ADDITIONS TO THE ORIBATID MITE FAUNA (ACARI, ORIBATIDA) OF ETHIOPIA, WITH REMARKS ON SOME SPECIES OF GALUMNIDAE

Luis S. Subías[1], Sergey G. Ermilov[2*], Umukusum Ya. Shtanchaeva[1] and Leonid B. Rybalov[3]

[1]Complutense University, Madrid, Spain
[2]X-BIO Institute, Tyumen State University, Tyumen, Russia
[3]A.N. Severtsov Institute of Ecology and Evolution, Moscow, Russia
[*]corresponding author; e-mail: ermilovacari@yandex.ru

ABSTRACT: This study is based on the oribatid mite material collected in Ethiopia in 2020. A list of identified taxa, including 38 species from 29 genera and 20 families, is provided. Of these, six species are recorded for the first time in the Afrotropical region, and five species are recorded for the first time in Ethiopia. Supplementary descriptions and illustrations, as well as taxonomic data on two species of the family Galumnidae (*Galumna lanceosensilla* Ermilov, Sidorchuk and Rybalov, 2011 and *Taeniogalumna behanae* Ermilov, Sidorchuk and Rybalov, 2010) are presented.

KEY WORDS: List of taxa, new record, taxonomy, morphology, *Galumna lanceosensilla*, *Taeniogalumna behanae*, Afrotropical region.

DOI: 10.21684/0132-8077-2021-29-1-11-16

INTRODUCTION

This work is based on the oribatid mite material (Acari, Oribatida) collected in the course of the Joint Russian–Ethiopian Biological Expedition in the Amhara Region, Semien Shewa Zone, near Debre Berhan, Ethiopia in March, 2020. The primary goal of our paper is to present a list of the identified taxa with notes on the new records.

Our secondary goal is to update the main morphological traits of two species of the family Galumnidae: *Galumna lanceosensilla* Ermilov, Sidorchuk and Rybalov, 2011 and *Taeniogalumna behanae* Ermilov, Sidorchuk and Rybalov, 2010. Both species were described by Ermilov *et al*. (2010, 2011, respectively). However, the original descriptions are not complete. Therefore, we add new figures and information on some diagnostic morphological structures, which will help with the identification of these species in the future.

MATERIALS AND METHODS

Specimens. Substrate samples (litter) containing oribatid mites were collected using a stainless-steel frame (50×50 cm) with a sieve (mesh size 2×2 cm) from the following locality: Ethiopia, Amhara Region, Semien Shewa Zone, near Debre Berhan, 10°17′38.7″ N, 039°54′3.2″ E, 2890 m a.s.l., *Juniperus* forest, March 17, 2020 (collected by L.B. Rybalov). Mites were extracted into 75% ethanol using Berlese's funnels with electric lamps in laboratory conditions. The identified material has been deposited in the Tyumen State University Museum of Zoology, Tyumen, Russia.

Observation and documentation. 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 notogaster. Notogastral width refers to the maximum width of the notogaster in dorsal view. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers (μm). Formulas for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus 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 DM 2500 transmission light microscope.

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

Abbreviations. *Prodorsum*: *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 seta, respectively; *Ad*—dorsosejugal porose area; *D*—dorsophragma; *P*—pleurophragma. *Notogaster*: *c*, *la*, *lm*, *lp*, *h*, *p*—setal alveoli; *Aa*, *A1*, *A2*, *A3*—porose areas; *ia*, *im*, *ip*, *ih*, *ips*—lyrifissures; *gla*—opisthonotal gland opening. *Epimeral and lateral podosomal regions*: *eb*—epimeral band; *1a*, *1b*, *3b*, *3c*, *4a*, *4b*, *4c*—epimeral setae; *PdI*, *PdII*—pedotectum I, II, respectively; *dis*—discidium; *cpc*—circumpedal carina. *Anogenital region*: *g*, *ag*, *an*, *ad*—genital, aggenital, anal and adanal seta, re-

spectively; *iad*—adanal lyrifissure; *po*—preanal organ.

LIST OF IDENTIFIED TAXA*

Brachychthoniidae

Liochthonius tyrrhenicus Bernini, 1985: 6 ex. Distribution: western Mediterranean. New record of the species in the Afrotropical region.

Liochthonius perelegans Moritz 1976: 1 ex. Distribution: central and western Europe. New record of the species in the Afrotropical region.

Nothridae

Nothrus crassisetus Mahunka 1982: 11 ex. Distribution: Ethiopia.

Crotoniidae

Camisia horrida (Hermann, 1804): 11 ex. Distribution: Holarctic, northern Oriental and northern Neotropical regions, Ethiopia.

Heminothrus glaber Mahunka, 1984: 2 ex. Distribution: Afrotropical region.

Licnodamaeidae

Lyrifissiella africana (Pletzen, 1963): 5 ex. Distribution: Afrotropical region.

Aleurodamaeidae

Aleurodamaeus recenfesevpi Ermilov and Rybalov 2012: >20 ex. Distribution: Ethiopia.

Damaeidae

Metabelba platynota Grandjean, 1954: 2 ex. Distribution: southern Europe. New record of the species in the Afrotropical region.

Metabelba sphagni Strenzke, 1950: 1 ex. Distribution: Euro-Atlantic. New record of the species in the Afrotropical region.

Liacaridae

Liacarus coracinus (Koch, 1841): 5 ex. Distribution: Palaearctic and Afrotropical regions.

Liacarus paratanzicus Ermilov, Rybalov and Kemal, 2011: 1 ex. Distribution: Ethiopia.

Eremulidae

Eremulus flagellifer Berlese, 1908: 8 ex. Distribution: Cosmopolitan. New record of the species in Ethiopia.

Dameolidae

Fosseremus laciniatus (Berlese 1904): 12 ex. Distribution: Cosmopolitan.

Eremobelbidae

Eremobelba tuberculata Mahunka, 1982: 13 ex. Distribution: Ethiopia.

Oppiidae

Arcoppia rugosa (Mahunka 1974): >20 ex. Distribution: Afrotropical region.

Helioppia sol (Balogh 1959): 3 ex. Distribution: Afrotropical region, Vietnam.

Machuella ventrisetosa zehntneri Mahunka, 1977: 1 ex. Distribution: Oriental and Afrotropical regions. New record of the subspecies in Ethiopia.

Neoamerioppia africana (Kok, 1967): >20 ex. Distribution: Afrotropical and Sub-Antarctic regions.

Neoamerioppia csabai Mahunka and Mahunka-Papp 2007: 12 ex. Distribution: Afrotropical region.

Suctobelbidae

Suctobelbella (*Flagrosuctobelba*) *elegantula* (Hammer, 1958): 2 ex. Distribution: Tropical and Subtropical regions. New record of the species in Ethiopia.

Suctobelbella (*Ussuribata*) cf. *flagellata* (Balogh, 1959): 3 ex. Distribution: Afrotropical region. New record of the species in Ethiopia.

Suctobelbella (*Ussuribata*) *spirochaeta* Mahunka 1983: 7 ex. Distribution: Afrotropical region, Japan.

Suctobelbila fonticula Hammer, 1975: >20 ex. Distribution: Algeria, Afrotropical region. New record of the species in Ethiopia.

Dampfiellidae

Beckiella opposita Mahunka, 1982: 2 ex. Distribution: Ethiopia.

Tectocepheidae

Tectocepheus velatus (Michael 1880): >20 ex. Distribution: Cosmopolitan.

Scutoverticidae

Scutovertex granulatus Mihelčič, 1957: 1 ex. Distribution: southern Palaearctic region. New record of the species in the Afrotropical region.

Eremaeozetidae

Mahunkaia sp.: 1 ex.

Phenopelopidae

Eupelops occultus (Koch, 1835) "sensu" Pérez-Íñigo (1993): 5 ex. Distribution: Palaearctic region. New record of the species in the Afrotropical region.

Ceratozetidae

Melanozetes sp.: >20 ex.

Punctoribatidae

Antarctozetes cf. *depilatus* (Berlese, 1910): 7 ex. Distribution: Afrotropical region.

Scheloribatidae

Scheloribates discifer Balogh, 1959: 2 ex. Distribution: Afrotropical region.

*Distribution: mostly from Subías (online version 2021). Ptyctimous mites: not included.

Scheloribates latipes (Koch 1844): 6 ex. Distribution: Semicosmopolitan.

Scheloribates maximus Balogh, 1962: 2 ex. Distribution: Afrotropical region.

Scheloribates pallidulus (Koch 1841): 2 ex. Distribution: Cosmopolitan.

Perscheloribates ethiopicus (Mahunka 1986): 1 ex. Distribution: Afrotropical region.

Galumnidae

Galumna lanceosensilla Ermilov, Sidorchuk and Rybalov, 2011: 12 ex. Distribution: Afrotropical region.

Taeniogalumna behanae Ermilov, Sidorchuk and Rybalov, 2010: >20 ex. Distribution: Ethiopia.

Trichogalumna nipponica (Aoki, 1966): 1 ex. Distribution: Semicosmopolitan.

Hence, we have found 38 species/subspecies from 29 genera and 20 families. Of these, five species are recorded for the first time in Ethiopia; six species are recorded for the first time in the Afrotropical region.

SYSTEMATICS

Galumna lanceosensilla Ermilov, Sidorchuk and Rybalov, 2011

Figs. 1–4

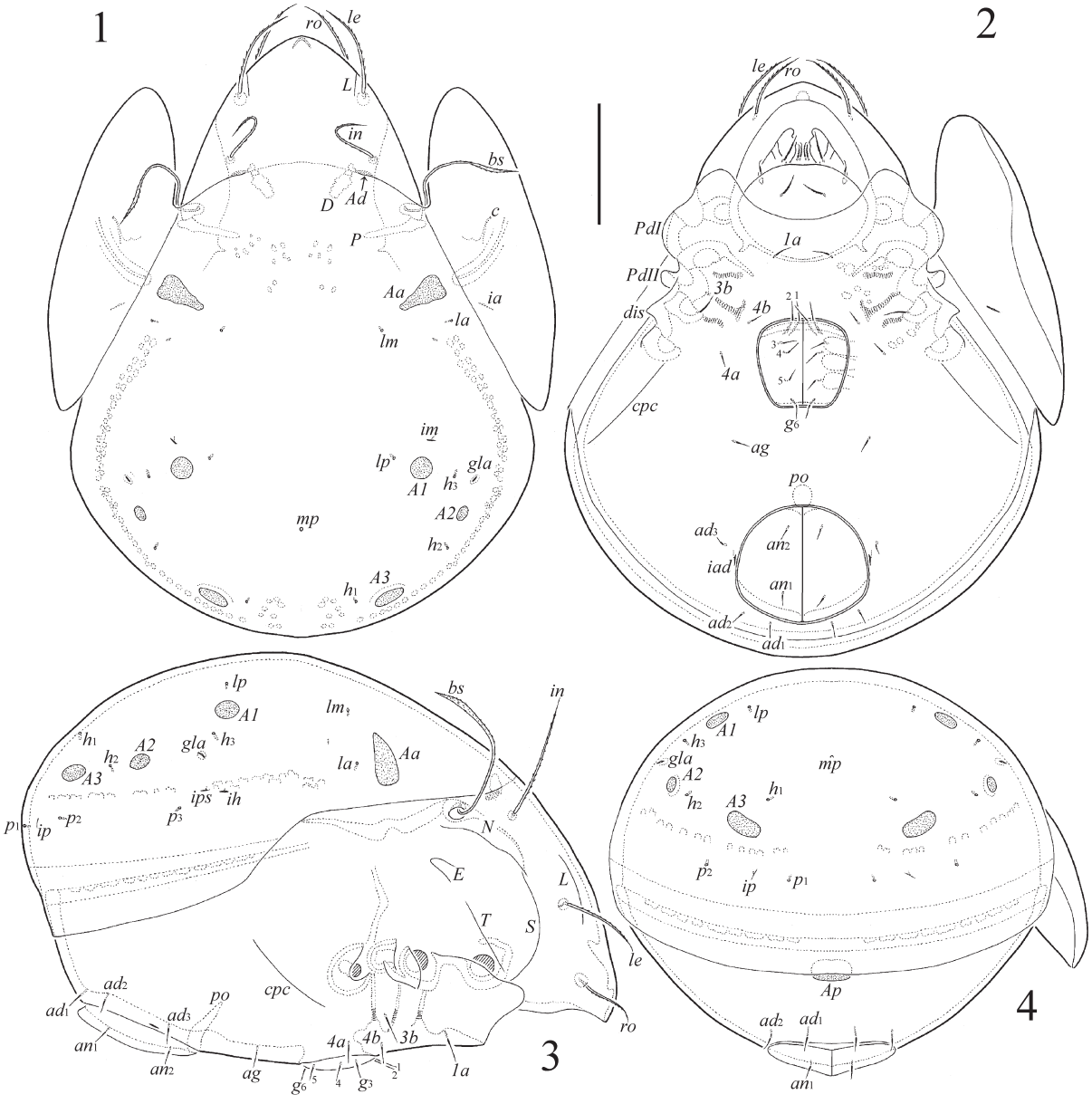
Main morphological traits. *Measurements*. Body color brown. Body length about 460–570. *Integument*. Surface of prodorsum, notogaster and ventral side without sculpturing and ornamentation. *Prodorsum*. Rostrum rounded. Lamellar line short, thin, straight, located dorsally on prodorsum; sublamellar line long, thin, curving backwards. Rostral, lamellar and interlamellar setae long, setiform, barbed; *ro* shortest, *in* longest. Bothridial seta long, narrowly lanceolate, barbed. Dorsosejugal porose area oval, located posteriorly to insertion of interlamellar seta. Dorsophragma distinctly elongated longitudinally. *Notogaster*. Dorsosejugal suture complete, but usually hardly visible medially. Ten pairs of setal alveoli (*c*, *la*, *lm*, *lp*, h_1–h_3 and p_1–p_3). Four pairs of porose areas (*Aa*, *A1*, *A2* and *A3*); *Aa* triangular or boot-shaped, others rounded or oval; *Aa* located close to pteromorphal hinge and anteriorly to setal alveolus *la*. Median pore present between porose areas *A2*. Opisthonotal gland opening located laterally to *A1*. Lyrifissure *im* located close and anteriorly to *A1*; *ip* between p_1 and p_2, slightly closer to the former; *ih* and *ips* close to each other, anteriorly to p_3. *Gnathosoma*. All subcapitular setae (*a*, *m* and *h*) setiform, slightly barbed; *a* longest, *m* shortest. *Epimeral and lateral podosomal regions*. Epimeral setal formula: 1–0–1–2; setae (*1a*, *3b*, *4a* and *4b*) short setiform, thin, roughened to slightly barbed; *1a* and *3b* longer than *4a* and *4b*. Circumpedal carina comparatively short, distinctly not reaching of insertion of *3b*. *Anogenital region*. Genital, aggenital, anal and adanal setae short, setiform, thin, smooth to roughened; g_1 and g_2 longer than others. Anterior edge of genital plate with two setae. Aggenital seta located between genital and anal apertures, slightly closer to the former. Adanal setae ad_1 and ad_2 posteriorly, ad_3 laterally to anal plate. Distance ad_1–ad_2 shorter than ad_2–ad_3. Adanal lyrifissure located close and parallel to anal plate. Postanal porose area large, oval. *Legs*. Chaetome is typical for Galumnidae.

Taeniogalumna behanae Ermilov, Sidorchuk and Rybalov, 2010

Figs. 5–8

Main morphological traits. *Measurements*. Body color brown to dark brown. Body length about 410–470. *Integument*. Surface of prodorsum, notogaster and ventral side densely microgranulate (visible only under high magnification). *Prodorsum*. Rostrum rounded. Lamellar and sublamellar lines long, thin, parallel, curving backwards. Rostral, lamellar and interlamellar setae short, setiform, smooth to roughened; *ro* longest*, *le* slightly longer than *in*. Bothridial seta long, setiform, with shortly ciliate unilaterally in middle-distal part. Dorsosejugal porose area absent. Dorsophragma distinctly elongated longitudinally. *Notogaster*. Dorsosejugal suture complete, distinct. Ten pairs of setal alveoli (*c*, *la*, *lm*, *lp*, h_1–h_3 and p_1–p_3). Three pairs of rounded porose areas (*Aa*, *A1* and *A3*); *Aa* larger than others, located close to pteromorphal hinge and anteriorly to setal alveolus *la*. Median pore absent. Opisthonotal gland opening and lyrifissure *im* located close to each other and laterally to *A1*. Lyrifissure *ip* located between p_1 and p_2, closer to the former, or posteriorly/posterolaterally to p_1; *ih* and *ips* close to each other, located anteriorly to p_3. *Gnathosoma*. All subcapitular setae (*a*, *m* and *h*) setiform, smooth to roughened; *a* longer than others.

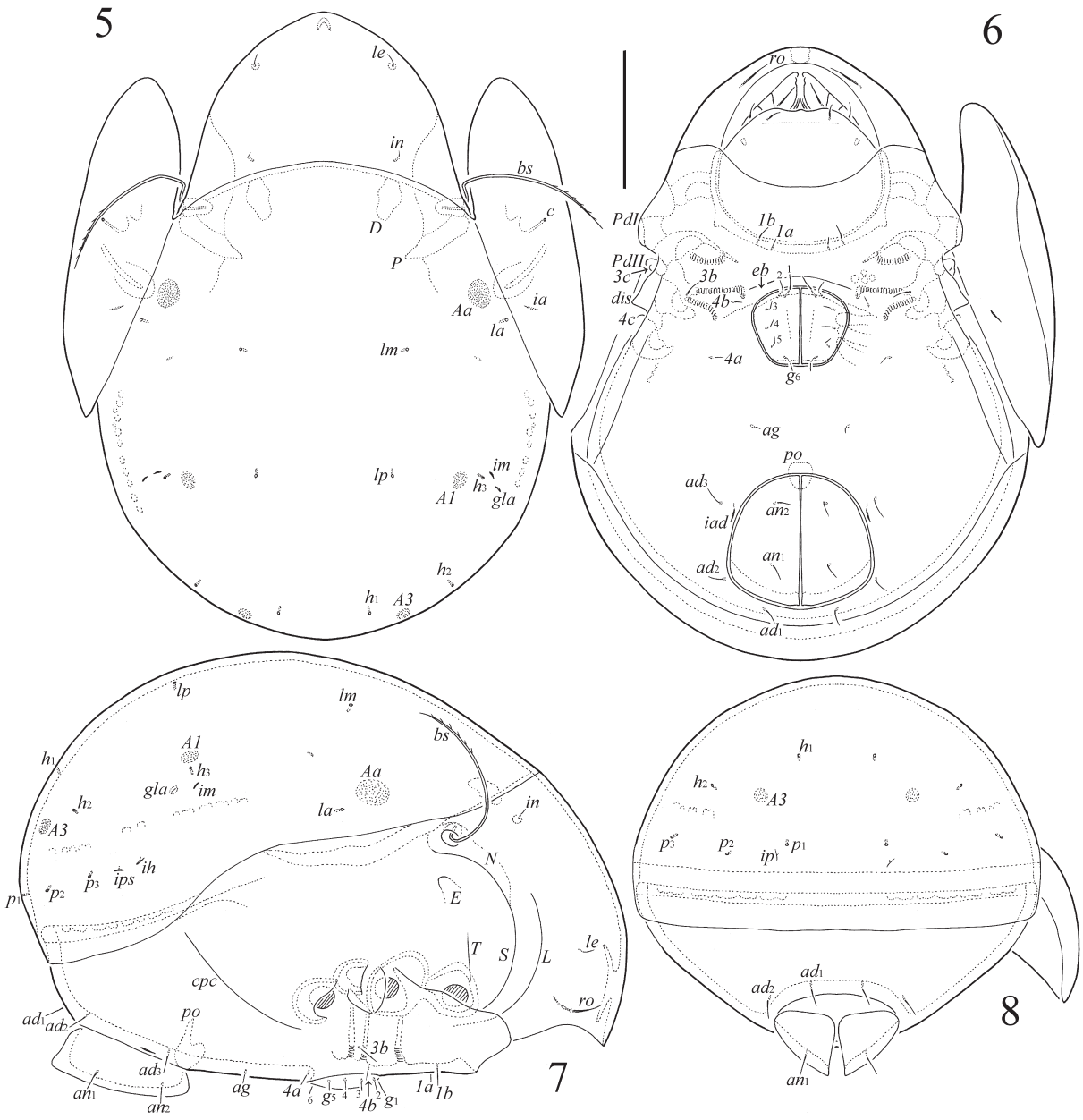
*Ermilov *et al.* (2010) described rostral, lamellar and interlamellar setae of the same length; however, an additional examination of the materials of *T. behanae* showed that this statement was incorrect. Really, *ro* is longer than others.



Figs. 1–4. *Galumna lanceosensilla* Ermilov, Sidorchuk and Rybalov, 2011, adult: 1—dorsal view; 2—ventral view (not shown: right pteromorph and legs); 3—right lateral view (not shown: pteromorph, gnathosoma and legs); 4—posterior view (not shown: left pteromorph); Scale bar=100 μm.

Epimeral and lateral podosomal regions. Transverse pigmented band well-developed or indistinct. Epimeral setal formula: 2[or 1; if *1a* absent]–0–2–3; setae (*1a*, *1b*, *3b*, 3c, *4a*, *4b* and *4c*) short setiform, thin, smooth to roughened; *1b* and *3b* longer than others. Circumpedal carina comparatively short, distinctly not reaching insertion of *3b*. *Anogenital region*. Genital, aggenital, anal and adanal setae short, setiform, thin, smooth to roughened; anal and adanal setae longer than others. Anterior edge of genital plate with two setae. Aggenital seta located between genital and anal apertures, equally distant from them. Adanal setae ad_1 and ad_2 posteriorly, ad_3 laterally to anal plate. Distance ad_1–ad_2 shorter than ad_2–ad_3. Adanal lyrifissure located close and parallel to anal plate. Postanal porose area absent. *Legs*. Chaetome is typical for Galumnidae. Seta *v'* on femur I very short.

Remarks. *Taeniogalumna behanae* was described by Ermilov, Sidorchuk and Rybalov (2010) and included in the genus *Taeniogalumna* Balogh, 1962, based on the presence of a well-developed transverse pigmented (dark brown) epimeral band (main generic character). However, this feature is invisible or partially visible (in median part, before



Figs. 5–8. *Taeniogalumna behanae* Ermilov, Sidorchuk and Rybalov, 2010, adult: 5—dorsal view; 6—ventral view (not shown: right pteromorph and legs); 7—right lateral view (not shown: pteromorph, gnathosoma and legs); 8—posterior view (not shown: left pteromorph); Scale bar=100 μm.

genital aperture) in new specimens from Amhara Region, Semien Shewa Zone, near Debre Berhan. This morphological nuance illustrates the similarity between *T. behanae* and the representatives of the genus *Pergalumna* Grandjean, 1936, especially with *Pergalumna tanzanica* Mahunka, 1984. Such similarity is observed in many traits: e.g., body of medium size; rostral, lamellar and interlamellar setae comparatively short; bothridial seta setiform, ciliate unilaterally; dorsosejugal porose area absent; dorsosejugal suture present; three pairs of rounded notogastral porose areas; median pore absent.

Taeniogalumna behanae can be distinguished from *P. tanzanica* in the following: 1) the localization of notogastral porose area *Aa* (close to pteromorphal hinge in *T. behanae vs.* removed from hinge in *P. tanzanica*); 2) localization of subcapitular seta *h* (close to anterior margin of mentum in *T. behanae vs.* removed from anterior margin of mentum in *P. tanzanica*); 3) the morphology of bothridial seta (shortly ciliate in the middle-distal part in *T. behanae vs.* cilia longer, completely covering the seta in *P. tanzanica*); and 4) the length of anal and adanal setae (comparatively long in *T. behanae vs.* minute in *P. tanzanica*).

ACKNOWLEDGEMENTS

This work was performed within the framework of the Joint Russian–Ethiopian Biological Expedition, financially supported by the Russian Academy of Sciences. This research was partially supported by a grant from the Russian Science Foundation (project No. 19-14-00004).

REFERENCES

Ermilov, S.G. and Klimov, P.B. 2017. Generic revision of the large-winged mite superfamily Galumnoidea (Acari, Oribatida) of the world. *Zootaxa*, 4357(1): 1–72.

Ermilov, S.G., Sidorchuk, E.A. and Rybalov, L.B. 2010. New species of oribatid mites of the superfamily Galumnoidea (Acari: Oribatida) from Ethiopia. *Zootaxa*, 2646: 43–62.

Ermilov, S.G., Sidorchuk, E.A. and Rybalov, L.B. 2011. Three new species of oribatid mites (Acari: Oribatida: Galumnoidea) from Ethiopia. *International Journal of Acarology*, 37 (Supplement 1): 2–17.

Subías, L.S. 2021. Listado sistemático, sinonímico y biogeográfico de los Ácaros Oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles), 16ª actualización. 532 pp. bba.bioucm.es/cont/docs/RO_1.pdf