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## Article

### A new oribatid mite of the genus *Pergalumna* (Acari: Oribatida: Galumnidae) from north-west of Iran

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#### ABSTRACT

A new species of galumnid mite (Acari: Oribatida: Galumnidae), *Pergalumna* (*Pergalumna*) *granulistriata* Akrami **sp. nov.**, is described from soil in Zanjan Province, northwestern Iran. It is characterized by dentate rostrum; granulate-striate prodorsum; minute interlamellar setae; short bothridial setae, with finely barbed claviform head; complete dorsosejugal furrow; porose areas *Aa* divided into two parts, its anterior part very large, irregularly key-shaped, posterior part very small, rounded; presence of median pore; longitudinally striated genital plates and large, elongated postanal porose area. The new species is morphologically most similar to *Pergalumna* (*P.*) *formicaria* (Berlese, 1914), however, differs from it by the presence of teeth on rostrum; the surface ornamentation of prodorsum and pteromorphs; divided notogastral porose areas *Aa*. An identification key to known species of Iranian *Pergalumna* is given.

**KEY WORDS:** Galumnid mites; morphology; Sarcoptiformes; taxonomy; Zanjan.

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#### INTRODUCTION

*Pergalumna* is the second-largest genus of the family Galumnidae Jacot, 1925, comprising 169 species, which collectively show a cosmopolitan distribution except for Antarctica (Subías 2004, update 2020). This genus was proposed by Grandjean (1936) with *Oribates nervosa* Berlese, 1914, as type species. The main characters of the genus were summarized by Ermilov *et al.* (2013). Several identification keys to known species were presented by different authors (Gilyarov and Krivolutsky 1975; Balogh and Balogh 1990, 2002; Weigmann 2006; Ermilov *et al.* 2014, 2015; Ermilov and Stary 2018; Ermilov and Friedrich 2019). Ontogenetic morphology of *Pergalumna* species was studied by Bayartogtokh and Ermilov (2017).

Earlier, only five species of this genus have been recorded from Iran: *Pergalumna* (*P.*) *persica* Akrami & Ebrahimi, 2013 from Fars Province; *Pergalumna* (*P.*) *microtuberculata* Bayartogtokh & Akrami, 2014 from Mazandaran, Zanjan and Fars Provinces; *Pergalumna* (*P.*) *dentirostrata* (Bayartogtokh & Akrami, 2014) from Mazandaran, Fars, Alborz and Kerman Provinces; *Pergalumna* (*P.*) *myrmophila* (Berlese, 1914) (syn.: *Pergalumna* (*P.*) *iunctiporosa* Bayartogtokh & Akrami, 2014), from Mazandaran, Khorasan Razavi and Alborz Provinces; and *Pergalumna* (*P.*) *longisetosa*

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Balogh, 1960 from East Azerbaijan Province. Also, some unknown species of this genus have been collected from Hamadan, West Azerbaijan and Guilan Provinces previously (Akrami 2015; Azimi *et al.* 2018).

In the course of taxonomic identification of oribatid mites collected by the second author in 2012 from soil in Zanzan Province, north-west of Iran, we found a new species belonging to the genus *Pergalumna*, which we describe here under the name *Pergalumna (Pergalumna) granulistriata* Akrami **sp. nov.** An identification key to known species of Iranian *Pergalumna* is given.

## MATERIALS AND METHODS

Soil and litter samples were taken from Zanzan County, north-west of Iran. Mites were extracted from samples in Berlese-Tullgren funnels set over jars with 75% ethanol. Mites were removed, cleared in lactophenol and mounted in Hoyer's medium on glass microscope slides. The slides were placed in an oven at 45 °C for two weeks. Mites were studied using a light microscope (Zeiss Standard 20). Figures were made using a drawing tube attached to the microscope. Body length was measured from the tip of the rostrum to the posterior edge of the notogaster, and body width refers to the maximum width of the notogaster in dorsal aspect. All body measurements are presented in micrometers (µm). The examined materials and data on their locality and habitat are given in the "material examined" section. Species studied here are represented as adult. The morphological terminology and abbreviations used in this paper follows that of Norton and Behan-Pelletier (2009), and Ermilov and Klimov (2017).

## SYSTEMATICS

### Family Galumnidae Jacot, 1925 Genus *Pergalumna* Grandjean, 1936

**Type species:** *Oribata nervosa* Berlese, 1914

#### *Pergalumna (Pergalumna) granulistriata* Akrami **sp. nov.** (Figs. 1–10)

#### *Diagnosis*

With typical characters of *Pergalumna (Pergalumna)*; body size 537 × 374; basal half of the prodorsum with longitudinal striae and the rest granulate; rostrum with three distinct teeth: long median triangular tooth and two shorter lateral teeth; rostral and lamellar setae long, thin, nearly subequal in size, finely barbed unilaterally, interlamellar setae minute, but clearly visible, smooth; bothridial setae short, with finely barbed claviform head, rounded distally; dorsosejugal furrow developed; notogastral setae represented by their alveoli; five pairs of porose areas, *Aa* divided into two pairs: its anterior part very large, irregularly key-shaped, while posterior part very small, rounded; *A*<sub>1</sub> and *A*<sub>2</sub> nearly round, *A*<sub>3</sub> elongate oval; pteromorphs striated; postanal porose area large, elongate; median pore on the notogaster represented as single pore; notogastral lyrifissure *im* positioned far anteromedial of *A*<sub>1</sub>, between setae *lm* and *lp*, more close to *lm*; genital plates with faint longitudinal striations.

#### *Description*

**Measurements** – Holotype (male): body length 537, width of notogaster 374, length of prodorsum 142; one paratype (male): nearly same as holotype.

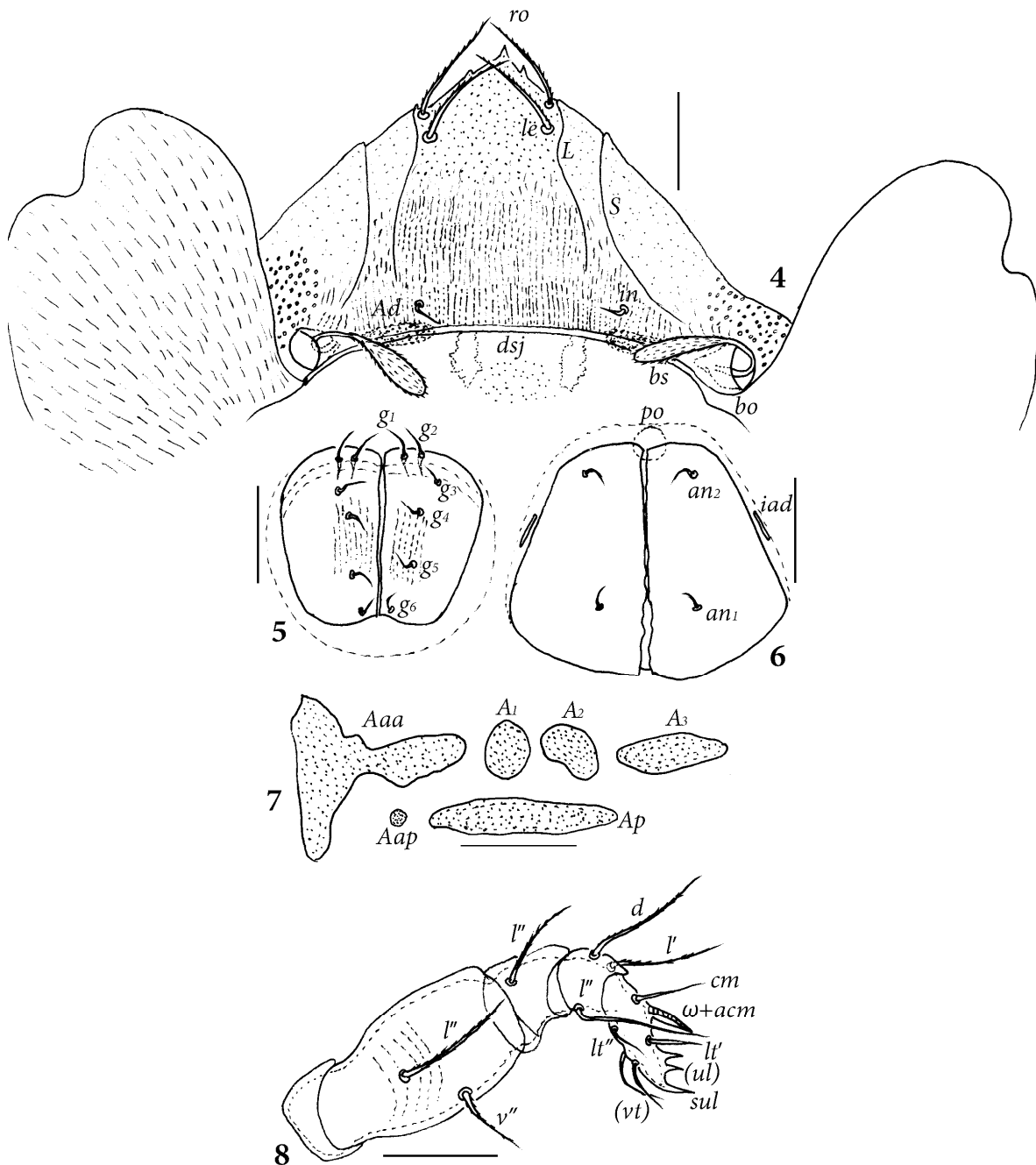
**Integument** – Body color light brown; cuticle of body and legs with minute granules; marginal part of prodorsum around the bothridia with larger granules; pteromorphs with radiated ridges and fine striations; epimeral region with a few round sigillae.

**Prodorsum (Figs. 1, 3, 4)** – Rostrum with pronounced triangular central tooth and two smaller lateral teeth. Basal half of prodorsum with longitudinal striae and the rest microgranulate. Lamellar (*L*) and sublamellar (*S*) lines well developed. Rostral setae (*ro*, 53–57) thin, finely barbed unilaterally, inserted ventrally and well visible in dorsofrontal view. Lamellar setae (*le*, 51–55) thin, finely barbed unilaterally. Interlamellar setae (*in*, 13) minute, very thin and smooth. Exobothridial setae not observed. Bothridial setae (*bs*) with thin, smooth stalk (33–37) and finely barbed claviform head (34), distally rounded, directed inwards. Dorsosejugal porose areas (*Ad*, 22–27 × 7) elongate oval, located lateroposterior to alveolus of setae *in*. Bothridia (*bo*, 19 × 14) funnel-like, with wide openings, directed laterally.



**Figures 1–3.** *Pergalumna granulistriata* Akrami sp. nov. – 1. Dorsal view of body; 2. Ventral view of body; 3. Bothridial seta. Scale bar (1 & 3 = 50  $\mu$ m; 2 = 25  $\mu$ m).

**Notogaster (Figs. 1, 7)** – Notogaster distinctly widened posteriorly. Anterior notogastral margin well developed. Notogastral setae vestigial, 10 pairs of alveoli well discernable. Five pairs of porose areas, *Aa* divided into two pairs: anterior half (*Aaa*) (length 67–74) very large, irregularly key-shaped, obliquely oriented, its lateral part conspicuously widened, but medial part elongately narrowed, posterior half (*Aap*) (7 × 5) very small, rounded, located lateroposterior to alveolus of *la*; *A*<sub>1</sub> and *A*<sub>2</sub> (22–24 × 18–20) nearly subequal in size, round or slightly oval shape, *A*<sub>3</sub> (38 × 17) elongate oval; median pore (*mp*) present, consisting of single pore, located mid-distance of porose areas *A*<sub>2</sub>. Lyrifissures *ia*, *im* and opisthonotal gland openings (*gla*) well developed, *im* inserted far anteromedially to *A*<sub>1</sub>, between setal alveoli *lm* and *lp*, more close to *lm*, other notogastral lyrifissures was not observed; *gla* situated lateral to *A*<sub>1</sub> and *h*<sub>3</sub>.



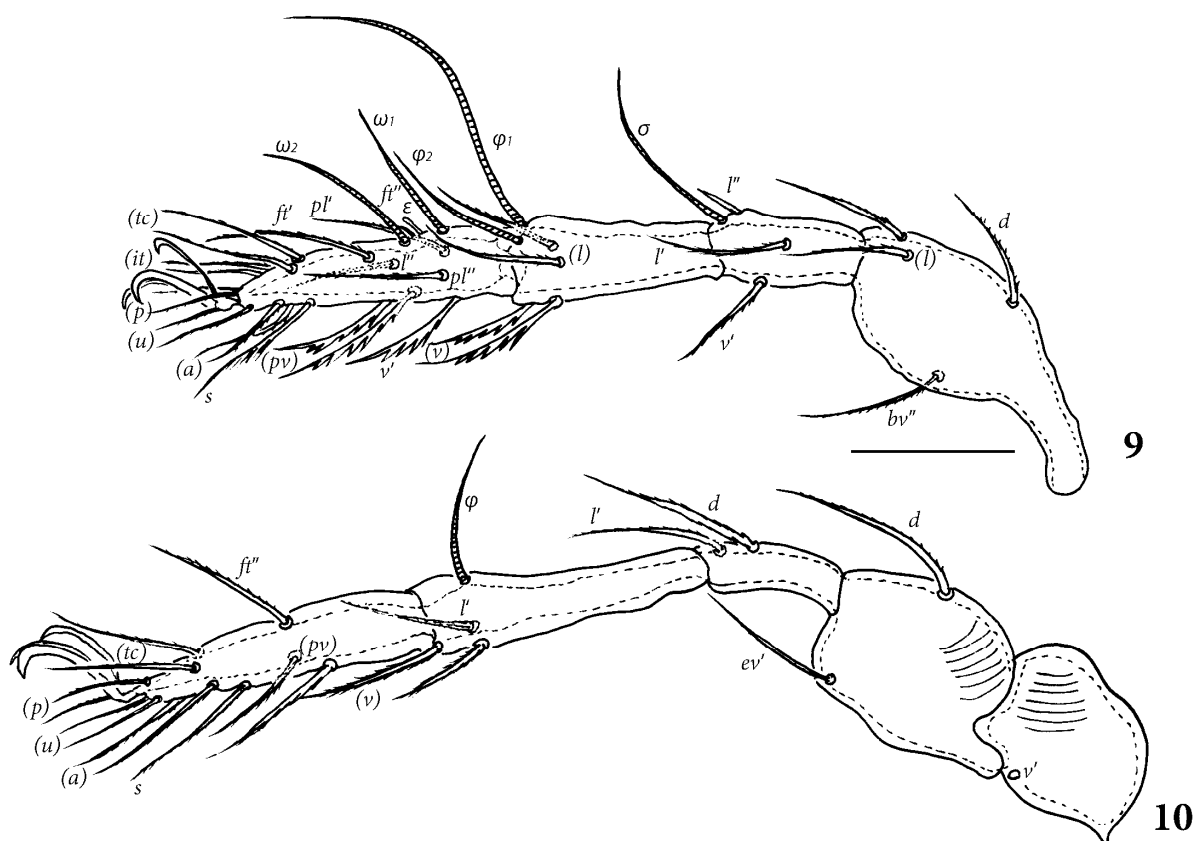
**Figures 4–8.** *Pergalumna granulistriata* Akrami **sp. nov.** – 4. Dorsofrontal view of prodorsum and anterior part of notogaster; 5. Genital plate; 6. Anal plate; 7. Notogastral porose areas (*Aa*, *A*<sub>1–3</sub>) and postanal porose area (*Ap*); 8. Palp. Scale bar (4–7 = 50 μm; 8 = 25 μm).

**Gnathosoma (Figs. 2, 8)** – Subcapitulum longer than wide, hypostomal setae *a*, *m* and *h* short, smooth. Palp typical for family, all setae except on tarsus finely barbed bilaterally, formula of setation: 0-2-1-3-10, including solenidion  $\omega$  on tarsus. Chelicera typical for family.

**Epimeral and podosomal region (Fig. 2)** – Pedotecta I and II, apodemes and discidia (*dis*) well developed. Circumpedal carina (*cp*) of medium length, thin, interrupted in level of insertions setae *4a*. Only four pairs of epimeral setae observed.

**Ano-genital region (Figs. 2, 5–7)** – Anal and genital apertures situated far from each other, anal aperture (103 long, 114 wide) far larger than genital one (78 long and wide). Genital plates with six pairs of thin, short, smooth genital setae (*g*<sub>1</sub>-*g*<sub>6</sub>) almost equal in size, *g*<sub>1</sub> and *g*<sub>2</sub> inserted on anterior margin of the plate; several short longitudinal striae inserted in inner margins of the plate. A pair of aggenital setae (*ag*) lateroposterior to genital plates; anal (*an*<sub>1</sub>, *an*<sub>2</sub>) and adanal (*ad*<sub>1</sub>-*ad*<sub>3</sub>) setae smooth; *ad*<sub>1</sub> and *ad*<sub>2</sub> posterior to anal plates, *ad*<sub>3</sub> situated on paraanal position; adanal lyrifissure (*iad*) situated parallelly to anal aperture, little posterior to seta *ad*<sub>3</sub>. Preanal organ (*po*) round. Postanal porose area (*Ap*, 80 × 13) large, elongate oval, narrowed laterally, situated posterior to anal plate.

**Legs (Figs. 9–10)** – All legs tridactylous, with stronger median and slender lateral claws, all claws smooth. Morphology of leg segments and structure and setation of legs generally typical for species of *Pergalumna*. All setae on podomeres barbed, especially some of ventral setae heavily barbed. Formula of setation including famulus: I (1-4-3-4-20), II (1-4-3-4-15), III (1-2-1-3-15), IV (1-2-2-3-12). Solenidiotaxy: I (1-2-2), II (1-1-2), III (1-1-0), IV (0-1-0). Homology of leg setae and solenidia indicated in Table 1.



**Figures 9–10.** *Pergalumna granulistriata* Akrami sp. nov. – 9. Chaetotaxy of leg I; 10. Chaetotaxy of leg IV. Scale bar (50  $\mu$ m).

#### Remarks

In having the granulate-striate prodorsum, dentate rostrum with three distinct teeth (long

triangular central tooth and two short lateral teeth), minute interlamellar setae, short, claviform bothridial setae, complete dorsosejugal furrow, divided notogastral porose areas *Aa*, far anterior position of notogastral lyrifissure *im*, presence of median pore, very long postanal porose area and longitudinally striated genital plates, *Pergalumna (P.) granulistriata* Akrami **sp. nov.** is unique among the known species of *Pergalumna*.

Among Palaearctic species, *P. formicaria* (Berlese, 1914) is most similar morphologically to the present new species. However, the former differs from the new species by the rounded rostrum, without teeth; smooth surface of prodorsum; elongate triangular porose areas *Aa* and smooth pteromorphs.

**Table 1.** Leg setation and solenidia of adult *Pergalumna (P.) granulistriata* Akrami **sp. nov.**

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

*Material examined*

Holotype (male): Taham village, Zanjan County, Zanjan Province, northwestern Iran, soil under poplar trees (*Populus* sp., Salicaceae), 36° 50' N, 48° 36' E, 1900 m a.s.l., 12 Nov. 2012, coll. M. Rajabi. One paratype (male): same data as holotype.

*Type deposition*

The holotype and paratype are deposited in the collection of the Department of Plant Protection, School of Agriculture, Shiraz University, Shiraz, Iran.

*Etymology*

The specific epithet "*granulistriata*" refers to the granulate-striate prodorsum in this species.

**Key to known species of Iranian *Pergalumna***

1. Bothridial setae setiform; dorsosejugal furrow undeveloped; three pairs of notogastral porose areas ..... 2
  - Bothridial setae with well dilated head; dorsosejugal furrow well-developed, complete; four pairs of notogastral porose areas ..... 3
2. Adanal setae *ad*<sub>1</sub> and *ad*<sub>2</sub> long, longer than length of anal plate, thickened; notogastral porose areas small, oval-shape; body size: 522–542 × 410–414 ..... ***Pergalumna (P.) longisetosa* Balogh, 1960**  
 Distribution: Ethiopian, Neotropical and Oriental regions and Iran
  - Adanal setae *ad*<sub>1</sub> and *ad*<sub>2</sub> short, setiform; notogastral porose areas large, rounded; body size: 685 × 520 ..... ***Pergalumna (P.) myrmophila* (Berlese, 1914)**  
 (syn.: *P. iunctiporosa* Bayartogtokh & Akrami, 2014)  
 Distribution: Southern Palaearctic and Ethiopian regions
3. Interlamellar setae minute ..... 4
  - Interlamellar setae well developed, long ..... 5
4. Head of bothridial setae narrow; rostrum pointed, without teeth; prodorsum smooth; notogastral porose areas *Aa* elongate triangular, genital plate smooth, without striation; body size 684–774 × 595–631 ..... ***Pergalumna (P.) persica* Akrami & Ebrahimi, 2013**  
 Distribution: Iran
  - Head of bothridial setae broad; rostrum dentate, with three distinct teeth; prodorsum striated; notogastral porose areas *Aa* key-shape; genital plates longitudinally striated; body size: 537 × 374 ..... ***Pergalumna (P.) granulistriata* Akrami sp. nov.**

- Distribution: Iran
5. Rostrum pointed, with lateral tooth on each side; epimeral region densely granulate, without striae; genital plates with dense longitudinal striations; postanal porose area *Ap* absent; body size: 600–615 × 496–530 ..... ***Pergalumna (P.) dentirostrata* (Bayartogtokh & Akrami, 2014)**  
 Distribution: Iran
- Rostrum with only small triangular central tooth; epimeral region with small tubercles and longitudinal striae; genital plates without longitudinal striae; postanal porose area *Ap* present; body size: 545–570 × 380–470 .... ***Pergalumna (P.) microtuberculata* Bayartogtokh & Akrami, 2014**  
 Distribution: Iran

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### REFERENCES

- Akrami, M.A. (2015) An annotated checklist of oribatid mites (Acari: Oribatida) of Iran. *Zootaxa*, 3963(4): 451–501.  
 DOI: 10.11646/zootaxa.3963.4.1
- Akrami, M.A. & Ebrahimi, F. (2013) A new species of the genus *Pergalumna* Grandjean, 1936 from Iran (Acari: Oribatida: Galumnidae). *Zoology in the Middle East*, 59(2): 168–172.  
 DOI: 10.1080/09397140.2013.810881
- Azimi, N., Shirdel, D., Lotfollahi, P. & Khalil Ariya, A.R. (2018) Introduction of some poronotic oribatid mites (Acari: Oribatida: Poronotic Brachypylina) from Arasbaran forests, North of East Azarbaijan Province. *Applied Research in Plant Protection*, 7(3): 117–123 (In Persian).
- Balogh, J. & Balogh, P. (1990) *Oribatid mites of the Neotropical Region II*. Elsevier, Amsterdam/Akadémiai Kiadó, Budapest, 333 pp.
- Balogh, J. & Balogh, P. (2002) *Identification keys to the oribatid mites of the Extra-Holarctic regions. Vol. 1*. Well-Press Publishing Limited, Miskolc, 453 pp.
- Bayartogtokh, B. & Akrami, M.A. (2014) The soil mite family Galumnidae of Iran (Acari: Oribatida). *Journal of Natural History*, 48(15–16): 881–917.  
 DOI: 10.1080/00222933.2013.840397
- Bayartogtokh, B. & Ermilov, S.G. (2017) Nymphal instars of two *Pergalumna* species, with remarks on morphological ontogeny of Galumnidae (Acari, Oribatida). *Systematic and Applied Acarology*, 22(4): 518–540.  
 DOI: 10.11158/saa.22.4.8
- Berlese, A. (1914) Acari nuovi. Manipulus IX. *Redia*, 10(1): 113–150, pls. X–XIII.
- Ermilov, S.G. & Friedrich, S. (2019) To the knowledge of oribatid mites (Acari, Oribatida) of Samoa. *Systematic and Applied Acarology*, 24(1): 118–131.  
 DOI: 10.11158/saa.24.1.9
- Ermilov, S.G., & Klimov, P.B. (2017) Generic revision of the large-winged mite superfamily Galumnoidea (Acari, Oribatida) of the world. *Zootaxa*, 4357(1): 1–72.  
 DOI: 10.11646/zootaxa.4357.1.1
- Ermilov, S.G. & Starý, J. (2018) New taxa of oribatid mites from Korup National Park (Cameroon). The genus *Pergalumna* (Acari, Oribatida, Galumnidae), with description of three new species and a key to known species from the Ethiopian region. *Zootaxa*, 4425(2): 201–222.  
 DOI: 10.11646/zootaxa.4425.2.1
- Ermilov, S.G., Starý, J., Sandmann, D., Marian, F. & Maraun, M. (2013) New taxa and new records of oribatid mites of the family Galumnidae (Acari: Oribatida) from Ecuador. *Zootaxa*, 3700(2):

259–270.

DOI: 10.11646/zootaxa.3700.2.4

Ermilov, S.G., Alvarado-Rodríguez, O. & Retana-Salazar, A.P. (2014) Two new species of *Pergalumna* (Acari, Oribatida, Galumnidae) from Costa Rica, including a key to all species of the genus from the Neotropical region. *ZooKeys*, 435: 7–23.

DOI: 10.3897/zookeys.435.8213

Ermilov, S.G., Sandmann, D., Klärner, B., Widyastuti, R. & Scheu, S. (2015) Contributions to the knowledge of oribatid mites of Indonesia. 2. The genus *Pergalumna* (Galumnidae) with description of a new species and key to known species in the Oriental region (Acari, Oribatida). *ZooKeys*, 529: 87–103.

DOI: 10.3897/zookeys.529.6421

Gilyarov, M.S. & Krivolutsky, D.A. (1975) *A key to the soil-inhabiting mites. Sarcoptiformes*. Nauka Press, Moscow, 492 pp. (In Russian).

Grandjean, F. (1936) Les Oribates de Jean Frédéric Hermann et de son père. *Annales de la Société Entomologique de France*, 105: 27–110.

Norton, R.A. & Behan-Pelletier, V.M. (2009) Oribatida. In: Krantz, G.W. & Walter, D.E. (Eds.), *A manual of acarology*. 3<sup>rd</sup> edition. Lubbock, Texas Tech University Press, pp. 430–564.

Subías, L.S. (2004) Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes: Oribatida) del mundo (excepto fósiles). *Graellsia*, 60: 3–305. Update [Internet] 2020 (Available from: [http://bba.bioucm.es/cont/docs/RO\\_1.pdf](http://bba.bioucm.es/cont/docs/RO_1.pdf))

Weigmann, G. (2006) *Hornmilben (Oribatida)*. *Die Tierwelt Deutschlands*. 76 Teil. Goecke and Evers, Keltern, 520 pp.

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## توصیف گونه جدید از کنه‌های ارباتیید جنس *Pergalumna* (Acari: Oribatida: Galumnidae) از شمال غرب ایران

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### چکیده

گونه جدیدی از کنه‌های خانواده Galumnidae (Acari: Oribatida) به نام *Pergalumna (Pergalumna) granulistriata* Akrami sp. nov. از خاک استان زنجان (شمال غرب ایران) توصیف می‌شود. این گونه با این ویژگی‌ها شناخته می‌شود: خرطوم دنداندار؛ پرودورسوم دانه‌دار-مخطط؛ موهای بین لاملایی ریز؛ موهای بوتریدیومی کوتاه با سر چماقی و مویچه‌های بسیار ظریف؛ شیار پستی کامل؛ دو قسمتی بودن نواحی منفذدار جلویی، قسمت جلویی بسیار بزرگ و به شکل یک کلید نامنظم و قسمت عقبی بسیار کوچک و گرد؛ وجود منفذ میانی نوتوگاستر؛ مخطط بودن طولی صفحات جنسی و کشیده بودن ناحیه منفذدار پس‌مخرجی. گونه جدید از نظر ویژگی‌های ریخت‌شناسی به گونه *Pergalumna formicaria* (Berlese, 1914) خیلی شبیه است، اما به دلیل داشتن دندان‌های روی خرطوم، وجود نقش و نگار روی پرودورسوم، شکل نواحی منفذدار جلویی و نقش و نگار اندام بال‌مانند با این گونه فرق می‌کند. کلید شناسایی گونه‌های ایرانی جنس *Pergalumna* نیز ارائه شده است.

واژگان کلیدی: کنه‌های گالومنید؛ ریخت‌شناسی؛ بالاراسته Sarcoptiformes؛ آرایه‌شناسی؛ زنجان.

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