A NEW SPECIES OF *LASIOBELBA* (ACARI, ORIBATIDA, OPPIIDAE) FROM TAIWAN

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ABSTRACT: A new species of oribatid mites of the genus *Lasiobelba* (Oribatida, Oppiidae), collected from the soil sample in the forest of Yangmingshan National Park (Taiwan), is described. *L. tsaoshanensis* Ermilov sp.n. differs from *L. sculpta* Wang, 1993, *L. yunnanensis* Wen, 1999 and *L. longisensilla* Ermilov, 2017 by the absence of notogastral setae h_3 and by the presence of notogastral setae *lm*, *lp* distinctly longer than *la* and h_3.

KEY WORDS: Oppiid mites, *Lasiobelba*, systematics, morphology, new species, Oriental region.

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INTRODUCTION

Lasiobelba (Acari. Oribatida, Oppiidae) was proposed by Aoki (1959) with *Lasiobelba remota* Aoki, 1959 as a type species. The genus is comprised of two subgenera and 36 species (Subías 2004, updated 2018; see also Ermilov and Starý 2018), which collectively have a cosmopolitan distribution, except for the Antarctic region (Subías 2004, updated 2018). Generic morphological traits and an identification key to known species of *Lasiobelba* are presented by Ermilov *et al*. (2014).

During our taxonomic study in the Yangmingshan National Park in Taiwan, we found one new species belonging to the genus *Lasiobelba*—the nominative subgenus. The main goal of the paper is to describe and illustrate the new species under the name *Lasiobelba* (*Lasiobelba*) *tsaoshanensis* Ermilov sp.n.

This work is part of the study on the oribatid fauna of Taiwan (e.g. Ermilov and Liao 2017*a*–*c*).

METHODS

Samples were collected manually and extracted into a 96% ethanol using Berlese's funnels in the course of seven days in the laboratory. Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. 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 of notogaster in dorsal view. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulas for leg setation are provided in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulas for leg solenidia are provided in square brackets according to the sequence genu–tibia–tarsus.

Drawings were made with a camera lucida using a Leica transmission light microscope "Leica DM 2500".

Morphological terminology used in this paper follows that of F. Grandjean: see Travé and Vachon (1975) for references, Norton (1977) for leg setal nomenclature, and Norton and Behan-Pelletier (2009), for overview.

The following abbreviations are used: *ro*, *le*, *in*, *bs*, *ex*—rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; *bo*—bothridium; *pcar*—prodorsal carina; *pf*—prodorsal furrow; *msig*—muscle sigillum; *la*, *lm*, *lp*, *h*, *p*—notogastral setae; *ia*, *im*, *ih*, *ips*—notogastral lyrifissures; *gla*—opisthonotal gland opening; *cs*—circumgastric scissure; *csb*—circumgastric sigillar band; *lr*—lateral ridge; *h*, *m*, *a*—subcapitular setae; *or*—adoral seta; *cm*, *acm*, *ul*, *sul*, *v*, *l*, *vt*, *lt*—palp setae; ω—palp and leg solenidion; *cha*, *chb*—cheliceral setae; *Tg*—Trägårdh's organ; *cht*—cheliceral tooth; *1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *4a*, *4b*, *4c*—epimeral setae; ap_{st}, ap_2, ap_{sj}—sternal apodeme, apodeme 2 and sejugal apodeme, respectively; *tub*—tubercle; *Pd* I—pedotectum I; *dis*—discidium; *g*, *ag*, *an*, *ad*—genital, aggenital, anal and adanal setae, respectively; *iad*—adanal lyrifissure; *p.o.*—preanal organ; Tr, Fe, Ge, Ti, Ta—leg trochanter, femur, genu, tibia, tarsus, respectively; *trt*—tooth of leg trochanter; σ, φ—leg solenidia; ε—leg famulus; *v*, *ev*, *bv*, *l*, *d*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl*—leg setae.

The following abbreviations of collections are used: NTU—National Taiwan University, Taipei, Taiwan; SMNH—Senckenberg Museum of Natural History, Görlitz, Germany; TSUMZ—Tyumen State University Museum of Zoology, Tyumen, Russia.

Fig. 1. *Lasiobelba tsaoshanensis* Ermilov sp.n., adult: dorsal view (legs not illustrated). Scale bar 50 μm.

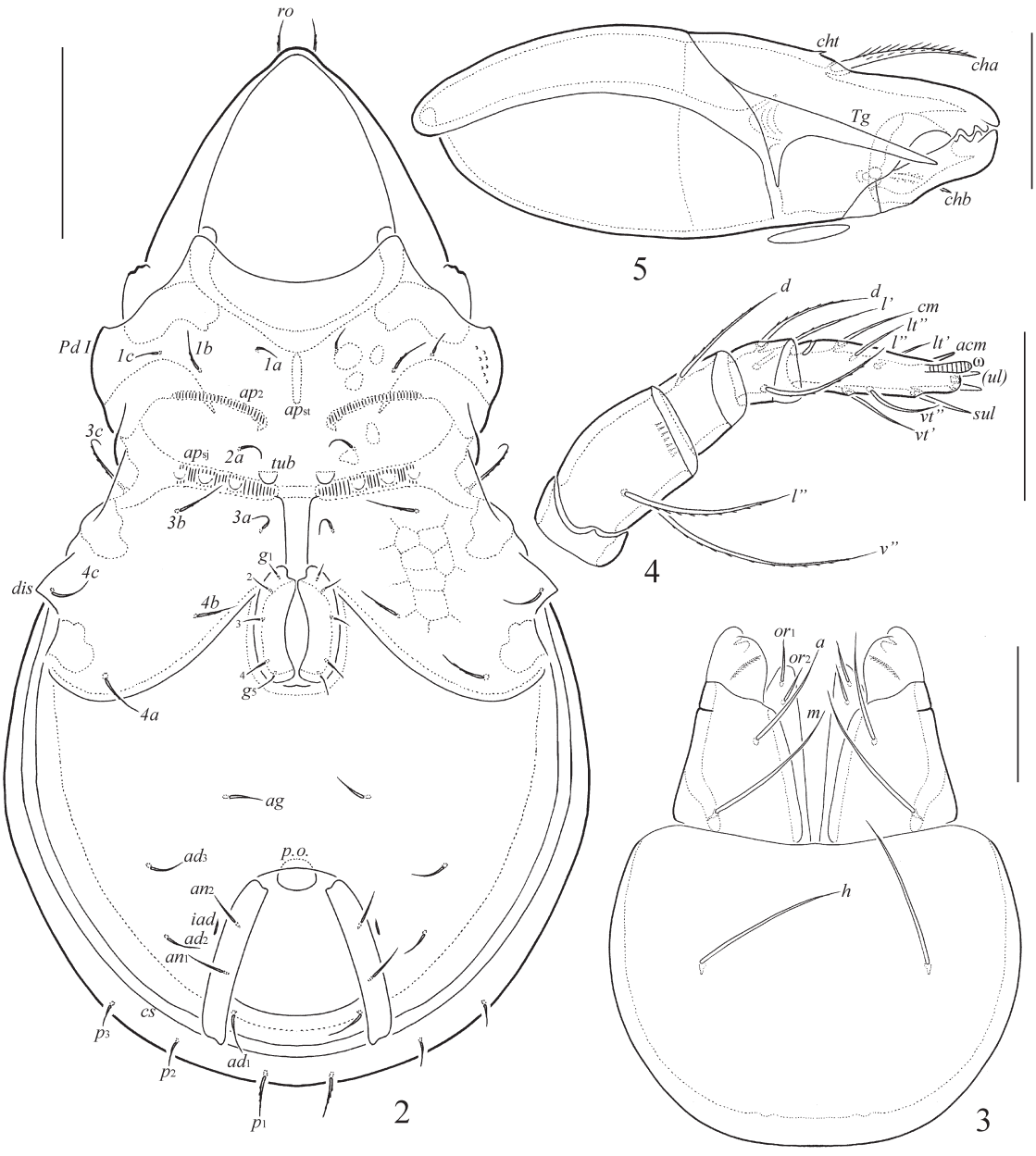
SYSTEMATICS

Family **Oppiidae**
Subfamily **Oppiinae**
Genus ***Lasiobelba*** **Aoki, 1959**

Lasiobelba (*Lasiobelba*) *tsaoshanensis* Ermilov sp.n.

Figs. 1–10

Diagnosis. Body size: 265–315×158–174. Body surface without sculpturing. Rostrum rounded. Prodorsum with lateral carinae. Rostral, lamellar and interlamellar setae setiform, barbed; *le* shortest and thinnest. Bothridial setae very long, spindle-form, barbed. Notogaster with eight pairs of setae (*c* and h_3 absent); p_2, p_3 shortest, smooth, other setae barbed, *lm*, *lp* longest. Subcapitular setae setiform, smooth; *a* shorter than *m*, *h*. Epimeral setae setiform, slightly barbed. Discidia triangularly pointed. Anogenital setae setiform, smooth. Leg trochanters III with one strong posterior tooth.



Figs. 2–5. *Lasiobelba tsaoshanensis* Ermilov sp.n., adult: 2—ventral view (gnathosoma and legs not illustrated); 3—subcapitulum, ventral view; 4—palp, right, antiaxial view; 5—chelicera, left, paraxial view. Scale bars 50 μm (2), 15 μm (3, 5), 10 μm (4).

Description. *Measurements*. Body length: 298 (holotype, female), 265–315 (11 paratypes, 11 females); notogaster width: 166 (holotype), 158–174 (11 paratypes).

Integument (Figs. 1, 2, 6). Body color light brown to yellow. Body surface densely microfoveolate (visible only under high magnification in dissected specimens, ×1,000). Lateral parts of body between bothridia and acetabula I–III and ventrolateral parts of epimere I tuberculate (diameter of tubercles up to 2).

Prodorsum (Figs. 1, 6). Rostrum slightly protruding, rounded. Longitudinal rows comprising several muscle sigillae, present in front of the bothridia. Interbothridial region with three to four pairs of muscle sigillae. Interbothridial and postbothridial tubercles not developed. Lateral prodorsal carinae distinct, arch-like. Rostral (28–32), lamellar (12) and interlamellar (36–41) setae setiform, slightly barbed, inserted on minute tubercles; *le* thinnest. Exobothridial setae (10–12) setiform, thin, smooth. Bothridial setae very long (110–123),

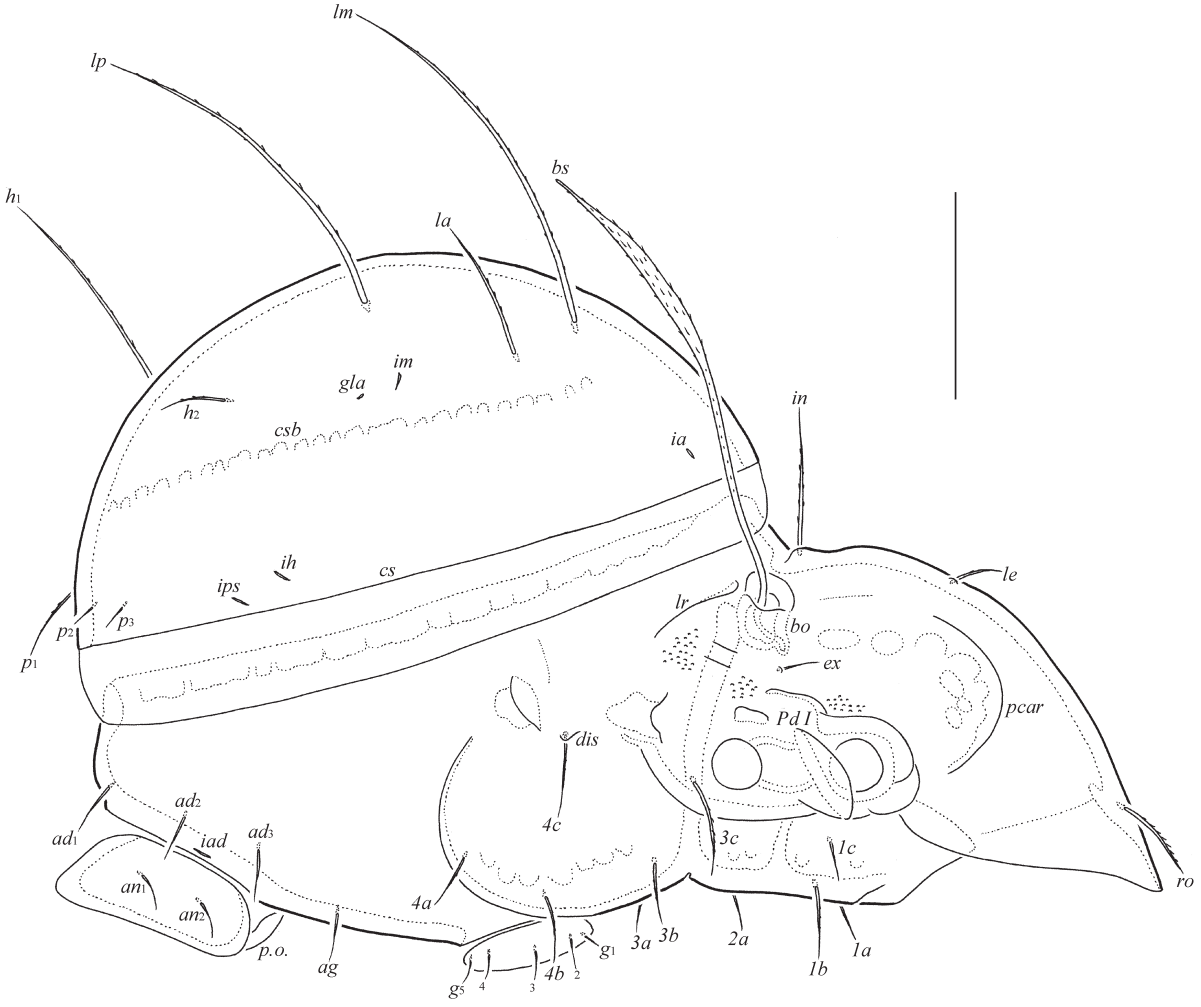


Fig. 6. *Lasiobelba tsaoshanensis* Ermilov sp.n., adult: lateral view (gnathosoma and legs not illustrated). Scale bar 50 μm.

spindle-form, barbed, with longer stalk and shorter, elongate head, and with well-developed apex, barbed. Transverse furrow located anteriorly to lamellar setae, poorly visible.

Notogaster (Figs. 1, 2, 6). Anterior border convex medially. Eight pairs of notogastral setae setiform, *lm*, *lp* (102–110) longer than h_1 (53–57), *la* (32–36) p_1, h_2 (16–20), all barbed, p_2, p_3 (10) smooth. Setae *c* and h_3 and their alveoli absent. Setae *la* inserted dorsolaterally, *lm*, *lp*—dorsomedially. Notogastral lyrifissures (except *ip* not found) and opisthonotal gland openings well visible, *im* and *gla* located posterolateral to *la*. Circumgastric scissure and circumgastric sigillar band distinct.

Gnathosoma (Figs. 3–5). Subcapitulum size: 57–61×45–49. Subcapitular setae setiform, smooth; *a* (14–16) shorter than *m*, *h* (18–20). Adoral setae (6) setiform, thin, smooth. Length of palps: 49–53. Palpal setal formula: 0–2–1–3–9(+1 solenidion). Solenidion of palptarsi short, bacilliform, dilated distally, pressed to tarsus surface. Postpalpal setae (2) spiniform, smooth. Length of chelicerae: 57–61. Cheliceral setae setiform, *cha* (14–16) ciliate, *chb* (10) barbed. Trägårdh's organ of chelicerae elongate triangular.

Epimeral and lateral podosomal regions (Figs. 2, 6). Sternal apodeme present, short. One pair of strong tubercles located close and anteromedially to sejugal apodeme; three to four pairs of slightly developed tubercles located on sejugal borders. Epimeral setal formula: 3–1–3–3. Epimeral setae setiform, slightly barbed; *3c*, *4c* (28–36) longer than *1b*, *3b*, *4a*, *4b* (18–20) and *1a*, *1c*, *2a*, *3a* (10–12). Discidia triangularly pointed. Lateral ridge posterior to bothridia on lateral sides of body present.

Anogenital region (Figs. 2, 6). Five pairs of genital (g_1, 4–6; g_2–g_5, 8), one pair of aggenital (14–16), two pairs of anal (10–12) and three pairs of adanal (14–16) setae setiform, smooth. Genital plates excavated anteromedially. Aggenital setae equal distanced from genital and anal plates. Adanal setae ad_1 posterior, ad_2 and ad_3 lateral to anal aper-

Figs. 7–10. *Lasiobelba tsaoshanensis* Ermilov sp.n., adult: 7—leg I, without trochanter, left, antiaxial view; 8—trochanter, femur and genu of leg II, right, antiaxial view; 9—trochanter, femur and genu of leg III, right, paraxial view; 10—leg IV, right, paraxial view. Scale bar 15 μm.

ture. Adanal lyrifissures located close and parallel to anal plates.

Legs (Figs. 7–10). Claw of each leg slightly barbed dorsally. Trochanters III with one strong posterior tooth. Formulas of leg setation and solenidia: I (1–5–2–4–20) [1–2–2], II (1–5–2–4–16) [1–1–2], III (2–3–1–3–15) [1–1–0], IV (1–2–1–3–12) [0–1–0]; homology of setae and solenidia indicated in Table 1. Setae *p* setiform on tarsi I, and very short, conical on tarsi II–IV. Famulus of tarsi I

short, erect, slightly dilated distally, inserted posterior to solenidion ω_1.

Material examined. Holotype (female) and seven paratypes (all females): #21, Taiwan, New Taipei City, Tamsui Dist., Balaka Highway, Yangmingshan National Park, 25°10.969′ N, 121°30.564′ E, 703 m a.s.l., forest, soil, 17.IX.2017 (collected by J.-R. Liao and H.C. Lee). Four paratypes (all females): #19, Taiwan, Taipei City, Shilin Dist., Jingshan Nature Center, Yangmingshan National Park, 25°9.464′ N, 121°31.847′ E, 642 m a.s.l., forest, soil, 17.IX.2017 (collected by J.-R. Liao and H.C. Lee).

Type deposition. The holotype (in ethanol with drop of glycerol) is deposited in NTU; three paratypes (in ethanol with drop of glycerol) are deposited in SMNH; eight paratypes (in ethanol with drop of glycerol) are deposited in TSUMZ.

Etymology. The specific name *tsaoshanensis* refers to the old name of Yangmingshan "Tsaoshan".

Remarks. *Lasiobelba tsaoshanensis* Ermilov sp.n. is morphologically most similar to *L. sculpta* Wang, 1993 and *L. yunnanensis* Wen, 1999 from southern China, and *L. longisensilla* Ermilov, 2017 from Vietnam in having very long, spindle-form bothridial setae with a well-developed setiform apex, and long dorsal notogastral setae. However, the new species differs from the previously identified species by the absence of notogastral setae h_3 (versus h_3 being developed in ther species), and by the presence of long notogastral setae *lm*, *lp* that are distinctly longer than *la* and h_3 (versus *lm*, *lp*, *la* and h_3 differing slightly in length).

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REFERENCES

Aoki, J. 1959. Die Moosmilben (Oribatei) aus Südjapan. *Bulletin of the Biogeographical Society of Japan*, 21 (1): 1–22.

Ermilov, S.G. 2017. A new species of *Lasiobelba* (Acari, Oribatida, Oppiidae) from Vietnam. *Ecologica Montenegrina*, 15: 33–39.

Ermilov, S.G. and Liao, J.-R. 2017*a*. Contribution to the knowledge of the oribatid mite genus *Brassiella* (Acari: Oribatida: Caloppiidae). *Biologia*, 72 (9): 1041–1048.

Ermilov, S.G. and Liao, J.-R. 2017*b*. Neotype designations and supplementary descriptions of *Taiwanoppia subtropica* Tseng, 1982 and *Muliercula chiayiensis* Tseng, 1984 (Acari: Oribatida: Oppiidae, Scheloribatidae). *Systematic and Applied Acarology*, 22 (7): 897–914.

Ermilov, S.G. and Liao, J.-R. 2017*c*. New faunistic and taxonomic data on oribatid mites (Acari, Oribatida) of Taiwan. *Systematic and Applied Acarology*, 22 (6): 824–840.

Ermilov, S.G., Shtanchaeva, U.Ya., Subías, L.S. and Martens, J. 2014. Two new species of oribatid mites of *Lasiobelba* (Acari, Oribatida, Oppiidae) from Nepal, including a key to all species of the genus. *ZooKeys*, 424: 1–17.

Ermilov, S.G. and Starý, J. 2018. Oribatid mites (Acari, Oribatida) from Korup National Park (Cameroon): list of taxa, new findings, descriptions of two new species. *Systematic and Applied Acarology*. 23 (4): 733-747.

Norton, R.A. 1977. A review of F. Grandjean's system of leg chaetotaxy in the Oribatei (Acari) and its application to the family Damaeidae. *In*: D.L. Dindal (Ed.). Biology of Oribatid Mites. Syracuse, SUNY College of Environmental Science and Forestry, pp. 33–61.

Norton, R.A. and Behan-Pelletier, V.M. 2009. Suborder Oribatida. Chapter 15. *In*: G.W. Krantz and D.E. Walter (Eds.). A Manual of Acarology. 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 (número extraordinario): 3–305. Online version accessed in January 2018, 605 pp.; http://bba.bioucm.es/cont/docs/RO_1.pdf

Travé, J. and Vachon, M. 1975. François Grandjean. 1882–1975 (Notice biographique et bibliographique). *Acarologia*, 17 (1): 1–19.

Wang, H. 1993. Three new species of oppiid mites from China (Oribatida: Oppiidae). *Acta Arachnologica Sinica*, 2 (2): 97–103.

Wen, Z. 1999. A new species oribatid mite of the genus *Lasiobelba* from China (Acari: Oribatida: Oppiidae). *Acta Zootaxonomica Sinica*, 24 (1): 46–48.

Table 1

Leg setation and solenidia of adult *Lasiobelba tsaoshanensis* Ermilov sp.n.

Leg	**Tr**	**Fe**	**Ge**	**Ti**	**Ta**
I	*v′*	*d*, *(l)*, *bv″*, *v″*	*(l)*, σ	*(l)*, *(v)*, φ_1, φ_2	*(ft)*, *(tc)*, *(it)*, *(p)*, *(u)*, *(a)*, *s*, *(pv)*, *(pl)*, *l″*, *v′*, ε, ω_1, ω_2
II	*v′*	*d*, *(l)*, *bv″*, *v″*	*(l)*, σ	*(l)*, *(v)*, φ	*(ft)*, *(tc)*, *(it)*, *(p)*, *(u)*, *(a)*, *s*, *(pv)*, *l″*, ω_1, ω_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′*, *(v)*, φ	*ft″*, *(tc)*, *(p)*, *(u)*, *(a)*, *s*, *(pv)*

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