# Two new species of oribatid mites (Acari: Oribatida) from Bu Gia Map National Park (Vietnam)

# Два новых вида орибатидных клещей (Acari: Oribatida) из Национального парка Бузямап (Вьетнам)

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Two species of oribatid mites (Acari: Oribatida), *Pergalumna pseudosejugalis* **sp. nov.** and *Oribatella gerdweigmanni* **sp. nov.** are described from Bu Gia Map National Park (Southern Vietnam). *Pergalumna pseudosejugalis* **sp. nov.** is most similar morphologically to *P. crassipora* Mahunka, 1995, but it differs from the latter in the microfoveolate integument, presence of pseudosejugal line, of a pair of transversal striate bands on ventral side and of median pore, and by shorter lamellar setae. *Oribatella gerdweigmanni* **sp. nov.** is most similar morphologically to *O. sculpturata* Mahunka, 1987, but it differs from the latter in a smaller body size, a microfoveolate integument, the presence of the translamella, more short lateral and medial lamellar dens, and sparse striae in an epimeral region.

Два новых вида орибатидных клещей (Acari: Oribatida) – *Pergalumna pseudosejugalis* **sp. nov.** и *Oribatella gerdweigmanni* **sp. nov.** – описаны из Национального парка Бузямап (Южный Вьетнам). Морфологически *Pergalumna pseudosejugalis* **sp. nov.** наиболее сходен с *P. crassipora* Mahunka, 1995, но отличается микроямочными покровами тела, наличием псевдосеюгальной линии, пары поперечных складчатых полос на вентральной стороне и медиальной поры, а также более короткими ламеллярными щетинками. Морфологически *Oribatella gerdweigmanni* **sp. nov.** наиболее сходен с *O. sculpturata* Mahunka, 1987, но отличается меньшими размерами тела, микроямочными покровами тела, наличием трансламеллы, более короткими ламеллярными кусписами, а также редкими складками в эпимеральной области.

**Key words:** oribatid mites, Bu Gia Map National Park, Vietnam, *Pergalumna*, *Oribatella*, new species

**Ключевые слова:** орибатидные клещи, Национальный парк Бузямап, Вьетнам, *Pergalumna*, *Oribatella*, новые виды

## INTRODUCTION

The oribatid mite fauna of Southern Vietnam is poorly studied, and presently only some data are available from Dong Nai Biosphere Reserve (=Cat Tien National Park) (Ermilov & Anichkin, 2010, 2011a, 2011b, 2011c, 2011d, 2011e; Ermilov, 2011).

In the course of studies of oribatid mites of Bu Gia Map National Park (Southern Vietnam) we found representatives of two new species: one species belonging to the genus *Pergalumna* Grandjean, 1936 (Galumnidae), and one species belonging to the genus *Oribatella* Banks, 1895 (Oribatellidae).

The genus *Pergalumna* comprises more than 110 species that collectively have a cosmopolitan distribution (Subías, 2004, online version 2011). At present, only nine species from this genus have been recorded from Vietnam (Balogh & Mahunka, 1967; Mahunka, 1989; Krivolutsky et al., 1997; Ermilov & Anichkin, 2011d, 1011e): *P. altera* (Oudemans, 1915), *P. cattienica* Ermilov et Anichkin, 2011, *P. granulata* Balogh et Mahunka, 1967, *P. indistincta* Ermilov et Anichkin, 2011, *P. kotschyi* Mahunka, 1989, *P. magnipora* (Hammer, 1961), *P. margaritata* Mahunka, 1989, *P. punctulata* Balogh et Mahunka, 1967, *P. yurtaevi* Ermilov et Anichkin, 2011.

The genus *Oribatella* comprises more than 110 species that collectively have a cosmopolitan distribution (Subías, 2004, online version 2011). At present, only two species from this genus have been recorded from Vietnam (Mahunka, 1987; Ermilov & Anichkin, 2012): *O. sculpturata* Mahunka, 1987, *O. umaetluisorum* Ermilov et Anichkin, 2012.

## MATERIALS AND METHODS

Specimens were studied in lactic acid, mounted in temporary cavity slides for the duration of the study, then stored in 70% alcohol in vials. All body measurements are presented in micrometers. Body length was measured in lateral view, from the tip of rostrum to the posterior edge of ventral plate (in order to avoid discrepancies caused by different degrees of notogastral distension). Notogastral width refers to the maximum width in dorsal aspect.

Formulae of leg setation are given according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulae of leg solenidia are given (in square brackets) according to the sequence genu–tibia–tarsus.

Terminology used in this paper follows that of Grandjean (see Travé & Vachon, 1975 for references) and Norton and Behan-Pelletier (2009).

Types of the new species are deposited at the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZIN), the Siberian Zoological Museum, Novosibirsk, Russia (SZM), and in the personal collection of the first author (PC).

## RESULTS

Suborder **ORIBATIDA**

Family **GALUMNIDAE**

Genus ***Pergalumna*** Grandjean, 1936

***Pergalumna pseudosejugalis* sp. nov.**
(Figs 1, 2)

*Holotype*. Female, Southern **Vietnam**, northeastern *Binh Phuoc Province*, Phuoc Long District, Bu Gia Map National Park, 12°12′N, 107°12′E, under *Dipterocarpus alatus* in dark loamy soil with litter (leaves and branches), 17–31 May 2011, coll. A.E. Anichkin (ZIN).

*Paratypes*. Female and male, same data as for holotype (SZM); female and male, same data as above, but under *Swintonia floribunda* with admixture *Dipterocarpus turbinatus*, in dark loamy soil with litter (leaves and branches of *Swintonia floribunda*), 17–31 May 2011, coll. A.E. Anichkin (PC).

*Diagnosis*. The new species is characterised by the following combination of characters: body size 262–282 × 192–209; rostrum rounded; surface of body microfoveolate; prodorsum with transverse stria (pseudosejugal line) between lamellar and interlamellar setae; ventral side with one pair of transversal striate bands; rostral and interlamellar setae short, thin; sensillus clavate; dorsosejugal furrow absent; three pairs of round and amorphous porose areas present; median pore present; postanal porose area absent.

*Description*. Small species. Measurements: body length 282 (holotype), 262–282 (mean 270; four paratypes); body width 209 (holotype), 192–209 (mean 201; four paratypes).

Integument (Figs 1A, B). Body color brown. Surface of body microfoveolate. Prodorsum with transverse thin stria (pseu-

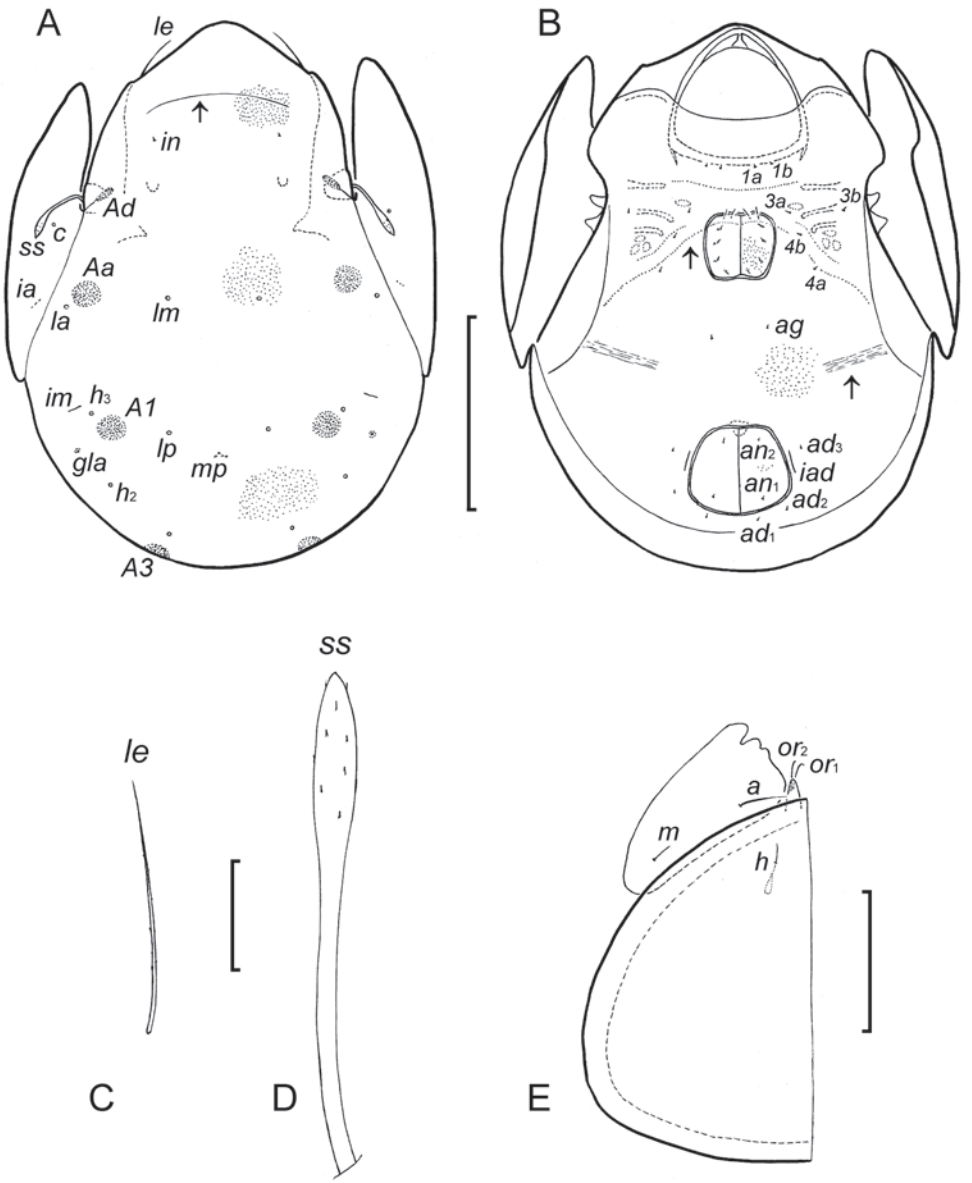


**Fig. 1.** *Pergalumna pseudosejugalis* **sp. nov. A**, dorsal view (arrow pointing to pseudosejugal line); **B**, ventral view, legs, palps and subcapitular setae not shown (arrows pointing to slightly pigmented arch-like band and transversal striate band); **C**, lamellar seta; **D**, sensillus; **E**, right half of subcapitulum. Scale bars: 100 μm (A, B), 10 μm (C, D), 20 μm (E).

dosejugal line), which inserted between lamellar and interlamellar setae. A one pair of transversal striate bands located on ventral side between genital and anal plates.

Prodorsum (Figs 1A, C, D; 2A, B). Rostrum rounded in dorsal view. Rostral setae (*ro*) short (8–12), setiform, thin, smooth. Lamellar setae (*le*) longer (24–28), seti-

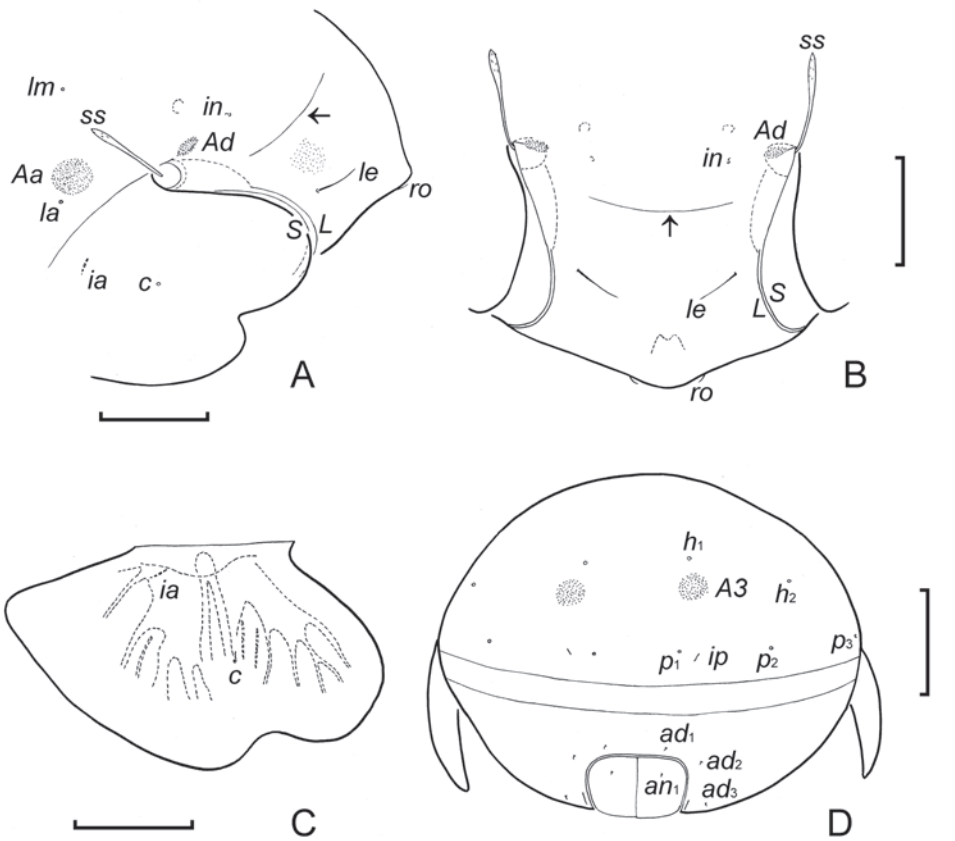


**Fig. 2.** *Pergalumna pseudosejugalis* **sp. nov. A**, dorso-lateral view of prodorsum (arrow pointing to pseudisejugal line); **B**, anterior view of prodorsum (arrow pointing to pseudisejugal line); **C**, pteromorpha; **D**, posterior view of notogaster. Scale bars 50 μm.

form, sparsely barbed (visible under high magnification). Interlamellar setae (*in*) minute (2–4), thin, smooth. Sensilli (ss) longest seta on prodorsum (40–44), clavate, with long stalk (26–28) and shorter slightly barbed head (14–16). A pair of oval porose areas *Ad* present posterolaterally to interlamellar setae.

Notogaster (Figs 1A; 2A, C, D). Dorsosejugal furrow absent. Pteromorphs with pigmented ornamentation. Notogastral setae represented by 10 pairs of alveoli. Three pairs of round, amorphous porose areas developed: *Aa* and *A1* 16–20 (in diameter), *A3*. Median pore (*mp*) present in all specimens. Lyrifissures *im* transversely oriented, located anterolateral to *A1*.

Lateral part of body (Figs 2A, B). Lamellar (*L*) and sublamellar (*S*) lines well developed, paralell, inserted very close to each other. Exobothridial setae not observed.

Gnathosoma (Fig. 1E). Typical for *Pergalumna* (for example, see Engelbrecht 1972; Ermilov & Anickin 2011d, 2011e). Subcapitulum slightly longer than wide: 65–69 × 61–65. Hypostomal setae short, thin, smooth; *a* (6–8) little longer than *m* and *h* (3–4). Adoral setae ($or_1$, $or_2$) hook-like, short (4–6), smooth. Length of palp 61. Length of chelicera 73; cheliceral setae long, setiform, barbed: *cha* (20) longer, than *chb* (12).

Epimeral region (Fig. 1B). Apodemes 1, 2, sejugal and 3 well visible. Some speci-

**Table 1**. Leg setation and solenidia of adult *Pergalumna pseudosejugalis* **sp. nov.** Roman letters refer to normal setae (*e* – famulus), Greek letters refer to solenidia. One apostrophe (') marks setae on anterior and double apostrophe (") setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

| Leg | Trochanter | Femur | Genu | Tibia | Tarsus |
|---|---|---|---|---|---|
| I | *v'* | *d, (l), bv"* | *(l), v',* σ | *(l), (v),* $\varphi_1$, $\varphi_2$ | *(ft), (tc), (it), (p), (u), (a), s, (pv), v', (pl), l", e,* $\omega_1$, $\omega_2$ |
| II | *v'* | *d, (l), bv"* | *(l), v',* σ | *(l), (v),* φ | *(ft), (tc), (it), (p), (u), (a), s, (pv),* $\omega_1$, $\omega_2$ |
| 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)* |

mens with slightly pigmented arch-like band anteriorly to genital plates (similar to representatives of the genus *Taeniogalumna* Balogh, 1962), however, the other specimens without such a band. Epimeral setal formula: 2–0–2–2. Epimeral setae (*1a, 1b, 3a, 3b, 4a, 4b*) short (4), thin, smooth. Setae *1a* and *1b* on epimera I located close to each other.

Anogenital region (Figs 1B; 2D). Six pairs of genital ($g_1$, $g_2$ 4–6, $g_3$–$g_6$ 2–4), one pair of aggenital (*ag*, 1–2), three pairs of adanal ($ad_1$–$ad_3$, 1–2) and two pairs of anal ($an_1$ $an_2$, 1–2) setae very short, thin, smooth. Anterior part of genital plate with two setae ($g_1$, $g_2$). Lyrifissures *iad* paranal, located close to anal plates. Postanal porose area absent.

Legs. Tridactylous. Morphology of leg segments, setae and solenidia typical for *Pergalumna* (for example, see Engelbrecht 1972; Ermilov & Anickin 2011d, 2011e). Formulae 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.

*Etymology*. This specific name "*pseudosejugalis*" refers to the presence of a pseudosejugal line on the prodorsum.

*Comparison. Pergalumna pseudosejugalis* **sp. nov.** is most similar to *P. crassipora* Mahunka, 1995 from Borneo (Mahunka, 1995) in having a small body size, three pairs of round porose areas, clavate sensilli, short rostral and interlamellar setae, close insertion of epimeral setae *1a* and *1b*, and by the absence of dorsosejugal furrow. However, the new species clearly differs from the latter in having a completely microfoveolate integument (v. small and large foveolae present), the prodorsum with the transverse thin stria (v. without stria), the presence of a pair of transversal striate bands on ventral side (v. absent), the presence of median pore (v. absent), and shorter lamellar setae (v. longer).

## Family **ORIBATELLIDAE**

### Genus ***Oribatella*** Banks, 1895

### ***Oribatella gerdweigmanni*** **sp. nov.**
(Figs 3, 4)

*Holotype*. Female, Southern **Vietnam**, northeastern *Binh Phuoc Province*, Phuoc Long District, Bu Gia Map National Park, 12°12´N, 107° 2´E, under *Swintonia floribunda* with admixture *Dipterocarpus turbinatus*, in dark loamy soil with litter (leaves and branches of *Swintonia floribunda*), 17–31 May 2011, coll. A.E. Anichkin (ZIN).

*Paratypes*. 2 males, same data as for holotype (SZM, PC).

*Diagnosis*. New species is characterised by the following combination of characters: body size 225–246 × 139–155; integument microfoveolate; surface of epimeral region with sparse and long striae; rostrum bidentate; translamella present; lateral dens of lamellae with several teeth; sensilli clavate; head oblong; notogastral setae medium size;

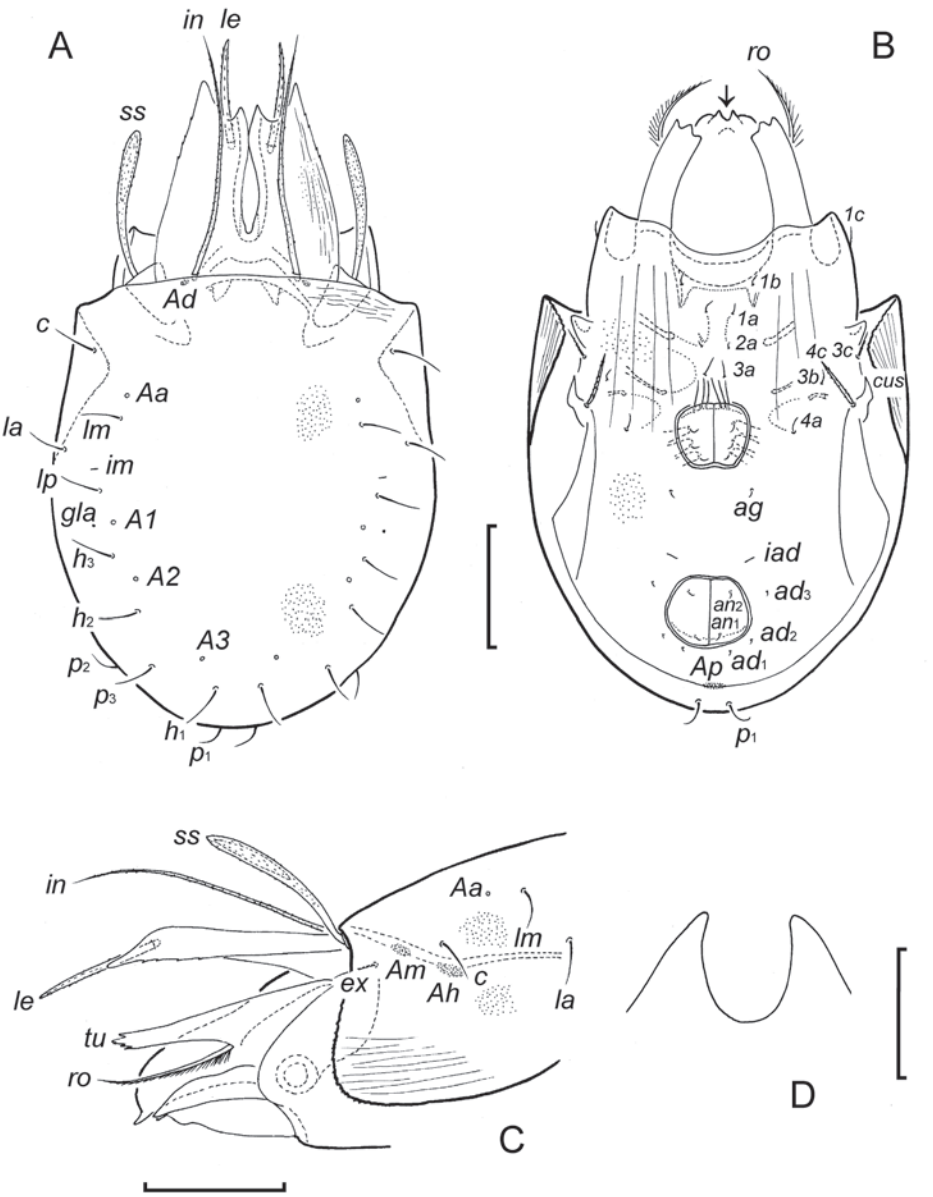


**Fig. 3.** *Oribatella gerdweigmanni* **sp. nov. A**, dorsal view; **B**, ventral view, legs and gnathosoma not shown (arrow pointing to bidentate rostrum); **C**, lateral view of prodorsum and partly of notogaster; **D**, rostrum. Scale bars: 100 μm (A–C), 10 μm (D).

tutoria with four or five teeth distally; anoadanal and aggenital setae short and thin; lyrifissures *iad* in direct apoanal position; epimeral setae *3c* long, setiform, thickened, barbed; epimeral setae *4c* thick, longest among epimeral setae, barbed; legs monodactylous; leg setae *l"* on tibiae I, II and genua I, II thick, barbed.

*Description.* Small species. Measurements: body length 237 (holotype), 225–246 (mean 235; two paratypes); body width 155 (holotype), 139 (two paratypes).

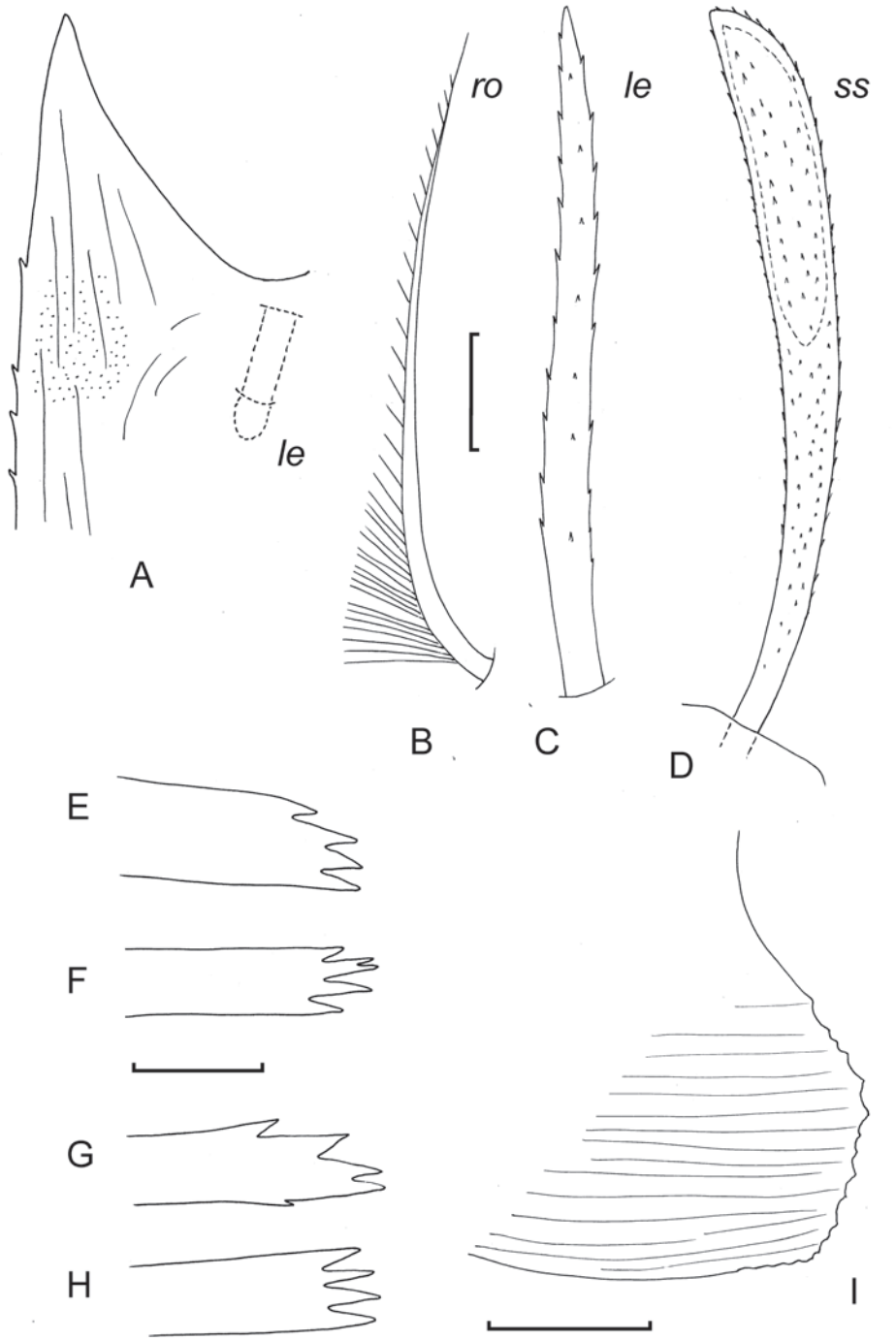


**Fig. 4.** *Oribatella gerdweigmanni* **sp. nov. A**, lateral dens of lamella; **B**, rostral seta; **C**, lamellar seta; **D**, sensillus; **E**–**H**, variations of distal part of tutoria; **I**, anterolateral part of pteromoph. Scale bars: 10 μm (A–H), 20 μm (I).

Integument. Body color light brown to brown. Surface of lamellae, of notogaster, of pteromorphs and of ventral plate (including subcapitular mentum, anal and genital plates) with microfoveolae; lateral parts of lamellae striate; epimeral region with long sparse longitudinal striae; anterior margin of notogaster with short transverse striae; anterolateral parts of pteromorphs striate.

Prodorsum (Figs 3A–D; 4A–D). Rostrum with two teeth and indentation between them. Lamellae broad at level of insertion of lamellar seta and contiguous anteromedially, translamella present. Lamellae with two short (shorter than half of lamella), blunt-ended dens. Medial dens weakly developed, almost straight, smooth. Lateral dens longer than medial dens, straight, with three to five small teeth on lateral margin; position and number of teeth varies. Rostral setae 49–57, setiform, with dense unilateral cilia in medioproximal part and with fewer barbs in distal part. Lamellar setae 49–53, thick, straight, barbed, blunt-ended, parallel to midline. Interlamellar setae longest on prodorsum, 102–106, little longer than prodorsum, slightly thickened, barbed. Sensilli 61–69, clavate, with oblong and slightly barbed head. Porose areas *Ad* small, oval, positioned lateroposteriorly of interlamellar setae and medial of bothridia.

Notogaster (Figs 3A, C; 4I). Length longer than width. Anterior margin almost straight. Pteromorphs with irregular teeth on anterolateral margin. Four pairs of porose areas small (2–4), poorly visible, rounded. Ten pairs of notogastral setae medium size, 16–20 ($p_1$, $p_2$ shorter, 12), setiform, with indistinct barbs. Only two pairs of setae ($p_1$, $p_2$) inserted in posteromarginal position; setae $p_3$ in dorsomarginal position. Opisthonotal gland opening (*gla*) located laterally to *A1*. Lyrifissures *im* located dorsolaterally to setae *lp*. Lyrifissures *ia* and *ip* developed in typical arrangement for genus, but poorly visible.

Lateral part of body (Figs. 3C; 4E–H). Tutoria (*tu*) long, with four to five teeth distally. Position of teeth varied (sometimes even in one specimen). Exobothridial setae 20–24, setiform, thin, slightly barbed. Custodium (*cus*) short, directed anteriorly. Porose areas *Am* and *Ah* oval, poorly visible. Lyrifissures *ih* and *ips* developed in typical arrangement for genus.

Gnathosoma. Typical for *Oribatella* (for example, see Behan-Pelletier, 2011; Ermilov & Anichkin, 2012). Subcapitulum longer than wide: 53–57 × 36–41. Hypostomal setae setiform, thin, slightly barbed; *a* (8–10) little longer than *m* and *h* (both 6). Two pairs of adoral setae 4–6, setiform, hook-like distally, slightly barbed. Length of palp 32–36. Solenidion (ω) pressed to palptarsus in proximal part and connected with acm in mediodistal part. Length of chelicera 57; cheliceral setae setiform, barbed: *cha* (20) longer, than *chb* (12).

Epimeral region (Fig. 3B). Apodemes 1, 2, sejugal and 3 well visible. Epimeral setal formula: 3–1–3–2. Setae *4b* and their alveoli absent. Setae *4c* longest, 20–24, thick, straight, barbed. Setae *3c* 12–16, setiform, thickened, barbed. Other setae shorter, 6–10, setiform, with indistinct barbs.

Anogenital region (Fig. 3B). Six pairs of genital ($g_1$–$g_3$ 8–10, $g_4$–$g_6$ 4–6), one pair of aggenital (4), three pairs of adanal (4) and two pairs of anal (4) setae very short, thin, smooth (except slightly barbed $g_1$–$g_3$). Lyrifissures *iad* in direct apoanal position. Postanal porose area (*Ap*) present, but poorly visible.

Legs. Monodactylous. Morphology of segments and chaetome very similar to other *Oribatella* species (for example, Bernini, 1974; Behan-Pelletier & Eamer, 2010). Formulae of leg setation and solenidia: I (1–5–3–4–20) [1–2–2], II (1–5–3–4–15) [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 2. Setae *l»* on tibiae I, II and genua I, II thick, barbed. Tibiae III, IV and genua III, IV without thick setae. Solenidia simple.

*Etymology*. The species is named in honor of Prof. Dr. Gerd Weigmann (Free University, Institute of Zoology, Berlin, Ger-

**Table 2.** Leg setation and solenidia of adult Oribatella gerdweigmanni sp. nov. See Table 1 for explanations.

| Leg | Trochanter | Femur | Genu | Tibia | Tarsus |
|---|---|---|---|---|---|
| I | *v′* | *d, (l), bv″, v″* | *(l), v′*, σ | *(l), (v)*, $\varphi_1$, $\varphi_2$ | *(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), (l), e*, $\omega_1$, $\omega_2$ |
| II | *v′* | *d, (l), bv″, v″* | *(l), v′*, σ | *(l), (v)*, φ | *(ft), (tc), (it), (p), (u), (a), s, (pv)*, $\omega_1$, $\omega_2$ |
| III | *l′, v′* | *d, l′, 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)* |

many), the distinguished acarologist, for his extensive contributions to our knowledge of the oribatid mites.

*Comparison. Oribatella gerdweigmanni* **sp. nov.** is most similar to *O. sculpturata* Mahunka, 1987 from Vietnam (Mahunka, 1987) in having the shape of prodorsal and notogastral setae (see Prodorsum and Notogaster sections above), a bidentate rostrum, the shape of tutorium (see Lateral part of body section above), serrate pteromorphs, a striate epimeral region, thick epimeral setae *4c*, a short custodium and one claw on legs. However, the new species clearly differs from the latter in having smaller body size (225–246 × 139–155 v. 303–324 × 216–232), the integument only with microfoveolae (v. with microfoveolae and polygonal ornamentation), the presence of translamella (v. translamella absent), lateral and medial lamellar dens shorter, indentation between them smaller (v. longer and larger), and the striae sparse in an epimeral region (v. numerous in).

## ACNOWLEDGEMENTS

We thank Dr. Elizabeth A. Hugo-Coetzee (National Museum, Bloemfontein, South Africa) for valuable comments. We thank the staff of Bu Gia Map National Park for their support during the fieldwork.

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*Recieved December 14, 2011 / Accepted April 15, 2012* .