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Redescription of *Perlohmannia (Perlohmannia) dissimilis* (Acari, Cryptostigmata, Perlohmanniidae) collected from Guilan Province Iran

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Abstract: During 2013, some specimens belonging to *Perlohmannia (Perlohmannia) dissimilis* (HEWITT, 1908) (Acari: Perlohmanniidae), were collected from Guilan Province (Northern Iran). The adult, deutonymph and tritonymph instars are redescribed here with details. Some morphological characters of our specimens are different from those that have been described and redescribed before.

Key words: Oribatid mites, *Perlohmannia (Perlohmannia) dissimilis*, Perlohmanniidae, Iran, Redescription

Introduction

According to SUBIAS catalogue (2015) the family Perlohmanniidae contains 2 genera and 10 species that are distributed in the holarctic region of the world and Australia. Genus *Perlohmannia* was proposed by HEWITT (1908) with *Lohmannia insignis* BERLESE, 1904, as type species. This genus comprises 2 subgenera: *Perlohmannia (Perlohmannia)* BERLESE, 1916, with 6 species and *Perlohmannia (Apolohmannia)* AOKI, 1960 with 3 species. *Perlohmannia (P.) dissimilis* is distributed in the Central Europe, Central West Asia, East Russia and Hawaii (LUXTON 1996, SWIFT & NORTON 1998, ARROYO et al. 2013). This species was described as *Lohmannia insignis* BERLESE var. *dissimilis* from some tulip bulbs (Manchester, England). Family Perlohmanniidae and *Perlohmannia (P.) dissimilis* were reported from Iran by AKRAMI & SABOORI (2004) for the first time; and this is the only species belonging to this family that has been reported from Iran until now. The original description of *Perlohmannia (P.) dissimilis* is incomplete; HEWITT (1908) reported it as a distinct variety of *Lohmannia insignis* BERLESE, 1904, and just noted some striking differences between these 2 taxa. GRANJEAN (1958), redescribed all instars of this species as *Perlohmannia dissimilis*, but this redescription has been written in French and using it, is thus difficult for most of the researchers. Also our specimens have some morphological differences with previous ones, so in this paper we redescribed adult, deutonymph and tritonymph instars completely.

Materials and methods

During 2013, 15 adults, 2 deutonymphs and 2 tritonymphs of *Perlohmannia* (*P. dissimilis*) were collected from Saravan (37°08.097' N, 049°39.926' E, 118.3 m above sea level), Guilan Province, Northern Iran. Soil samples were taken from different habitats like walnut [*Juglans regia* L. (Juglandaceae)], raspberry [*Rubus* spp. (Rosaceae)], ironwood [*Parrotia persica* (DC.) C.A. MEY (Hamamelidaceae)], elm [*Ulmus minor* MILL. (Ulmaceae)] and Egyptian willow [*Salix aegyptiaca* L. (Salicaceae)]. The specimens were extracted by Berlese funnel and cleared in Nesbitt's solution; then mounted in Hoyer's medium on microscopic slides. Specimens were examined and drawn by using an Olympus BX51 (Olympus Optical Co., LTD., Japan) microscope. The unit of measurement is micrometer (μm). All microscopic slides are deposited in Acarology Laboratory, Department of Plant Protection, Faculty of Agricultural Science, University of Guilan, Rasht, Iran.

Results

Family *Perlohmanniidae* GRANDJEAN, 1954

Perlohmannia (*P. dissimilis*) (HEWITT, 1908)

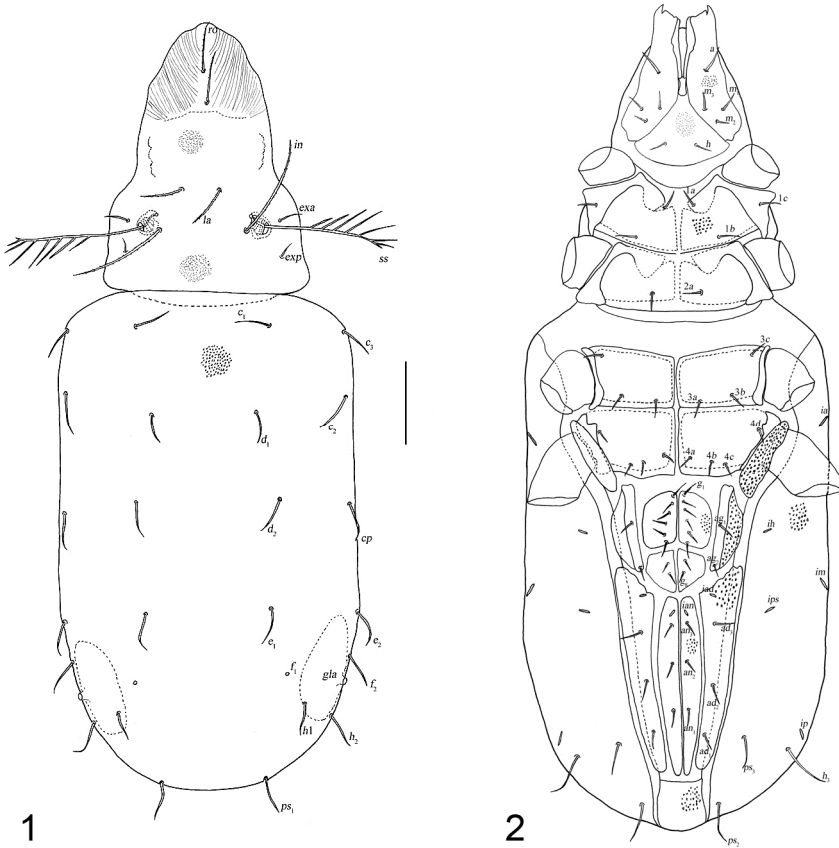
Distribution: Central Europe, central-Asia, East Asiatic Russia and Hawaii (SUBIAS 2015).

Redescription (Adult) (Figs 1-13)

Measurements and color: Body orange brown. Length of body 848-968 μm , length of prodorsum 320-352 μm , length of notogaster 560-640 μm , width of notogaster 332-412 μm (n= 5).

Prodorsum (Fig. 1): Surface of prodorsum finely punctulate, pits are small and dense. Rostral region with some strips. Rostrum rounded with convex apex. Rostral setae (*ro*) with medium length (60), arising behind each other and barbed unilaterally. Lamellar setae (*le*) a bit shorter than rostral ones (52). Interlamellar setae (*in*) are thicker than rostral and lamellar ones and more than 2 times longer than lamellar setae (118); both of these setae barbed bilaterally; all the cilia are very short. Anterior exobothridial setae (*exa*= 27) smooth. Posterior exobothridial setae (*exp*) also smooth and the shortest of prodorsal setae (21). Sensillus (*ss*) (Fig. 4) is the longest seta of body (164), setiform, with 7 lateral branches of different length. Bothridium completely distinguished.

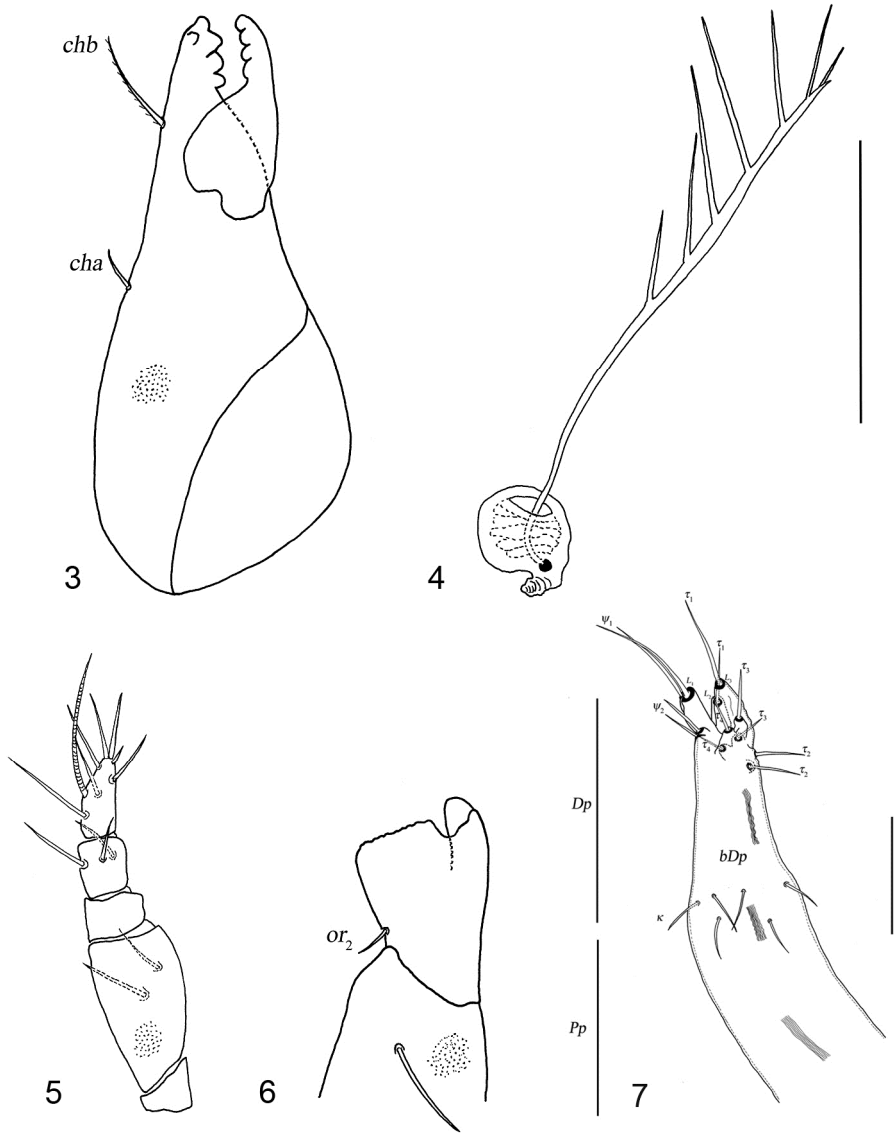
Notogaster (Fig. 1): Surface of notogaster finely punctulate, pits are larger than prodorsum. Notogaster almost oval shape, elongated, with straight anterior margin and semicircular posterior one, lateral margins are parallel. Notogaster bearing 12 pairs of setae, all setae thin, smooth and almost in the same medium length (45). Seta f_1 is assimilated and shown just with its insertion point. External opening of oil glands (*gla*) well distinguished.



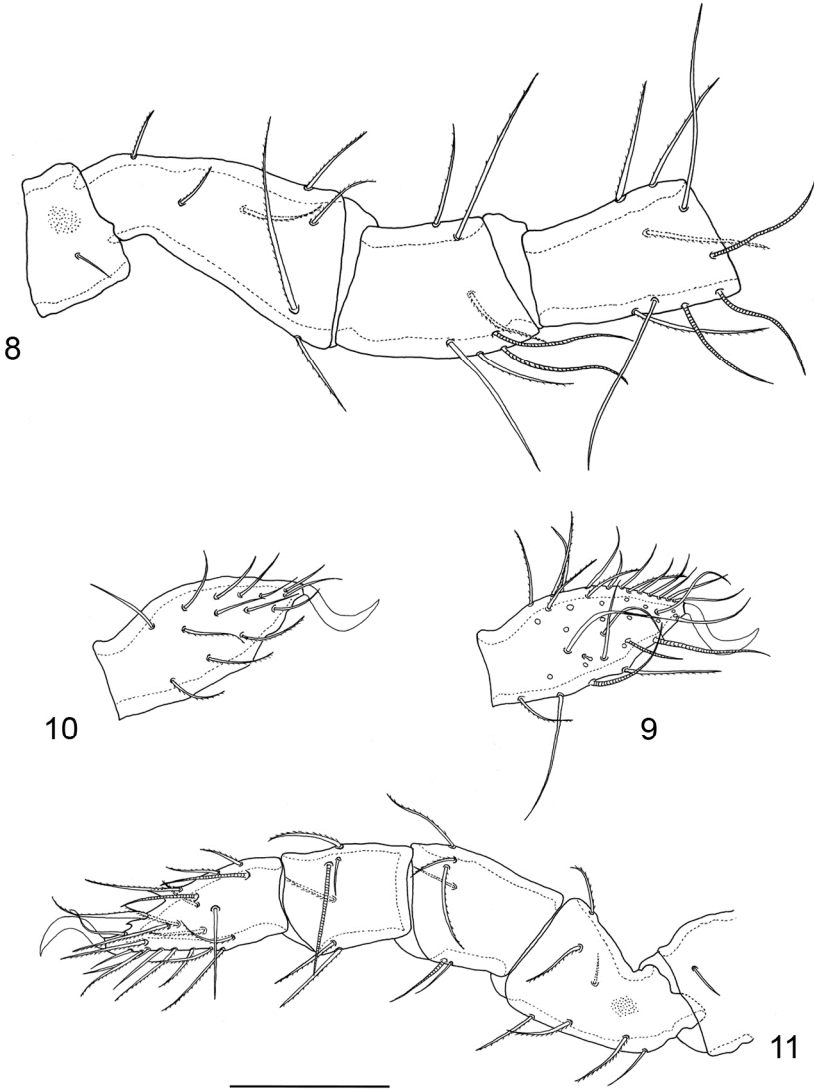
Figs 1-2: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (adult). (1). Dorsal view. (2) Ventral view. Scale bar: 100 μm .

Anogenital region (Fig. 2): Surface of anogenital plates finely punctulate. Genital plate divided transversely into 2 parts, the anterior bearing 6 pairs of genital setae (*g*) and the posterior 2 pairs, aggenital plates well distinguished having 2 pairs of setae (*ag*), all these setae thin, smooth and almost equal in length (15). Anal and adanal plates elongated, bearing 3 pairs of anal setae (*an*) and 3 pairs of adanal ones (*ad*), anal setae about as long as *g* and *ag*, but adanal setae are a bit longer (21). Also a postanal plate present. Lyrifissures *ian* and *iad* well visible. Also lyrifissures *ia*, *ih*, *im*, *ips* and *ip* on ventral region well distinguished. Setae *ps*₂, *ps*₃ and *h*₃ visible on ventral region. Surface of ventral region also finely punctulate.

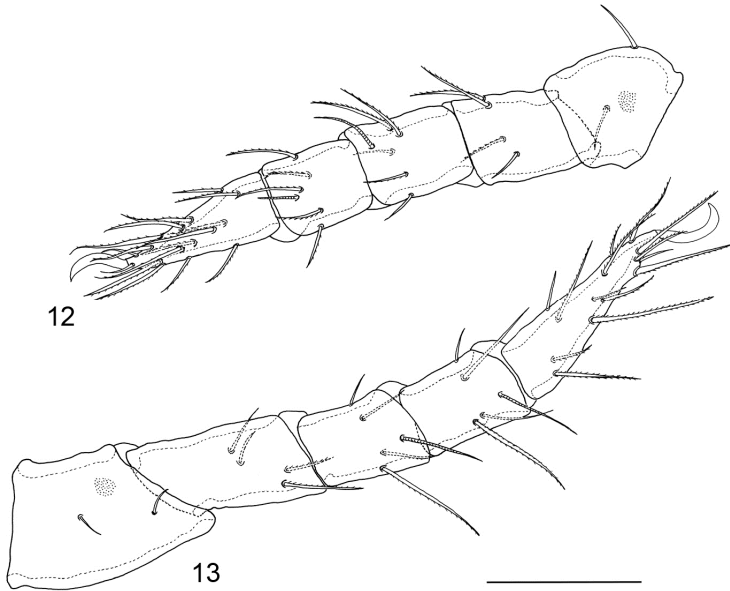
Ovipositor (Fig. 7): Length: 328-340 μm ($n=3$). In the shape of a hollow cylinder, subdivided into 2 parts: proximal (*Pp*) and distal (*Dp*), the base of the distal part (*bDp*) terminates as 3 small lobes (*L*₁, *L*₂ and *L*₃). Twelve spine like setae are present on ovipositor lobes, 4 on each lobe; lobe *L*₁ bearing 2 setae ($\psi_1=100$ and 85) on the apex and 2 setae ($\psi_2=38$ and 31) lower, lobes *L*₂ and *L*₃ (clockwise in relation to *L*₁), with a



Figs 3-7: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (adult). (3) chelicerae; (4) sensillus; (5) palp; (6) rutellum; (7) ovipositor. Scale bars: 100 μm .



Figs 8-11: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (adult). **(8)** leg 1; **(9)** tarsus of leg 1 in dorsal view; **(10)** tarsus of leg 1 in ventral view; **(11)** leg 2. Scale bar: 100 μ m.



Figs 12-13: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (adult). (12) leg 3; (13) leg 4. Scale bar: 100 μm .

single seta (τ_1) on the apex, [L_2 (46), L_3 (78)], and setae τ_{2-4} lower, [L_2 (43, 23, 24), L_3 (42, 42, 31)]. The base of the distal part of the ovipositor bearing 6 setae (κ), all setae setiform, smooth and equal in length (34). Surface of ovipositor except for smooth lobes, is covered with longitudinal sinuous folds.

Epimeral region (Fig. 2): Finely punctulate. Setal formula: 3-1-3-4, all setae thin, smooth and different in length.

Gnathosoma: Subcapitulum (Fig. 2) longer than wide, setae h , m_1 , m_2 and m_3 setiform and smooth, m_1 and m_3 as long as h , (24) but m_2 shorter (18), setae a setiform and smooth but thicker and longer than others (30). Palp's setal formula: 2-0-3-7(1) (Fig. 5), all setae setiform and smooth. Chelicerae (Fig. 3) chelate-dentate, fixed digit with 5 teeth, movable digit with 4, setae cha short (15), setiform, smooth, setae chb about 3 times longer than cha (38), thicker, and sparsely barbed unilaterally. Rutellum (Fig. 6) robust, with 2 big teeth and some small ones, setae or_2 short (11), smooth and setiform. Surface of mentum, palp, chelicerae and rutellum punctulate.

Legs (Figs 8-13): Surface of legs punctulate. Setal formula: I, 1-7-5(2)-6(3)-37(3); II, 1-7-5(1)-5(1)-20(2); III, 2-4-5(1)-5(1)-16(0); IV, 2-4-4(1)-4(1)-14(0). Some of seta barbed. All tarsi monodactylous.

Deutonymph (Figs 14-18)

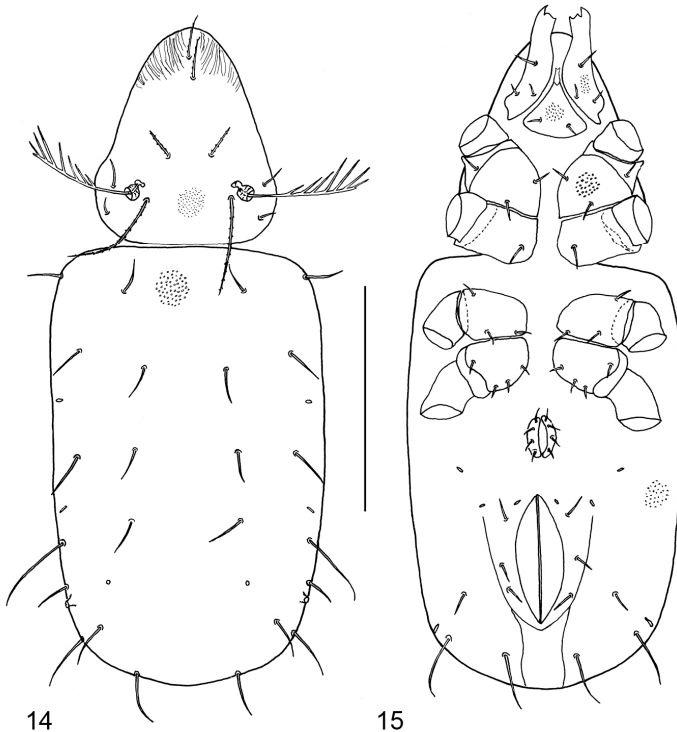
Measurements and color: Body light orange brown. Length of body 576-632 μm , length of prodorsum 192-212 μm , length of notogaster 376-440 μm , width of notogaster 240-260 μm ($n=2$).

Prodorsum (Fig. 14): Surface of prodorsum finely punctulate like adult. Rostral region with some strips. Rostrum rounded. All prodorsal setae and bothridium like adult; *ro* (36), *le* (33), *in* (87), *exa* (21), *exp* (15), *ss* (100).

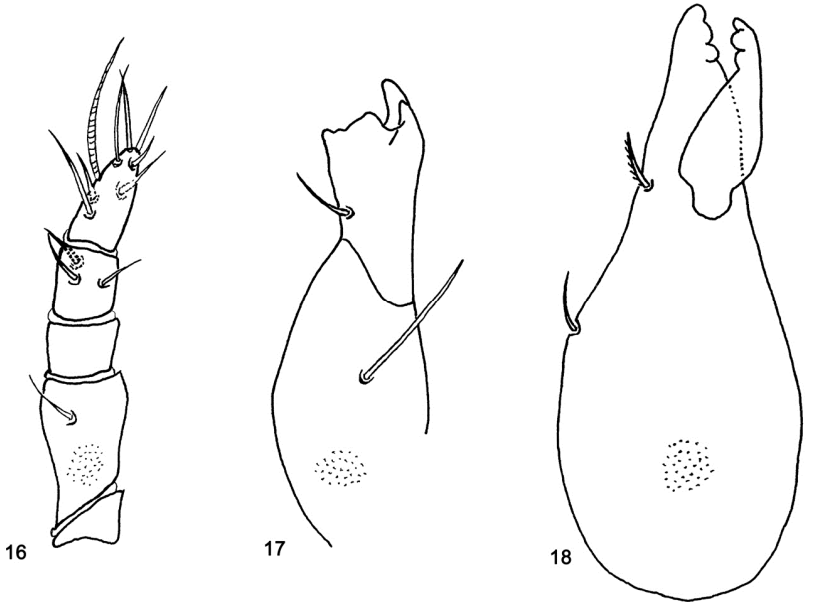
Notogaster (Fig. 14): Shape and integument of notogaster like adult. Setae with different length, setae *e*₂ (76) much longer than others. External opening of oil glands (*gla*) well distinguished. Lyrifissures *ia* and *im* well distinguished.

Anogenital region (Fig. 15): Genital plate very small, not divided transversely, bearing 4 pairs of setiform, short and smooth setae, equal in length (12). Aggenital plates and their setae not formed. Anal and adanal plates not well formed, bearing 3 pairs of smooth setiform adanal setae, longer than genital ones (18), anal setae not formed. Lyrifissures *iad* well visible. Also lyrifissures *ih*, *ips* and *ip* on ventral region well distinguished. Setae *ps*₂, *ps*₃ and *h*₃ visible on ventral region. Surface of ventral region also finely punctulate.

Epimeral region (Fig. 15): Finely punctulate. Setal formula: 3-1-3-4, all setae thin, smooth and not equal in length.



Figs 14-15: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (deutonymph). (14) dorsal view; (15) ventral view. Scale bar: 100 μ m.



Figs 16-18: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (deutonymph). (16) palp; (17) rutellum; (18) chelicerae. Scale bar: 100 μ m.

Gnathosoma: Subcapitulum (Fig. 15) longer than wide, setae *h*, *m*₁, *m*₃ (15) and *a* (21) like adult, setae *m*₂ not present. Palp's setal formula: 1-0-3-7(1) (Fig. 16), all setae setiform and smooth. Chelicerae (Fig. 18) chelate-dentate, fixed digit and movable digit both with 3 teeth, setae *cha* and *chb* with the same size (15), *cha* smooth, but *chb* sparsely barbed unilaterally. Rutellum (Fig. 17) with 2 big teeth and no small ones, setae *or*₂ short (15), smooth and setiform. Surface of mentum, palp, chelicerae and rutellum punctulate.

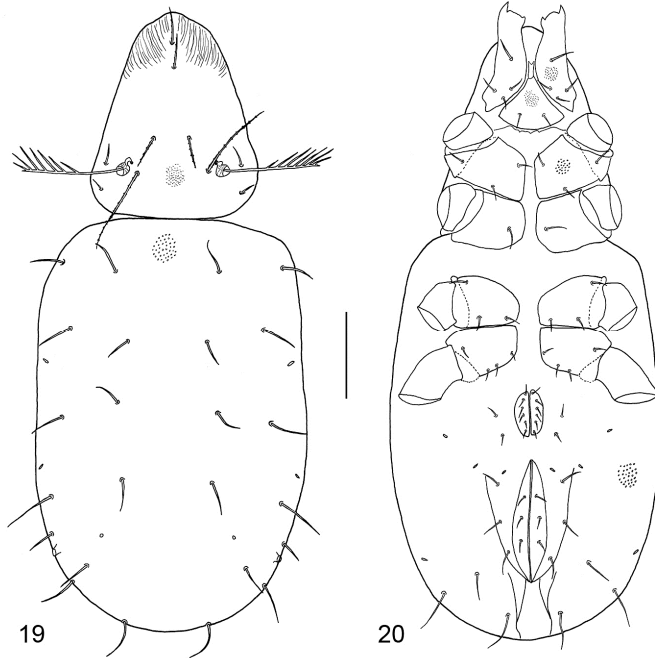
Legs: Surface of legs punctulate. Setal formula: I, 1-6-5(2)-6(2)-25(2); II, 1-6-5(1)-5(1)-15(2); III, 2-3-4(1)-3(1)-14(0); IV, 1-2-2(1)-3(1)-13(0). Some of seta barbed. All tarsi monodactylous.

Tritonymph (Figs 19-23)

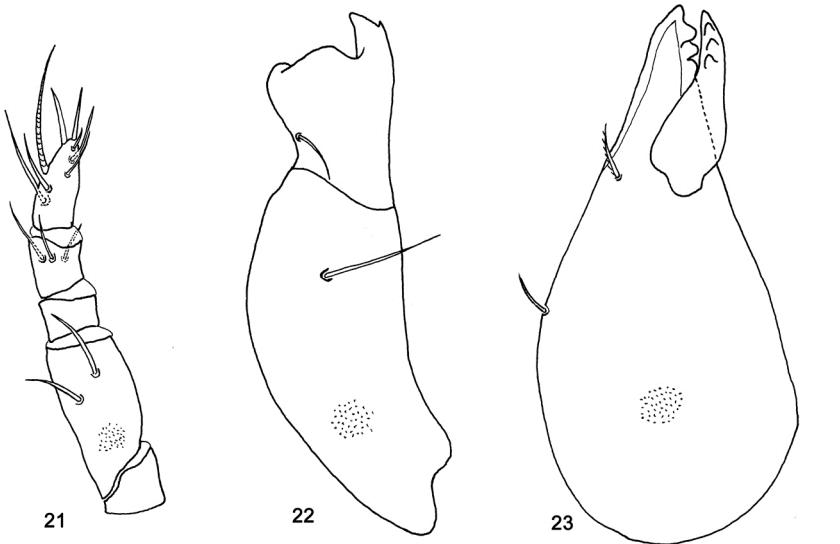
Measurements and color: Body light orange brown. Length of body 736-740 μ m, length of prodorsum 240-248 μ m, length of notogaster 504-512 μ m, width of notogaster 304-308 μ m (n= 2).

Prodorsum (Fig. 19): Surface of prodorsum finely punctulate like adult. Rostral region with some strips. Rostrum like adult, rounded with convex apex. All prodorsal setae and bothridium like adult; *ro* (42), *le* (39), *in* (97), *exa* (22), *exp* (16), *ss* (103).

Notogaster (Fig. 19): Shape and integument of notogaster like adult. Setae with different length, setae *e*₂ (54) longer than others. External opening of oil glands (*gla*) and lyrifissures *ia* and *im* well distinguished.



Figs 19-20: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (tritonymph). (19) dorsal view; (20) ventral view. Scale bar: 100 μ m.



Figs 21-23: *Perlohmannia (Perlohmannia) dissimilis* (HEWITT) (tritonymph). (21) palp; (22) rutellum; (23) chelicerae. Scale bar: 100 μ m.

Anogenital region (Fig. 20): Genital plate small, not divided transversely, bearing 6 pairs of short setae. Aggenital plates not formed. 2 pairs of aggenital setae present. Anal and adanal plates not well formed, bearing 3 pairs of anal setae and 3 pairs of adanal setae, anal, genital and aggenital setae almost with the same length (15), but adanal setae longer (21). All these setae setiform and smooth. Lyrifissures *iad* well visible. Also lyrifissures *ih*, *ips* and *ip* on ventral region well distinguished. Setae *ps*₂, *ps*₃ and *h*₃ visible on ventral region. Surface of ventral region also finely punctulate.

Epimeral region (Fig. 20): Finely punctulate. Setal formula: 3-1-3-4, all setae thin, smooth and with different length.

Gnathosoma: Subcapitulum (Fig. 20) longer than wide, setae *h* (21), *m*₁ (21), *m*₂ (15), *m*₃ (21) and *a* (27) like adult. Palp's setal formula: 2-0-3-7(1) (Fig. 21), all setae setiform and smooth. Chelicerae (Fig. 23) chelate-dentate, fixed digit and movable digit both with 4 teeth, setae *cha* and *chb* with the same size (18), *cha* smooth, but *chb* sparsely barbed unilaterally. Rutellum (Fig. 22) with 2 big teeth and no small ones, setae *or*₂ short (17), smooth and setiform. Surface of mentum, palp, chelicerae and rutellum punctulate.

Legs: Finely punctulate. Formulae of leg setation: I, 1-7-5(2)-6(2)-31(3); II, 1-7-5(1)-5(1)-18(2); III, 2-4-5(1)-5(1)-16(0); IV, 2-3-4(1)-4(1)-14(0). Some of seta barbed. All tarsi monodactylous.

Discussion

There are some differences between our specimens and those described and redescribed before: This specimen is smaller than the previous ones, average body length of 897 versus 1000 µm in HEWITT (1908) and 860-1000 µm in GRANJEAN (1958). Lamellar setae in our specimens are much longer than GRANJEAN (1958), in our ones lamellar setae are a bit shorter than rostral setae and half of the interlamellar ones or a bit shorter than half, but in GRANJEAN (1958) lamellar setae are about one third of rostral ones and one fifth of interlamellar ones. Also lamellar, interlamellar and rostral setae in our specimens are barbed, while in GRANJEAN (1958) and HEWITT (1908) they are smooth. Sensillus is much longer than interlamellar setae versus sensillus is about as long as interlamellar setae in GRANJEAN (1958). Notogasteral setae in our specimens are almost in the same length, only a bit difference is visible, but in GRANJEAN (1958) and HEWITT (1908) differences are much more visible, median setae are shorter than marginal ones.

We think these differences are not enough to make this specimen a new species or even subspecies, so we have just redescribed these specimens as a variety in *Perlohmannia dissimilis*, furthermore redescrptions of this species in English are required.

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