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Two new species of *Pedrocortesella*, with the checklist of oribatid mites from riverine substrata in southern Vietnam

(Acari, Oribatida, Pedrocortesellidae)

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An annotated checklist of oribatid mite taxa from riverine substrata near Dong Nai river in southern Vietnam is provided, which consisted of 37 species from 29 genera and 20 families. Four species, *Peloribates guttatoides*, *Phyllhermannia bimaculata*, *Transoribates agricola* and *Vesiculobates silvaticus*, and two genera, *Transoribates* and *Vesiculobates*, are recorded for the first time in Vietnam; of these, *Transoribates agricola* and *Transoribates* are recorded for the first time in the Oriental region. Two new species of the genus *Pedrocortesella* are described. *Pedrocortesella dongnaiensis* spec. nov. is morphologically most similar to *P. callitarsus* Hunt, 1996, however, the new species differs from the latter by the localization of notogastral foveolae and bothridia, length of notogastral ridge and subcapitular setae, and morphology of posterior part of notogaster. *Pedrocortesella vietnamica* spec. nov. is morphologically most similar to *P. anica* Hunt, 1996 and *P. bithongabela* Hunt, 1996, however, the new species differs from both mentioned species by body size, morphology of lamellar and notogastral setae, localization of bothridia, and morphology of notogastral longitudinal ridge. Juvenile instars of *Pedrocortesella dongnaiensis* spec. nov. are described and compared to known juveniles of *Pedrocortesella* (*P. africana*, *P. montis* and *P. monicai*).

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Introduction

This work is part of our continuing study of the Southern Vietnamese mite fauna (see for example Ermilov & Anichkin 2011, 2013a,b; Ermilov et al. 2012a,b; Ermilov & Niedbała 2013) and includes data about oribatid taxa collected from some riverine substrata (epiphytic roots of trees, with ferns and mosses covered stones and bases of trunks of trees, leaf litter), which are located near to the Dong Nai river and flooded by water during a damp season annually (June–September). Earlier the oribatid mites of riverine substrata were not studied in Vietnam. A primary goal of our paper is to present an annotated checklist of oribatid mites from these substrata and also to annotate taxa, which are recorded for the first time from Vietnam and the Oriental region.

In the course of taxonomic identification, we found two new species of the genus *Pedrocortesella* Hammer, 1961. The second goal of our paper is to

describe and illustrate these species as *Pedrocortesella dongnaiensis* spec. nov. and *P. vietnamica* spec. nov. For the Vietnamese fauna *Pedrocortesella* has been recorded earlier, only represented by unidentified species (Ermilov et al. 2012b). Thus, the two new species are the first identified members of this genus recorded in Vietnam. We compared our present material with that of previously found specimens of *Pedrocortesella* sp. (Ermilov et al. 2012b), and clarified that *Pedrocortesella vietnamica* spec. nov. and the latter are the same species.

The genus *Pedrocortesella* of the family Pedrocortesellidae (see Paschoal 1988, Norton & Behan-Pelletier 2009, Schatz et al. 2011) was proposed by Hammer (1961) with *Pedrocortesella pulchra* Hammer, 1961 as type species. It comprises about 35 species (see different opinions on classification, for example: Hunt 1996, Bayartogtokh 2001, Subías 2004, updated 2013) with a semicosmopolitan distribution. The main morphological characters of *Pedrocortesella* were summarized, for example, by Paschoal (1988), Balogh & Balogh (1992), Hunt (1996), Bayartogtokh (2010). The identification keys to selective species of the genus have been presented earlier by, for example: Ryabinin (1986), Hunt (1996), Balogh & Balogh (2002), Bayartogtokh (2010).

Additionally, the juvenile instars of *Pedrocortesella dongnaiensis* spec. nov. were studied and described. The morphology of the juveniles in this genus was described for three species: *Pedrocortesella africana* (Pletzen, 1963), *P. monicai* Eugaras, Martinez & Fernandez, 1990, and *P. montis* Fernandez, 1990 (see Ermilov et al. 2010, Eugaras et al. 1990, Fernandez 1990, respectively). Also, Hammer (1961) described a nymph (instar not identified) of *P. pulchra* Hammer, 1961.

Materials and methods

Material examined

Southern Vietnam, Dong Nai Province, Dong Nai Biosphere Reserve, 11°26' N, 107°26' E, near Dong Nai river, riverine substrata flooded by water during a damp season, collected by A. E. Anichkin and S. G. Ermilov in October and November 2013.

List of substrata

V-RS-1: mosses on bases of trunks of trees, 25.X.2013
V-RS-2: mosses on bases of trunks of trees, 25.X.2013
V-RS-3: leaf litter, 25.X.2013
V-RS-4: epiphytic roots of trees, 25.X.2013
V-RS-5: epiphytic roots of trees, 25.X.2013
V-RS-6: mosses and ferns on stones, 25.X.2013
V-RS-7: mosses and ferns on stones, 25.X.2013
V-RS-a: mosses and ferns on stones, 28.XI.2013
V-RS-b: soil, 28.XI.2013
V-RS-c: leaf litter, 28.XI.2013
V-RS-d: leaf litter, 28.XI.2013
V-RS-e: mosses on bases of trunks of trees, 28.XI.2013
V-RS-f: mosses on bases of trunks of trees, 28.XI.2013

The samples were put in zip-lock plastic bags, properly labelled and brought to laboratory for further examinations. In the laboratory the substrates (leaves, epiphytic roots, fern and moss) were immediately put in the Tullgren funnel and illuminated with a 40-watt bulb for 10 days to extract the mites into a small jar containing 70 % ethanol placed under each funnel.

Studied 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. The notogastral width refers to the maximum width in dorsal aspect (without pteromorphs). Length of body setae were measured in lateral aspect. All body measurements are presented in micrometers. General terminology used in this paper follows that of F. Grandjean (summarized by Norton & Behan-Pelletier 2009) and Hunt (1996).

Checklist of identified oribatid mite taxa[1]

Lohmanniidae
Meristacarus sundensis Hammer, 1979. Locality: V-RS-2 (2 ex.), V-RS-6 (1 ex.), V-RS-a (3 ex.), V-RS-e (1 ex.)

Malaconothridae
Malaconothrus dorsofoveolatus Hammer, 1979. Locality: V-RS-1 (2 ex.)

Hermanniidae
Phyllhermannia bimaculata Hammer, 1979. Locality: V-RS-1 (2 ex.), V-RS-2 (1 ex.), V-RS-f (1 ex.)

Pedrocortesellidae
Pedrocortesella dongnaiensis spec. nov. Locality: V-RS-a (1 ex.), V-RS-f (1 ex.)
Pedrocortesella vietnamica spec. nov. Locality: V-RS-2 (1 ex.), V-RS-a (1 ex.)

Gymnodamaeidae
Arthrodamaeus vietnamicus Ermilov & Anichkin, 2011. Locality: V-RS-2 (1 ex.)

Oppiidae
Lasiobelba kuehnelti (Csiszár, 1961). Locality: V-RS-d (1 ex.)

1 The species which remained unidentified are not included in the checklist.

Neoamerioppia vietnamica (Mahunka, 1988). Locality: V-RS-2 (1 ex.), V-RS-a (2 ex.), V-RS-e (1 ex.), V-RS-f (1 ex.)
Taiwanoppia hungarorum (Mahunka, 1988). Locality: V-RS-2 (1 ex.)

Suctobelbidae
Suctobelbella (*Ussuribata*) *variosetosa* (Hammer, 1961). Locality: V-RS-a (1 ex.)

Otocepheidae
Basiceramerus igorotus Corpuz-Raros & Gruèzo, 2011. Locality: V-RS-a (1 ex.)

Carabodidae
Chistyakovella insolita Ermilov, Aoki & Anichkin, 2013. Locality: V-RS-6 (5 ex.)

Tectocepheidae
Tectocepheus velatus (Michael, 1880). Locality: V-RS-4 (1 ex.)
Tegeozetes tunicatus Berlese, 1913. Locality: V-RS-6 (2 ex.)

Idiozetidae
Idiozetes javensis Hammer, 1979. Locality: V-RS-4 (1 ex.)

Licneremaeidae
Licneremaeus polygonalis Hammer 1971. Locality: V-RS-6 (1 ex.)

Oribatellidae
Oribatella umaetluisorum Ermilov & Anichkin, 2012. Locality: V-RS-1 (9 ex.), V-RS-d (11 ex.)

Mycobatidae
Lamellobates molecula (Berlese, 1916). Locality: V-RS-2 (18 ex.), V-RS-3 (3 ex.), V-RS-6 (7 ex.), V-RS-7 (1 ex.), V-RS-a (7 ex.)

Mochlozetidae
Unguizetes clavatus Aoki, 1967. Locality: V-RS-6 (3 ex.)
Unguizetes cattienensis Ermilov & Anichkin, 2011. Locality: V-RS-e (4 ex.)

Caloppiidae
Zetorchella reticulata (Willmann, 1933). Locality: V-RS-3 (1 ex.)

Scheloribatidae
Scheloribates (*Scheloribates*) *latipes* (Koch, 1844). Locality: V-RS-b (8 ex.), V-RS-c (7 ex.)
Scheloribates (*Scheloribates*) *praeincisus praeincisus* (Berlese, 1910). Locality: V-RS-3 (3 ex.), V-RS-7 (3 ex.)
Vesiculobates silvaticus Hammer, 1979. Locality: V-RS-1 (1 ex.), V-RS-d (1 ex.)

Haplozetidae
Peloribates guttatoides Hammer, 1979. Locality: V-RS-3 (2 ex.)
Peloribates rangiroaensis Hammer, 1972. Locality: V-RS-2 (1 ex.), V-RS-d (3 ex.)
Peloribates spiniformis Ermilov & Anichkin, 2011. Locality: V-RS-2 (1 ex.), V-RS-6 (1 ex.)
Peloribates stellatus Balogh & Mahunka, 1967. Locality: V-RS-6 (4 ex.), V-RS-a (2 ex.)
Protoribates paracapucinus (Mahunka, 1988). Locality: V-RS-1 (1 ex.)
Trachyoribates ovulum Berlese, 1908. Locality: V-RS-3 (1 ex.), V-RS-4 (3 ex.), V-RS-a (4 ex.)
Transoribates agricola (Nakamura & Aoki, 1989). Locality: V-RS-4 (1 ex.), V-RS-e (2 ex.)

Phenopelopidae
Nesopelops intermedius Hammer, 1979. Locality: V-RS-1 (6 ex.), V-RS-2 (22 ex.), V-RS-6 (1 ex.), V-RS-a (31 ex.), V-RS-d (1 ex.), V-RS-e (33 ex.), V-RS-f (38 ex.)

Galumnidae
Galumna (*Galumna*) *khoii* Mahunka, 1989. Locality: V-RS-3 (1 ex.), V-RS-a (6 ex.), V-RS-c (2 ex.), V-RS-d (22 ex.), V-RS-e (21 ex.), V-RS-f (36 ex.)
Galumna (*Cosmogalumna*) *dongnaiensis* Ermilov & Anichkin, 2013. Locality: V-RS-2 (2 ex.), V-RS-6 (2 ex.), V-RS-e (4 ex.)
Pergalumna hauseri Mahunka, 1995. Locality: V-RS-2 (1 ex.)
Pergalumna punctulata Balogh & Mahunka, 1967. Locality: V-RS-2 (3 ex.), V-RS-4 (1 ex.), V-RS-a (2 ex.), V-RS-d (3 ex.), V-RS-e (10 ex.), V-RS-f (8 ex.)
Trichogalumna nipponica (Aoki, 1966). Locality: V-RS-a (2 ex.), V-RS-f (5 ex.)

Hence, we identified 37 species from 29 genera and 20 families. Four species, *Peloribates guttatoides* (distribution: Indonesia), *Phyllhermannia bimaculata* (Java and Thailand), *Transoribates agricola* (Palaearctic region) and *Vesiculobates silvaticus* (Java), and two genera, *Transoribates* Pérez-Íñigo, 1992 and *Vesiculobates* Hammer, 1979, are recorded for the first time in Vietnam; of these, *Transoribates agricola* and *Transoribates* are recorded for the first time in the Oriental region.

Descriptions

Pedrocortesella dongnaiensis spec. nov.

Figs 1–14

Adult

Diagnosis. Body size: 614-630 × 348–365 µm. Surface of prodorsum, notogaster and anogenital region foveolate. All body setae without cerotegument. Sensilli long, clavate. Bothridia distanced from the anterior margin of notogaster. Posterior margin of notogaster concave medially. Dorsal part of notogaster with central longitudinal ridge and circummarginal furrow U-shaped. Anogenital and five pairs of notogastral setae rather short, thin.

Description

Measurements. Body length: 614 µm (holotype, male), 630 µm (paratype, male); body width: 348 µm (holotype), 365 µm (paratype).

Integument (Figs 1–4). Body colour dark brown. Body surface and legs covered with round cerotegumental granules (diameter up to 1 µm) and vermicular cerotegument. All body setae without cerotegument. Surface of prodorsum, notogaster and anogenital region with round foveolae (diameter up to 6 µm), clearly distanced from one another.

Prodorsum (Figs 1, 3). Rostrum rounded. Rostral (*ro*) and lamellar (*le*) setae of medium size, similar in length (61–69 µm), setiform, smooth, directed anterio-mediad. Interlamellar setae (*in*) short (8 µm), spiniform, directed upwards. Sensilli (*ss*, 82–90 µm) clavate, directed posterio-laterad; sensillar head elongated, densely covered by small scales. Bothridia distanced from anterior margin of notogaster. Exobothridial setae and their alveoli absent. Two pedotectal tooth (*pdt*) well developed, triangular, weakly blunted.

Notogaster (Figs 1–4) oval in dorsal view, flattened in lateral view. Anterior margin convex, weakly extending anteromedially and reaching level of bothridia. Posterior margin concave medially. Dorsal part with central longitudinal ridge (*r*) large and wide, distinctly visible, about ⅔ length of notogaster. Circummarginal furrow (*cmf*) U-shaped, represented by deep depression, bordering central longitudinal ridge. Five pairs of notogastral setae (h_1, h_2, p_1–p_3) similar in length (22–24 µm), thin, smooth, inserted (except p_1) dorso-laterally in one row. Lyrifissures *ia*, *im*, *ip*, *ih*, *ips* short, thin. Opisthonotal gland openings not visible.

Gnathosoma (Fig. 2). Morphology of subcapitulum, palps and chelicerae typical for *Pedrocortesella* (Fernandez 1990, Hunt 1996, Bayartogtokh 2001).

Epimeral region (Figs 2, 3). Epimeral setal formula: 3–1–3–3. Epimeral setae (18–20 µm) thin, smooth.

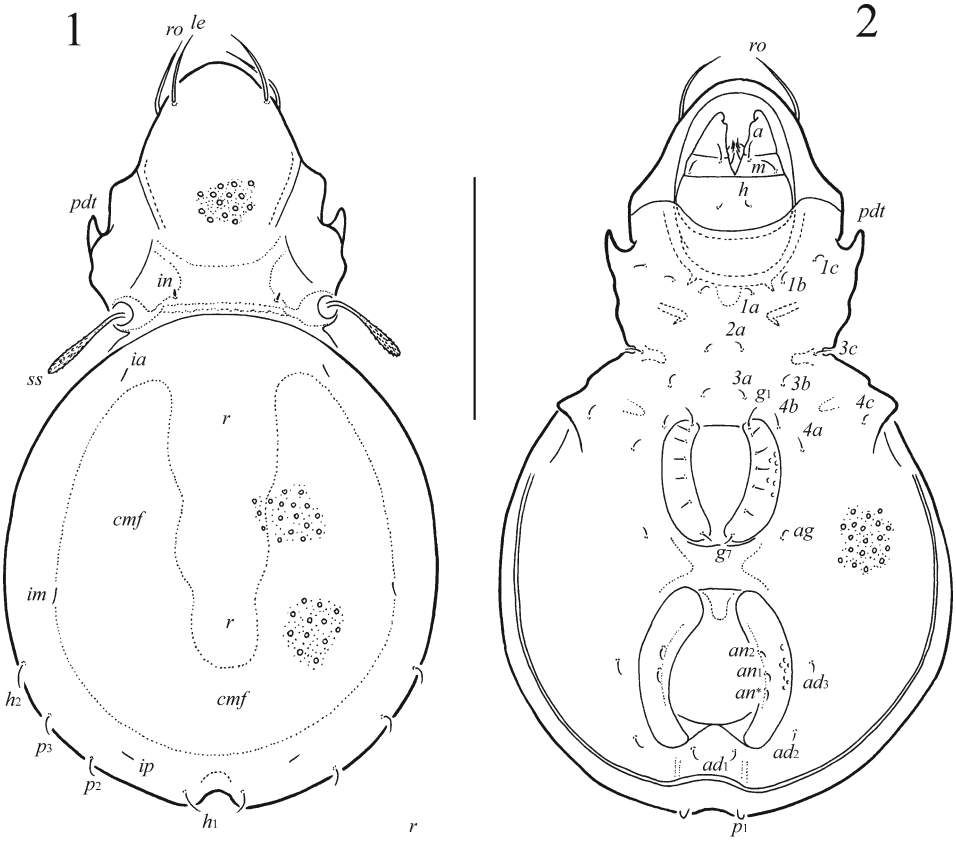
Anogenital region (Figs 2, 3). Seven pairs of genital (g_1, 18–20 µm; g_2–g_7, 12–14 µm), one pair of aggenital (*ag*, 16–18 µm), two pairs of anal (an_1, an_2, 12–14 µm) and three pairs of adanal (ad_1–ad_3, 16–18 µm) setae setiform, thin, smooth. Left anal plate of holotype with three anal setae. Adanal setae ad_1 located in postanal position, ad_2 in latero-postanal position, ad_3 in paraanal position. Lyrifissures *iad* not visible.

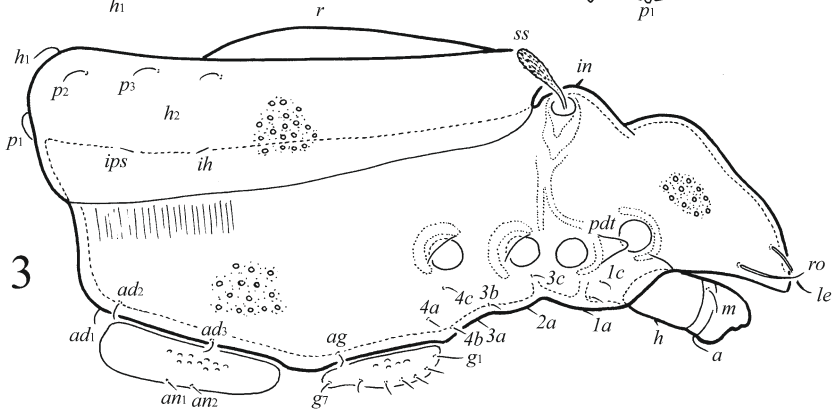
Legs. Three claws of each leg indistinctly barbed on dorsal side. Medial claw slightly thicker than lateral ones. Morphology of leg segments, setae and solenidia typical for *Pedrocortesella* (Fernandez 1990, Eguaras et al. 1990, Hunt 1996, Bayartogtokh 2001, Bayartogtokh & Smelyansky 2004). Formulae and homology of leg setae and solenidia indicated in Tables 1 and 2.

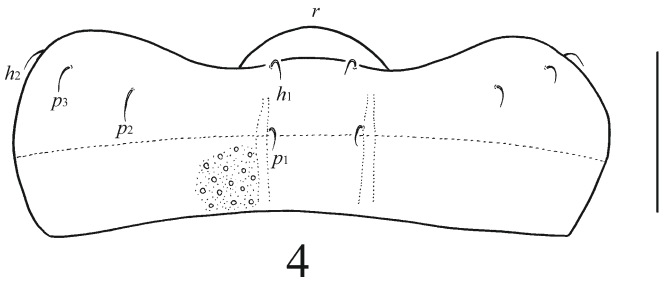
Table 1. Setal and solenidial counts on legs of *Pedrocortesella dongnaiensis* spec. nov. during ontogeny (same data for adult *P. vietnamica* spec. nov.).

	Formula of setae	Formula of solenidia
Leg I		
Larva	0–2–3–4–16	1–1–1
Protonymph	0–4–3–4–16	1–1–2
Deutonymph	0–4–3–5–16	1–2–2
Tritonymph	1–5–3–5–18	1–2–2
Adult	1–5–4–4–18	1–2–2
Leg II		
Larva	0–2–3–3–13	1–1–1
Protonymph	0–4–3–3–13	1–1–1
Deutonymph	0–4–3–4–13	1–1–2
Tritonymph	1–4–3–5–15	1–1–2
Adult	1–4–4–5–15	1–1–2
Leg III		
Larva	0–2–2–2–13	1–1–0
Protonymph	0–3–2–2–13	1–1–0
Deutonymph	1–3–2–3–13	1–1–0
Tritonymph	2–3–2–4–15	1–1–0
Adult	2–3–3–4–15	1–1–0
Leg IV		
Protonymph	0–0–0–0–7	0–0–0
Deutonymph	0–2–2–3–12	0–1–0
Tritonymph	1–2–2–4–12	0–1–0
Adult	1–2–3–4–12	0–1–0

Figs 1–4. *Pedrocortesella dongnaiensis* spec. nov., adult. ▷ **1.** Dorsal view. **2.** Ventral view (legs not shown). **3.** Lateral view (legs not shown). **4.** Notogaster, posterior view. Scale bars 1–3 = 100 µm, 4 = 100 µm.







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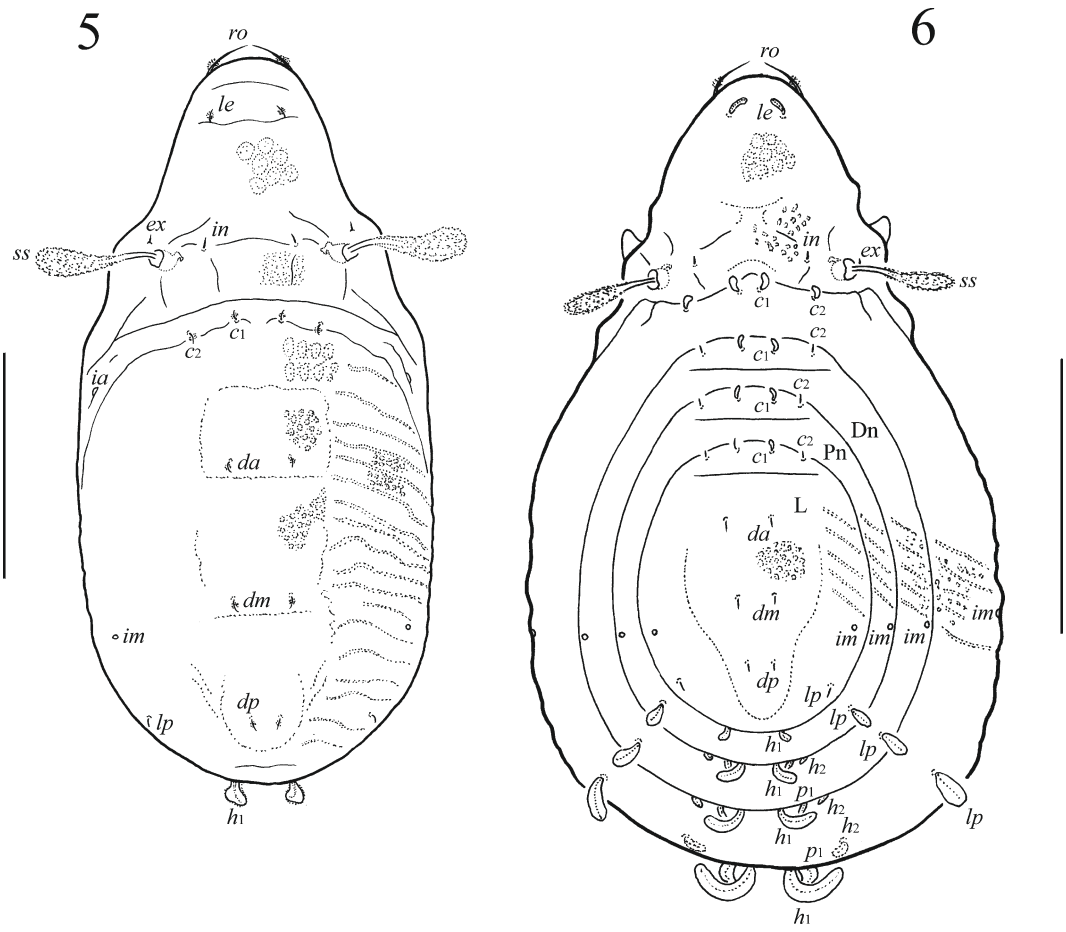


Figs 5–6. *Pedrocortesella dongnaiensis* spec. nov., juvenile instars. **5.** Larva, dorsal view. **6.** Tritonymph, dorsal view. Scale bars 5 = 100 µm, 6 = 200 µm.

Juvenile instars

Description

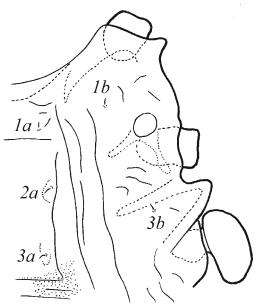
Measurements. Total length of larva: 298–332 µm (n = 3), protonymph: 348–365 µm (n = 2), deutonymph: 415–448 µm (n = 3), tritonymph: 531–547 µm (n = 3). Total width of larva: 166–182 µm (n = 3), protonymph: 198–215 µm (n = 2), deutonymph: 232–249 µm (n = 3), tritonymph: 298–332 µm (n = 3).

Integument (Figs 5–14). Body cuticle colourless to yellowish. Microgranular (diameter less than 1 µm) cerotegument covers body and legs in all juvenile instars. Interlamellar, exobothridial, subcapitular, epimeral, genital and aggenital setae usually without cerotegument, other setae consistently covered with cerotegument, described together as a unit. Cuticle of prodorsum and gastronotic regions, and segments of legs with reticular ornamentation. Cuticle of epimeral and anogenital regions folded.

Prodorsum (Figs 5, 6). Triangular, relatively short, about 3/5 length of gastronotic region. Rostrum widely rounded. Rostral setae of medium size, setiform, smooth. Lamellar setae simple (in larval instar) or leaf-shaped (in nymphal instars). Interlamellar setae short, spiniform. Exobothridial setae short, simple. Sensilli petiolate, tuberculate blades with a rounded distal margin, longest setae on prodorsum. Relative length of prodorsal setae: *ss* > *ro* > *le* > *in* ≈ *ex*.

Gastronotic region (Figs 5, 6, 11–14) weakly flat

Figs 7–14. *Pedrocortesella dongnaiensis* spec. nov., juvenile instars. **7–10.** Epimeral region (legs except trochanters not shown) of larva, proto-, deuto- and tritonymph, respectively. **11–14.** Anogenital region of larva, proto-, deuto- and tritonymph, respectively. Scale bars 7, 8, 11, 12 = 50 µm; 9, 10, 13, 14 = 100 µm. ▷



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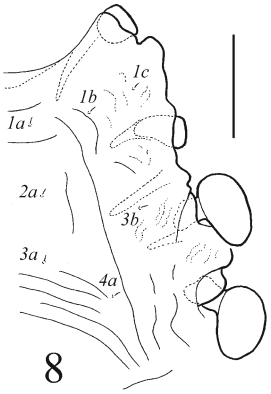

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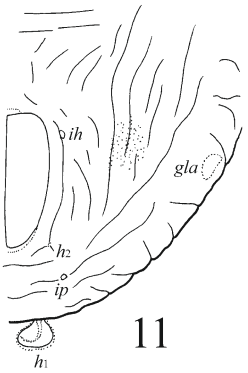

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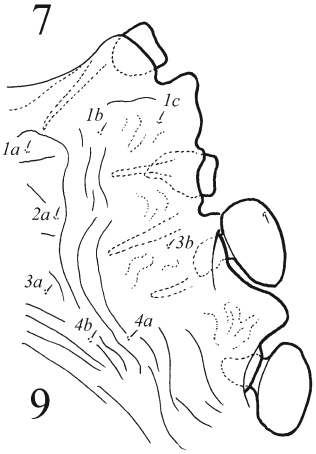

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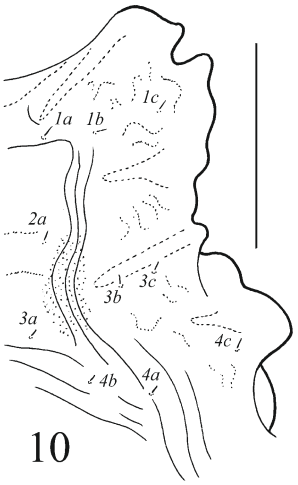

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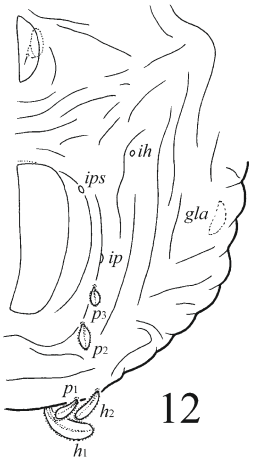

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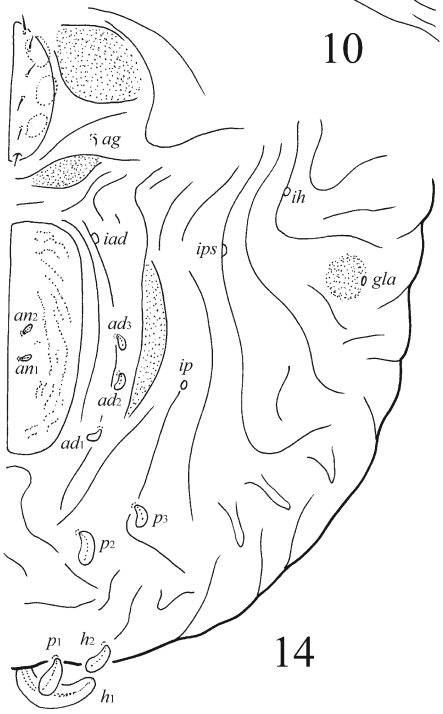

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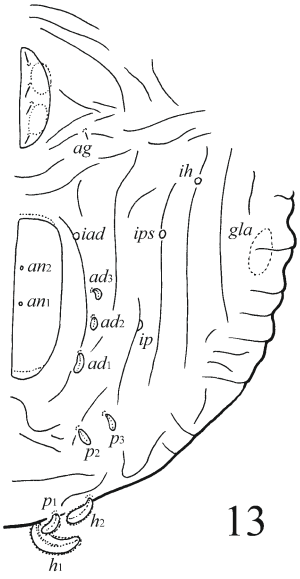

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in lateral view. Rounded posteriorly. Centrodorsal region convex. Larva with eight pairs of gastronotic setae ($c_1, c_2, da, dm, dp, lp, h_1, h_2$). Setae c_3 and their alveoli absent. Setae h_1 longest, leaf-shaped; other setae short, simple. Nymphs also with eight pairs of gastronotic setae ($c_1, c_2, lp, h_1, h_2, p_1–p_3$). All setae leaf-shaped, h_1 longest. Larval exuvial scalp with seven pairs of setae ($c_1, c_2, da, dm, dp, lp, h_1$); nymphal exuvial calps with six pairs of setae ($c_1, c_2, lp, h_1, h_2, p_1$). Cupules *ia*, *im*, *ip* and opisthonotal gland openings poorly visible.

Gnathosoma. Morphology of subcapitulum, palps and chelicerae typical for juveniles of *Pedrocortesella* (Ermilov et al. 2010).

Epimeral region (Figs 7–10). Setal formulae for epimeres: larva 3–1–2 (*1c* forms protective scale over Claparède's organ), protonymph 3–1–2–1, deutonymph 3–1–2–2, tritonymph 3–1–3–3. Epimeral setae simple, thin, smooth.

Anogenital region (Figs 11–14). Ontogeny of genital, aggenital, adanal, anal setal formulae, larva to tritonymph, 0–1–4–6, 0–0–1–1, 0–0–3–3, 0–0–0–2, respectively. Deutonymphal instar with two pairs of vestigial alveoli of anal setae. Genital and aggenital setae simple, smooth; anal and adanal setae leaf-shaped. Cupules *ih*, *ips*, *iad* and opisthonotal gland opening appearing in normal ontogenetic pattern.

Legs. One claw of each leg barbed on dorsal side. Morphology of leg segments, setae and solenidia typical for juveniles of *Pedrocortesella* (Ermilov et al. 2010). Formulae and homology of leg setae and solenidia indicated in Tables 1 and 2.

Material examined. Collection data: V-RS-a (holotype and juvenile instars), V-RS-f (paratype).

Type deposition. The holotype is deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; one paratype and juvenile instars are deposited in the collection of the Tyumen State University Museum of Zoology, Tyumen, Russia.

Etymology. The specific name *"dongnaiensis"* refers to the Dong Nai river, near to which a new species has been found.

Remarks. Adult. In having the combination of main morphological characters (body surface foveolate;

Table 2. Leg setation and solenidia of *Pedrocortesella dongnaiensis* spec. nov. during ontogeny (same data for adult *P. vietnamica* spec. nov.). Roman letters refer to normal setae, Greek letters refer to solenidia; *e*, famulus; *d*φ, solenidion and seta coupled. 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. Setae are listed only for the stage in which they first appear.

	Trochanter	Femur	Genu	Tibia	Tarsus
Leg I					
Larva	–	*d, bv"*	*d, (l)*, σ	*(l), v', d*φ$_1$	*(ft), (tc), (p), (u), (a), s, (pv), (pl)*, e (sunken), ω$_1$
Protonymph	–	*(l)*	–	–	ω$_2$
Deutonymph	–	–	–	*v"*, φ$_2$	–
Tritonymph	*v'*	*v"*	–	–	*(it)*
Adult	–	–	*v'*	*–d*	–
Leg II					
Larva	–	*d, bv"*	*d, (l)*, σ	*d, l', v'*, φ	*(ft), (tc), (p), (u), (a), s, (pv)*, ω$_1$
Protonymph	–	*(l)*	–	–	–
Deutonymph	–	–	–	*l"*	ω$_2$
Tritonymph	*v'*	–	–	*v"*	*(it)*
Adult	–	–	*v'*	–	–
Leg III					
Larva	–	*d, ev'*	*d, l'*, σ	*d, v'*, φ	*(ft), (tc), (p), (u), (a), s, (pv)*
Protonymph	–	*l'*	–	–	–
Deutonymph	*v'*	–	–	*l'*	–
Tritonymph	*l'*	–	–	*v"*	*(it)*
Adult	–	–	*v'*	–	–
Leg IV					
Protonymph	–	–	–	–	*ft", (p), (u), (pv)*
Deutonymph	–	*d, ev'*	*d, l'*	*d, l', v'*, φ	*(tc), (a), s*
Tritonymph	*v'*	–	–	*v"*	–
Adult	–	–	*v'*	–	–

notogaster with central longitudinal ridge and circummarginal furrow U-shaped; five pairs of notogastral setae rather short, setiform), *Pedrocortesella dongnaiensis* spec. nov. is most similar to *P. callitarsus* Hunt, 1996 from Australia (Hunt 1996). However, the new species differs from the latter by the notogastral foveolae located sparsely (versus densely in *P. callitarsus*), bothridia distanced from anterior margin of notogaster (versus close in *P. callitarsus*), notogastral ridge about ⅔ length of notogaster (versus ridge posteriorly continues in apophysis in *P. callitarsus*), posterior part of notogaster distinctly concave medially (versus weakly concave *P. callitarsus*), and subcapitular setae *a* similar to *m* in length (versus *m* longer than *a* in *P. callitarsus*).

Juvenile instars. The morphological comparative analysis of juvenile instars of *Pedrocortesella africana*, *P. montis* and *P. monicai* has been presented earlier (Ermilov et al. 2010).

1) Distinctions between *Pedrocortesella dongnaiensis* spec. nov. and *P. africana* (data from Ermilov et al. 2010).

The larval instar of *P. dongnaiensis* spec. nov. is characterized by: body setae (except h_1) simple; gastronotic setae $da \approx dm \approx dp$; gastronotic setae c_3 absent; setae h_1 longest in gastronotic region; centrodorsal gastronotic region reticulate. The larva of *P. africana* is characterized by: body setae leaf-shaped; gastronotic setae $da < dm < dp$; gastronotic setae c_3 present; setae *dp*, *lp* and h_1 longest in gastronotic region; centrodorsal gastronotic region folded.

The nymphal instars of *Pedrocortesella dongnaiensis* spec. nov. are characterized by: rostral setae setiform; gastronotic setae *lp*, h_2, p_1–p_3 of medium size; gastronotic setae c_3 absent; epimeral, genital and aggenital setae simple; deutonymphal instar with two pairs of anal vestigial alveoli. The nymphal instars of *P. africana* are characterized by: rostral setae leaf-shaped; gastronotic setae *lp*, h_2, p_1–p_3 small; gastronotic setae c_3 present; epimeral, genital, aggenital and adanal setae leaf-shaped; deutonymphal instar without anal vestigial alveoli.

2) Distinctions between *Pedrocortesella dongnaiensis* spec. nov. and *P. monicai* (description of larva absent, only data about larval scalp present; data from Eguaras et al. 1990).

The exuvial larval scalp of *P. dongnaiensis* spec. nov. is characterized by: gastronotic setae (except h_1) simple; gastronotic setae $da \approx dm \approx dp$; c_1 and c_2 present; setae h_1 longest on scalp. The exuvial larval scalp of *P. monicai* is characterized by: gastronotic setae leaf-shaped; gastronotic setae $da \approx dm < dp$; one pair of setae *c* present; setae *dp* longest on scalp.

The nymphal instars of *Pedrocortesella dongnaiensis* spec. nov. are characterized by: interlamellar and exobothridial setae developed; eight pairs of gastronotic setae present (including c_1, c_2); adanal setae leaf-shaped; deutonymphal instar with two pairs of anal vestigial alveoli. The nymphal instars of *P. monicai* are characterized by: interlamellar and exobothridial setae not evident; six pairs of gastronotic setae present (c_1, c_2 absent); adanal setae simple; deutonymphal instar without anal vestigial alveoli.

3) Distinctions between *Pedrocortesella dongnaiensis* spec. nov. and *P. montis* (data from Fernandez 1990).

The larval instar of *P. dongnaiensis* spec. nov. is characterized by: rostral setae setiform; gastronotic setae (except h_1) simple; setae c_3 absent; setae c_1 and c_2 distanced; setae h_1 longest in gastronotic region; centrodorsal gastronotic region reticulate. The larva of *P. montis* is characterized by: rostral and gastronotic setae leaf-shaped; setae c_3 present, c_1 and c_2 close together; setae h_1 not longer than other gastronotic setae; centrodorsal gastronotic region folded.

The nymphal instars of *Pedrocortesella dongnaiensis* spec. nov. are characterized by: rostral setae setiform; setae c_3 absent; setae c_1 and c_2 distanced; setae h_1 longest in gastronotic region; epimeral formula for deutonymphal instar: 3–1–2–2; deutonymphal instar with two pairs of anal vestigial alveoli. The nymphal instars of *P. montis* are characterized by: rostral setae leaf-shaped; setae c_3 present; setae c_1 and c_2 close together; setae h_1 not longer than other gastronotic setae; epimeral formula for deutonymphal instar: 3–1–3–2; deutonymphal instar without anal vestigial alveoli.

Pedrocortesella vietnamica spec. nov.

Figs 15–19

Adult

Diagnosis. Body size: 365–381 × 166–182 µm. Body surface reticulate. Rostral setae setiform, lamellar and interlamellar setae leaf-shaped. Notogastral setae well visible, leaf-shaped. Sensilli long, clavate. Bothridia distanced from the anterior margin of notogaster. Dorsal part of notogaster with central longitudinal ridge and two circummarginal furrows of oval, elongate form. Adanal setae leaf-shaped, other ventral setae setiform.

Description

Measurements. Body length: 381 µm (holotype, male), 365 µm (paratype, male); body width: 182 µm (holotype), 166 µm (paratype).

Integument (Figs 15–18). Body colour yellow-brownish. Body surface and legs covered with round cerotegumental granules (diameter up to 1 µm) and reticulate ornamentation. Subcapitular, epimeral,

genital, aggenital and anal without cerotegument; other setae with cloud-like or vermicular cerotegument.

Prodorsum (Figs 15, 17). Rostrum rounded. Rostral setae (45–49 µm) setiform, smooth, directed anterio-mediad. Lamellar (28–32 µm) leaf-shaped, directed upwards. Interlamellar setae (8–10 µm) leaf-shaped, directed upwards. Sensilli (73–77 µm) clavate, directed posterio-laterad; sensillar head large, elongate, covered by small scales. Bothridia distanced from anterior margin of notogaster. Exobothridial setae and their alveoli absent. Two pedotectal teeth well developed, triangular, weakly blunted.

Notogaster (Figs 15–18) oval in dorsal view, flattened in lateral view. Anterior margin convex. Posterior margin rounded. Dorsal part with central longitudinal ridge large and wide, distinctly visible, reaching posterior part of notogaster. Circummarginal furrow represented by two deep, elongate longitudinally depressions, bordering central longitudinal ridge. Five pairs of notogastral setae similar in length (28–32 µm), leaf-shaped, inserted (except p1) dorso-laterally in one row. Lyrifissures and opisthonotal gland openings not visible.

Gnathosoma (Fig. 16). Morphology of subcapitulum, palps and chelicerae typical for *Pedrocortesella* (Fernandez 1990, Hunt 1996, Bayartogtokh 2001).

Epimeral region (Figs 16, 17). Epimeral setal formula: 3–1–3–3. Epimeral setae (10–12 µm) thin, smooth.

Anogenital region (Figs 16, 17). Posterior part of ventral plate weakly concave medially. Seven pairs of genital (g_1, 18–20 µm; g_2–g_7, 10–12 µm), one pair of aggenital (10–12 µm) and two pairs of anal (10–12 µm) setae setiform, thin, smooth. Three pairs of adanal setae (16–18 µm) leaf-shaped. Adanal setae ad_1 located in postanal position, ad_2 in latero-postanal position, ad_3 in paraanal position. Lyrifissures *iad* not visible.

Legs (Fig. 19). Three claws of each leg smooth. Medial claw thicker than lateral ones. Morphology of leg segments, setae and solenidia typical for *Pedrocortesella* (Fernandez 1990, Eguaras et al. 1990, Hunt 1996, Bayartogtokh 2001, Bayartogtokh & Smelyansky 2004). Formulae and homology of leg setae and solenidia indicated in Tables 1 and 2.

Material examined. Collection data: V-RS-a (holotype), V-RS-2 (paratype).

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

Etymology. The specific name *"vietnamica"* refers to the country origin, Vietnam.

Remarks. Adult. In having the combination of main morphological characters (body surface reticulate; notogaster with central longitudinal ridge and two circummarginal furrows of elongate form; five pairs of notogastral setae of medium size, leaf-shaped, *Pedrocortesella vietnamica* spec. nov. is most similar to *P. anica* Hunt, 1996 and *P. bithongabela* Hunt, 1996 from Australia (Hunt 1996). However, the new species differs from both by the smaller body size (365–381 × 166–182 µm versus 450–530 × 250–350 µm in *P. anica*, 465 × 250–330 µm), lamellar setae leaf-shaped (versus setiform in *P. anica* and *P. bithongabela*), bothridia distanced from anterior margin of notogaster (versus close in *P. anica* and *P. bithongabela*), notogastral longitudinal ridge strongly developed (versus weakly developed); notogastral setae of medium size, leaf-shaped (versus shorter, setiform).

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Figs 15–19. *Pedrocortesella vietnamica* spec. nov., adult. ▷ **15.** Dorsal view. **16.** Ventral view (legs except trochanters III, IV not shown). **17.** Lateral view (legs not shown). **18.** Notogaster, posterior view. **19.** Tarsus of legs IV, left, antiaxial view. Scale bars 15–17 = 100 µm; 18–19 = 50 µm.

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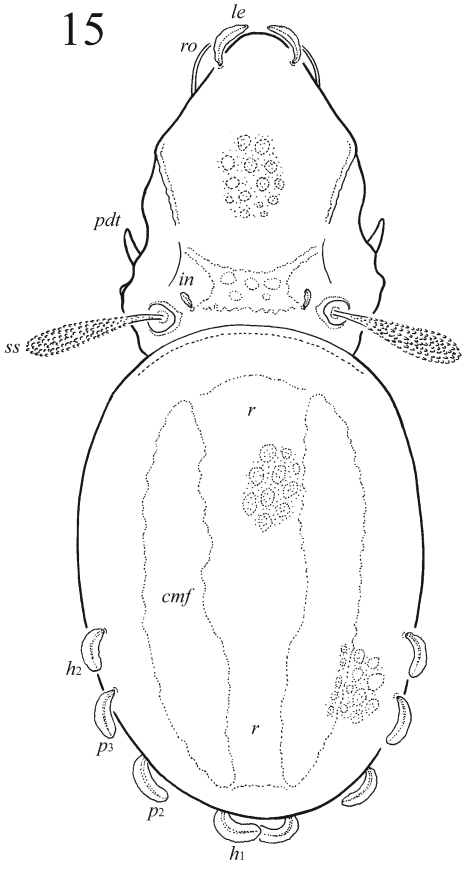

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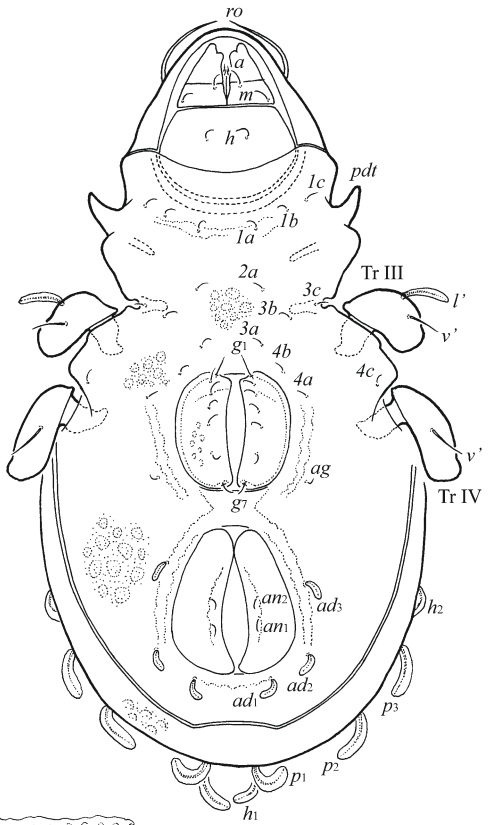

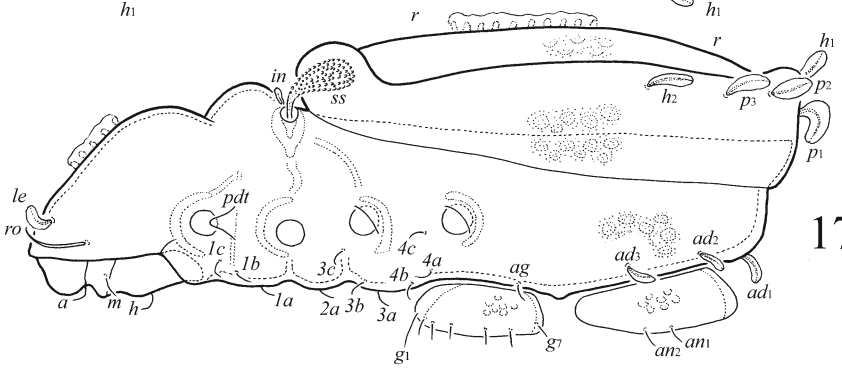

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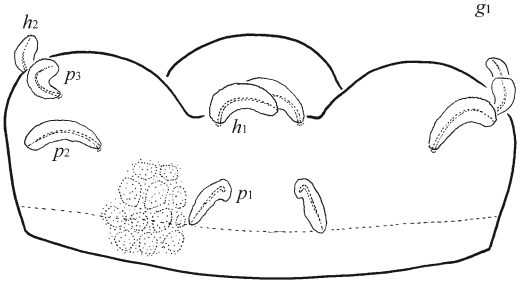

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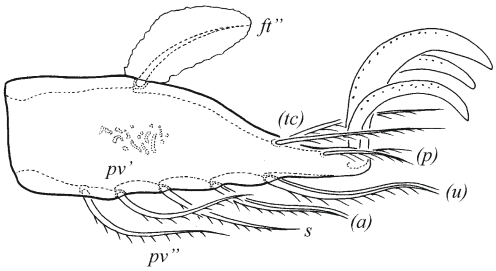

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