

# FIRST REPORTS OF GALUMNELLIDAE (ACARI, ORIBATIDA) FROM THE PHILIPPINES, WITH DESCRIPTION OF *GALUMNELLA JUNICHIAOKII* SP. N.

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**ABSTRACT:** Oribatid mites (Acari, Oribatida) of the family Galumnellidae are recorded from the Philippines for the first time, represented by *Porogalumnella reducta* Mahunka, 1995 (previously known from only Borneo) and a new species of *Galumnella*. *Galumnella junichiaokii* sp. n., is described and illustrated on the basis of adult specimens. This species is morphologically similar to *G. nipponica* Suzuki et Aoki, 1970, from Japan, but differs by its smaller body size, the presence of a dorsal longitudinal ridge and lateral tooth-like projections on the prodorsum, a large anterior tectum on epimere I, and lamellar and sublamellar lines that diverge distally.

**KEY WORDS:** oribatid mites, Galumnellidae, *Galumnella*, new record, new species, Philippines

## INTRODUCTION

Galumnellidae (Acari, Oribatida) is a family of oribatid mites comprising 42 species and six to eight genera (see different opinions: Balogh 1968; Mahunka 1994; Subías 2004, updated 2014). During taxonomic survey of the Philippine oribatid mite material from the collection of the Museum of Natural History, University of the Philippines Los Baños, we found two species of this family: one is a new species of the genus *Galumnella* Berlese, 1916; the other is *Porogalumnella reducta* Mahunka, 1995, which was previously known from only Borneo (Mahunka 1995). These represent the first records of Galumnellidae from the Philippines. The main goal of our paper is to describe and illustrate the new species under the name *G. junichiaokii* sp. n.

*Galumnella* was proposed by Berlese (1916) with *Galumnella paradoxa* Berlese, 1916 as type species. Currently it comprises 20 named species<sup>1</sup>: 11 species are from the Ethiopian region, seven are from the Oriental region, one from the Palearctic region, and one found in both Oriental and Palearctic regions (Subías 2004, updated 2014). Identification keys for many species of *Galumnella* were presented by Balogh (1960), Aoki and Hu (1993), J. Balogh and P. Balogh (2002) and Ermilov and Anichkin (2011). The main generic characters of *Galumnella* were by Ermilov and Kalúz (2013).

<sup>1</sup>Subías (2004) considered the genus *Bigalumnella* Mahunka, 1994 (with *B. csavatorum* Mahunka, 1994) as a subgenus of *Galumnella*, however, we do not support this opinion in this moment.

## MATERIAL AND METHODS

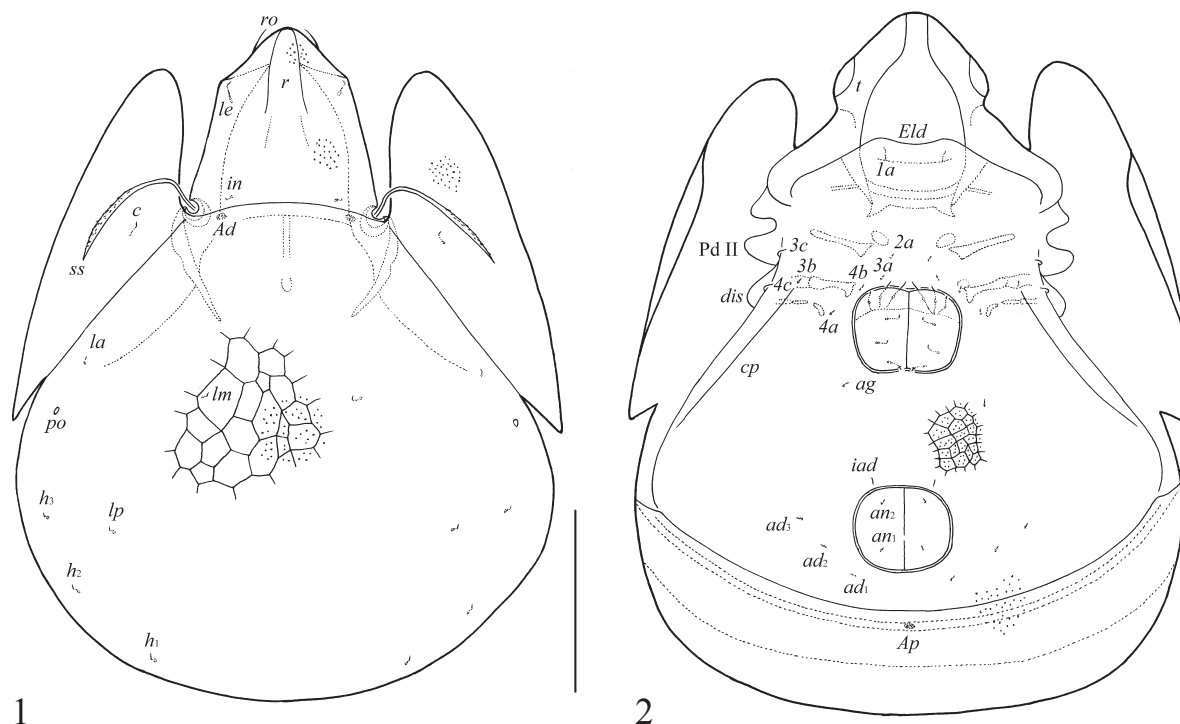
The collection locality and habitat of the new species are given in the “*Material examined*” section. Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. The body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum width in dorsal aspect. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. 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. General terminology used in this paper follows that of Grandjean (summarized by Norton and Behan-Pelletier 2009). Drawings were obtained through a drawing tube mounted on a Carl Zeiss transmission light microscope “Axioskop-2 Plus”.

## DESCRIPTION

### *Galumnella junichiaokii* sp. n.

Figs 1–23

**Diagnosis.** Body size: 315–381 × 249–298. Surface of body punctate; notogaster and anogenital region additionally with reticulate pattern. Rostrum rounded. Prodorsum with medial longitudinal ridge and two lateral tooth-like projections. Lamellar and sublamellar lines developed, parallel basally but divergent distally. Rostral setae of medium size; lamellar, interlamellar and notogastral setae minute. Bothridial setae long, with head di-



Figs 1–2. *Galumnella junichiaokii* sp. n., adult: 1 — dorsal view; 2 — ventral view (gnathosoma and legs not illustrated). Scale bar 100  $\mu$ m.

lated unilaterally, barbed, pointed distally. Subcapitular setae *a* longer and thicker than *h*; *m* shortest and thinnest. Anterior tectum of epimere I well developed, forming a trapezoid ledge. Adanal lyrifissures located anteriorly to anal aperture. Post-anal porose area small, oval.

**Description.** *Measurements.* Body length: 381 (holotype: female), 315–381 (11 paratypes: three females, eight males); notogastral width (without pteromorphs): 290 (holotype), 249–298 (11 paratypes).

*Integument* (Figs 1–9, 11–13, 18–23). Body color brown to dark brown. Body surface, pteromorphs, genital and anal plates and subcapitular mentum densely punctate (points rounded or weakly elongated; their diameter or length less than 1). Raised reticulate pattern on dorsal part of notogaster (length of cells up to 32) and in anogenital region (length of cells up to 12).

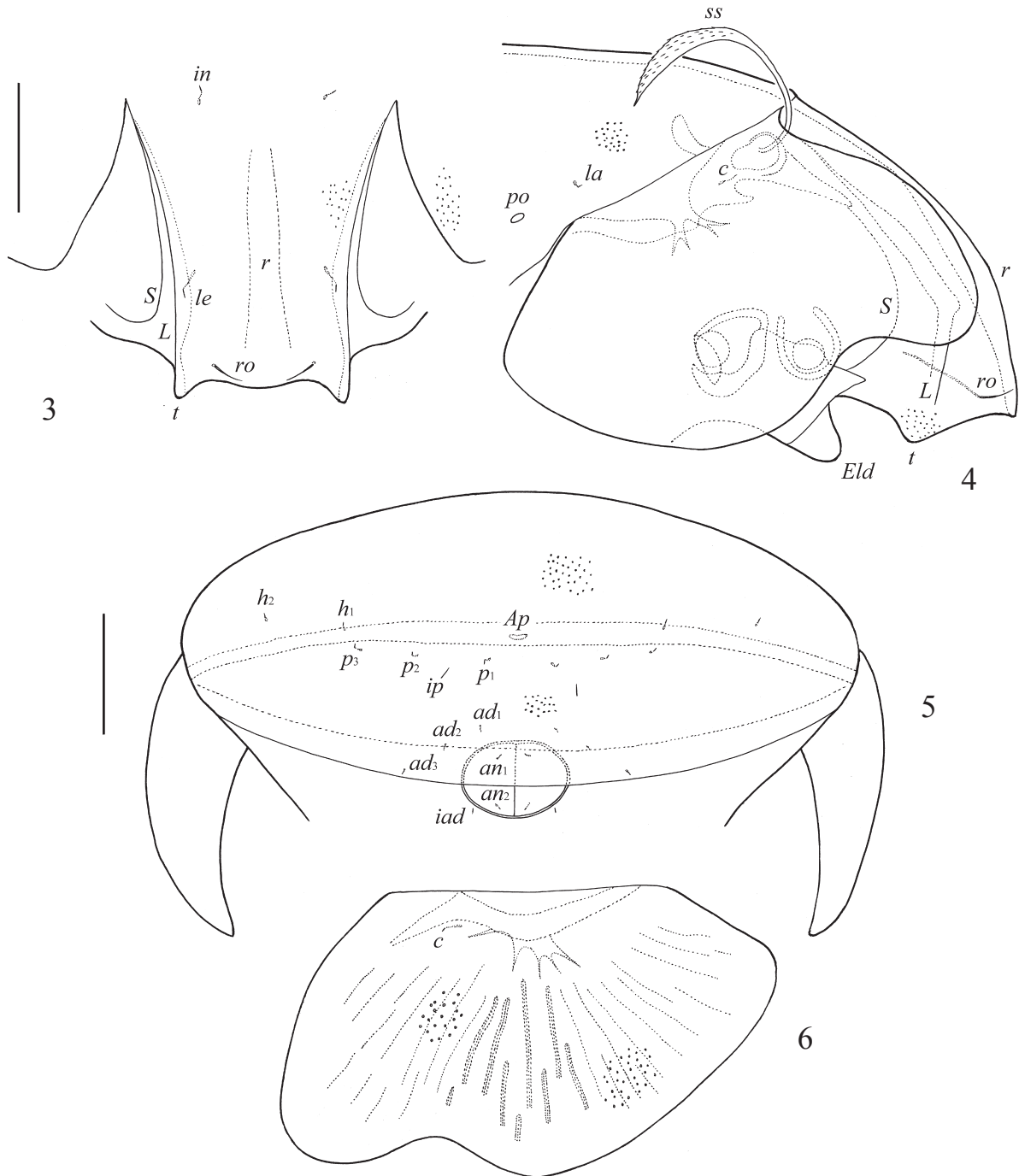
*Prodorsum* (Figs 1, 3, 4, 7–10). Rostrum distally rounded; antero-medially with strong longitudinal dorsal ridge (*r*); lateral margins with large tooth-like projections (*t*). Lamellar (*L*) and thin sublamellar (*S*) lines parallel basally but strongly divergent distally; lines *S* curving posteriorly, lines *L* directed toward tooth-like projections, forming apparent prominent tubercle in dorsal view. Rostral setae (*ro*, 14–16) simple, smooth.

Lamellar (*le*, 4–6) and interlamellar (*in*, 2) setae minute, thin, weakly visible. Bothridial setae (*ss*, 94–102) with long stalk and slightly shorter head; head dilated unilaterally, barbed, pointed distally. Exobothridial setae absent without vestige. Porose areas *Ad* oval (6  $\times$  2–4). Insertions of lamellar setae located between lateral lines (medially to respective line *L*).

*Notogaster* (Figs 1, 4–6, 11, 12). Anterior notogastral margin weakly convex. Notogaster with 10 pairs of short (4–6), thin setae. One pair of pores (*po*) dorso-laterally, between setae *la* and *h3*. No lyrifissure or opisthonotal gland opening visible. Median pore absent.

*Gnathosoma* (Figs 13–17). Subcapitular mentum longer than wide (73–77  $\times$  51–57). Subcapitular setae simple, slightly barbed: *a* (28–32) longer and thicker than *h* (18–20); *m* shortest (8–12) and thinnest. Two pairs of adoral setae (12–14) setiform, slightly barbed. Palps (61–69) with setation 0–2–1–3–9(+ $\omega$ ); solenidion straight, thickened, slightly dilated distally, attached to eupathidium. Chelicerae (143) with three small teeth on dorsal digit. Trägårdh's organ and cheliceral setae not found.

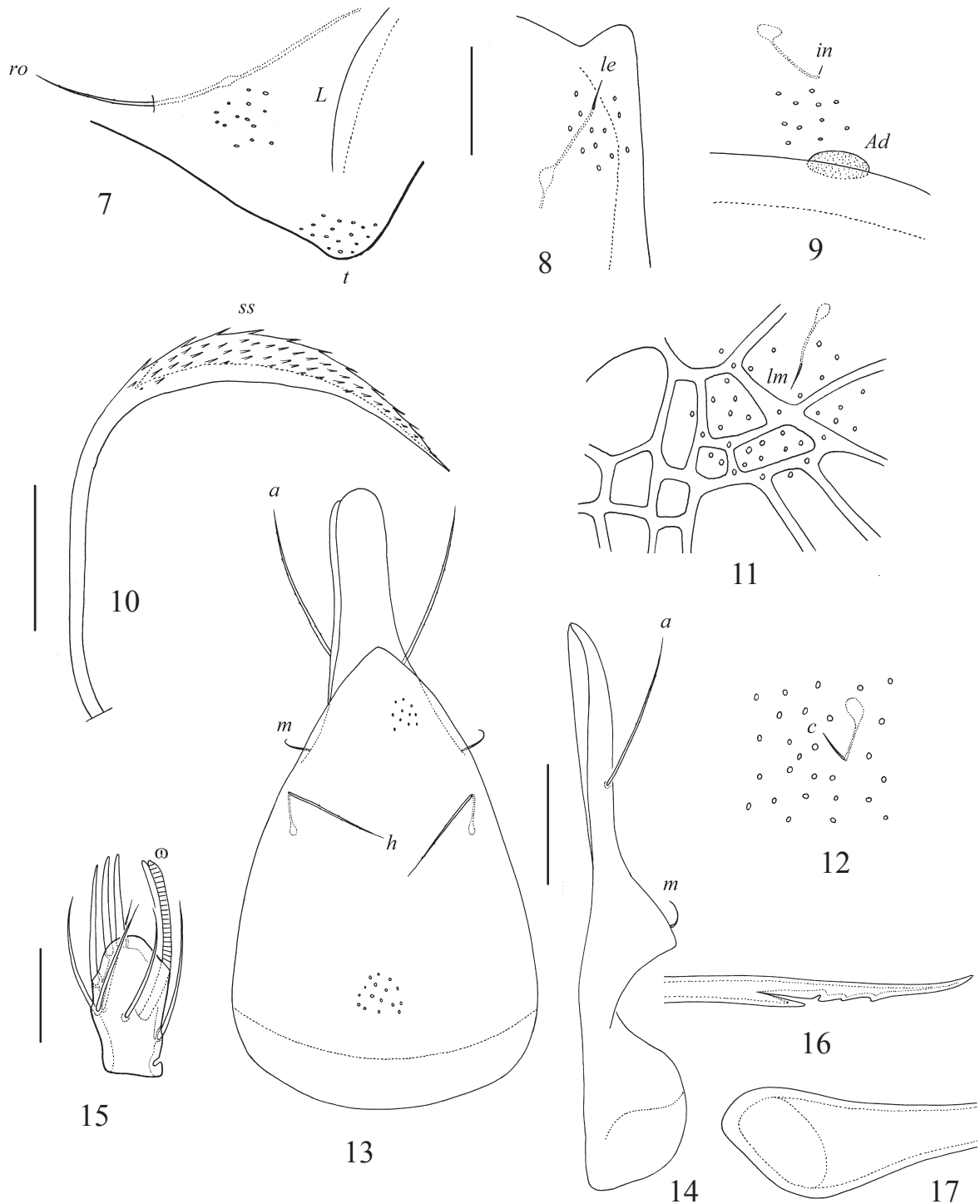
*Epimeral and lateral podosomal regions* (Figs 2, 4, 18, 19). Anterior tectum of epimere I (*Eld*) well developed, forming trapezoidal and dis-



Figs 3–6. *Galumnella junichiaokii* sp. n., adult: 3 — frontal view of prodorsum; 4 — lateral view of anterior part of body (legs I, II not illustrated); 5 — posterior view; 6 — pteromorph. Scale bars 50  $\mu$ m.

tally slightly concave anterior ledge. Apodemes (1, 2, sejugal, 3) clearly visible. Eight pairs of simple, thin epimeral setae present; formula: 1–1–3–3. Setae 3c and 4c (12) longer than others (4–6). Pedotecta II (Pd II) rectangular, rounded anteriorly in ventral view. Discidia (*dis*) triangular, rounded distally. Circumpedal carinae (*cp*) distinct, directed toward insertions of setae 3b.

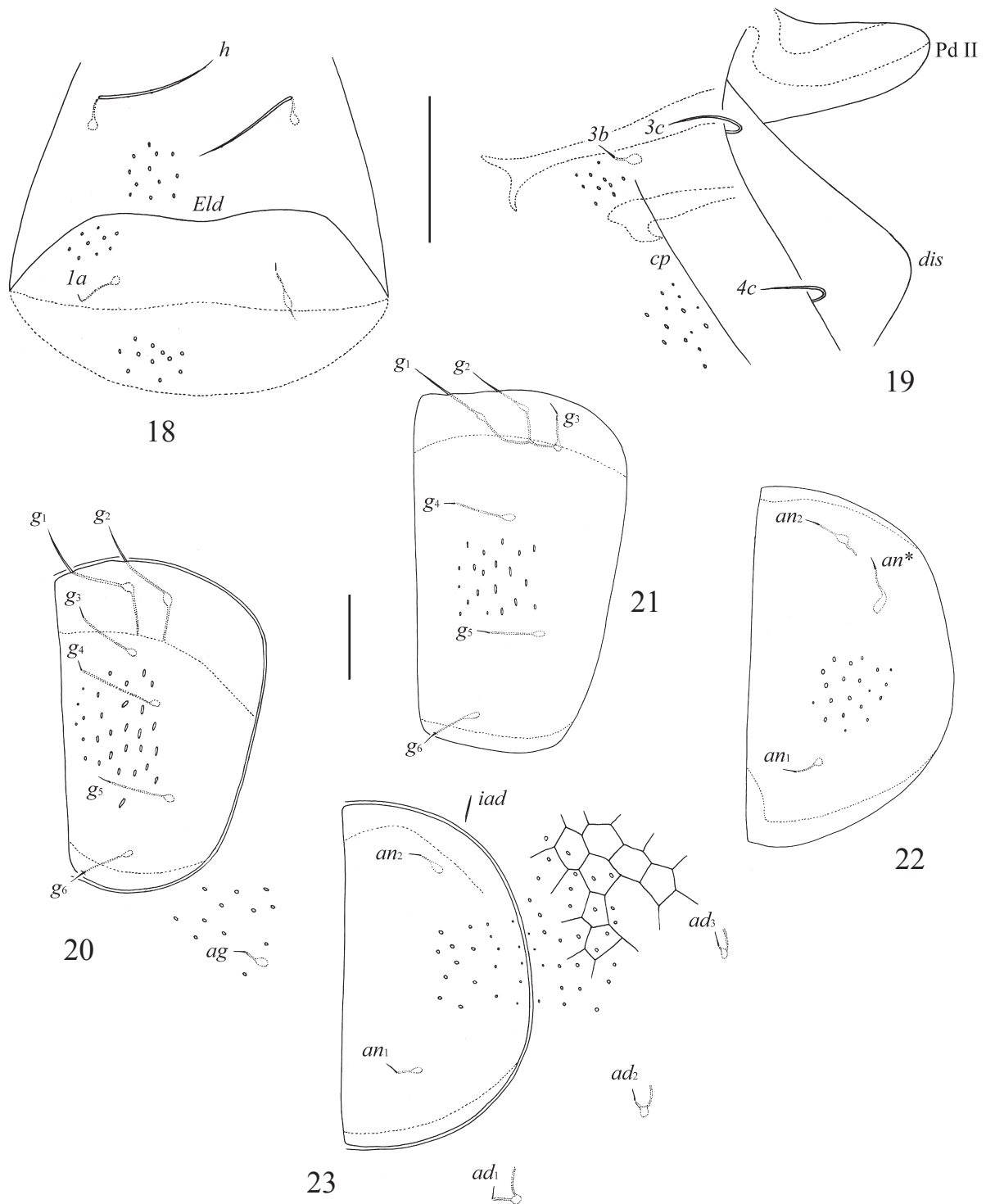
*Anogenital region* (Figs 2, 5, 19–23). Six pairs of genital setae ( $g_1$ , 10–12,  $g_2$ , 6–10,  $g_3$ – $g_6$ , 4–6), two or three positioned along anterior edge; one pair of aggenital (*ag*, 4–6), two pairs of anal ( $an_1$ ,  $an_2$ , 4–6) and three pairs of adanal ( $ad_1$ – $ad_3$ , 4–6) setae minute, thin, smooth. Adanal lyrifissures (*iad*) longitudinal, located anterior to anal aperture. Postanal porose area (*Ap*) oval (6–8  $\times$  2–4).



Figs 7–17. *Galumnella junichiaokii* sp. n., adult: 7 — lateral margin of prodorsum with rostral seta, distal part of lamellar line and tooth-like projection; 8 — lamellar seta; 9 — interlamellar seta and porose area *Ad*; 10 — bothridial seta; 11 — notogastral seta *lm* and part of notogaster with reticulate pattern; 12 — notogastral seta *c* on pteromorph; 13 — subcapitulum, ventral view; 14 — rutellum; 15 — palptarsus; 16 — distal part of chelicera; 17 — basal part of chelicera. Scale bars 10  $\mu$ m (7–9, 11, 12, 15), 20  $\mu$ m (10, 13, 14, 16, 17).

**Legs.** Tridactylous; median claw considerably longer and thicker than lateral claws. Morphology of leg segments, setae and solenidia generally typical for *Galumnella* species (e.g., Engelbrecht 1972; Ermilov et al. 2010; Ermilov, Anichkin

2011). 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.



Figs 18–23. *Galumnella junichiaokii* sp. n., adult: 18 — anterior tectum of epimere I; 19 — epimeral setae *3b*, *3c* and *4c*, pedotectum II and discidium; 20 — genital plate, left, and aggenital seta; 21 — genital plate, left; 22 — anal plate, left; 23 — anal plate, left, adanal lyrifissure and adanal setae. Scale bars 20  $\mu$ m (18, 19), 20  $\mu$ m (20–23).

**Material examined.** Holotype (female) and 11 paratypes (three females, eight males): Philippines, Luzon Island, Mount Makiling, on north trail to peak, 700–900 m a.s.l., in mosses, 4.05.1975, collected by R.S. Raros.

**Type deposition.** The holotype is deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; eight paratypes are deposited in the collection of the Tyumen State University Museum of

Table 1.  
Leg setation and solenidia of *Galumnella junichiaokii* sp. n.

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
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)

Roman letters refer to normal setae (ε to famulus), Greek letters to solenidia. Single prime (') marks setae on anterior and double prime (') setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

Zoology, Tyumen, Russia; three paratypes are deposited in the Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines.

**Etymology.** The specific name is dedicated to our colleague, acarologist, Prof. Dr. Jun-ichi Aoki (Tokyo, Japan) for his extensive contributions to our knowledge of oribatid mites of the world.

**Comparison.** In having a punctate body surface with reticulate pattern only in notogastral and anogenital regions, and narrowly and unilaterally dilated bothridial setae, *Galumnella junichiaokii* sp. n. is most similar to *G. nipponica* Suzuki et Aoki, 1970 (= *G. angustifrons* Aoki, 1970<sup>2</sup>) from the Palearctic and Oriental regions (Aoki 1970; Suzuki and Aoki 1970). However, it differs from the latter by its smaller body size (315–381 × 249–298 versus 415–460 × 305–370 in *G. nipponica*), a prodorsum with a dorsal longitudinal ridge and lateral tooth-like projections (versus all absent in *G. nipponica*), a large, trapezoidal anterior tectum of epimere I (versus of normal size, not noticeably projecting in *G. nipponica*), and distally divergent lines *L* and *S* (versus lines parallel throughout in *G. nipponica*).

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<sup>2</sup>*Galumnella nipponica* Suzuki et Aoki, 1970 and *G. angustifrons* Aoki, 1970 were described simultaneously with participation of Dr. J. Aoki in both cases. The synonymy presented by Fujikawa et al. (1993) is supported by Aoki (pers. com.).

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