

A NEW SPECIES OF *GALUMNA* (ACARI, ORIBATIDA, GALUMNIDAE) FROM ETHIOPIA

Sergey G. Ermilov^{1*} and Leonid B. Rybalov²

¹X-BIO Institute, Tyumen State University, Tyumen, Russia

²A.N. Severtsov Institute of Ecology and Evolution, Moscow, Russia

*corresponding author; e-mail: ermilovacari@yandex.ru

ABSTRACT: A new oribatid mite species of the genus *Galumna* (Oribatida, Galumnidae) is described from Ethiopia, based on the material collected from litter and fallen leaves on the Sanetti Plateau, Bale Mountains. *Galumna* (*Galumna*) *paracapensis* Ermilov sp.n. differs from *Galumna* (*Galumna*) *capensis* Engelbrecht, 1969 in larger body size, strongly elongate postanal porose area, long longitudinal parts of porose areas Aa and the presence of sculpturing on prodorsum and pteromorphs.

KEY WORDS: Galumnid mites, systematics, morphology, Ethiopian region.

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INTRODUCTION

This work is a part of our continuing study of oribatid mites (Acari, Oribatida) of Ethiopia (e.g., Ermilov and Rybalov 2018, 2019; Ermilov 2019). It is based on oribatid mite material collected on the Sanetti Plateau of the Bale Mountains in the course of the Russian-Ethiopian expedition in 2014. During taxonomic identification, we found one new species belonging to the genus *Galumna* Heyden, 1826 (nominative subgenus) of the family Galumnidae. The primary goal of the paper is to describe and illustrate this new species.

At present, the Ethiopian oribatid mite fauna is fairly well studied, and six species of *Galumna* (*Galumna*) have been recorded: *G. (G.) anuakensis* Ermilov, 2019; *G. (G.) flabellifera* Hammer, 1958; *G. (G.) gambelaensis* Ermilov, 2019; *G. (G.) incisa* Mahunka, 1982; *G. (G.) lanceosensilla* Ermilov, Sidorchuk and Rybalov, 2011; *G. (G.) nuda* Engelbrecht, 1972 (e.g., Mahunka 1982; Ermilov *et al.* 2012; Ermilov 2016; Ermilov and Rybalov 2019).

MATERIALS AND METHODS

Litter and fallen leaves were collected using a stainless-steel frame (50×50 cm) with a sieve (mesh size 2×2 cm). Mites were extracted into 75% ethanol using Berlese's funnels with electric lamps in laboratory conditions.

The 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 notogaster (behind pteromorphs). The notogastral width refers to the maximum width of the notogaster in dorsal view. All body measurements are presented in micrometers (μm). The formulas for leg setation are given in parentheses

according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). The formulas for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus.

The drawings were made with a camera lucida using a Leica transmission light microscope “Leica DM 2500”. The microscope images were obtained with an AxioCam ICc3 camera using a Carl Zeiss transmission light microscope “Axio Lab.A1”.

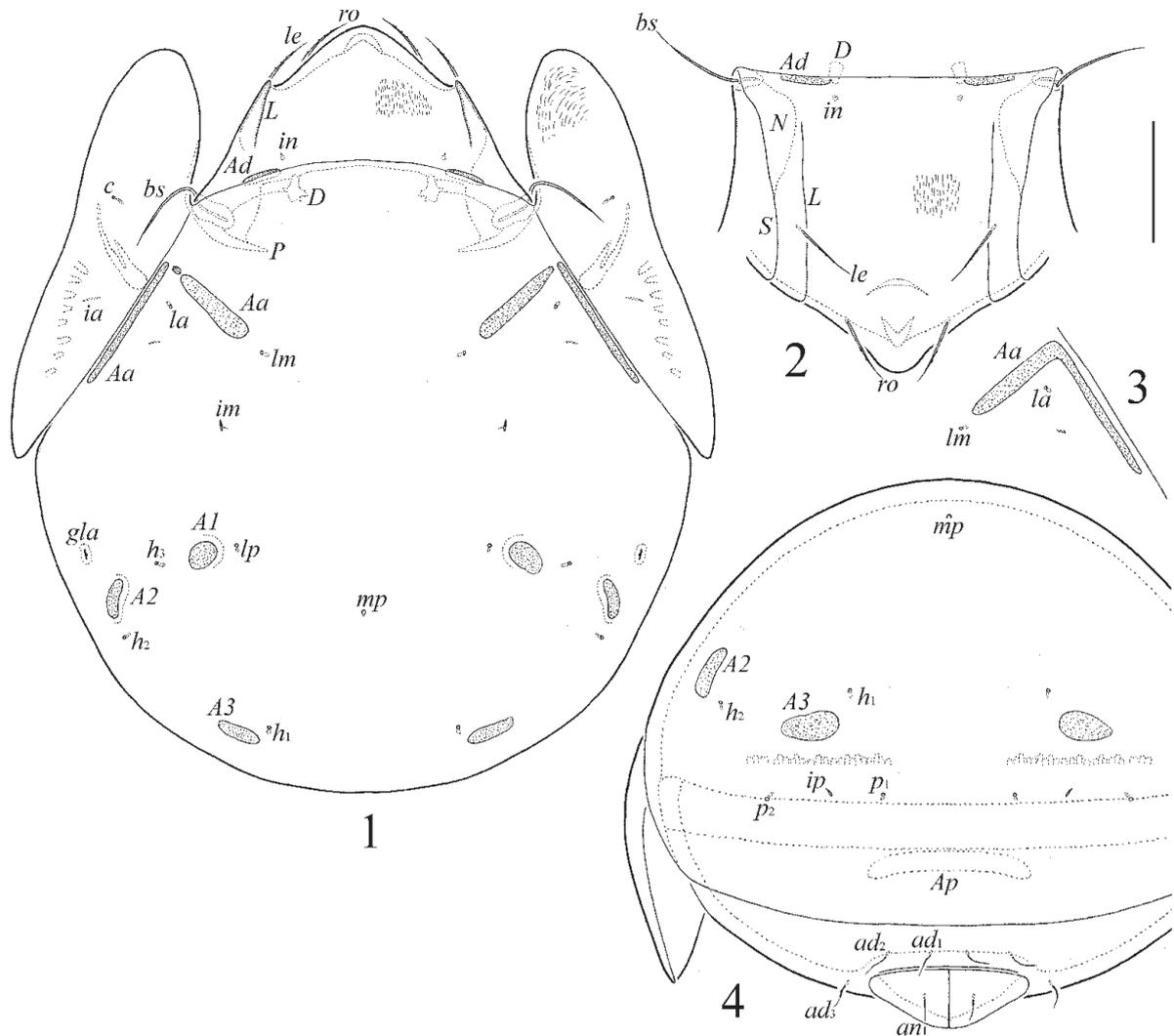
Morphological terminology used in this paper follows that of F. Grandjean (see Ermilov and Klimov 2017 for review and application).

The following abbreviations are used: *L*—lamellar line; *S*—sublamellar line; *N*—prodorsal leg niche; *E*, *T*—lateral ridges of prodorsum; *ro*, *le*, *in*, *bs*—rostral, lamellar, interlamellar and bothridial setae, respectively; *Ad*—sejugal porose area; *D*—dorsophragma; *P*—pleurophragma; *c*, *la*, *lm*, *lp*, *h*, *p*—notogastral setal alveoli; *Aa*, *Al*, *A2*, *A3*—notogastral porose areas; *mp*—median pore; *ia*, *im*, *ip*, *ih*, *ips*—notogastral lyrifissures; *gla*—opisthotal gland opening; *a*, *m*, *h*—subcapitular setae; *or*—adoral seta; *as*—axillary sacculi; *I*, *II*—pedotecta I, II, respectively; *1b*, *3b*, *4a*, *4b*—epimeral setae; *dis*—discidium; *cp*—circumpedial carina; *g*, *ag*, *an*, *ad*—genital, aggenital, anal and adanal setae, respectively; *iad*—adanal lyrifissure; *Ap*—postanal porose area; *po*—preanal organ; *Tr*, *Fe*, *Ge*, *Ti*, *Ta*—leg trochanter, femur, genu, tibia, tarsus, respectively; *pa*—porose area; ω, σ, φ—leg solenidia; ε—leg famulus; *v*, *ev*, *bv*, *l*, *d*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl*—leg setae.

SYSTEMATICS

Superfamily **Galumnoidea**

Family **Galumnidae**



Figs. 1–4. *Galumna (Galumna) paracapensis* Ermilov sp.n., adult: 1—dorsal view; 2—anterior part of prodorsum, dorsoanterior view; 3—complete notogastral porose area *Aa*; 4—posterior view. Scale bar= 200 μ m.

Genus *Galumna* Heyden, 1826

Subgenus *Galumna (Galumna)* Heyden, 1826

Type species *Notaspis alatus* Hermann, 1804

***Galumna (Galumna) paracapensis*
Ermilov, sp.n.**

(Figs. 1–13)

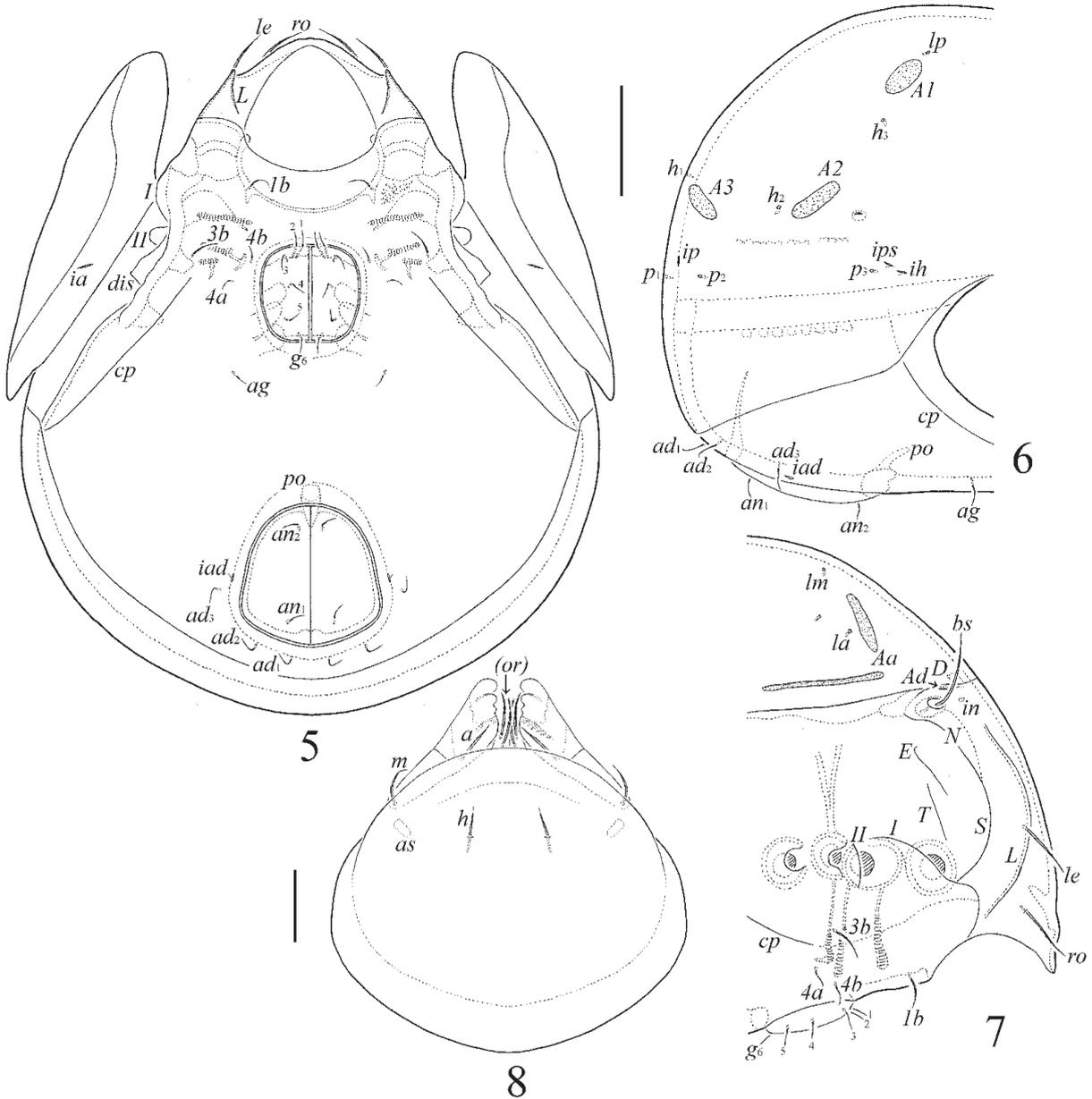
Diagnosis. Body size: 1,195–1,310 \times 1,012–1,095. Rostrum rounded. Prodorsum and partially pteromorphs with sculpturing (short ridges). Lamellar and sublammellar lines long, parallel, curving backwards. Rostral, lamellar and bothridial setae of medium size, setiform, *ro* and *le* slightly barbed, *bs* roughened. Interlamellar setae vestigial. Dorsosejugal porose areas, median pore and strongly elongate oval postanal porose area present. Four pairs of notogastral porose areas: *Aa* boomerang-like, others oval to elongate oval. Epimeral and

anogenital setae short, setiform, slightly barbed. Solenidion on leg tibiae IV inserted in anterior part of the segment.

Description. *Measurements.* Body length: 1,195 (holotype, male), 1,228–1,310 (three paratypes, one male and two females); notogaster width: 1,012 (holotype), 1,029–1,095 (three paratypes). Females larger than males: 1,261–1,310 \times 1,079–1,095 vs. 1,195–1,228 \times 1,012–1,029.

Integument (Figs. 11, 12). Body color brown. Body surface punctate and partially microgranulate (visible under high magnification: \times 1,000). Prodorsum and anterior, lateral and posterior parts of pteromorphs with short ridges. Lateral parts of epimeres I and II with rounded and elongated tubercles and partially with short ridges.

Prodorsum (Figs. 1, 2, 7). Rostrum rounded. Lamellar and sublammellar lines long, parallel, curv-



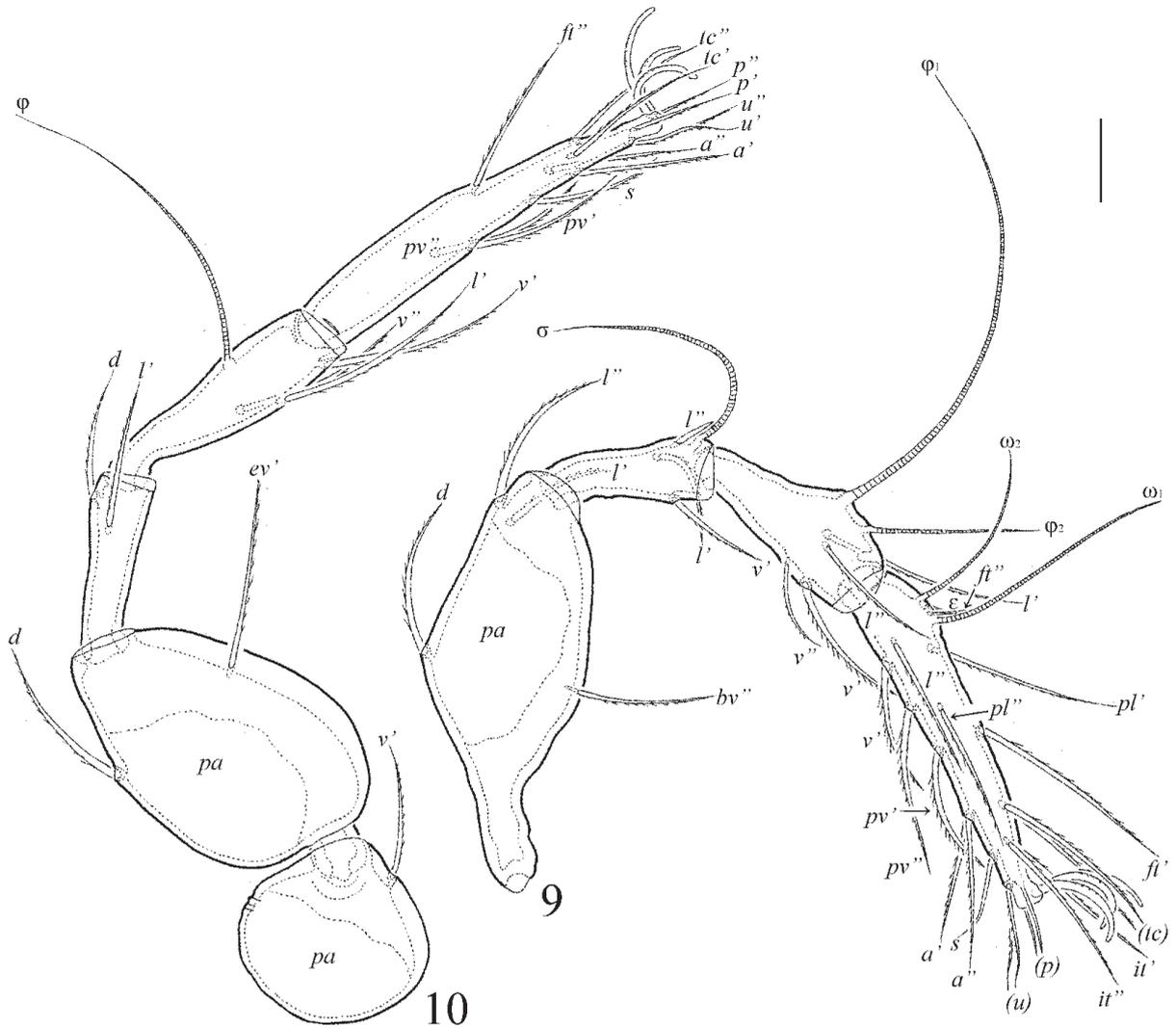
Figs. 5–8. *Galumna (Galumna) paracapensis* Ermilov sp. n., adult: 5—ventral view (not shown: gnathosoma and legs); 6—posterior part of body, lateral view; 7—anterior part of body, lateral view (not shown: gnathosoma, pteromorph and legs); 8—subcapitulum, ventral view. Scale bars = 200 μ m (5–7), 50 μ m (8).

ing backwards, *L* slightly thicker than *S*. Lateral structures *N* and ridges *E* and *T* poorly developed. Rostral and lamellar setae similar in length (106–114), setiform, slightly barbed. Interlamellar setae (1) vestigial. Bothridial setae (143–155) setiform, roughened. Exobothridial setae and their alveoli absent. Dorsosejugal porose areas (65–86 \times 10–12) elongate oval, transversely oriented, located posterolateral to interlamellar setae. Dorsophragmata slightly elongated longitudinally.

Notogaster (Figs. 1, 3, 4, 6, 7). Dorsosejugal suture complete, slightly convex medially. With 10 pairs of setal alveoli and four pairs of porose areas:

Aa boomerang-like, sometimes interrupted in angles, medial parts (180–205 \times 24–32) transverse, lateral parts (229–287 \times 12–16) longitudinal, very close to pteromorphal hinges, narrower than medial parts; *A1* (53–90 \times 36–45), *A2* (73–110 \times 28–32) and *A3* (90–123 \times 24–41) oval or elongate oval. Median pore present in both sexes, located between *A2*. Opisthotal gland openings and all lyrifissures distinct; *gla* located anterolateral to *A2* and removed from them, *im* between *Aa* and *A1*, *ip* between *p*₁ and *p*₂, *ih* and *ips* located close to each other, anterior to *p*₃.

Gnathosoma (Fig. 8). Size of subcapitulum: 270–274 \times 262–266. Subcapitular setae (*a* and *m*,



Figs. 9–10. *Galumna (Galumna) paracapensis* Ermilov sp.n., adult: 9—leg I, without trochanter, right, antiaxial view; 10—leg IV, left, antiaxial view. Scale bar= 50 μ m.

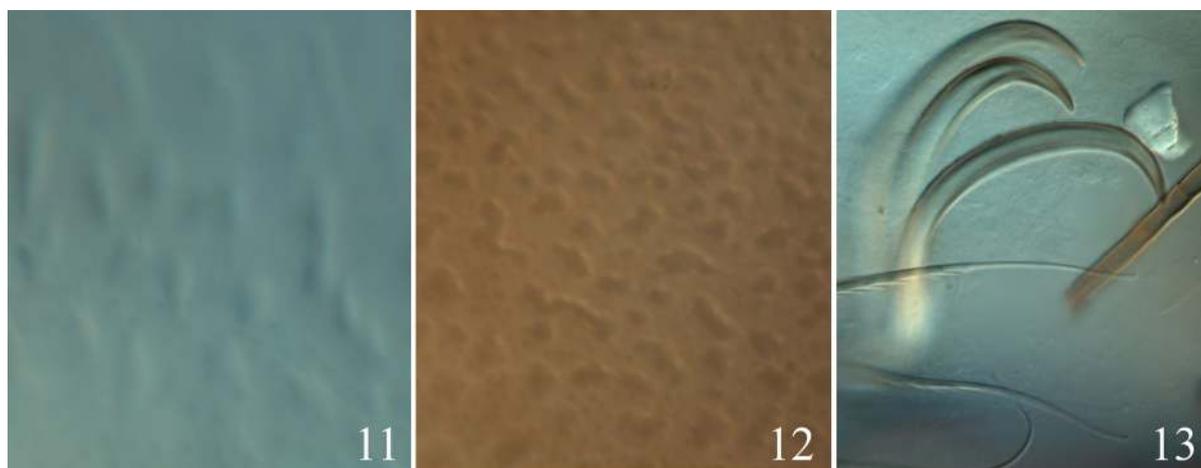
36–45; *h*, 32–41) setiform, slightly barbed; *a* thickest. Adoral setae (36–41) setiform, barbed. Palps (184–188) with typical formula 0–2–1–3–9(+ ω). Postpalpal setae (12) thorn-like. Length of chelicerae: 314–318. Cheliceral setae (*cha*, 90–94; *chb*, 65–69) setiform, barbed. Trägårdh's organ of chelicerae long, elongate triangular.

Epimeral and lateral podosomal regions (Figs. 2, 7). Anterior tectum of epimere I smooth. Epimeral setal formula 1–0–1–2. Epimeral setae setiform, slightly barbed; *1b* and *3b* (65–69) longer than *4a* and *4b* (36–41). Pedotecta I and II rounded in ventral aspect. Discidia triangular. Circumpedial carinae of medium size, thin, directed to insertions of epimeral setae *3b* but not reaching them.

Anogenital region (Figs. 4–7). Six pairs of genital, one pair of aggenital, two pairs of anal and three pairs of adanal setae comparatively similar

in length (36–41) setiform, slightly barbed. Anterior edge of genital plates with two setae. Aggenital setae located between genital and anal apertures, closer to the former. Adanal lyrifissures located close and parallel to anal plates. Adanal setae *ad*₁ and *ad*₂ posterior, *ad*₃ lateral to anal plates. Unpaired postanal porose area elongate oval, not shorter than width of two anal plates (266–287 \times 28–32). Ovipositor elongated (499 \times 131), blades (274) longer than length of distal section (beyond middle fold; 225). Each of the three blades with four smooth setae, $\psi_1 \approx \tau_1$ (151) setiform, $\psi_2 \approx \tau_a \approx \tau_b \approx \tau_c$ (49) thorn-like. Coronal setae (6) spiniform.

Legs (Figs. 9, 10, 13). Claws slightly differ in size and thickness, all barbed on dorsal sides. Porose areas on all femora and on trochanters III, IV poorly visible. Formulas of leg setation and solenidia: I (1–4–3–4–20) [1–2–2], II (1–4–3–4–15)



Figs. 11–13. *Galumna (Galumna) paracapensis* Ermilov sp.n., adult, microscope images: 11—sculpturing on prodorsum; 12—sculpturing in lateral part of epimere I; 13—claws of leg III.

[1–1–2], III (1–2–1–3–15) [1–1–0], IV (1–2–2–3–12) [0–1–0]; homologies of setae and solenidia indicated in Table 1. Famulus on tarsi I inserted posteriorly to solenidion ω_1 . Solenidion on tibiae IV inserted in anterior part of the segment.

Material examined. Holotype (male) and three paratypes (one male and two females): Ethiopia, Bale Mountains, Sanetti Plateau, Afro-Alpica, sparse vegetation, dominated by cushion-shaped shrubs (*Helichrysum splendidum*, with *Festuca richardii*, *Pentaschistis pictigluma* as codominants), 06°48' 40.7"N, 39°51'07.7"E, 4,050 m a.s.l., litter and fallen leaves, Berlese's funnels, 16.XI.2014, collected by E. Kuzmicheva.

Type deposition. The holotype is deposited in the collection of the Senckenberg Institute, Görlitz, Germany; three paratypes are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. All in ethanol with a drop of glycerol.

Etymology. The specific name *paracapensis* refers to the similarity between the new species and *Galumna capensis* Engelbrecht, 1969.

Remarks. *Galumna (Galumna) paracapensis* Ermilov sp.n. is morphologically most similar to *Galumna (Galumna) capensis* Engelbrecht, 1969 from the Ethiopian region (see Engelbrecht 1969) in the presence of dorsosejugal suture, median pore, setiform bothridial setae, four pairs of notogastral porose areas with boomerang-like *Aa* and minute interlamellar setae. The former species differs from the latter in larger body size (1,195–1,310 × 1,012–1,095 versus 630 × 504), presence (versus absence) of sculpturing on the prodorsum and on the pteromorphs, strongly elongate (versus oval) postanal

porose area and long (versus distinctly shorter) longitudinal parts of porose areas *Aa*.

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Table 1

Leg setation and solenidia of *Galumna (Galumna) paracapensis* Ermilov sp.n.

Leg	<i>Tr</i>	<i>Fe</i>	<i>Ge</i>	<i>Ti</i>	<i>Ta</i>
I	<i>v</i> '	<i>d</i> , (<i>l</i>), <i>bv</i> ''	(<i>l</i>), <i>v</i> ' , σ	(<i>l</i>), (<i>v</i>), φ_1 , φ_2	(<i>ft</i>), (<i>tc</i>), (<i>it</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>), <i>v</i> ' , (<i>pl</i>), <i>l</i> '', ε , ω_1 , ω_2
II	<i>v</i> '	<i>d</i> , (<i>l</i>), <i>bv</i> ''	(<i>l</i>), <i>v</i> ' , σ	(<i>l</i>), (<i>v</i>), φ	(<i>ft</i>), (<i>tc</i>), (<i>it</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>), ω_1 , ω_2
III	<i>v</i> '	<i>d</i> , <i>ev</i> '	<i>l</i> ' , σ	<i>l</i> ' , (<i>v</i>), φ	(<i>ft</i>), (<i>tc</i>), (<i>it</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>)
IV	<i>v</i> '	<i>d</i> , <i>ev</i> '	<i>d</i> , <i>l</i> '	<i>l</i> ' , (<i>v</i>), φ	<i>ft</i> '', (<i>tc</i>), (<i>p</i>), (<i>u</i>), (<i>a</i>), <i>s</i> , (<i>pv</i>)

Note: Roman letters refer to normal setae, Greek letters—to solenidia (except ε = famulus), 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.