three pairs of subcapitular setae setiform, *m* (28–32) and *h* (36–41) thin, barbed, *a* (36–41) thicker, roughened. Adoral setae (16–20) setiform, densely barbed. Length of palps: 123–127. Postpalpal setae (4) thorn-like. Length of chelicerae: 209–217. Cheliceral setae (*cha*, 69–73; *chb*, 45) setiform, barbed. Trägårdh's organ long, elongate triangular.

Epimeral and lateral podosomal regions (Figs. 2, 4). Anterior tectum of epimere I smooth. Pedotecta I and II rounded in ventral view. Discidia triangular. Circumpedal carinae of medium size, thin, reaching of level of acetabula IV. Epimeral setal formula 1–0–1–2. Epimeral setae setiform, thin, slightly barbed, *1b* and *3b* (36–41) longer than *4a* and *4b* (24–28).

Anogenital region (Figs. 2–5). Six pairs of genital (*g*₁, *g*₂, 24–28; *g*₃–*g*₆, 20–24), one pair of aggenital (24–28), two pairs of anal (24–28) and three pairs of adanal (24–28) setae setiform, thin, slightly barbed. Anterior edge of genital plates with two setae. Aggenital setae located closer to genital aperture than to anal aperture. Adanal lyrifissures located close and parallel to anal plates. Adanal setae *ad*₁ and *ad*₂ posterior, *ad*₃ lateral to anal plates. Postanal porose area absent.

Legs (Figs. 9–12). Median claw distinctly thicker than lateral claws, all barbed on dorsal sides. Porose areas on all femora and on trochanters III, IV clearly visible. Formulas of leg setation and



Figs. 1–3. *Allogalumna oromiaensis* Ermilov sp.n., adult: 1—dorsal view; 2—anterior part of body (gnathosoma, pteromorph and legs not shown), lateral view; 3—posterior part of body (pteromorph not shown), lateral view. Scale bar=100 μ m.

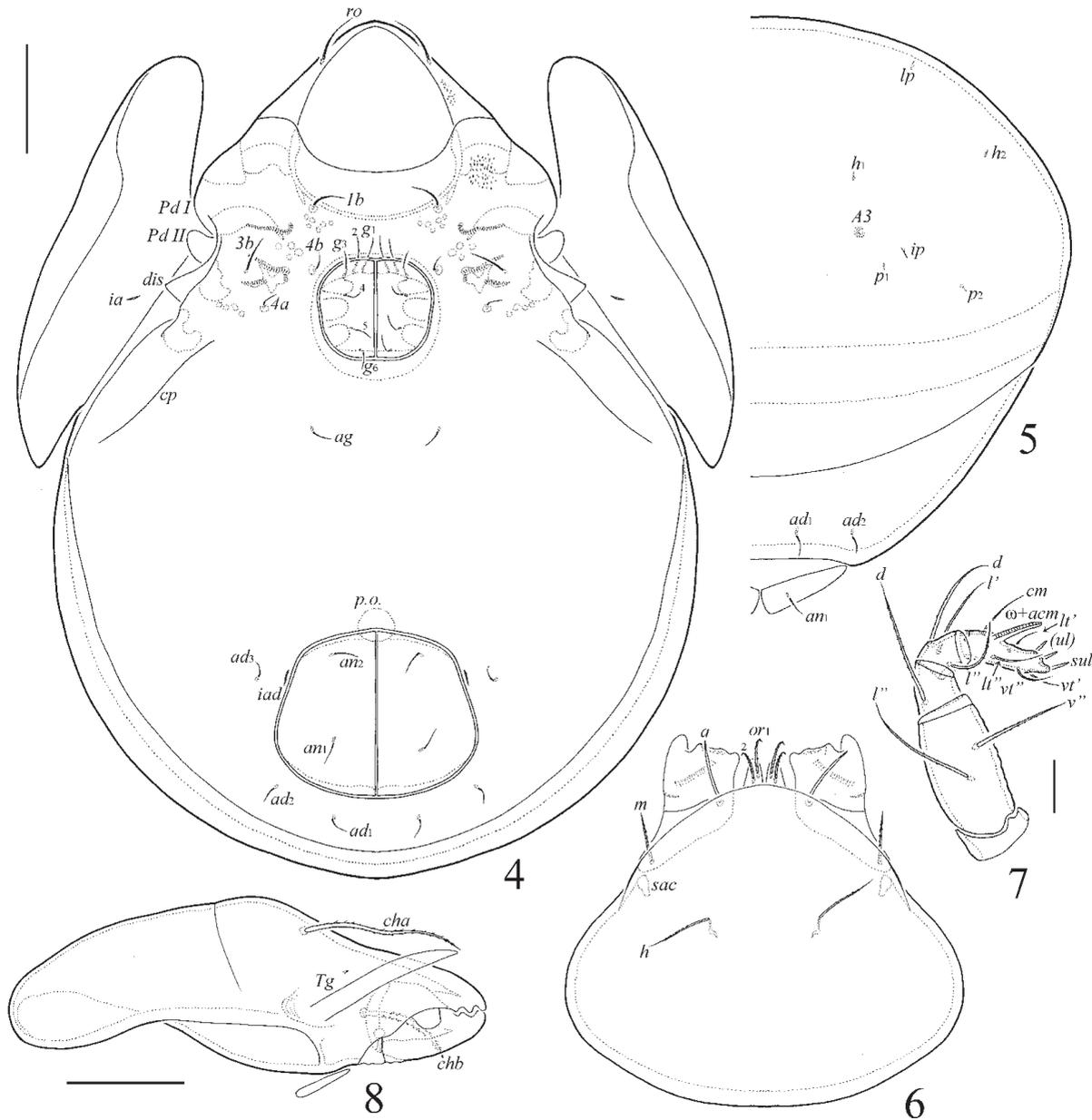
solenidia: I (1–4–3–4–20) [1–2–2], II (1–4–3–4–15) [1–1–2], III (1–2–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homologies of setae and solenidia indicated in Table 1. Famulus on tarsi I inserted anteriorly to solenidion ω_1 . Solenidion on tibiae IV inserted in anterior part of the segment.

Material examined. Holotype and five paratypes: Ethiopia, Oromia region, Kelam Welega Zone, near the Dembidollo-Gambelara road, 08°36'02.1"N, 034°36'47.9"E, 1,612 m a.s.l., deciduous evergreen forest patch with coffee under-

growth, on the slope of a mountain, on mollic Nitisols, litter, November 7th, 2017 (L.B. Rybalov).

Type deposition. The holotype is deposited in the collection of Senckenberg Institute, Görlitz, Germany; five paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. All in ethanol with a drop of glycerol.

Etymology. The specific name *oromiaensis* refers to the Oromia region in Ethiopia, where the type material was collected.



Figs. 4–8. *Allogalumna oromiaensis* Ermilov sp.n., adult: 4—ventral view (gnathosoma and legs not shown); 5—posterior view (left half not shown); 6—subcapitulum, ventral view; 7—palp, right, antiaxial view; 8—chelicera, left, paraxial view. Scale bars=100 μ m (4, 5), 50 μ m (6, 8), 20 μ m (7).

Differential diagnosis. *Allogalumna oromiaensis* Ermilov sp.n. is morphologically similar to *Allogalumna abrupta* (Hammer, 1972) from Tahiti (see Hammer 1972) in having long rostral, lamellar and interlamellar setae and three pairs of rounded notogastral porose areas. However, *A. oromiaensis* differs from *A. abrupta* in having lanceolate bothridial setae (vs. setiform) and in having a complete dorsosejugal suture (vs. interrupted).

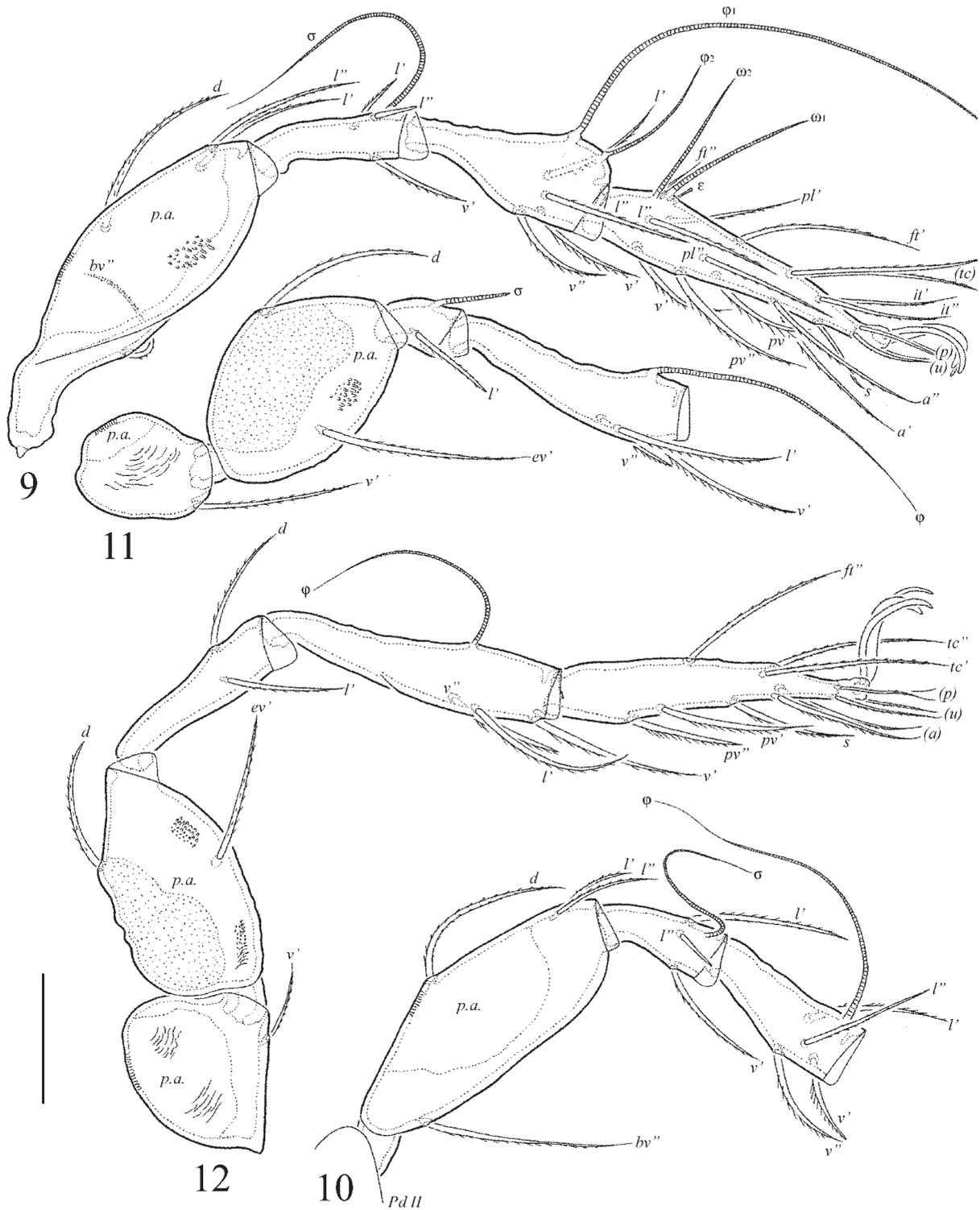
Also, the new species is similar to *Allogalumna bipartita* (Aoki et Hu, 1993) from the Oriental region (see Aoki and Hu 1993; Ermilov and Leong

2017) in having long rostral, lamellar and interlamellar setae, rounded notogastral porose areas and lanceolate bothridial setae. However, *A. oromiaensis* differs from *A. bipartita* in having three pairs of notogastral porose areas *Aa*, *A1*, *A3* (vs. five pairs, including *A2* and divided *Aa*) and in having a dorsosejugal suture (vs. interrupted).

NEW RECORDS

Ululohmannia cristata (Mahunka, 1984): 2 ex. Distribution: Tanzania.

Malaconothrus aureopunctatus Hammer, 1979: 5 ex. Distribution: Indonesia, Brazil.



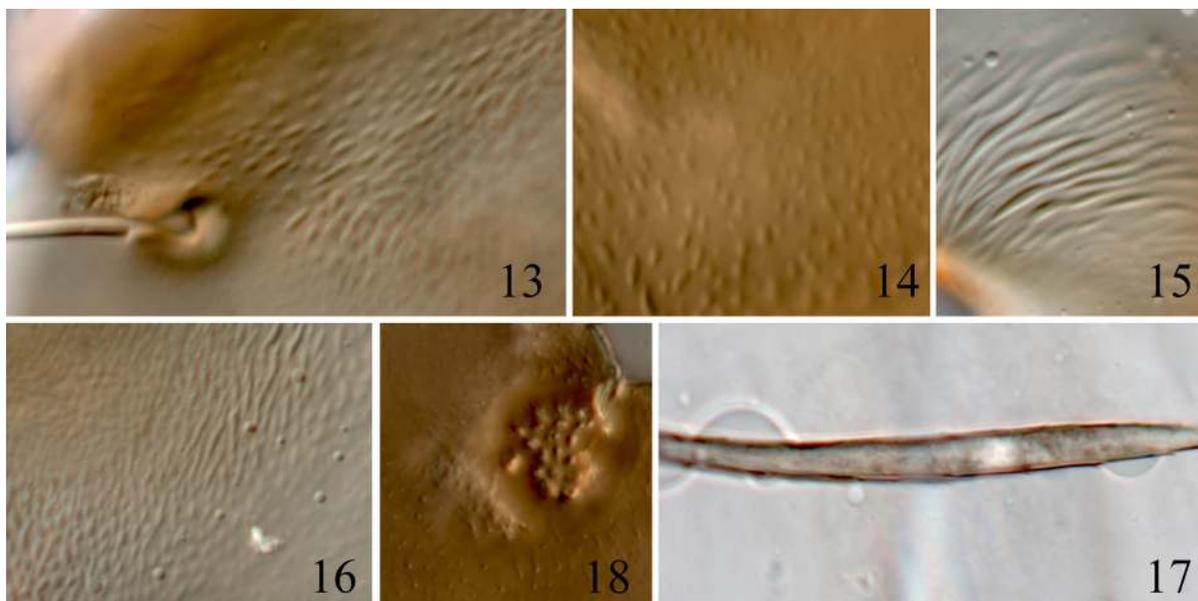
Figs. 9–12. *Allogalumna oromiaensis* Ermilov sp.n., adult: 9—leg I, without trochanter, right, antiaxial view; 10—leg II, without tarsus, right, antiaxial view; 11—leg III, without tarsus, left, antiaxial view; 12—leg IV, left, antiaxial view. Scale bar=50 μ m.

Wallworkoppia directa (Mahunka and Mahunka-Papp, 2007): 2 ex. Distribution: Kenya.

Suctobelbella (*Flagrosuctobelba*) *kontschani* (Mahunka and Mahunka-Papp, 2007): 2 ex. Distribution: Kenya.

Tectocepheus minor Berlese, 1903: 8 ex. Distribution: Semicosmopolitan.

Hammerabates nasalis Mahunka, 1983: 4 ex. Distribution: Ethiopian and Subantarctic regions.



Figs. 13–18. *Allogalumna oromiaensis* Ermilov sp.n., adult: 13—sculpturing near insertion of rostral seta; 14—sculpturing of antiaxial side of leg femur II; 15—sculpturing of antiaxial side of leg trochanter III; 16—sculpturing of epimere I; 17—head of bothridial seta; 18—notogastral porose area AI.

Heterogalumna lineolata Balogh, 1960: 4 ex. Distribution: Congo.

Malaconothrus aureopunctatus and *Tectocephus minor* are recorded for the first time in the Ethiopian region. The other five species, as well as the genera *Ululohmannia* Mahunka, 1987, *Hammerabates* Balogh, 1970 and *Heterogalumna* Balogh, 1960, are recorded for the first time in Ethiopia.

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Leg setation and solenidia of adult *Allogalumna oromiaensis* Ermilov sp.n.

Leg	Tr	Fe	Ge	Ti	Ta
I	v'	d, (l), bv''	(l), v', σ	(l), (v), φ ₁ , φ ₂	(ft), (tc), (it), (p), (u), (a), s, (pv), v', (pl), l'', ε, ω ₁ , ω ₂
II	v'	d, (l), bv''	(l), v', σ	(l), (v), φ	(ft), (tc), (it), (p), (u), (a), s, (pv), ω ₁ , ω ₂
III	v'	d, ev'	l', σ	l', (v), φ	(ft), (tc), (it), (p), (u), (a), s, (pv)
IV	v'	d, ev'	d, l'	l', (v), φ	ft'', (tc), (p), (u), (a), s, (pv)

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.