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# A new species of *Fissicepheus* and a supplementary description of *Leptotocepheus murphyi* (Mahunka, 1989) (Acari, Oribatida, Otocepheidae) from Malaysia

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**Original research**

**ABSTRACT**

This work includes taxonomic data on two species of oribatid mites of the family Otocepheidae from Malaysia. A new species of the genus *Fissicepheus* is described. *Fissicepheus parastriganovae* **n. sp.** differs from *Fissicepheus striganovae* Ermilov and Anichkin, 2014 by body ornamentation, length of interlamellar and notogastral setae and morphology of genital plates. The species *Leptotocepheus murphyi* (Mahunka, 1989) is recorded in Malaysia for the first time. A supplementary description of this species which was originally described from Singapore is given on the basis of the Malaysian specimens. The main morphological traits for *L. murphyi* are summarized.

**Keywords** otocepheid mites; systematics; morphology; Oriental region
**Zoobank** http://zoobank.org/C9EE10E4-A618-442D-A7F4-A10A240820CF

## Introduction

This work is based on the random set of the Malaysian oribatid mite (Acari, Oribatida) material, which was received from the collection of the Institute of Zoology (Slovak Academy of Sciences, Bratislava, Slovakia), and includes data on the family Otocepheidae.

In the course of taxonomic identification we found two otocepheid species, one species belonging to the genus *Fissicepheus* Balogh and Mahunka, 1967 is new to science, and the other is a known species, *Leptotocepheus murphyi* (Mahunka, 1989); both are from the nominative subgenera.

The primary goal of our paper is to describe and illustrate a new species under the name *Fissicepheus parastriganovae* **n. sp.** *Fissicepheus* was described by Balogh and Mahunka (1967), with *Fissicepheus elegans* Balogh and Mahunka, 1967 as type species. The genus comprises two subgenera and 27 species (Subías 2019). The generic diagnosis was presented by Balogh and Mahunka (1967) and Aoki (1967). The nominative subgenus comprises 26 species, which are distributed in the Palaearctic and Oriental regions (Subías 2019). An identification key to known species of the subgenus is provided by Zheng and Chen (2018).

The secondary goal of our paper is to present a supplementary description of *L. murphyi*, adding new figures and information about morphological variability and some morphological structures and their measurements, identification of leg setae and solenidia and morphology of the gnathosoma, which will assist with identification of this species in the future. *Leptotocepheus murphyi* was found earlier in Singapore and Vietnam (Mahunka 1989; Ermilov and Bayartogtokh 2015). Thus, it is the first finding of this species in Malaysia.

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## Methods

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 notogaster. Notogastral width refers to the maximum width of the notogaster in dorsal view. 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.

Drawings were made with a camera lucida using a Leica transmission light microscope "Leica DM 2500". SEM photos were made with the aid of a JEOL–JSM-6510LV SEM microscope.

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 in this paper: *cos* – costula; *rr* – rostral ridge; *ro*, *le*, *in*, *bs*, *ex* – rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; *cpm*, *cpl* – medial and lateral prodorsal condyles, respectively; *cnm*, *cnl*, *cn* – medial, lateral and additional medial notogastral condyles, respectively; *c*, *la*, *lm*, *lp*, *h*, *p* – notogastral setae; *ia*, *im*, *ip*, *ih*, *ips* – notogastral lyrifissures; *gla* – opisthonotal gland opening; *a*, *m*, *h* – subcapitular setae; *v*, *l*, *d*, *cm*, *acm*, *ul*, *sul*, *vt*, *lt* – palp setae; ω – palp and leg solenidion; *cha*, *chb* – cheliceral setae; *Tg* – Trägårdh's organ; *PdI*, *PdII* – pedotecta I, II, respectively; *1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *4a*, *4b*, *4c* – epimeral setae; *dis* – discidium; *g*, *ag*, *an*, *ad* – genital, aggenital, anal and adanal setae, respectively; *iad* – adanal lyrifissure; *cvr* – circumventral ridge; *po* – preanal organ; *Tr*, *Fe*, *Ge*, *Ti*, *Ta* – trochanter, femur, genu, tibia, tarsus, respectively; *pa* – porose area; σ, φ – leg solenidia; ε – leg famulus; *v*, *ev*, *bv*, *l*, *d*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv* – leg setae.

## Systematics

### Superfamily Otocepheoidea

### Family Otocepheidae

### Genus *Fissicepheus* Balogh and Mahunka, 1967

### Subgenus *Fissicepheus* (*Fissicepheus*) Balogh and Mahunka, 1967

Type species *Fissicepheus elegans* Balogh and Mahunka, 1967

### *Fissicepheus parastriganovae* n. sp.

Zoobank: 4C1C6354-6DBD-4543-BE2C-F99371B4E84F

(Figures 1–7)

**Diagnosis** — Body size: 166–232 × 597–647. Body surface punctate, anal plates and medioposterior part of notogaster foveolate. Rostral and lamellar setae long, setiform, slightly barbed. Interlamellar and 10 pairs of notogastral setae of medium size, phylliform, slightly barbed. Bothridial setae long, fusiform or clavate, barbed. Lateral and medial prodorsal and notogastral condyles tubercle-like, simple. Epimeral setal formula 2-0-2-3. Epimeral and genitoaggenital setae setiform, slightly barbed. Adanal and anal setae phylliform, slightly barbed. Adanal lyrifissures distanced from anal aperture. Leg genua III and IV without seta *l'*. Setae *u* setiform on all leg tarsi.

**Description** — Measurements – Body length: 498 (holotype: male), 464–647 (seven paratypes: three females and four males); notogaster width: 182 (holotype), 166–232 (seven paratypes). Length/width ratio 2.7–2.8. Females larger than males: 597–647 × 199–215 versus 464–514 × 166–182.

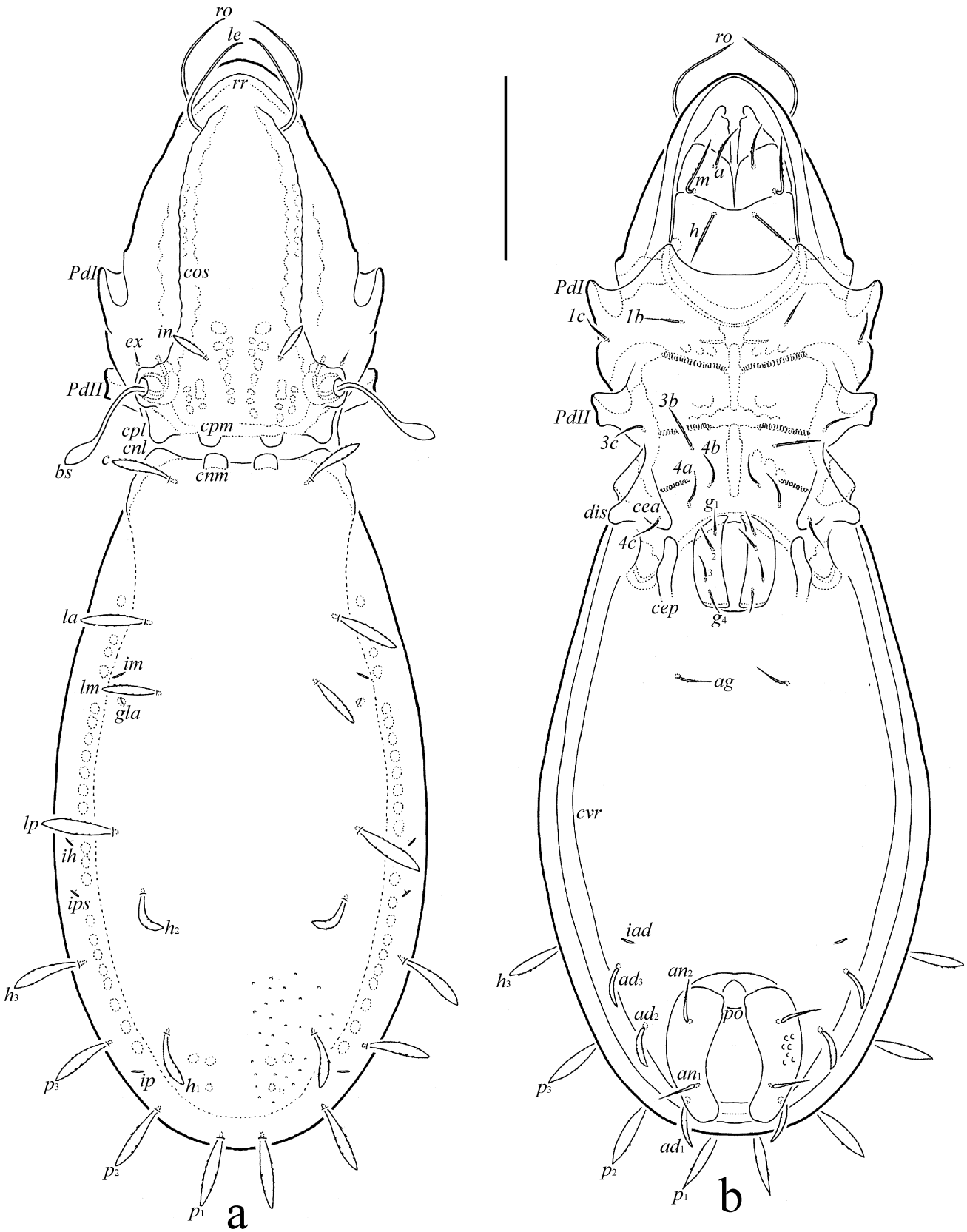



**Figure 1** *Fissicepheus parastriganovae* n. sp., adult: a – dorsal view (legs omitted); b – ventral view (legs omitted). Scale bar 100 μm.

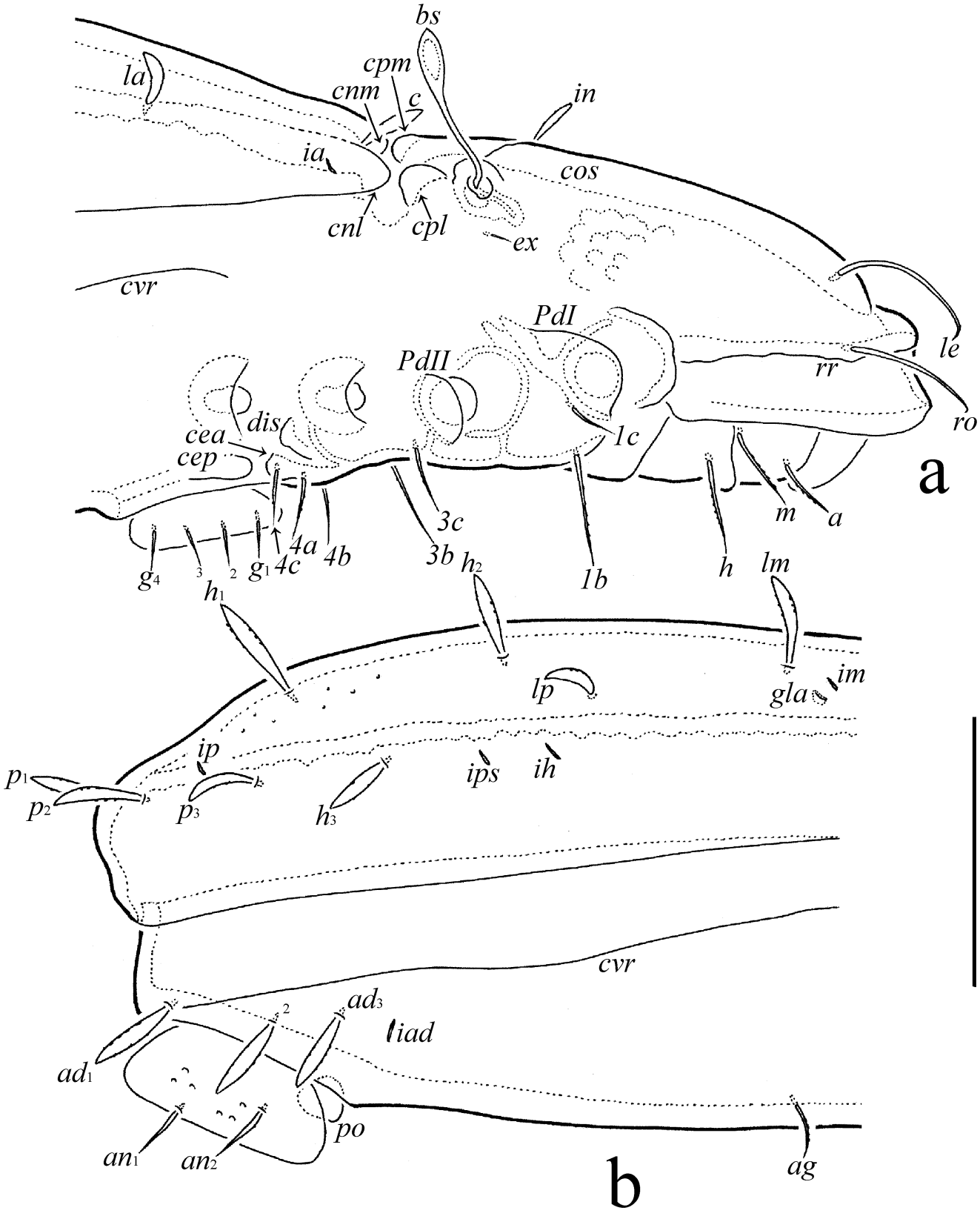



**Figure 2** *Fissicepheus parastriganovae* n. sp., adult: a – anterior part of body, lateral view (legs omitted); b – posterior part of body, lateral view. Scale bar 100 μm.




**Figure 3** *Fissicepheus parastriganovae* n. sp., adult: a – leg I, right, antiaxial view; b – leg II, right, antiaxial view. Scale bar 50 μm.

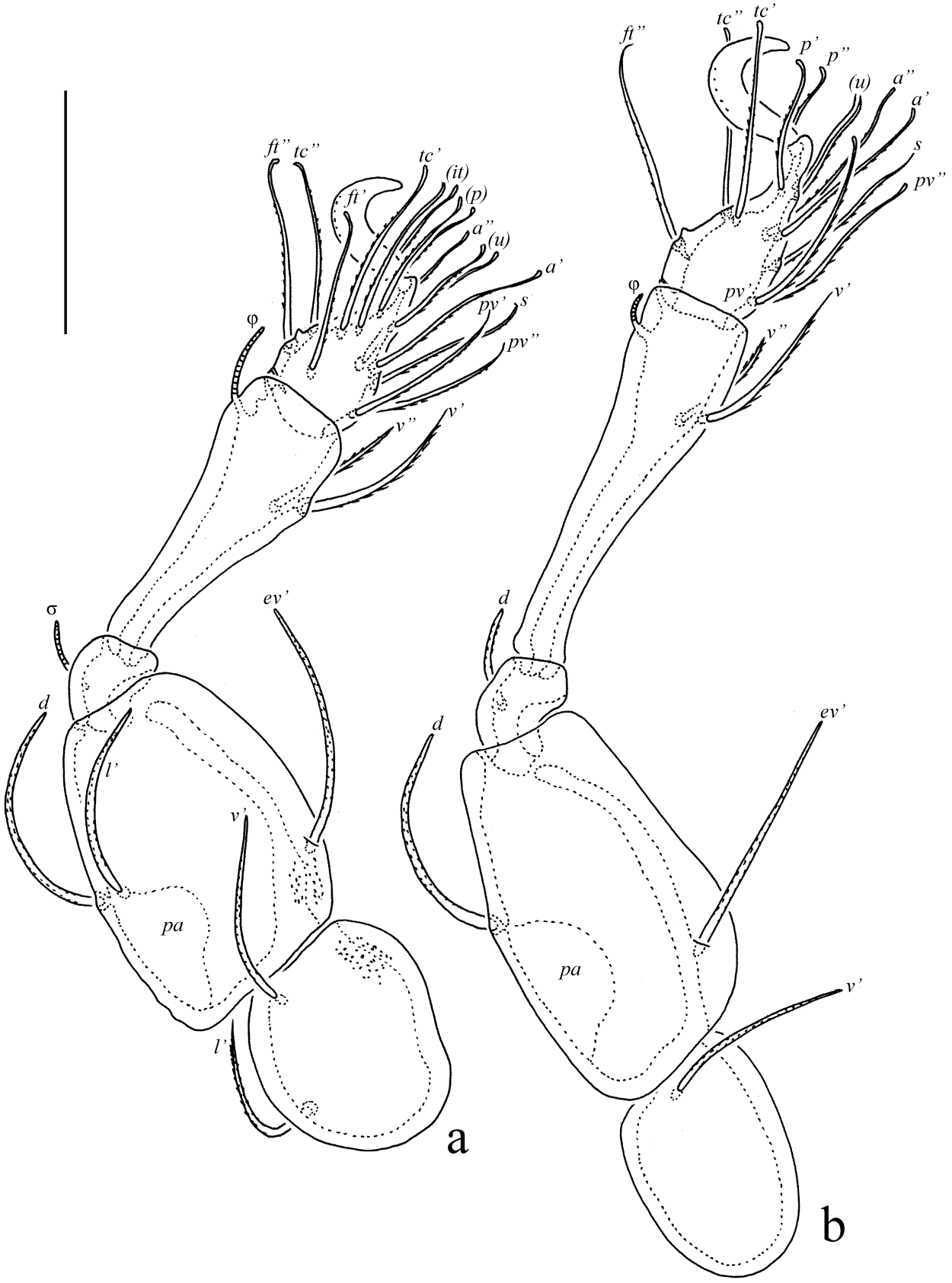



**Figure 4** *Fissicepheus parastriganovae* n. sp., adult: a – leg III, left, antiaxial view; b – leg IV, left, antiaxial view. Scale bar 50 µm.

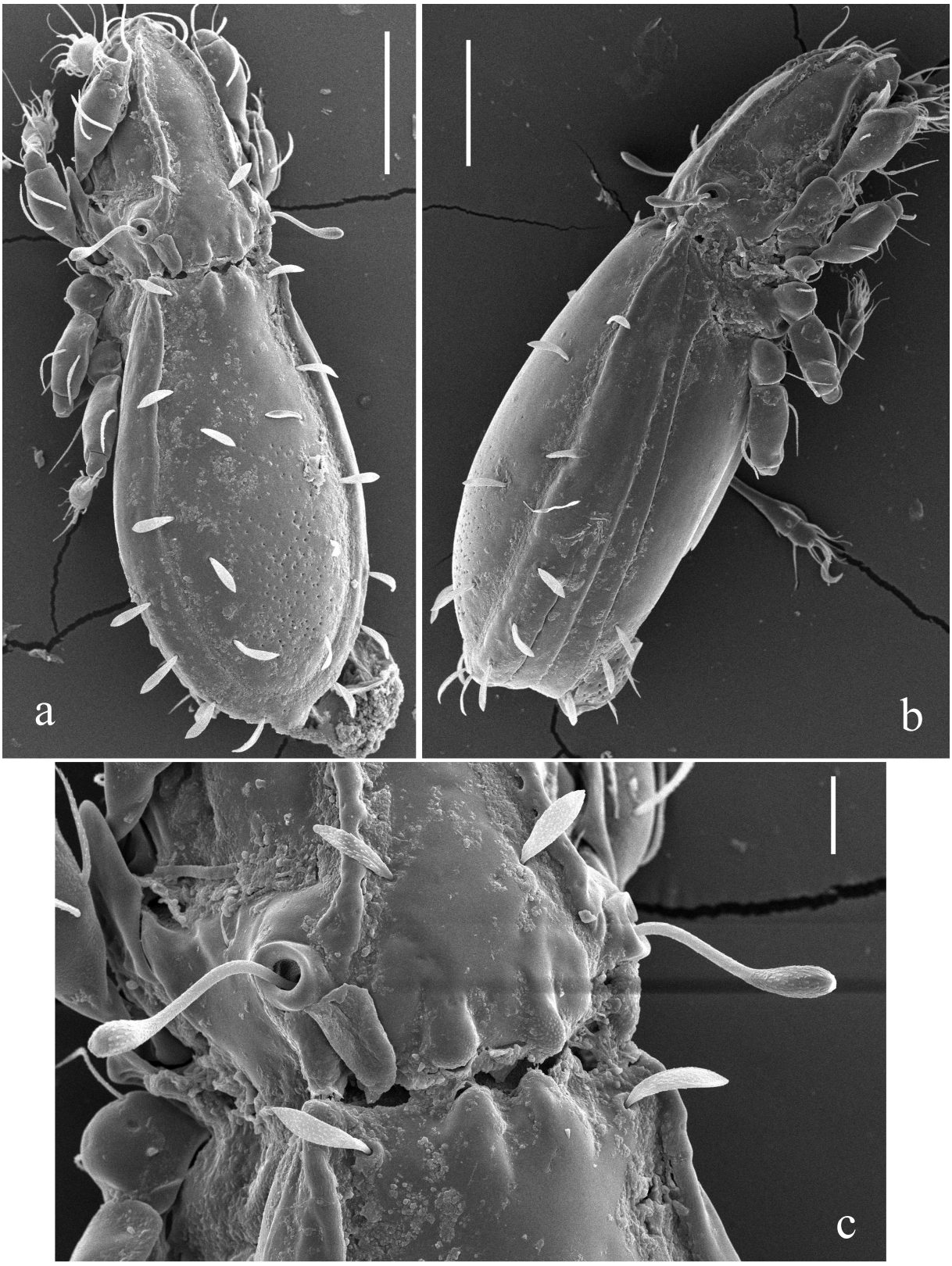



**Figure 5** *Fissicepheus parastriganovae* n. sp., adult, SEM photos: a – dorsal view; b – lateral view; c – basal part of prodorsum and anterior part of notogaster, anterior view. Scale bar 100 μm (a, b), scale bar 20 μm (c).

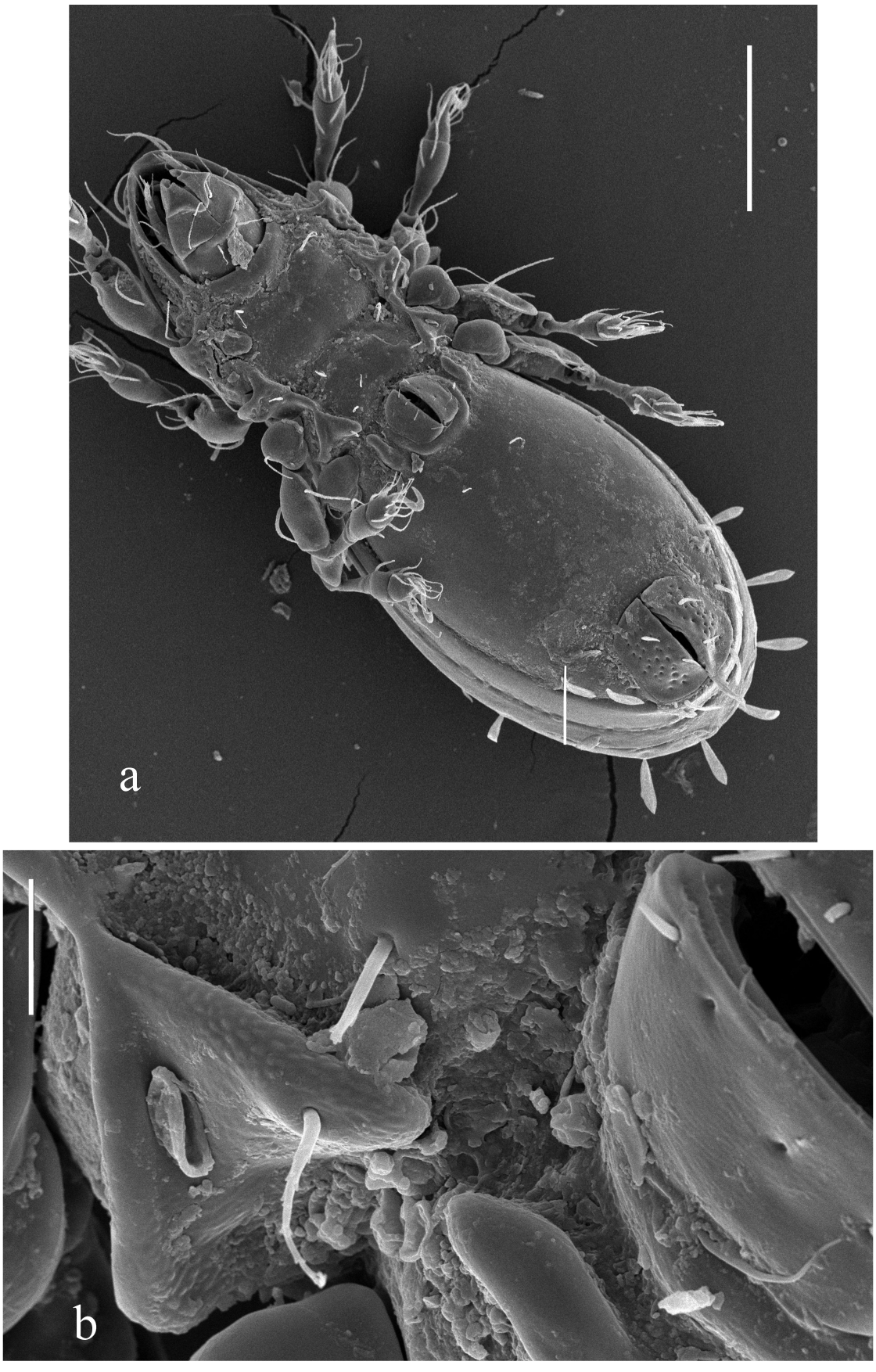



**Figure 6** *Fissicepheus parastriganovae* n. sp., adult, SEM photos: a – ventral view; b – epimeral condyles, discidium and part of genital plates, ventral view. Scale bar 100 µm (a), scale bar 10 µm (b).

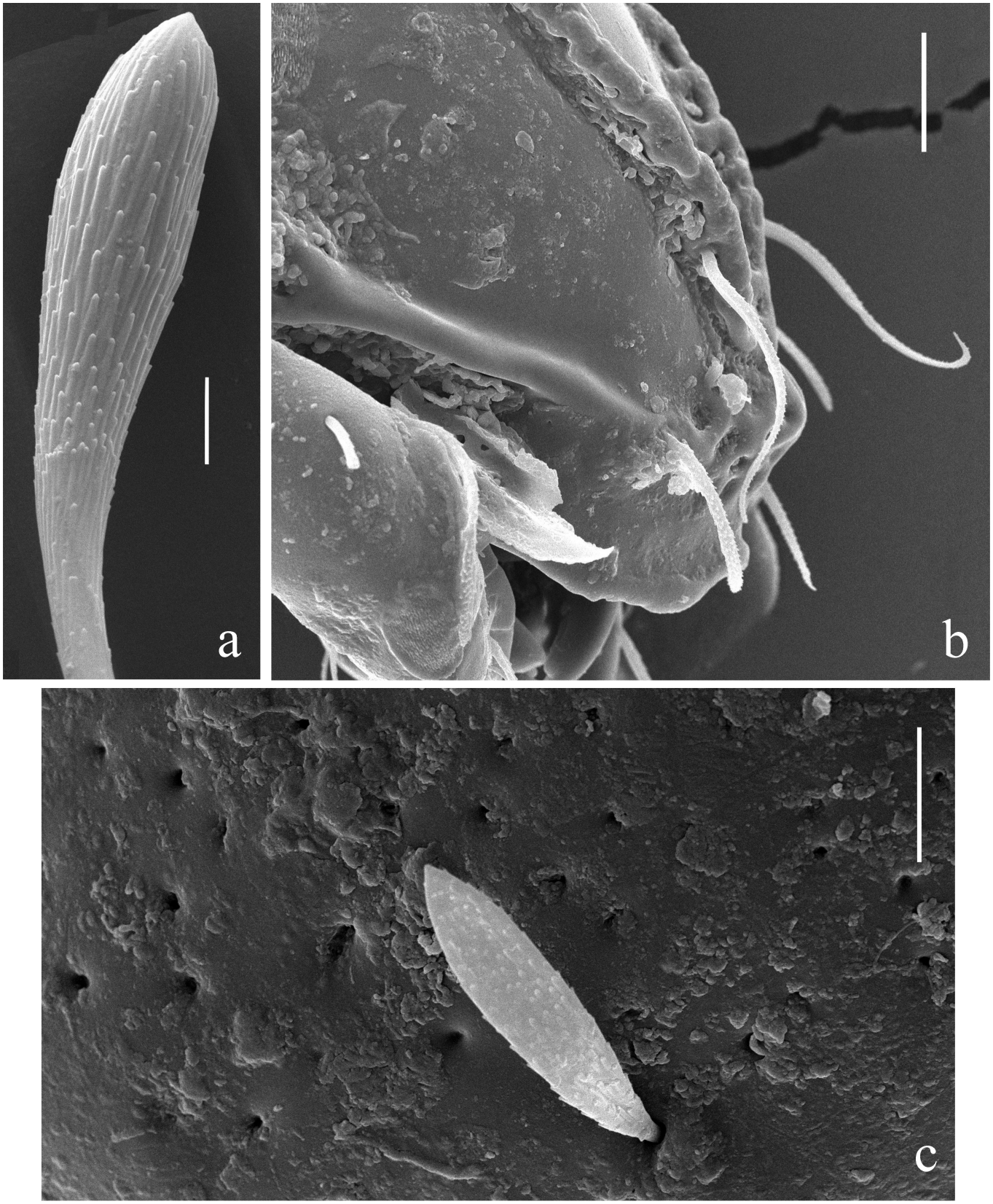



**Figure 7** *Fissicepheus parastriganovae* n. sp., adult, SEM photos: a – mediodistal part of bothridial seta, lateral view; b – anterior part of prodorsum, lateral view; c – notogastral seta $h_1$ and notogastral foveolae. Scale bar 5 µm (a), scale bar 20 µm (b), scale bar 10 µm (c).

Integument (Figs 1a, 1b, 2b, 3b, 4a, 5a, 6a, 7c) – Body color light brown, but legs, apodemes and anterior part of chelicerae dark brown. Body covered by layer of colorless, gel-like cerotegument. Body surface punctate. In addition, anal plates and medioposterior part of notogaster (between setae *lm* and $h_1$) sparsely foveolate (diameter of foveolae up to 4 and 2, respectively). Costulae partially foveolate. Lateral parts of body (between bothridia and acetabula I–III) without tubercles. Antiaxial side of all leg femora and trochanters III, IV with microgranules.

Prodorsum (Figs 1a, 2a, 5a-c, 7a, 7b) – Rostrum broadly rounded. Anterior part of prodorsum with strong transverse ridge. Costulae well developed, long, reaching bothridia basally and lamellar setae distally. Tutorial ridges and lateral carinae absent. Rostral (57–51) and lamellar (65–69) setae setiform, slightly barbed (poorly visible), curving and directed anteromedially. Interlamellar setae (24–32) phylliform, slightly barbed. Exobothridial setae (8–10) setiform, thin, smooth. Bothridial setae (length outside bothridia 65–73) with long, smooth stalk and shorter, fusiform or clavate, barbed head. Paired lateral and paired medial prodorsal condyles tubercle-like, located separately.

Notogaster (Figs 1a, 1b, 2a, 2b, 5a-c, 6a, 7c) – Paired lateral and paired medial notogastral condyles tubercle-like, without fusions, located separately. Circumdorsal part of notogaster slightly depressed (Figs 5a, 5b). Circumgastric sigillar band visible. Notogaster with 10 pairs (45–49) of phylliform, slightly barbed setae. Lyrifissures and opisthonotal gland openings distinct, *ia* located lateral to *c*, *im* and *gla* close to each other, lateral to *lm*, *ip* between $p_2$ and $p_3$, *ips* and *ih* anterior to $h_3$.

Gnathosoma (Figs 1b, 2a, 6a) – Generally, similar to *L. murphyi*. Subcapitulum longer than wide (114–123 × 73–82). Subcapitular setae setiform, barbed, *a* (28–30) shorter than *m* and *h* (36–41). Adoral setae and their alveoli absent. Palps (73–77) with typical setation 0-2-1-3-8(+ω). Postpalpal setae (6) spiniform, smooth. Chelicerae (135–139) with two setiform, barbed setae, *cha* (45–49) longer than *chb* (16–20). Trägårdh's organ of chelicerae elongate triangular.

Epimeral and lateral podosomal regions (Figs 1b, 2a, 5b, 6a, 6b) – Apodemes I, II, III and sejugal apodemes distinct. Sternal apodeme not developed. Condyles of epimere IV well developed. Epimeral setal formula 2-0-2-3, setae setiform, slightly barbed, *1b* (45–49) longer than *3b* (36–41) and others (28–32); *1a*, *2a*, *3a* and their alveoli absent. Pedotecta I and II represented by small lamina. Discidia tubercle-like.

Anogenital region (Figs 1b, 2a, 2b, 5b, 6a, 6b) – Aggenital lyrifissures not visible. Four pairs of genital (16–20) and one pair of aggenital (24–32) setae setiform, slightly barbed. Three pairs of adanal setae (36–41) narrowly phylliform, slightly barbed; $ad_3$ located lateral to anal plates and removed from them. Two pairs of anal setae (24–32) slightly dilated basally, with setiform mediodistal part, slightly barbed. Adanal lyrifissures transverse or diagonal, distanced from anal aperture, located anterior to insertions of adanal setae $ad_3$. Circumventral ridge well developed.

Legs (Figs 3a, 3b, 4a, 4b, 5b, 6a) – Claw of each leg strong, slightly barbed dorsally. Tarsi with one pair of very small teeth on dorsal side. Porose areas present on all femora and on trochanters III, IV (well visible in dissected specimens). Formulas of leg setation and solenidia: I (1-4-3-4-16) [1-2-2], II (1-4-3-3-15) [1-1-2], III (2-3-0-2-15) [1-1-0], IV (1-2-1-2-12) [0-1-0]; homology of setae and solenidia indicated in Table 1. Solenidia $\varphi_1$ and $\varphi_2$ on tibiae I, φ on tibiae II, σ on genua I, II setiform, others bacilliform. Famulus of tarsi I short, erect, distally blunt, inserted posterior to solenidia. Setae *u* setiform on all tarsi.

**Material examined** — Holotype (male) and seven paratypes (three females and four males): Malaysia, Perak District, 50 km NE to Gerik, Titiwangsa, 05°36'17.4"N, 101°32'34.0"E, alt. 1100 m, forest complex Belum–Temenggor, litter, 30 March–13April 2015 (E. Jendek & O. Šauša).

**Type deposition** — The holotype is deposited in the collection of the Institute of Zoology, Slovak Academy of Sciences, Bratislava, Slovakia; seven paratypes are deposited in the

**Table 1** Leg setation and solenidia of adult *Fissicepheus parastriganovae* n. sp. and *Leptotocepheus murphyi* (Mahunka, 1989).

| Leg | *Tr* | *Fe* | *Ge* | *Ti* | *Ta* |
|---|---|---|---|---|---|
| I | *v'* | *d, (l), bv"* | *(l), v',* σ | *(l), (v),* $\varphi_1$, $\varphi_2$ | *(ft), (tc), (it), (p), (u), (a), s, (pv),* ε, $\omega_1$, $\omega_2$ |
| 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', l'* | *d, l', ev'* | *l'*,* σ | *(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)* |

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.

* – seta *l'* on genua III and IV absent in *F. parastriganovae* **n. sp.** (versus present in *L. murphyi* )

collection of the Tyumen State University Museum of Zoology, Tyumen, Russia. All in ethanol with drop of glycerol.

**Etymology** — The species name refers to the similarity of the new species to *Fissicepheus striganovae* Ermilov and Anichkin, 2014.

**Remarks** — *Fissicepheus parastriganovae* **n. sp.** is morphologically most similar to *Fissicepheus striganovae* Ermilov and Anichkin, 2014 from Vietnam in having simple costulae, phylliform interlamellar, notogastral and adanal setae, and long bothridial setae, and the development of all prodorsal and notogastral condyles; it differs from the latter by the presence of partial foveolate body ornamentation (only on anal plates and in medioposterior part of notogaster versus prodorsum, notogaster and anogenital region completely foveolate), interlamellar setae clearly shorter than notogastral setae (versus similar in length) and more long notogastral setae (45–49 versus 24–32), and the absence of longitudinal stria on genital plates (versus present).

## Genus *Leptotocepheus* Balogh, 1961

## Subgenus *Leptotocepheus* (*Leptotocepheus*) Balogh, 1961

Type species *Leptotocepheus trimucronatus* Balogh, 1961

## *Leptotocepheus murphyi* (Mahunka, 1989)

(Figures 8–13)

**Supplementary description** — Measurements – Body length: 630–946 (21 specimens: 11 females and 10 males); notogaster width: 232–398 (21 specimens). Length/width ratio 2.3–2.7. Females larger than males: 813–946 × 365–398 versus 630–730 × 232–282.

Integument (Figs 8a, 8b, 9b, 9c, 12a-d, 13a, 13b) – Body color brown, but legs, genital plates, subcapitular genae and anterior part of chelicerae dark brown. Body covered by layer of colorless, gel-like cerotegument. Body surface microgranulate. In addition, prodorsum, notogaster, anogenital region and anterior part of ventral plate foveolate (diameter of foveolae up to 16); region between costulae sometimes slightly rugose. Costulae partially foveolate. Lateral parts of body (between bothridia and acetabula I–III) without tubercles (their diameter up to 8).

Prodorsum (Figs 8a, 9a, 9b, 12a-c, 13b, 13c) — Rostrum broadly rounded. Costulae well developed, long, reaching bothridia basally and lamellar setae distally. Tutorial ridges absent. One lateral carina between acetabulum I and insertion of rostral seta present on each side. Rostral (65–69) and lamellar (77–82) setae setiform, shortly ciliate on dorsal sides, curving and directed anteromedially. Interlamellar setae (98–110) thickened, barbed. Exobothridial setae

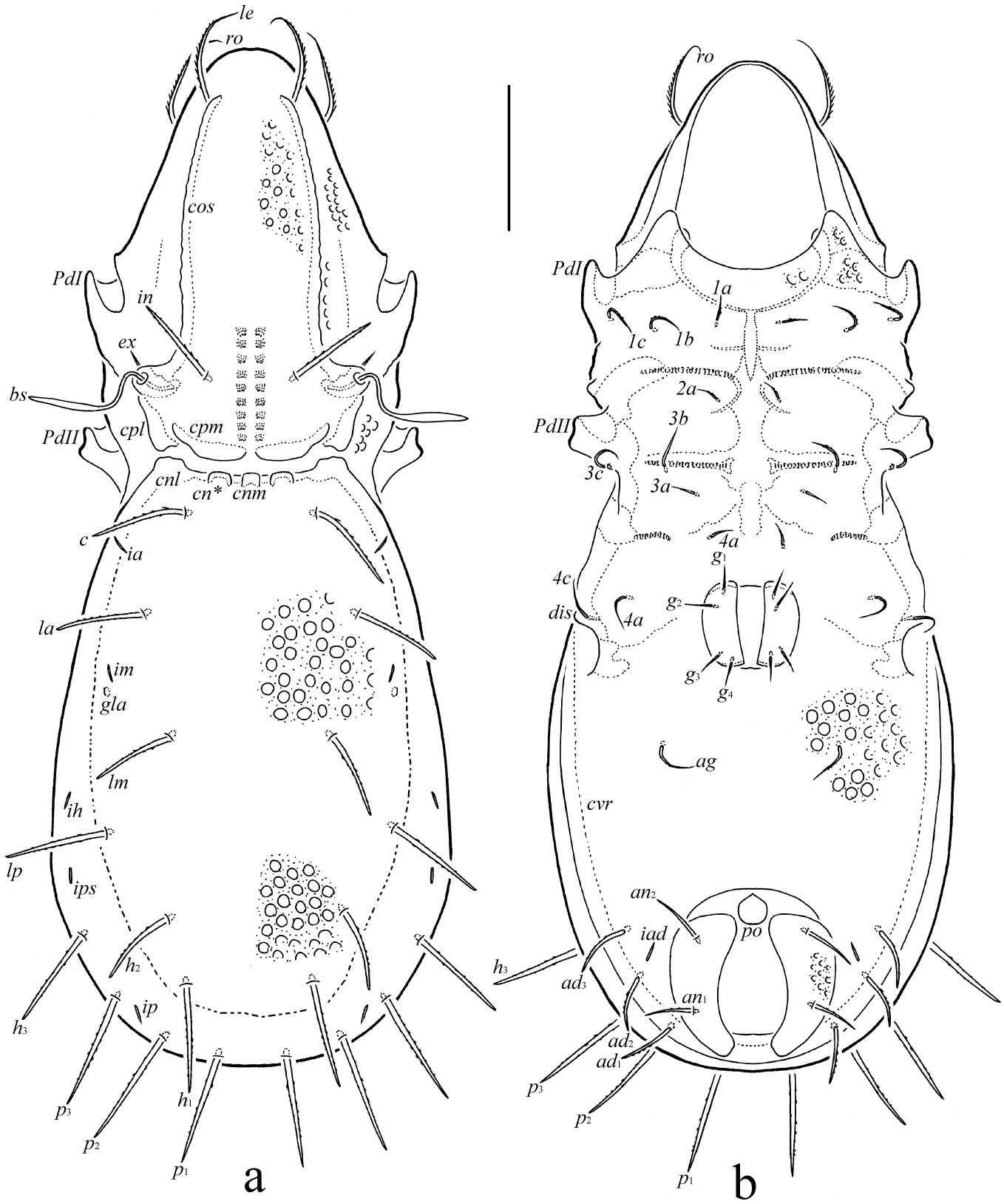



**Figure 8** *Leptotocepheus murphyi* (Mahunka, 1989), adult: a – dorsal view (gnathosoma and legs omitted); b – ventral view (legs omitted). Scale bar 100 µm.

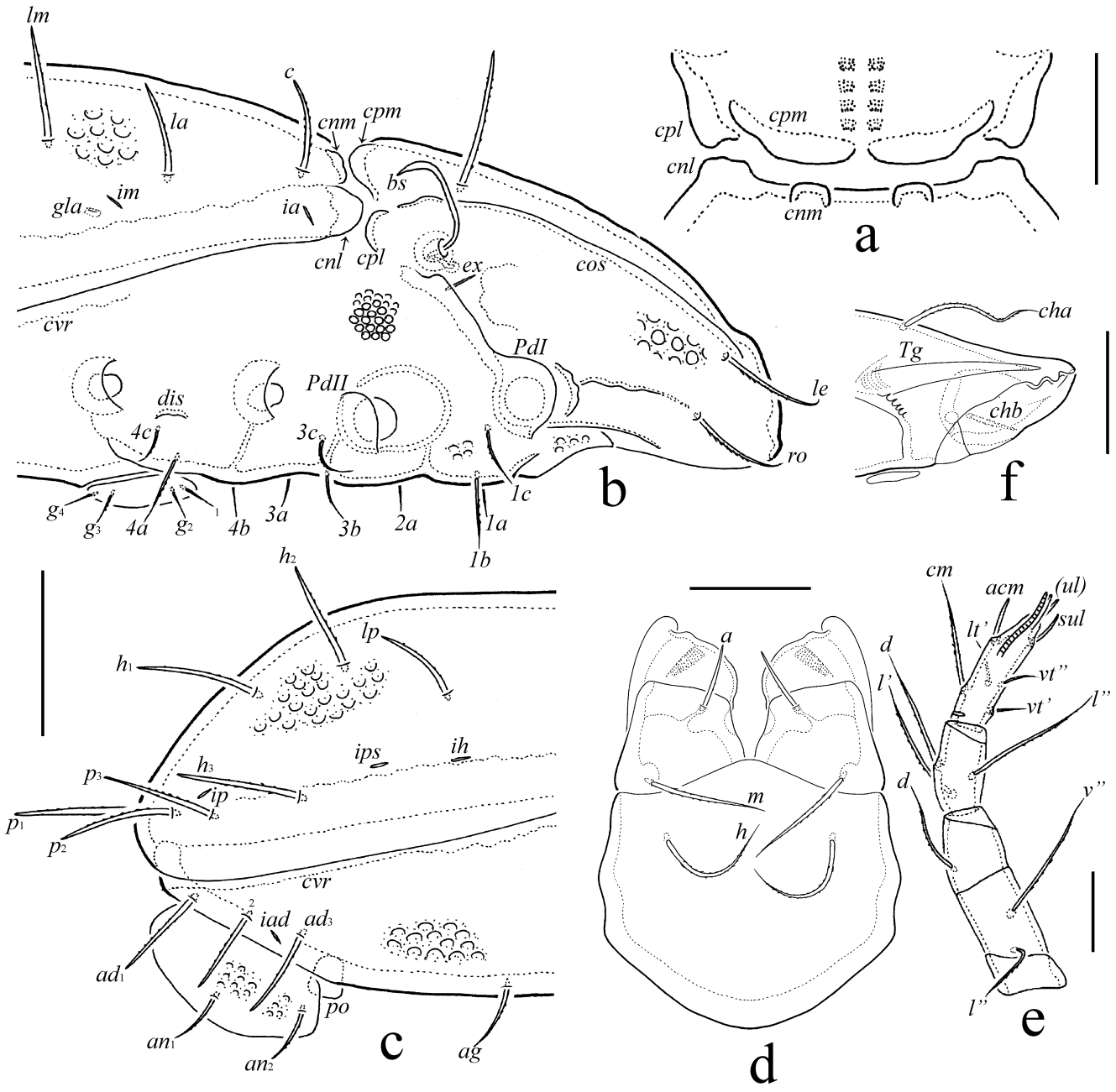



**Figure 9** *Leptotocepheus murphyi* (Mahunka, 1989), adult: a – prodorsal and notogastral condyles (unpair median notogastral condyle not developed), dorsal view; b – anterior part of body, lateral view (gnathosoma and legs omitted); c – posterior part of body, lateral view; d – subcapitulum, ventral view; e – palp, right, antiaxial view; f – anterior part of chelicera, left, paraxial view. Scale bar 50 µm (a), scale bar 100 µm (b, c), scale bar 50 µm (d, f), scale bar 20 µm (e).

(12–16) slightly thickened, smooth. Bothridial setae (length outside bothridia 94–98) with long, elongate, distinctly dilated mediodistally. Paired lateral prodorsal condyles tubercle-like, paired medial prodorsal condyles broadly rounded, all located separately.

Notogaster (Figs 8a, 8b, 9a-c, 12a-d) – Five notogastral condyles present: paired lateral, one unpaired median and additional paired medial notogastral condyles, all tubercle-like, without fusions, located separately. Unpaired median condyle sometimes weaker developed than additional medial notogastral condyles; also, it is absent in four males (Fig. 9a). Circumdorsal

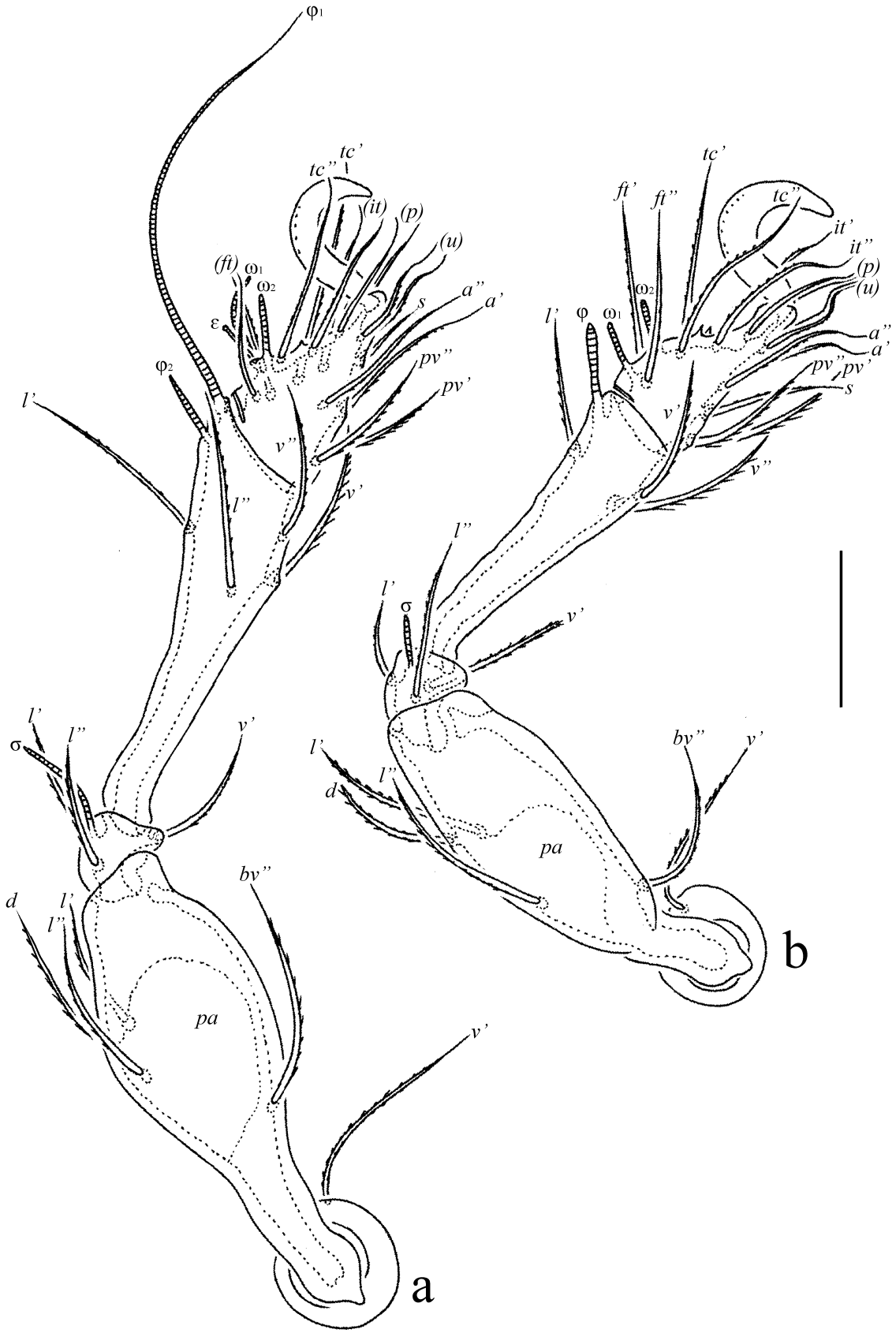



**Figure 10** *Leptotocepheus murphyi* (Mahunka, 1989), adult: a – leg I, right, antiaxial view; b – leg II, right, antiaxial view. Scale bar 50 μm.

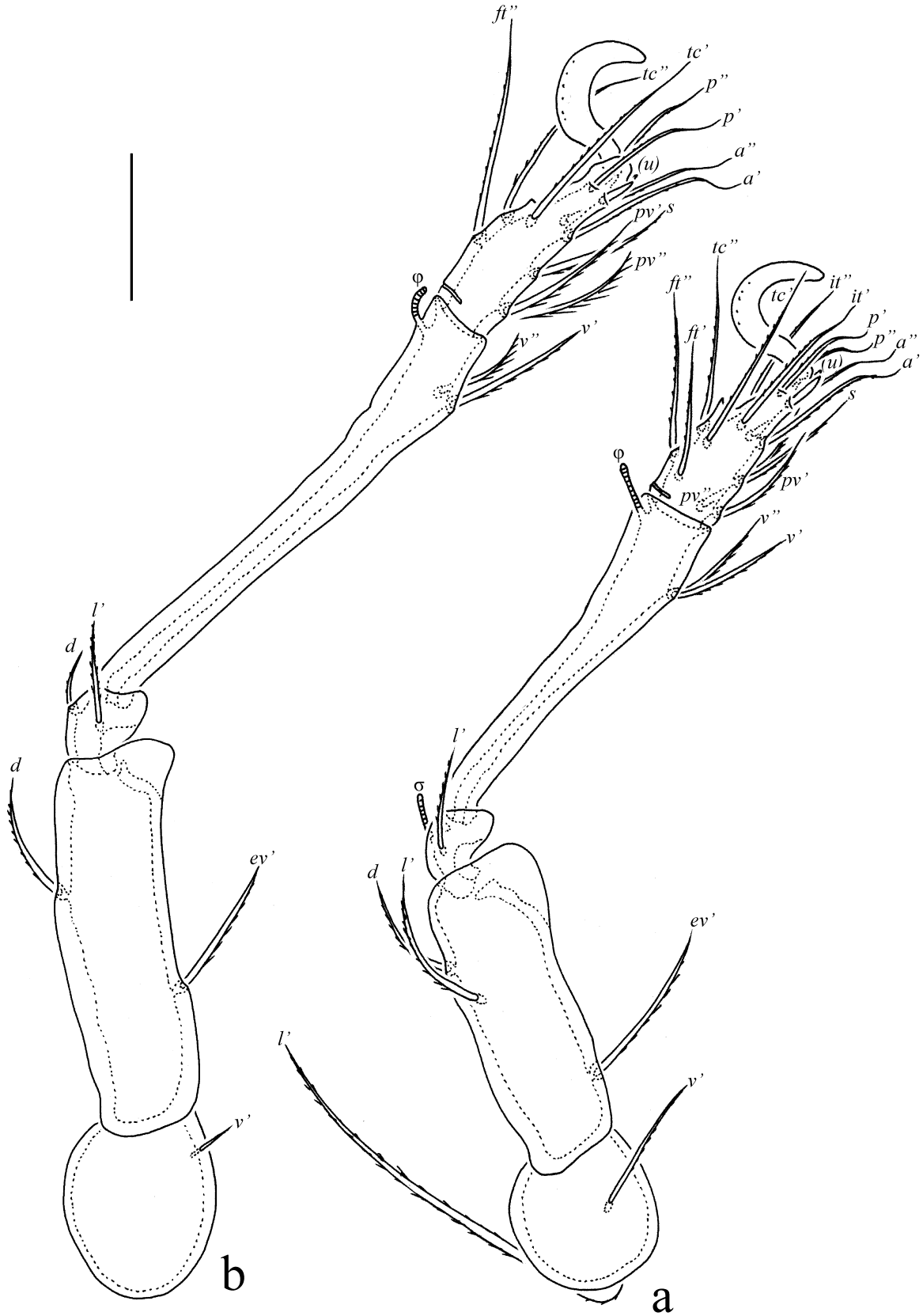



**Figure 11** *Leptotocepheus murphyi* (Mahunka, 1989), adult: a – leg III, left, antiaxial view; b – leg IV, left, antiaxial view. Scale bar 50 μm.

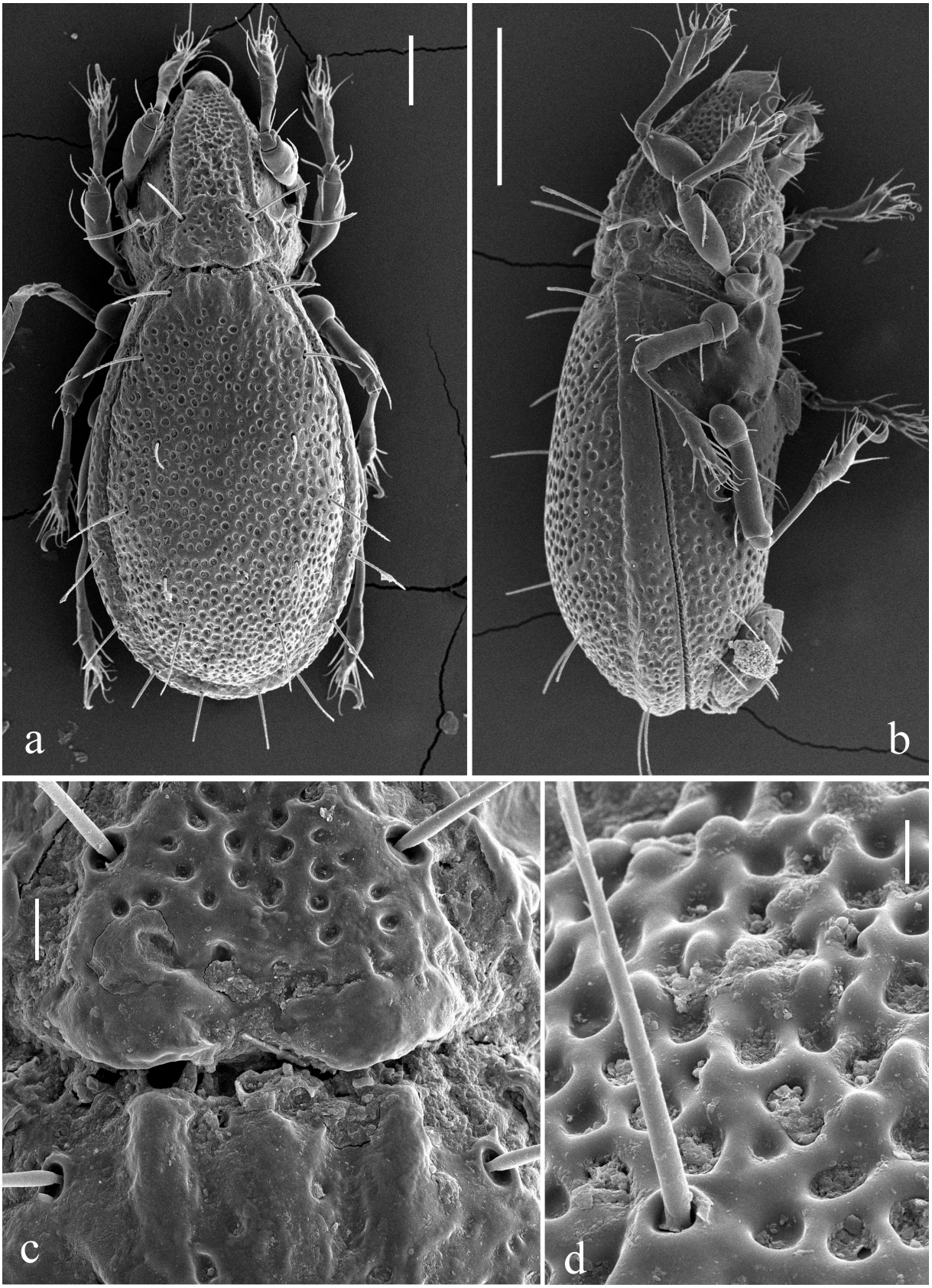



**Figure 12** *Leptotocepheus murphyi* (Mahunka, 1989), adult, SEM photos: a – dorsal view; b – lateral view; c – basal part of prodorsum and anterior part of notogaster, anterior view; d – mediobasal part of notogastral seta $h_1$, and notogastral foveolae. Scale bar 100 µm (a), scale bar 200 µm (b), scale bar 20 µm (c), scale bar 10 µm (d).

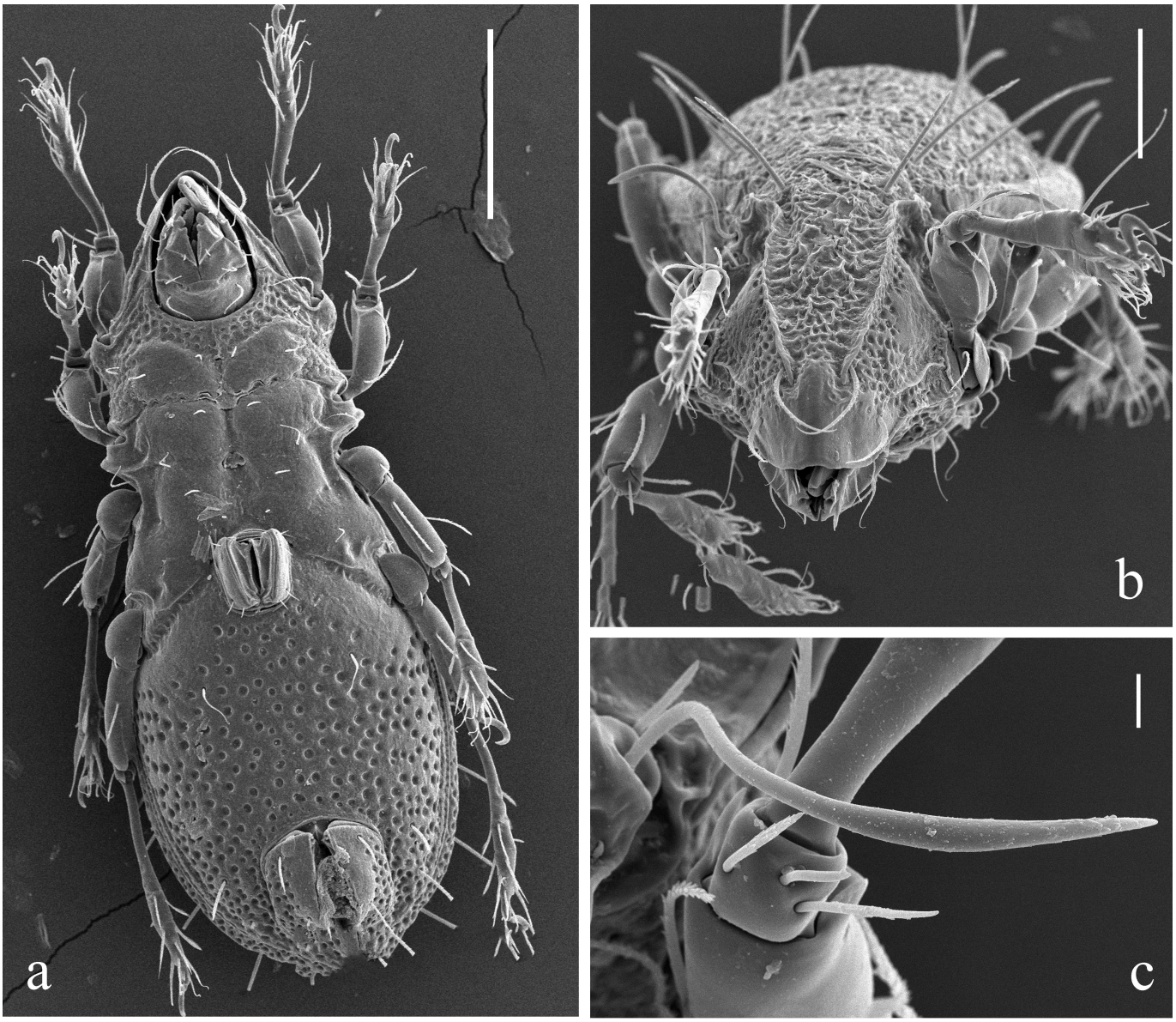



**Figure 13** *Leptotocepheus murphyi* (Mahunka, 1989), adult, SEM photos: a – ventral view; b – anterior view; c – bothridial seta. Scale bar 200 μm (a), scale bar 100 μm (b), scale bar 10 μm (c).

part of notogaster slightly depressed (Figs 12a, 12b). Circumgastric sigillar not visible. Notogaster with 10 pairs (82–94) thickened, barbed setae. Lyrifissures and opisthonotal gland openings distinct, *ia* located posterolateral to *c*, *im* and *gla* close to each other, posterolateral to *la*, *ip* between $p_2$ and $p_3$, *ips* and *ih* anterior to $h_3$.

Gnathosoma (Figs 9d-f, 12b, 13a) – Subcapitulum longer than wide (172–176 × 123–127). Subcapitular setae setiform, barbed, *a* (24–28) shorter than *m* (49–53) and *h* (57–61). Adoral setae and their alveoli absent. Palps (94–102) with typical setation 0-2-1-3-8(+ω). Postpalpal setae (8) spiniform, smooth. Chelicerae (188–192) with two setiform, barbed setae, *cha* (57–61) longer than *chb* (20–24). Trägårdh's organ of chelicerae elongate triangular.

Epimeral and lateral podosomal regions (Figs 8b, 9b, 12b, 13a) – Apodemes I, II, III and sejugal apodemes distinct. Sternal apodeme not developed. Epimeral setal formula 3-1-3-3, setae setiform, slightly barbed, *1a*, *2a*, *3a*, *4b* and *4c* (24–32) shorter than others (45–57).

Pedotecta I represented by large lamina, pedotecta II represented by small lamina. Discidia elongate triangular.

Anogenital region (Figs 8b, 9b, 9c, 12b, 13a) – Aggenital lyrifissures not visible. Four pairs of genital (20–24) and one pair of aggenital (49–61) setae setiform, slightly barbed. Three pairs of adanal (57–59) and two pairs of anal (45–53) setae thickened, barbed. Adanal lyrifissures diagonal, slightly distanced from anal aperture, located between anal aperture and insertions of adanal setae $ad_3$. Circumventral ridge present, but poorly visible (Fig. 12b).

Legs (Figs 10a, 10b, 11a, 11b, 12a, 12b, 13a, 13b) – Claw of each leg strong, slightly barbed dorsally. Tarsi with one pair of distinct teeth on dorsal side. Porose areas present on all femora and on trochanters III, IV (well visible in dissected specimens). Formulas of leg setation and solenidia: I (1-4-3-4-16) [1-2-2], II (1-4-3-3-15) [1-1-2], III (2-3-1-2-15) [1-1-0], IV (1-2-2-2-12) [0-1-0]; homology of setae and solenidia indicated in Table 1. Solenidion $\varphi_1$ on tibiae I setiform, others bacilliform. Famulus of tarsi I short, erect, distally blunt, inserted posterior to solenidia. Setae *u* setiform on tarsi I, II and spiniform on tarsi III, IV.

**Material examined** — Twenty one specimens (11 females and 10 males): Malaysia, Perak District, 50 km NE to Gerik, Titiwangsa, 05°36’17.4”N, 101°32’34.0”E, alt. 1100 m, forest complex Belum–Temenggor, litter, 30 March–13 April 2015 (E. Jendek & O. Šauša).

**Remarks** — Morphological traits – Based on the supplementary description and original description (Mahunka 1989), the following diagnostic morphological traits for *L. murphyi* are proposed:

Body size: 630–946 × 232–398. Body surface microgranulate; prodorsum, notogaster, anogenital region and anterior part of ventral plate foveolate. Rostral and lamellar setae long, setiform, shortly ciliate. Interlamellar and 10 pairs of notogastral setae long, thickened, barbed. Bothridial setae distinctly or slightly dilated mediodistally. Lateral prodorsal and lateral notogastral condyles tubercle-like, medial prodorsal condyles broadly rounded, three medial notogastral condyles (one pair of additional condyles and one median unpair condyle) tubercle-like. Epimeral and genitoaggenital setae setiform, slightly barbed. Adanal and anal setae thickened, barbed. Adanal lyrifissures diagonal. Setae *u* setiform on tarsi I, II and spiniform on tarsi III, IV.

Comparison – Our specimens of *L. murphyi* are morphologically identical to the Singapore specimens from the original description (Mahunka 1989). Only one slight difference is present: bothridial setae usually distinctly dilated mediodistally versus bothridial setae near setiform, slightly dilated in median part (only one our specimen has similar structure of bothridial setae).

Also, we have found that sometimes the median unpaired notogastral condyle is lacking in four males in Malaysia versus always developed. Thus, these morphological nuances must be considered in future identifications of *L. murphyi*.

## Discussion

The otocepheid genera *Leptotocepheus* and *Dolicheremaeus* Jacot, 1938 are morphologically similar in many main traits except one: *Leptotocepheus* with unpaired median notogastral condyle versus this unpaired condyle always absent and instead of it the paired medial condyles often present in *Dolicheremaeus*.

*Leptotocepheus murphyi* was described by Mahunka (1989) as the representative of the genus *Dolicheremaeus* Jacot, 1938. Ermilov (2015) and Ermilov and Bayartogtokh (2015) used the new generic position for this species (genus *Leptotocepheus*), and, later, the new systematic placement of *L. murphyi* was supported by other authors (e.g., Subías 2016, 2019; Ermilov and Minor 2018). This confusion is connected with one important morphological nuance: the species is unusual because its anteromedial part of notogaster has simultaneously three tubercles (one median unpaired condyle, and paired medial condyles). Based only on the presence of the paired medial condyles, Mahunka (1989) included *L. murphyi* in *Dolicheremaeus*, considering most likely that the unpaired median condyle is additional (not basic). On the contrary, Ermilov

(2015) and Ermilov and Bayartogtokh (2015) considered that the unpaired median condyle is basic (paired medial condyles are additional, not basic), therefore, they included the species in *Leptotocepheus*.

Our data on morphology of the Malaysian specimens of *L. murphyi* show presence and absence (seldom) of unpaired median notogastral condyle in different specimens, and this situation creates additional confusion about which notogastral condyles to consider basic or additional (unpaired median condyle or paired medial condyles). Thus, in this moment, based on the presence of unpaired median notogastral condyle (in typical case), we continue to consider the species as representative of *Leptotocepheus*, but its placement may be revised in the future (for example, after genetic analysis).

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