Persian J. Acarol., 14 (4): 140411.

Research Article https://biotaxa.org/pja https://doi.org/10.22073/pja.v14i4.87545

Taxonomic contribution to knowledge of the oribatid mite genus *Trichogalumna* (Acari, Oribatida, Galumnidae)

Sergey G. Ermilov

University of Tyumen, X-BIO Institute, Tyumen, Russia; E-mail: ermilovacari@yandex.ru

http://zoobank.org/urn:lsid:zoobank.org:pub:0379530D-6786-4BE3-8FD2-113150A8797E

Received: 08 August, 2025
Accepted: 20 September, 2025
Published: 15 October, 2025
Subject Editor: *O. Joharchi*

ABSTRACT

Trichogalumna (Oribatida, Galumnidae) currently comprises two subgenera and 34 species, collectively distributed in the pantropical and subtropical areas. A new subgenus—*Trichogalumna* (*Paratrichogalumna*) **subgen. nov.**, with *T. punctata* Engelbrecht, 1972 as type species—is proposed. It differs from the other subgenera of *Trichogalumna* by the location of the adanal lyrifissure (distinctly distanced from anal plate). One new species—*T.* (*T.*) *giaensis* **sp. nov.**—is described, based on adults collected from forest litter in central Vietnam. The new species is characterized mainly by small body size; sparsely striate pteromorphs; dense polygonate-foveolate ornamentation in dorsocentral region of the notogaster; dense polygonate-tuberculate sculpturing between genital and anal plates; long bothridial seta with lanceolate, barbed head, having distinct, acicular apex; and four pairs of small, circular porose areas. The following synonymy is suggested: *Trichogalumna* (*Trichogalumna*) *trowella* Nakamura, Nakamura & Fujikawa, 2013 (= *Trichogalumna gotoensis* Shirosaki, Nakamura & Fujikawa, 2017 **syn. nov.**). An identification key to the known species of *Trichogalumna* is provided.

KEYWORDS

Galumnid mites, identification key, morphology, Oriental region, taxonomy

CITE: Ermilov, S.G. (2025) Taxonomic contribution to knowledge of the oribatid mite genus *Trichogalumna* (Acari, Oribatida, Galumnidae). *Persian Journal of Acarology*, 14(4): 140411. https://doi.org/10.22073/pja.v14i4.87545

INTRODUCTION

The oribatid mite genus *Trichogalumna* (Acari, Oribatida, Galumnidae) was proposed by Balogh (1960), with *Pilogalumna lunai* Balogh, 1958 as type species. At present, the genus comprises 34 species, belonging to two subgenera (nominate subgenus, with 33 species, and *Trichogalumna* (*Tanzanycha*) Koçak & Kemal, 2008, with one species). Subías (2022, online version 2024) also included *Sarawakiella* Mahunka, 1996 (in 1996*b*) as subgenus within *Trichogalumna*, however, the former is characterized by the complex morphological character states that distinguish it from the latter at the generic level (Ermilov 2025). The generic diagnosis of *Trichogalumna* was revised by Ermilov and Klimov (2017). Identification keys to selective species of the genus have been presented by Ohkubo (1984), Villagomez and Palacios-Vargas (2013), and Hagino *et al.* (2017). Representatives of *Trichogalumna* collectively distributed in the pantropical and subtropical areas (Subías 2022, online version 2024) and prefer to live mainly in forest soil-litter and various microbiotopes (e.g., Ohkubo 1984; Corpuz-Raros and Ermilov 2020).

The sampled oribatid mite materials from the Kon Chu Rang Nature Reserve (southern Vietnam) included the specimens of a new species of *Trichogalumna*. The main goal of the present paper is to propose a new subgenus, *Trichogalumna* (*Paratrichogalumna*) **subgen. nov.**, describe a new species, *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.**, and to present identification key to the 35 known species of the genus.

The sampled oribatid mite materials from the Kon Chu Rang Nature Reserve (southern Vietnam)

included the representatives of a new species of *Trichogalumna*. The main goal of the present paper is to propose a new subgenus, *Trichogalumna* (*Paratrichogalumna*) **subgen. nov.**, describe a new species, *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.**, and to present identification key to the 35 known species of the genus.

METHODS

For measurement and illustration, specimens were mounted in lactic acid on temporary cavity slides. All body measurements are presented in micrometers (μm). Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the notogaster. Body width refers to the maximum width of the notogaster in dorsal view. Body setae were measured in lateral aspect. Formulas for leg setation are given in parentheses according to the sequence trochanter-femur-genu-tibia-tarsus (famulus of tarsus I included). Formulas for leg solenidia are given in square brackets, according to the sequence genu-tibia-tarsus. Paired structures are described in the singular, unless otherwise noted. Drawings were made with a camera lucida using a Leica DM 2500 light microscope. Images were obtained with an AxioCam ICc3 camera using a Carl Zeiss transmission light microscope Axio Lab.A.

Morphological terminology used in this paper mostly follows that of Grandjean (1956, 1957), Ermilov and Klimov (2017), and Norton and Ermilov (2017).

The following morphological abbreviations are used: *Prodorsum*: *L* = lamellar line; *S* = sublamellar line; *N* = prodorsal leg niche; *E*, *T* = lateral ridges; *ro*, *le*, *in*, *bs* = rostral, lamellar, interlamellar, and bothridial setae, respectively; *Ad* = dorsosejugal porose area; *D* = dorsophragma; *P* = pleurophragma. *Notogaster*: *fo* = foveolate ornamentation; *Aa*, *A1*, *A2*, *A3* = porose areas; *c*, *la*, *lm*, *lp*, h_1–h_3, p_1–p_3 = setae; *ia*, *im*, *ip*, *ih*, *ips* = lyrifissures; *gla* = opisthonotal gland opening. *Gnathosoma*: *a*, *m*, *h* = subcapitular setae; *or* = adoral seta; *sup*, *inf*, *d*, *l*, *cm*, *acm*, *ul*, *su*, *vt*, *lt* = palp setae; ω = palp solenidion; *as* = axillary saccule; *cha*, *chb* = cheliceral setae; *Tg* = Trägårdh's organ. *Epimeral and lateral podosomal regions*: *1a*, *3a*, *3b*, *3c*, *4a*, *4c* = epimeral setae; *PdI*, *PdII* = pedotecta I, II, respectively; *dis* = discidium; *cir* = circumpedal carina. *Anogenital region*: *ts* = tuberculate sculpturing; *g*, *ag*, *an*, *ad* = genital, aggenital, anal, and adanal setae, respectively; *iad* = adanal lyrifissure; *Ap* = postanal porose area; *po* = preanal organ. *Legs*: ω, φ, σ = solenidia; *e* = famulus; *d*, *l*, *v*, *bv*, *ev*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl* = setae; *pa* = porose area.

RESULTS

Taxonomy

Family Galumnidae

Genus *Trichogalumna* Balogh, 1960

Type species: *Pilogalumna lunai* Balogh, 1958

Trichogalumna (*Paratrichogalumna*) subgen. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:9C7BB7C9-050E-4F49-B6BE-DF03D212C212

Type species: *Trichogalumna punctata* Engelbrecht, 1972

Remarks

Trichogalumna (*Paratrichogalumna*) **subgen. nov.** differs from the other subgenera of *Trichogalumna*—*T.* (*Trichogalumna*) and *T.* (*Tanzanycha*)— by the location of the adanal lyrifissure (distinctly distanced from anal plate versus close to anal plate). The location of the adanal lyrifissure is used as generic and subgeneric diagnostic character within Galumnidae (e.g., *Allogalumna* (*Globogalumna*) Balogh & Balogh, 1990; *Galumna* (*Neogalumna*) Hammer, 1973; *Heterogalumna* Balogh, 1960), therefore, I proposed a new subgenus.

Trichogalumna (*Trichogalumna*) *giaensis* sp. nov. (Figs 1–20)

http://zoobank.org/urn:lsid:zoobank.org:act:02392EC8-9EA4-48DA-9578-0E6FC084F079

Type material

Holotype (female) and five paratypes (four males and one female): central Vietnam, Gia Lai Province, K'Bang District, Son Lang Commune, Kon Chu Rang Nature Reserve, 14° 28' 06.43" N, 108° 33' 59.48" E, 1020 m a.s.l., forest litter, 13 March 2025, collected by V.M. Salavatulin and V.A. Khaustov.

Type deposition

The holotype is deposited in the collection of the Senckenberg Museum of Natural History, Görlitz, Germany; five paratypes are in the collection of the University of Tyumen, Museum of Zoology, Tyumen, Russia. All specimens are preserved in 70% solution of ethanol with a drop of glycerol.

Diagnosis

Small species, body length 240–270. Pteromorph with long, sparse, longitudinal furrows. Dorsocentral region of notogaster with dense, polygonate-foveolate ornamentation. Region between genital and anal plates with slightly developed, dense, polygonate-tuberculate sculpturing. Rostral and lamellar setae medium-sized, setiform, nearly smooth. Interlamellar, notogastral, and ventral setae short, acicular. Bothridial seta with long stalk, short, lanceolate, barbed head, and distinct, acicular apex. Dorsosejugal and postanal porose areas present. Dorsosejugal suture interrupted medially. Four pairs of porose areas small, circular. Epimeral setal formula 1-0-2-2. Circumpedal carina long.

Description

Measurements – Body length 255 (holotype), 240–255 (male paratypes), 270 (female paratype). Notogaster width 195 (holotype), 180–195 (male paratypes), 195 (female paratype).

Integument (Figs 15–19) – Body color brown to dark brown. Cuticle slightly densely microgranulate. Pteromorph with striate pattern (long, sparse, longitudinal furrows). Dorsocentral region of notogaster with dense, polygonate-foveolate ornamentation. Region between genital and anal plates with slightly developed, dense, polygonate-tuberculate sculpturing. Antiaxial side of leg femur IV and trochanter IV partially with small, dense tubercles. Paraxial side of leg femur IV with several transverse ridges.

Prodorsum (Figs 1, 3, 4, 13, 14) – Rostrum broadly rounded. Lamellar and sublamellar lines thin, parallel, curving backwards at ventral end. Rostral (26–30) and lamellar (19–22) setae setiform, nearly smooth. Interlamellar seta (2–4) acicular. Bothridial seta (79–91) with long stalk (49–56), short, lanceolate, barbed head (19–22), and distinct, acicular apex (11–13). Dorsosejugal porose area circular (2–4), located posterolateral to insertion of interlamellar seta. Dorsophragma comparatively short, elongate.

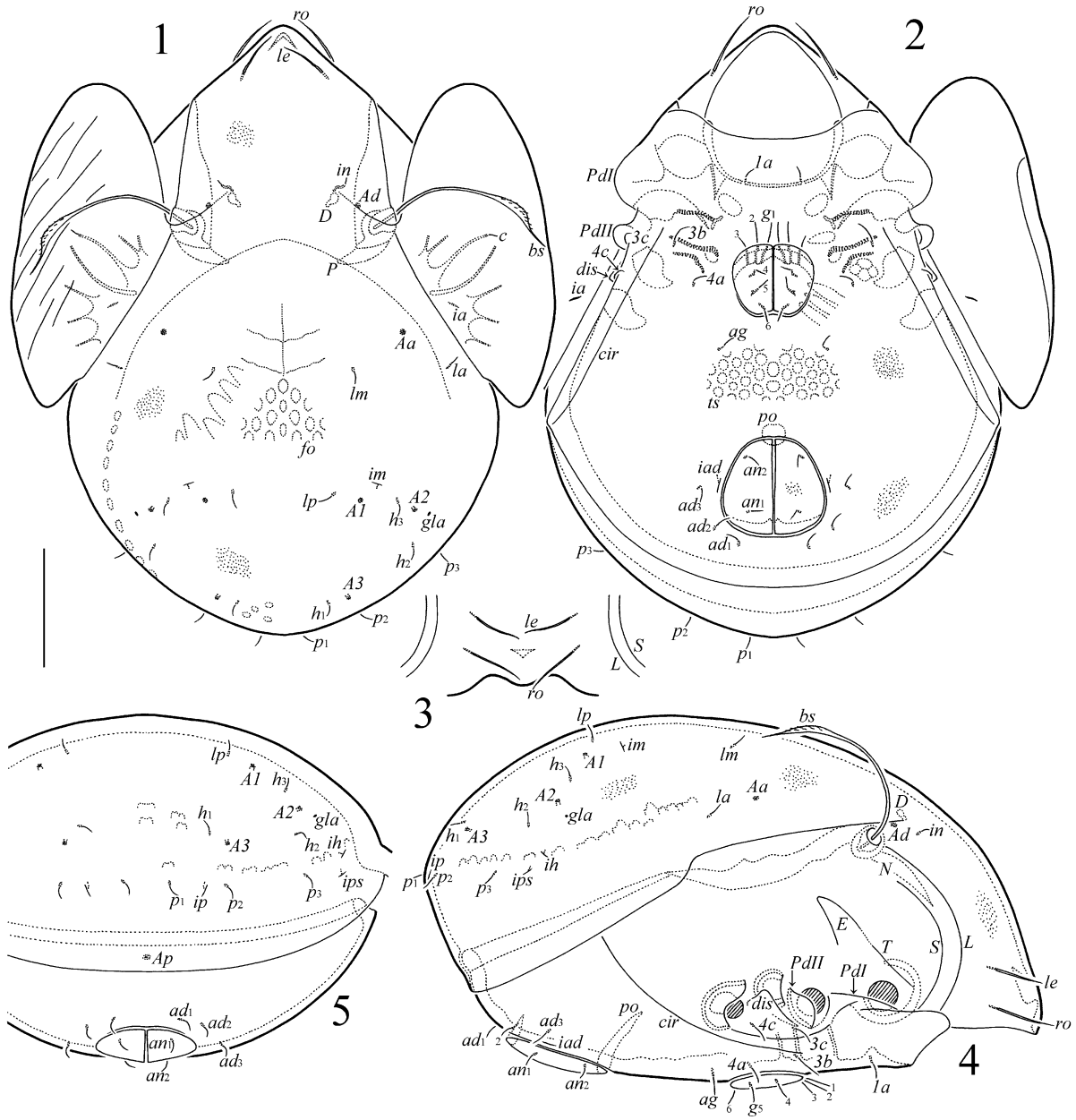
Notogaster (Figs 1, 4, 5) – Dorsosejugal suture interrupted medially. Ten pairs of notogastral setae (5–7) nearly acicular. Four pairs of porose areas circular (*Aa* 4; *A1*, *A2*, *A3* 1–4). Porose area *Aa* distanced from pteromorphal hinge, located anteromedial to *la* and anterolateral to *lm*. Median pore absent in both genders. Opisthonotal gland opening located lateral to *A2*. Lyrifissure *im* close and anterior to *A1*, *ip* between p_1 and p_2, *ih* and *ips* close to each other and anterior to p_3.

Gnathosoma (Figs 6–8) – Subcapitulum size 64–67 × 52–56. Three pairs of subcapitular setae (*a* 11–13; *m*, *h* 7) acicular, *a* thicker than *m* and *h*. Two pairs of adoral setae (9) setiform, curved distally, roughened. Palp length 52–56. Palp setal formula 0-2-1-3-9(+ω). Postpalpal seta (4) spiniform. Chelicera length 64–67. Setae (*cha* 19–22; *chb* 13–15) setiform, barbed.

Epimeral and lateral podosomal regions (Figs 2, 4) – Epimeral setal formula 1-0-2-2. Setae (*3b* 11; *1a*, *3c*, *4a*, *4c* 5–7) acicular. Circumpedal carina long, directed into epimere II, medial to seta *3b*.

Anogenital region (Figs 2, 4, 5) – Anogenital formula 6-1-2-3. Genital (g_1, g_2 11; g_3–g_6 5–7),

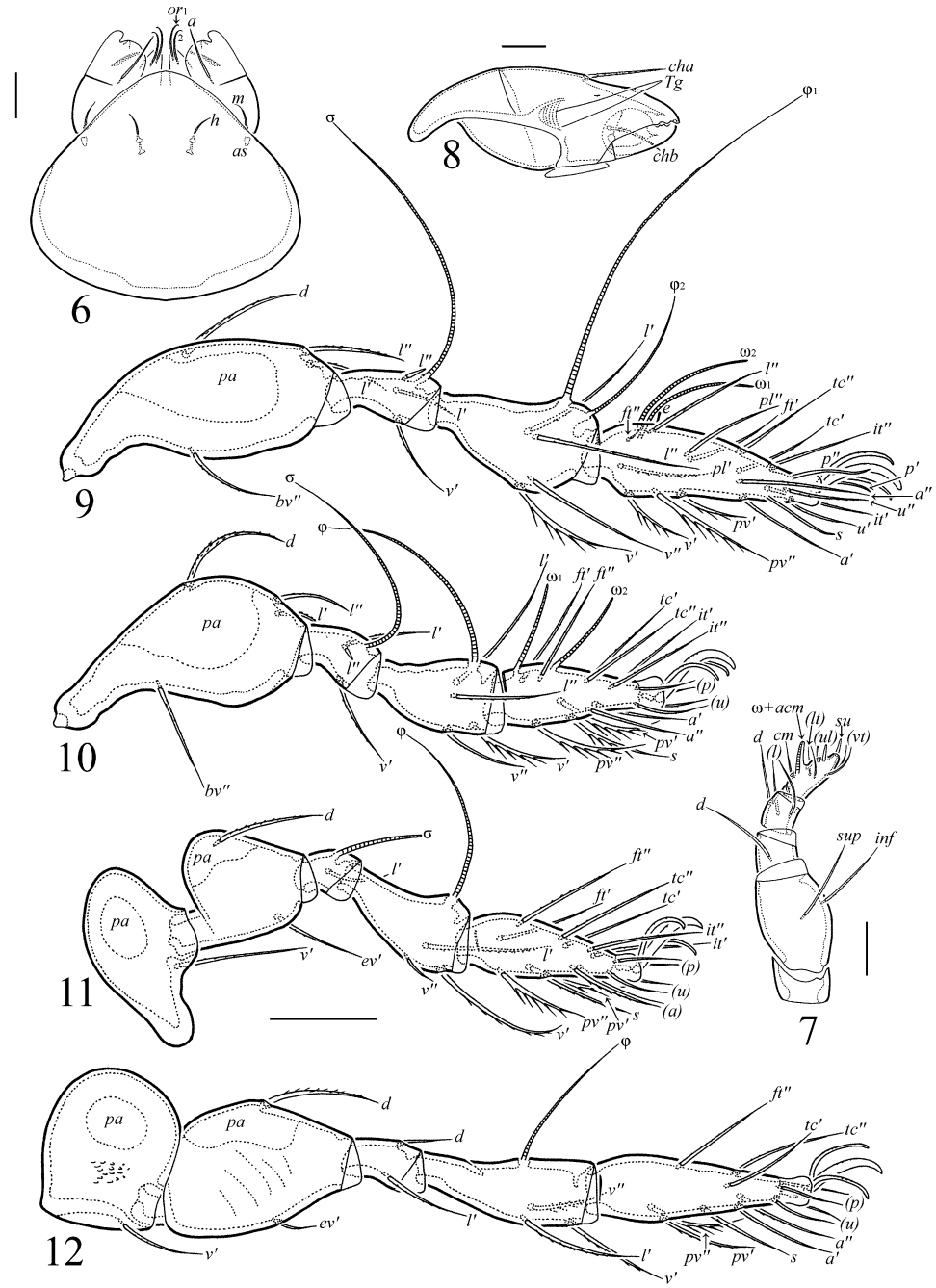
aggenital (5–7), anal (5–7), and adanal (5–7) setae acicular. Aggenital setae located closer to genital aperture and distanced from anal aperture. Adanal seta ad_1 posterior, ad_2 posterolateral, ad_3 lateral to anal plate. Distance ad_1–ad_2 slightly shorter than ad_2–ad_3. Adanal lyrifissure located close and parallel to anal plate. Postanal porose area circular (5–7) or oval (5–7 × 4).



Figures 1–5. *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.** (adult) – 1. Dorsal view; 2. Ventral view (gnathosoma, legs and right pteromorph omitted); 3. Anterior part of prodorsum, anterior view; 4. Right lateral view (gnathosoma, legs and right pteromorph omitted); 5. Posterior view (right pteromorph and part of left half omitted). Scale bar 50 μm.

Legs (Figs 9–12, 20) – Median claw distinctly thicker than lateral claws. All claws slightly barbed on dorsal side. Porose area on femora I–IV and on trochanters III, IV slightly visible. Proximoventral porose area on all tarsi and distoventral porose area on all tibiae absent. Formulas of leg setation and 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]. Homology of setae and solenidia indicated in Table 1. Famulus straight, inserted anterior to solenidia ω_1 and ω_2. Seta *s* of tarsus I eupathidial. Solenidion of tibia IV inserted in anterior part of dorsal side of

segment.



Figures 6–12. *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.** (dissected adult) – 6. Subcapitulum, ventral view; 7. Palp, right, antiaxial view; 8. Chelicera, left, paraxial view; 9. Leg I (trochanter omitted), right, antiaxial view; 10. Leg II (trochanter omitted), right, antiaxial view; 11. Leg III, right, paraxial view; 12. Leg IV, left, antiaxial view. Scale bars 10 μm (6–8), 20 μm (9–12).

Remarks

Trichogalumna (*Trichogalumna*) *giaensis* **sp. nov.** differs from all species of the genus in the presence (versus absence) of dense polygonate-foveolate ornamentation in dorsocentral region of the notogaster. Distinctive characters of the new species compared with other members of *Trichogalumna* can be found in the identification key given below.

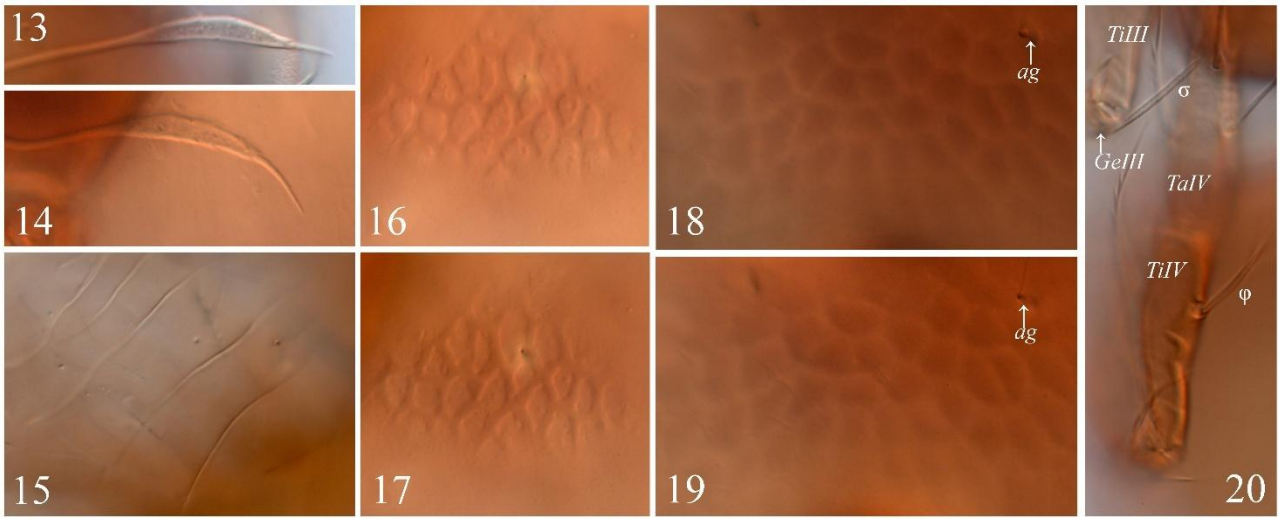
Etymology

The species name *giaensis* refers to the place of origin, Gia Lai Province.

Table 1. Leg setation and solenidia of adult *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.**

Leg	*Tr*	*Fe*	*Ge*	*Ti*	*Ta*
I	*v′*	*d*, *(l)*, *bv″*	*(l)*, *v′*, σ	*(l)*, *(v)*, φ1, φ2	*(ft)*, *(tc)*, *(it)*, *(p)*, *(u)*, *(a)*, *s*, *(pv)*, *v′*, *(pl)*, *l″*, *e*, ω1, ω2
II	*v′*	*d*, *(l)*, *bv″*	*(l)*, *v′*, σ	*(l)*, *(v)*, φ	*(ft)*, *(tc)*, *(it)*, *(p)*, *(u)*, *(a)*, *s*, *(pv)*, ω1, ω2
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)*

Note: *Tr*, *Fe*, *Ge*, *Ti*, *Ta* = trochanter, femur, genu, tibia, and tarsus, respectively. Roman letters refer to normal setae, Greek letters to solenidia. 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.



Figures 13–20. *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.** (microscope images, dissected adult) – 13, 14. Distal part of bothridial seta, lateral view; 15. Some furrows on pteromorph; 16. Polygonate-foveolate ornamentation in dorsocentral part of notogaster; 17. Same as 16, but in deep focus; 18. Polygonate-tuberculate sculpturing in aggenital region; 19. Same as 18, but in deep focus; 20. Legs III and IV partially. Magnification 400.

SYNONYMY

Nakamura *et al.* (2013) described *Trichogalumna trowella* from Japan. Later, Shirosaki *et al.* (2017) described *T. gotoensis* from Japan. Both species are morphologically very similar. According to Shirosaki *et al.* (2017), *T. gotoensis* differs from *T. trowella* by the absence of the rostral trowel and the absence of undulation of the inner genital margin. Firstly, the presence of the rostrophragma (see Norton and Ermilov 2017), or the "trowel" as understood by Nakamura *et al.* (2013) and Shirosaki *et al.* (2017), is a typical structure of the rostrum in representatives of the family Galumnidae, so it cannot be used as a differential character between species. The rostrophragma is an internal structure, therefore, it is often not depicted in drawings in papers on galumnid mites, however, this does not mean that the rostrophragma is lacking. Secondly, the presence or absence of the undulation of the inner part of the genital plates is not a differential character between species. Most likely, there was a defect due to the compression of the holotype (description based only on it) in the permanent slide. Thus, according to the original descriptions (Nakamura *et al.* 2013; Shirosaki *et al.* 2017), there is no significant morphological differences between *T.* (*T.*) *trowella* and *T.* (*T.*) *gotoensis*, therefore, I propose the following subjective synonymy: *Trichogalumna* (*Trichogalumna*) *trowella* Nakamura, Nakamura & Fujikawa, 2013 (= *Trichogalumna gotoensis* Shirosaki, Nakamura & Fujikawa, 2017 **syn. nov.**).

Key to world species of *Trichogalumna*

For *Trichogalumna* (*Trichogalumna*) *nipponica* (Aoki, 1966), the data from Ohkubo (1984) are excluded, because important morphological traits from this supplementary description do not correspond to those of the original description as well as other supplementary descriptions (Aoki 1966; Fujikawa 2004; Fujikawa *et al.* 2006) (e.g., presence/absence of transverse granulate band on the notogaster and in the anogenital region between genital and anal plates).

1. All leg tarsi with two claws. Body length 422–441 ..... *Trichogalumna* (*Tanzanycha*) *hesperis* (Mahunka, 1984)
Distribution: Tanzania
– All leg tarsi with three claws 2
2. Adanal lyrifissure distinctly distanced from anal plate. Body length 340 ..... *Trichogalumna* (*Paratrichogalumna*) *punctata* Engelbrecht, 1972
Distribution: South Africa
– Adanal lyrifissure located close to anal plate 3
3. Five pairs of notogastral porose areas developed, *Aa* represented by two pairs, *A3* elongate oval. Body length 570 ..... *Trichogalumna* (*Trichogalumna*) *duoporosa* Hammer, 1971
Distribution: Fiji
– Two to four pairs of notogastral porose areas developed, *Aa* represented by one pair, *A3* nearly circular 4
4. Two pairs of notogastral porose areas (*A1*, *A3*) developed, *Aa* and *A2* absent. Body length 265–298 ..... *Trichogalumna* (*Trichogalumna*) *mironovi* Ermilov & Starý, 2018
Distribution: Vietnam
– Three or four pairs of notogastral porose areas developed, *Aa* present, *A2* present or absent 5
5. Three pairs of notogastral porose areas developed, *A2* absent 6
– Four pairs of notogastral porose areas developed, *A2* present 9
6. Bothridial seta setiform, with short cilia unilaterally. Lamellar seta not longer than diameter of bothridium. Body length 266–312 ..... *Trichogalumna* (*Trichogalumna*) *atypica* Ermilov & Tolstikov, 2015
Distribution: Brazil
– Bothridial seta with clearly developed head, without cilia. Lamellar seta distinctly longer than diameter of bothridium 7
7. Notogastral porose area *Aa* circular, located close to insertion of seta *lm* and distanced from *la*. Bothridial seta with broadly dilated head unilaterally, having small, pointed tip, smooth. Body length 253–262 ..... *Trichogalumna* (*Trichogalumna*) *ekaterinae* Bayartogtokh & Shimano, 2019
Distribution: Palau
– Notogastral porose area *Aa* oval, located slightly closer to insertion of seta *la*, than to *lm*. Bothridial seta lanceolate-fusiform, barbed 8
8. Dorsosejugal suture developed medially. Pteromorph without lineate pattern. Interlamellar seta longer than rostral and lamellar setae. Genital plate with dense, longitudinal lines. Body length 581–830 ..... *Trichogalumna* (*Trichogalumna*) *interlamellaris* Ermilov & Corpuz-Raros, 2016
Distribution: Philippines
– Dorsosejugal suture interrupted medially. Anterior part of pteromorph with long, dense lines. Interlamellar seta shorter than rostral and lamellar setae. Genital plate without lineate pattern. Body length 381–398 ..... *Trichogalumna* (*Trichogalumna*) *albomaculata* Ermilov & Tolstikov, 2015
Distribution: Brazil
9. Notogastral porose area *Aa* located close to pteromorphal hinge. Body length 295 ..... *Trichogalumna* (*Trichogalumna*) *taeniata* Hammer, 1971
Distribution: Fiji

– Notogastral porose area *Aa* distanced from pteromorphal hinge 10
10. Notogastral porose area *Aa* distinctly elongate oval, transversely oriented. Body length 448 .... *Trichogalumna* (*Trichogalumna*) *microseta* Wallwork, 1965
Distribution: Chad.
– Notogastral porose area *Aa* circular or oval 11
11. Only anogenital region (between genital and anal plates) with one transverse granulate band, notogaster and anogenital region without transverse granulate band. Large species, body length 697–720 ..... *Trichogalumna* (*Trichogalumna*) *vietnamica* Mahunka, 1987
Distribution: Vietnam
– Both notogaster (centrodorsal part) and anogenital region (between genital and anal plates) with or without one transverse granulate band. Small species, body length less than 450 12
12. Both notogaster (centrodorsal part) and anogenital region (between genital and anal plates) with transverse granulate band 13
– Both notogaster and anogenital region without transverse granulate band 20
13. Pteromorph mostly with long, dense lines 14
– Pteromorph mostly without lineate pattern 16
14. Genital plate without lineate pattern. Body length 325–345 .... *Trichogalumna* (*Trichogalumna*) *lineata* Ohkubo, 1984
Distribution: Japan
– Genital plate with dense, longitudinal lines 15
15. Subcapitular mentum with dense tubercles. Body length 323–358 .... *Trichogalumna* (*Trichogalumna*) *pseudoohkuboi* Hu, Zheng & Yang, 2023
Distribution: southeastern China
– Subcapitular mentum without tubercles. Body length 316–326 .... *Trichogalumna* (*Trichogalumna*) *ohkuboi* Hagino, Bayartogtokh & Shimano, 2017 (see also Bayartogtokh & Bae 2024) Distribution: Japan, Korea
16. Prodorsum nearly smooth 17
– Prodorsum with sparse granules 18
17. Bothridial seta with broadly dilated head unilaterally, having small, pointed tip distoventrally, smooth. Subcapitular mentum without lineate pattern. Body length 370–395 .... *Trichogalumna* (*Trichogalumna*) *arborea* Ohkubo, 1984
Distribution: Japan
– Bothridial seta lanceolate-fusiform. Posterior part of subcapitular mentum with transverse lines. Body length 297–300 ..... *Trichogalumna* (*Trichogalumna*) *imperfecta* Ohkubo, 1984 (see also Hagino *et al.* 2017)
Distribution: Japan
18. Medioanterior part of pteromorph with dense granules versus posterior half of pteromorph with lines. Body length 320–350 ..... *Trichogalumna* (*Trichogalumna*) *chimaera* Ohkubo, 1984
Distribution: Japan
– Anterior and/or median parts of pteromorph with dense granules versus posterior part of pteromorph mostly smooth 19
19. Anterior part of pteromorph with dense granules versus medioanterior part of pteromorph without granules. Interlamellar seta not longer than diameter of bothridium. All notogastral porose areas of normal size. Body length 280–302 .... *Trichogalumna* (*Trichogalumna*) *boninensis* Hagino, Bayartogtokh & Shimano, 2017 (see also Bayartogtokh and Bae 2024) Distribution: Japan, Korea
– Anterior and median parts of pteromorph with dense granules. Interlamellar seta distinctly longer than diameter of bothridium. All notogastral porose areas unusually small. Body length 310–330 .... *Trichogalumna* (*Trichogalumna*) *granuliala* Ohkubo, 1984
Distribution: Japan
20. Pteromorph mostly with long lines 21

– Pteromorph mostly without lineate pattern 24

21. Lines of pteromorph sparse, longitudinal to oblique. Head of bothridial seta with acicular apex. Dorsocentral region of notogaster with dense, polygonate-foveolate ornamentation. Region between genital and anal plates with slightly developed, dense, polygonate-tuberculate sculpturing. All notogastral porose areas small. Body length 240–270 ..... *Trichogalumna* (*Trichogalumna*) *giaensis* **sp. nov.**
Distribution: Vietnam

– Lines of pteromorph dense, transverse. Head of bothridial seta without acicular apex. Dorsocentral region of notogaster without polygonate-foveolate ornamentation. Region between genital and anal plates without polygonate-tuberculate sculpturing. All notogastral porose areas of normal size 22

22. Prodorsum with dense, longitudinal lines. Notogaster and anogenital region with dense, curved ridges. Body length 290–310 ..... *Trichogalumna* (*Trichogalumna*) *vittateata* Hu, Zheng & Yang, 2023
Distribution: southeastern China.

– Prodorsum without lineate pattern. Notogaster and anogenital region without dense, curved ridges 23

23. Prodorsum, notogaster, and ventral plate with granulate pattern. Genital plate with dense, longitudinal lines. Body length 370–400 ..... *Trichogalumna* (*Trichogalumna*) *hygrophila* Ohkubo, 1984
Distribution: Japan

– Prodorsum, notogaster, and ventral plate without granulate pattern. Genital plate without lineate pattern. Body length 286–321 .....
Trichogalumna (*Trichogalumna*) *trowella* Nakamura, Nakamura & Fujikawa, 2013 (= *Trichogalumna gotoensis* Shirosaki, Nakamura & Fujikawa, 2017)
Distribution: Japan

24. Lamellar seta short, about bothridium diameter, distinctly shorter than rostral seta. Body length 328 ..... *Trichogalumna* (*Trichogalumna*) *punctata* Engelbrecht, 1972
Distribution: South Africa

– Lamellar seta medium-sized, distinctly longer than bothridium diameter, slightly differs from rostral seta in length 25

25. Interlamellar seta long, subequal to prodorsum length, subflagellate. Body length 350 .... *Trichogalumna* (*Trichogalumna*) *seminuda* Balogh, 1960
Distribution: Afrotropical region, India

– Interlamellar seta medium-sized or short, or represented by alveolus, distinctly shorter than prodorsum length, setiform or acicular 26

26. Rostral, lamellar, and interlamellar setae slightly differs in length 27

– Interlamellar seta distinctly shorter than rostral and lamellar setae 28

27. Head of bothridial seta with small, pointed tip distoventrally, smooth. Body length 381–415 .... *Trichogalumna* (*Trichogalumna*) *africana* Ermilov, Sidorchuk & Rybalov, 2011
Distribution: Afrotropical region

– Head of bothridial seta bifid distally, partially barbed. Body length 360–370 .... *Trichogalumna* (*Trichogalumna*) *lunai* (Balogh, 1958) (see also Balogh 1960)
Distribution: Afrotropical region, Japan

28. Interlamellar seta short, subequal to bothridium diameter, or represented by alveolus 29

– Interlamellar seta distinctly longer than bothridium diameter 30

29. Head of bothridial seta smooth. Body length 320 .... *Trichogalumna* (*Trichogalumna*) *chitralensis* Hammer, 1977
Distribution: Pakistan, India

– Head of bothridial seta barbed. Body length 318–350 .... *Trichogalumna* (*Trichogalumna*) *subnuda* Balogh & Mahunka, 1967
Distribution: Vietnam

30. Notogastral porose area *Aa* oval, smaller than *A1*. Body length 356–369 .....

..... *Trichogalumna* (*Trichogalumna*) *madagassica* Mahunka, 1996 (in Mahunka 1996*a*)
Distribution: Madagascar

– Notogastral porose area *Aa* circular, not smaller than *A1* 31

31. Genital and anal plates with dense, granulate pattern. Rostrum pointed. Body length 384–414 .....
..... *Trichogalumna* (*Trichogalumna*) *mexicana* Villagómez & Palacios-Vargas, 2013
Distribution: Mexico

– Genital and anal plates without granulate pattern. Rostrum rounded 32

32. Head of bothridial seta smooth. Body length 384–414 .....
..... *Trichogalumna* (*Trichogalumna*) *montana* Balogh, 1962
Distribution: Afrotropical region.

– Head of bothridial seta barbed 33

33. Notogastral porose areas *A1* and *A2* distinctly distanced from each other. 314–333 .....
..... *Trichogalumna* (*Trichogalumna*) *nabhitabhatai* Mahunka, 2008
Distribution: Thailand

– Notogastral porose areas *A1* and *A2* located close to each other ..... Two similar species: 1. *Trichogalumna* (*Trichogalumna*) *curva* (Ewing, 1907) (see also Norton & Ermilov 2017) (body length 315–400; distribution: Holarctic region). 2. *Trichogalumna* (*Trichogalumna*) *nipponica* (Aoki, 1966) (see also Aoki 2000; Fujikawa 2004; Fujikawa *et al.* 2006) (body length 293–412; distribution: semicosmopolitan)

ACKNOWLEDGEMENTS

I thank Vladimir M. Salavatulin and Vladimir A. Khaustov (both from University of Tyumen, Tyumen, Russia) for oribatid mite sampling, the staff of the Kon Chu Rang Nature Reserve for the support during the field work, and two anonymous reviewers for their valuable comments. The work was performed within the framework of the Joint Russian-Vietnamese Biological Expedition. Collecting of materials was conducted under an Agreement on the scientific cooperation between Kon Chu Rang Nature Reserve and the Joint Russian-Vietnamese Tropical Research and Technological Center.

Author contributions: The author has read and agreed to the published version of the manuscript.

Funding: This study was supported by the Ministry of Science and Higher Education of the Russian Federation within the framework of the Carbon Measurement Test Area in Tyumen' Region (FEWZ-2024-0016).

Data availability: Data are available upon request from the author.

Ethics approval: This study only included arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

REFERENCES

Aoki, J. (1966) The large-winged mites of Japan (Acari: Cryptostigmata). *Bulletin of the National Science Museum*, 9: 257–275.

Aoki, J. (2000) Oribatid mites in moss cushions growing on City Constructions. *Tokai University Press*: 1–188.

Balogh, J. (1958) Oribatides nouvelles de l'Afrique tropicale. *Revue de Zoologie et de Botanique Africaines*, 58: 1–34.

Balogh, J. (1960) Oribates (Acari) nouveaux d'Angola et du Congo Belge (2ème série). *Companhia de Diamantes de Angola*, 51: 15–40.

Balogh, J. (1962) Mission zoologique de l'I.R.S.A.C. en Afrique orientale (P. Basilewsky et N. Leleup, 1957). LXXV. Acari Oribates. *Annales du Musêe Royal de l'Afrique Centrale Tervuren Belgium*, *Zoologie*, 110: 90–131.

Balogh, J. & Balogh, P. (1990) Identification key to the genera of the Galumnidae Jacot, 1925 (Acari: Oribatei). *Acta Zoologica Hungarica*, 36: 321–328.

Balogh, J. & Mahunka, S. (1967) New oribatids (Acari) from Vietnam. *Acta Zoologica Academiae Scientiarum Hungaricae*, 13: 39–74.

Bayartogtokh, B. & Bae, Y.S. (2024) New findings of poronotic oribatid mites (Acari: Oribatida) from Korea. *Zootaxa*, 5405: 151–184. https://doi.org/10.11646/zootaxa.5405.2.1

Bayartogtokh, B. & Shimano, S. (2019) Contribution to the knowledge of Galumnidae (Acari: Oribatida) in the Oriental region. *Zootaxa*, 4647: 368–377. https://doi.org/10.11646/zootaxa.4647.1.23

Corpuz-Raros, L. & Ermilov, S.G. (2020) Catalogue of oribatid mites (Acari: Oribatida) from Continental Southeast Asia. Zootaxa, 4893: 1–216. https://doi.org/10.11646/zootaxa.4893.1.1

Engelbrecht, C.M. (1972) South African species of the genus *Trichogalumna* Balogh, 1961 (Galumnidae: Oribatei). *Acarologia*, 14: 268–280.

Ermilov, S.G. (2025) Proposal for new taxonomic synonyms and combinations in Galumnidae (Acari, Oribatida). *Zootaxa*, 5633: 394–397. https://doi.org/10.11646/zootaxa.5633.2.11

Ermilov, S.G. & Corpuz-Raros, L.A. (2016) New species and records of Galumnidae (Acari, Oribatida) from the Philippines. *Zootaxa*, 4171: 77–100. https://doi.org/10.11646/zootaxa.4171.1.3

Ermilov, S.G. & Klimov, P.B. (2017) Generic revision of the large-winged mite superfamily Galumnoidea (Acari, Oribatida) of the world. *Zootaxa*, 4357: 1–72. https://doi.org/10.11646/zootaxa.4357.1.1

Ermilov, S.G. & Starý, J. (2018) New Galumnoidea (Acari, Oribatida) from Hanoi (Northern Vietnam). *Zootaxa*, 4379: 497–516. https://doi.org/10.11646/zootaxa.4379.4.3

Ermilov, S.G. & Tolstikov, A.V. (2015) Additions to the galumnid oribatid mite fauna of Brazil, with description of two new species of *Trichogalumna* (Acari, Oribatida, Galumnidae). *International Journal of Acarology*, 41: 170–180. https://doi.org/10.1080/01647954.2014.999824

Ermilov, S.G., Sidorchuk, E.A. & Rybalov, L.B. (2011) Three new species of oribatid mites (Acari: Oribatida: Galumnoidea) from Ethiopia. *International Journal of Acarology*, 37: 2–17. https://doi.org/10.1080/01647954.2010.528799

Ewing, H.E. (1907) New Oribatidae. *Psyche*, 14: 111–115. https://doi.org/10.1155/1907/296057

Fujikawa, T. (2004) Oribatida. *In*: A monitoring development for the forest ecosystem conservation of the Shirakami-sanchi World Heritage Site and a forest management method development for harmonization with forest utilization in its surrounding areas, pp. 165–222 [In Japanese with English abstract].

Fujikawa, T., Ishikawa, K., Shiba, M., Ono, H., Morikawa, K., Tamura, H. & Nakamura, Y. (2006) Soil animals from 88 temples in Shikoku Island 4. Morphological variation in the nineteen known species of oribatid mites. *Edaphologia*, 79: 1–22.

Grandjean, F. (1956) Galumnidae sans carènes lamellaires (Acariens, Oribates). 1re série. *Bulletin de la Société Zoologique de France*, 81: 134–150.

Grandjean, F. (1957) Observations sur les Oribates (37e série). *Bulletin du Museum nationale d'Histoire Naturelle*, 2e Série, 29: 88–95.

Hagino, W., Bayartogtokh, B., Shimano, S. & Hiruta, S.F. (2017) Three species of the genus *Trichogalumna* (Acari: Oribatida: Galumnidae) from Japan. *Systematic and Applied Acarology*, 22: 858–873. https://doi.org/10.11158/saa.22.6.10

Hammer, M. (1971) On some oribatids from Viti Levu, the Fiji Islands. *Det Kongelige Danske Videnskabernes Selskab Biologiske Skrifter*, 16: 1–60.

Hammer, M. (1973) Oribatids from Tongatapu and Eua, the Tonga Islands, and from Upolu, Western Samoa. *Det Kongelige Danske Videnskabernes Selskab Biologiske Skrifter*, 20: 1–70.

Hammer, M. (1977) Investigations on the oribatid fauna of North-West Pakistan. *Det Kongelige Danske*

Videnskabernes Selskab Biologiske Skrifter, 21: 1–71.

Hu, Y., Zheng, Q.F. & Yang, M.F. (2023) Two new species of the genus *Trichogalumna* (Acari: Oribatida: Galumnidae) from China. *Acarologia*, 63: 1197–1210. https://doi.org/10.24349/wwh6-l67r

Koçak, A.O. & Kemal, M. (2008) Nomenclatural notes in the genus group taxa of Acarina. *Miscellaneous Papers, Centre of Entomological Studies Ankara*, 139–140: 4–5.

Mahunka, S. (1984) Oribatids of the Eastern Part of the Ethiopian Region (Acari). V. *Acta Zoologica Hungarica*, 30: 87–136.

Mahunka, S. (1987) A survey of the Oribatid (Acari) fauna of Vietnam, I. *Annales Historico-Naturales Musei Nationalis Hungarici*, 79: 259–279.

Mahunka, S. (1996*a*) Galumnoid taxa (Acari: Oribatida) from Madagascar (Part I). *Acta Zoologica Academiae Scientiarum Hungaricae*, 42: 163–181.

Mahunka, S. (1996*b*) Oribatids from Sarawak I (Acari: Oribatida). New and interesting mites from the Geneva Museum LXXVIII. *Revue Suisse de Zoologie*, 103: 259–282. https://doi.org/10.5962/bhl.part.79945

Mahunka, S. (2008) A new genus and some other data of oribatids from Thailand (Acari: Oribatida). *Acta Zoologica Academiae Scientiarum Hungaricae*, 54: 125–150.

Nakamura, K., Nakamura, Y. & Fujikawa, T. (2013) Oribatid mites (Acari, Oribatida) from Tohoku (Northeast Japan), collected after a tidal wave in 2011. *Acarologia*, 53: 41–76. https://doi.org/10.1051/acarologia/20132081

Norton, R.A. & Ermilov, S.G. (2017) Identity of the oribatid mite *Oribata curva* and transfer to *Trichogalumna* (Acari, Oribatida, Galumnidae), with discussion of nomenclatural and biogeographical issues in the '*curva*' species-group. *Zootaxa*, 4272: 551–564. https://doi.org/10.11646/zootaxa.4272.4.4

Ohkubo, N. (1984) Several species of *Trichogalumna* (Acarina, Oribatida) from Japan. *Acarologia*, 25: 293–306.

Shirosaki, T., Nakamura, Y. & Fujikawa, T. (2017) Three new oribatid species (Acari: Oribatida) from organic debris at the root of a banyan tree in South Japan. *Transactions of the Nagasaki Biological Society*, 81: 31–48.

Subías, L.S. (2022) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes, Oribatida) del mundo (excepto fósiles). *Monografías Electrónicas Sociedad Entomológica Aragonesa*, 12: 1–539.

Subías, L.S. (2024) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles), 19ª actualización, 1–545. (Accessed in January 2024).

Villagomez, F. & Palacios-Vargas, J.G. (2013) A new species of *Trichogalumna* (Acari: Oribatida: Galumnidae) from Mexico. *Brenesia*, 79: 72–80.

Wallwork, J.A. (1965) Some Oribatei (Acari: Cryptostigmata) from Tchad (2nd. series). *Revue de Zoologie et de Botanique Africaines*, 72: 83–108.

اطلاعـــات آرایه‌شـــناختی در شـــناخت هرناهـــای اوریباتیـــد جـــنس *Trichogalumna* (Acari, Oribatida, Galumnidae)

سرگی جی. ارمیلوف

دانشگاه تیومن، مؤسسه زیست‌شناسی زیست‌محیطی و کشاورزی (X-BIO) ، تیومن، روسیه؛ رایانامه: ermilovacari@yandex.ru

چکیده

جنس Trichogalumna (Oribatida, Galumnidae) در حال حاضر شامل دو زیرجنس و ۳۴ گونه است که به طور جمعی در مناطق گرمسیری و نیمه گرمسیری توزیع شده‌اند. زیرجنسی جدید – *Trichogalumna* (*Paratrichogalumna*) **subgen. nov.** با *Trichogalumna punctata* Engelbrecht, 1972 به عنوان گونه تایپ – پیشنهاد شده است. این زیرجنس با سایر زیرجنس‌های *Trichogalumna* از نظر محل شیار کنارمخرجی (که به طور مشخص از صفحه مخرجی فاصله دارد) متفاوت است. گونهٔ جدید – *T.* (*T.*) *giaensis* **sp. nov.** – بر اساس کنه‌های کامل جمع‌آوری شده از زباله‌های جنگلی در ویتنام مرکزی توصیف شده است. این گونه جدید عمدتاً با اندازه کوچک بدن؛ اندام‌های بال مانند مخطط پراکنده؛ تزئینات متراکم چندضلعی–حفره ای در ناحیه پشتی–مرکزی پسین‌گرده؛ تزئینات متراکم چندضلعی–برجسته بین صفحات تناسلی و مخرجی؛ موهای حفره‌ای بلند نوک سر نیزه‌ای و خاردار، دارای رأس سوزنی شکل و مشخص؛ و چهار جفت ناحیه متخلخل کوچک و دایره‌ای مشخص می‌شود. مترادف زیر پیشنهاد شده است: *Trichogalumna* (*Trichogalumna*) *trowella* Nakamura, Nakamura & Fujikawa, 2013 (= *Trichogalumna gotoensis* Shirosaki, Nakamura & Fujikawa, 2017 **syn. nov.**) کلید شناسایی گونه‌های شناخته شده *Trichogalumna* ارایه شده است.

واژگان کلیدی: هرناهای گالومنید، کلید شناسایی، ریخت‌شناسی، ناحیهٔ شرقی، آرایه‌شناسی

CITE: Ermilov, S.G. (2025) Taxonomic contribution to knowledge of the oribatid mite genus *Trichogalumna* (Acari, Oribatida, Galumnidae). *Persian Journal of Acarology*, 14(4): 140411.

https://doi.org/10.22073/pja.v14i4.87545

دریافت
۱۷ مرداد ۱۴۰۴

پذیرش
۲۹ شهریور ۱۴۰۴

انتشار
۲۳ مهر ۱۴۰۴

دبیر تخصصی
ا. جوهرچی