Genus	Vol. 3(4): 211-231	Wrocław, 15 XII 1992

Three new genera related to the genus *Syringobia* TROUESSART & NEUMANN, 1888 (*Astigmata*: *Pterolichoidea*: *Syringobiidae*)

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ABSTRACT. Quill inhabiting feather mite genus *Syringobia* TROUESSART & NEUMANN 1888 is revised and divided into four genera: *Syringobia* sensu nov., *Eurysyringobia* gen.nov., *Longipedia* gen.nov. and *Megasyringobia* gen.nov. Generic diagnoses and key to genera are given.

Twelve species of the genus *Syringobia* have been described till now. Three of them, i.e. *Syringobia calidris* OUDEMANS 1904 from *Tringa totanus*, *S.totani* OUDEMANS 1904 from *Tringa totanus* and *S.tringae* VITZTHUM 1922 from *Calidris minuta*, were based on nymphal stages only. The descriptions did not allow a univocal statement (nymphs of new or described species). Besides the list of hosts cited by OUDEMANS is doubtful, because this author used name *Totanus calidris* (=*Tringa totanus*) for many waders of the genera *Tringa* and *Calidris*. Probably these three species are *nomina nuda* and will be not taken into consideration in the present paper.

Among other "good" species of the genus *Syringobia* four groups can be distinguished. Six species, closely related to the type species *Syringobia chelopus* TROUESSART & NEUMANN 1888 form a homogenous group, which differs from the remaining three species. In turn these three species differ strongly among themselves and from the above group of six species. The division of the genus *Syringobia* into four groups has got an additional support from the analysis of phylogenetic relationships between hosts of these quill mites (DABERT, 1991).

The greatest part of the material for study was acquired by field collecting and examining of bird skins in museums in Poland and Germany. Additional specimens were loaned from the U.S.A. and Russia.

I would like to express my appreciation to Prof. Warren T. ATYEO, University of Georgia, and Dr. Sergej V. MIRONOV, Zoological Institute, Sanct-Petersburg who made

their collections, including type species and unstudied specimens, available for my study.

In the present paper the genus *Syringobia* is divided into the following genera:

1. *Syringobia* TROUESSART & NEUMANN 1888
2. *Eurysyringobia* **gen.nov.**
3. *Longipedia* **gen.nov.**
4. *Megasyringobia* **gen.nov.**

These closely related genera are characterized by several common characters (males): lack of opisthosomal lobes or lobes very small, without membranes; antero-medial part of propodosomal shield well separated from the other part of shield (also in females); tendency to hypertrophy of fourth pair of legs, third pair not hypertrophied; big paragenital apodemes (fused or not) lying laterally to aedeagus; adanal apodemes absent; tarsi IV with big apico-ventral or apical spine, other segments of legs III, IV and sometimes I and II with various apophyses; setae ps1 and all terminal setae piliform, setae f and d on tarsi IV are microchaetae.

All the common features of females are similar to those of other syringobiid females: idiosoma cylindrical, elongated (long/width=2.5-3.5); terminal end of opisthosoma rounded without terminal cleft; epigynum well developed, arched or horseshoe-shaped.

Syringobia TROUESSART & NEUMANN 1888

Type species: *Syringobia chelopus* TROUESSART & NEUMANN 1888.

The following species inhabiting feather quills of Tattlers (*Scolopacidae*; *Tringini*) are included in this genus:

1. *Syringobia chelopus* TROUESSART & NEUMANN 1888 from *Tringa totanus*, *Cataptrophorus semipalmatus* (new record).
2. *Syringobia calcarata* OUDEMANS 1904 from *Tringa erythropus*.
3. *Syringobia longipenis* VASJUKOVA & MIRONOV 1986 from *Tringa glareola*.
4. *Syringobia parachelopus* VASJUKOVA & MIRONOV 1986 from *Tringa nebularia*.
5. *Syringobia simillima* VASJUKOVA & MIRONOV 1986 from *Tringa stagnatilis*, *Tr.flavipes* (new record).
6. *Syringobia uncitibia* VASJUKOVA & MIRONOV 1991 from *Heteroscelus* (=*Tringa*) *incanus*.

GENUS DIAGNOSIS:

MALE (figs. 1, 2) - Medium-sized mites: length of idiosoma 420 μm (*S.longipenis*) to 540 μm (*S.chelopus*), width of idiosoma 140 μm (*S.longipenis*) to 180 μm (*S.chelopus*). Idiosoma elongated (l/w=3.0), cylindrical without opisthosomal lobes or lobes very small, separated by shallow terminal cleft. Hysterosoma constricted at the level of legs IV. Terminal margin of propodosomal shield divided into three lobes by shallow incisions. Antero-medial part of propodosomal shield rectangular or trapeziform. Scapular and humeral (as a rule) shields reduced. Propodosomal coxal fields covered almost completely by cuticular shields; near sternum more or less reduced. Between

coxal fields III a pair of rod-shaped, parallel sclerites; sometimes sclerites secondarily divided into four parts or greatly reduced. Paragenital apodemes fused anterad to the base of aedeagus. Adanal discs small (diameter about 20 μm) with some small knobs on the margins. Fourth pair of legs larger than the other pairs (strongly hypertrophied as a rule) with 1-3 spines; 0-1 ventral on femora, 0-1 ventral on genua, 1 apico-ventral on tarsi. Tarsi I and II without apico-ventral spines. Ventral surface of tibiae III between setae kT and distal end of podomer softly serrate (except *Syringobia uncitibia*). Setae cG on genua I and II piliform or needle-shaped.

FEMALE (figs. 3, 4) - larger than male: length of idiosoma 500 μm (*S. longipenis*) to 620 μm (*S. chelopus*), width 160 μm (*S. longipenis*) to 220 μm (*S. chelopus*). Idiosoma elongated (l/w = 2.8, *S. chelopus*) to very elongated (l/w = 3.5, *S. simillima*), cylindrical with regularly rounded terminus, without terminal cleft. Terminal margin of propodosomal shield divided into three lobes by shallow incisions. Scapular and humeral shields reduced. Soft lateral sclerites do not fuse with hysterosomal shield. Epigynum horseshoe-shaped, elongated antero-terminally, with sharp ends of arms. Shields of coxal fields I form narrow sclerites at the base of trochanters. At least one of setae c2, d2, e2 long and thick. Setae e1 set on the level of or posteriad to setae e2. Setae f2 lanceolate. Setae c2 and e2 set outside the hysterosomal shield. On the ventro-terminal part of opisthosoma one pair of longer setae (ad3). Setae cG on genua I and II piliform.

Eurysyringobia gen.nov.

Type species: *Syringobia spinigera* Vasjukova & Mironov 1986.

The genus comprises two species from the Calidrine Sandpipers (*Scolopacidae*; *Calidridini*): *Eurysyringobia spinigera* (Vasjukova & Mironov 1986) from *Calidris ferruginea* and one undescribed species from *Calidris mauri*.

Genus diagnosis:

MALE (fig. 5) - Mites as long as the smallest species of *Syringobia* (*S. longipenis*) but much broader: length of idiosoma 405 (380-450) μm, width of idiosoma 165 (140-190) μm, l/w = 2.5. Hysterosoma narrowed gradually or terminally at the level of legs IV. Propodosomal shield divided transversely into two parts. Antero-medial part of propodosomal shield triangular or trapeziform. Scapular shields narrow or absent; humeral shields absent. Shields of propodosomal coxal fields not fused; distal end of sternum with triangular shield. Medial sclerites between coxal field III absent. Paragenital apodemes free. Adanal discs very small (diameter < 10 μm) with smooth margins. Fourth pair of legs unusually hypertrophied with 3-4 spines; 0-1 lateral on trochanters, 1 ventral on femora, 1 ventral on genua and 1 apical on tarsi. Ventral surface of tibiae III-IV between setae kT and distal end of podomer smooth. Tarsi I-II without apico-ventral spines. Setae cG on genua I and II y-shaped, thin.

FEMALE (fig. 6.) (only female of *E. spinigera* is known) - larger than male: length of idiosoma 490 (440-520) μm, width of idiosoma 170 (140-180) μm. Idiosoma elongated (l/w = 2.9), cylindrical with regularly rounded terminus, without terminal

cleft. Terminal margin of propodosomal shield divided into three lobes by shallow incisions. Scapular and humeral shields absent. Lateral sclerites absent. Epigynum horseshoe-shaped, length/width 1. Shields of propodosomal coxal fields not fused; distal end of sternum with triangular shield. Setae e1 set anterad to the level of setae e2. All setae c2, d2, e2 short, not longer than 1/2 idiosoma width. Setae f2 lanceolate. Setae c2 and e2 set outside the hysterosomal shield. Ventro-terminal part of opisthosoma with two pairs of longer setae (ps2 i ad3). Setae cG on genua I and II y-shaped, thin.

Longipedia gen.nov.

Type species: *Syringobia tricalcarata* TROUESSART & NEUMANN 1888.

Genus with two species from Plovers (*Charadriidae*; *Charadriinae*): *Longipedia tricalcarata* (TROUESSART & NEUMANN 1888) from *Charadrius dubius* and one undescribed species from *Charadrius melanops*.

GENUS DIAGNOSIS:

MALE (figs. 7, 8) - Mites as big as the largest species of *Syringobia* (*S.chelopus*): length of idiosoma 550 (540-570) μm, width of idiosoma 210 (200-220) μm, l/w=2.7. The whole hysterosoma becomes gradually narrower to the terminus. Antero-medial part of propodosomal shield rectangular or trapeziform. Posterior corners of propodosomal shield form rounded "ears". Triangular scapular shields present, humeral shields absent. Coxal fields I covered completely by cuticular shields; shields of coxal fields II form rings open at the bases of legs. Medial sclerites on coxal fields III absent. Paragenital apodemes free. Adanal discs small (diameter 10-15 μm) with some small knobs on the margins. Third pair of legs thin and long; posterad reaching at least as far as legs IV. Fourth pair of legs hypertrophied with 3 spines; 2 ventral on femora, 1 apico-dorsal on tarsi. Tarsi I-II with double apico-ventral spines. Ventral surface of tibiae III-IV between setae kT and distal end of podomer smooth. Setae cG on genua I lanceolate, on genua II awl-shaped.

FEMALE (figs. 9, 10) - larger than male: length of idiosoma 630 μm, width of idiosoma 220 μm. Idiosoma elongated (l/w=2.9), cylindrical with regular rounded terminus, with small or without terminal cleft. Terminal margin of propodosomal shield $\pm$ straight. Scapular shields strongly reduced or absent; humeral shields absent. Lateral sclerites rudimental, not fused with hysterosomal shield, or absent. Shields of coxal fields I either completely fused or strongly reduced; on the coxal fields II shields not fused. Striae on the ventral idiosoma lie in antero-terminal direction. Epigynum arched, with medial process on concave margin shorter than broad. Setae e1 set anterad to the level of setae e2. Setae c2 short, d2 and e2 longer. Setae f2 piliform. Setae c2 and e2 set outside the hysterosomal shield. Ventro-terminal part of opisthosoma with one pair of longer setae (ad3). Setae cG on genua I lanceolate, on genua II awl-shaped.

Megasyringobia gen.nov.

Type species: *Syringobia calceata* TROUESSART 1898.

The genus includes two species from Tattlers (*Scolopacidae*; *Tringini*): *Megasyringobia calceata* (TROUESSART 1898) from *Tringa ochropus* and one undescribed species from *Tringa solitaria*.

GENUS DIAGNOSIS:

MALE (figs. 11, 12) - Idiosoma large: length 740 (630 [homomorphic male] to 880 [heteromorphic male]) μm, width 260 (230-310) μm, l/w=2.8, gradually narrowed to the terminus. Terminal margin of propodosomal shield straight or variously incised. Antero-medial part of propodosomal shield rectangular or trapeziform. Scapular shields present or absent, humeral shields present. Propodosomal coxal fields covered almost completely by cuticular shields. Big medial sclerites on the coxal fields III present; their anterior ends may connect with shields of coxal fields III. Paragenital apodemes not fused; their posterior ends may be connected with opisthoventral sclerites. Adanal discs small (diameter 15 μm) with several small knobs on the margins. The length of all legs ± the same; legs I and IV slightly longer than legs II and III. Fourth pair of legs may be hypertrophied; with 1 apico-ventral spine on tarsi. Tarsi I-II with 2-4 apico-ventral and ventral apophyses. Ventral surface of tibiae III between setae kT and distal end of podomer with tongue-shaped apophyses or softly serrate; tibiae IV with tongue-shaped apophyses or smooth. Setae cG on genua I and II thick, square, slightly forked at the top.

FEMALE (figs. 13, 14) - not larger than male: length of idiosoma 670 (640-700) μm, width of idiosoma 250 (230-260) μm. Idiosoma slightly elongated (l/w=2.7), cylindrical with regularly rounded terminus, without terminal cleft. Propodosomal shield completely covers dorsal propodosoma; terminal margin of shield straight or divided into three lobes by shallow incisions. Scapular and humeral shields absent. Lateral sclerites well developed or strongly reduced, fused terminally with hysterosomal shield. Epigynum horseshoe-shaped; length/width 1. Shields of coxal fields I completely fused; on the coxal fields II shields not fused. Setae e1 set posterad to or on the level of setae e2. Setae c2 and sometimes e2 set outside the hysterosomal shield. Setae f2 lanceolate or longer, macrochaetae. Ventro-terminal part of opisthosoma with two pairs of longer setae (ps2 and ad3). Setae cG on genua I and II thick, square, slightly forked at the top.

DIFFERENTIAL DIAGNOSIS:

Both sexes of *Syringobia* differ from the other three genera in having piliform or needle-shaped setae cG on genua I-II. Males have fused paragenital apodemes; these apodemes are free in the other genera. Terminal edge of male propodosomal shield is divided into three lobes by shallow incisions; in the remaining genera this margin of shield is straight or of different shape. Between coxal fields III a pair of rod-shaped, parallel sclerites; similar but much bigger sclerites are present in *Megasyringobia*.

The genus *Eurysyringobia* is characterized by the presence of y-shaped, thin setae cG on genua. Contrary to the other genera, males of *Eurysyringobia* have propodosomal shield divided transversely in two parts. Shields of propodosomal coxal fields are more reduced than in the other genera. Adanal discs very small, with smooth margins (like in *Plutarchusia* and *Leptosyringobia*). Fourth pair of legs is the most hypertrophied among the described genera with, apart from other spines, a unique big apophyse on genua. Females have the shortest lateral setae in the group, shorter than 1/2 opisthosoma width.

The most characteristic feature of males of the genus *Longipedia* is the length of third pair of legs and double apophyse on femora IV. Females have piliform setae f2, unlike most genera of *Syringobiinae* (f2 dilated or lanceolate). Epigynum of females in the described group is most often horseshoe-shaped with sharp ends, but in *Longipedia* it is arched, with rounded ends and medial process on concave margin. Coxal fields of propodosoma are more sclerotized than in *Syringobia* and *Eurysyringobia* but weaker than in *Megasyringobia*.

Genus *Megasyringobia* is phylogenetically closest to the genus *Syringobia* (DABERT, 1991). It differs from *Syringobia* in larger body size and not fused paragenital apodemes. Contrary to *Syringobia* and *Eurysyringobia*, it has 2- 4 small ventral and apico-ventral spines on tarsi I-II. Apart of tarsal spine, legs IV without spines; in the other genera at least with one (*Syringobia uncitibia*) other apophyse on these legs. Females have the strongest sclerotization of propodosomal coxal fields in the whole group.

KEY TO THE GENERA OF *SYRINGOBIA* S.L. GROUP

1. Genua IV of male with large, obtuse ventro-proximal apophyse; propodosomal shield divided transversely in two parts. Setae cG on genua I and II of female thin, y-shaped; all setae c2, d2, e2 shorter than 1/2 idiosoma width ..... *Eurysyringobia*
-. Genua IV of male without apophyses; propodosomal shield not divided in two parts. Setae cG of female not y-shaped, often dilated; at least one of setae c2, d2, e2 as long or longer than idiosoma width.....2.
2. Males with 2 ventral apophyses on femora IV; legs III thin and reach posterad at least as far as legs IV. Setae f2 of female hair-like; epigynum arched, flat with small medial protrusion on concave margin..... *Longipedia*
-. Males with at most 1 ventral apophyse on femora IV; legs III do not reach as far posterad as legs IV. Setae f2 of females dilated; epigynum horseshoe-shaped.....3.
3. Tarsi I and II of males with 2-4 small ventral and ventro-apical spines; paragenital sclerites free. Coxal fields I of female completely covered by cuticular shield; setae cG dilated, slightly forked at the top..... *Megasyringobia*
-. Tarsi I and II of males at most with 1 small ventro-apical spine; paragenital sclerites fused at the base of aedeagus. Coxal fields I of female with small shields at the bases of legs; setae cG hairlike or needle-shaped..... *Syringobia*

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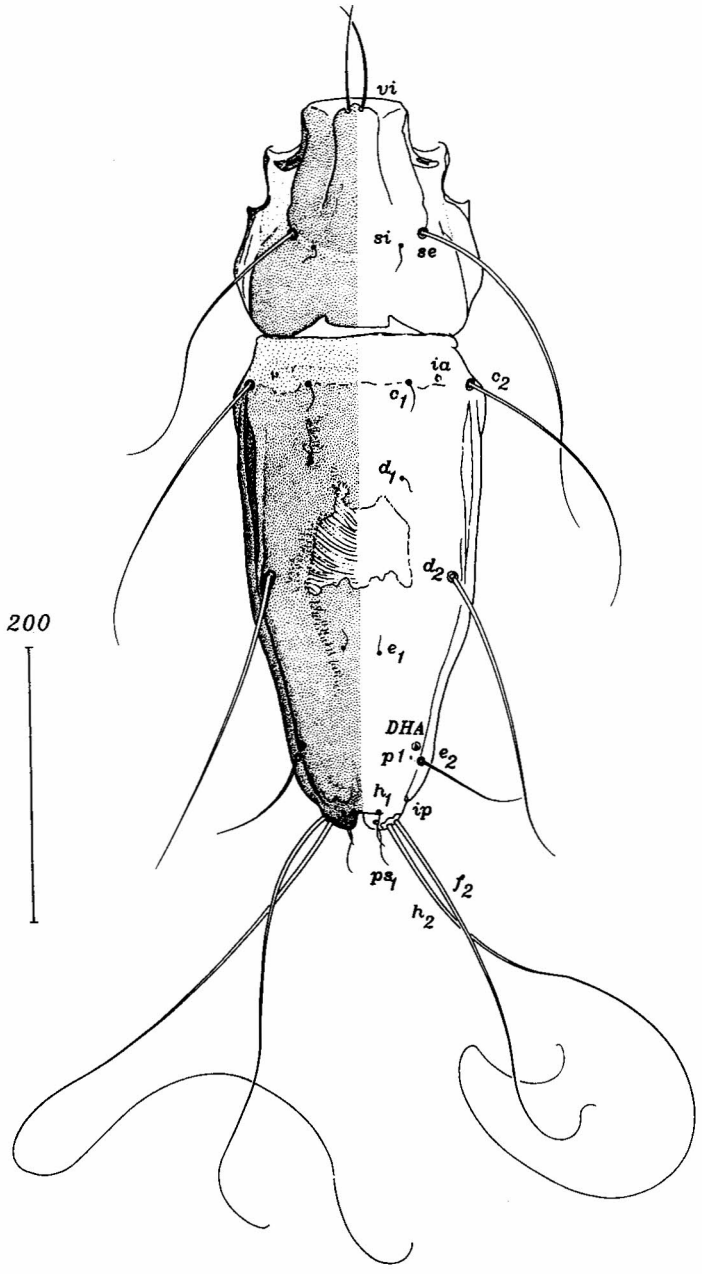
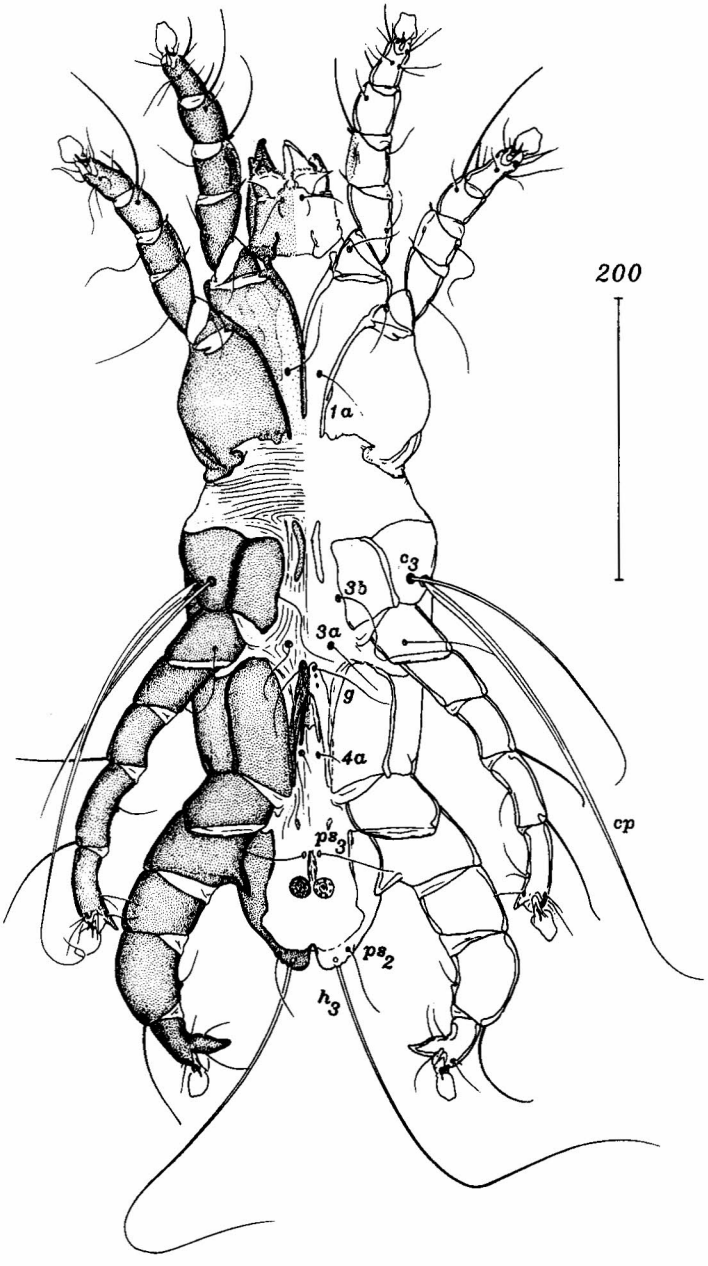
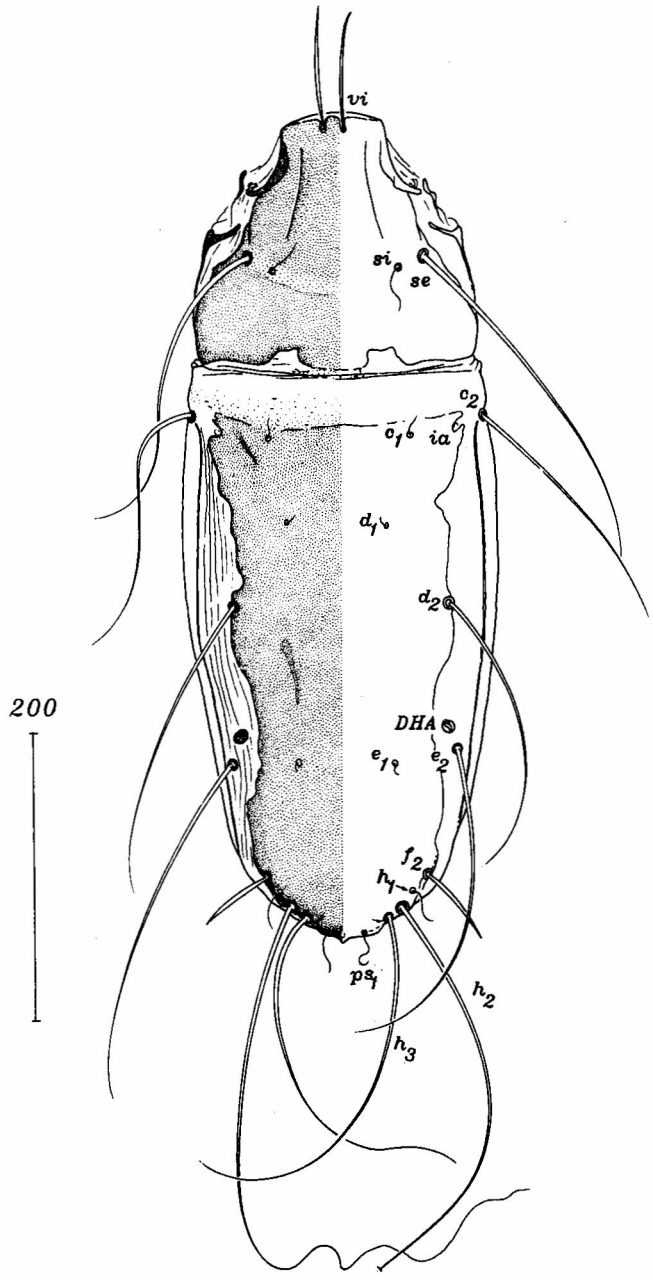


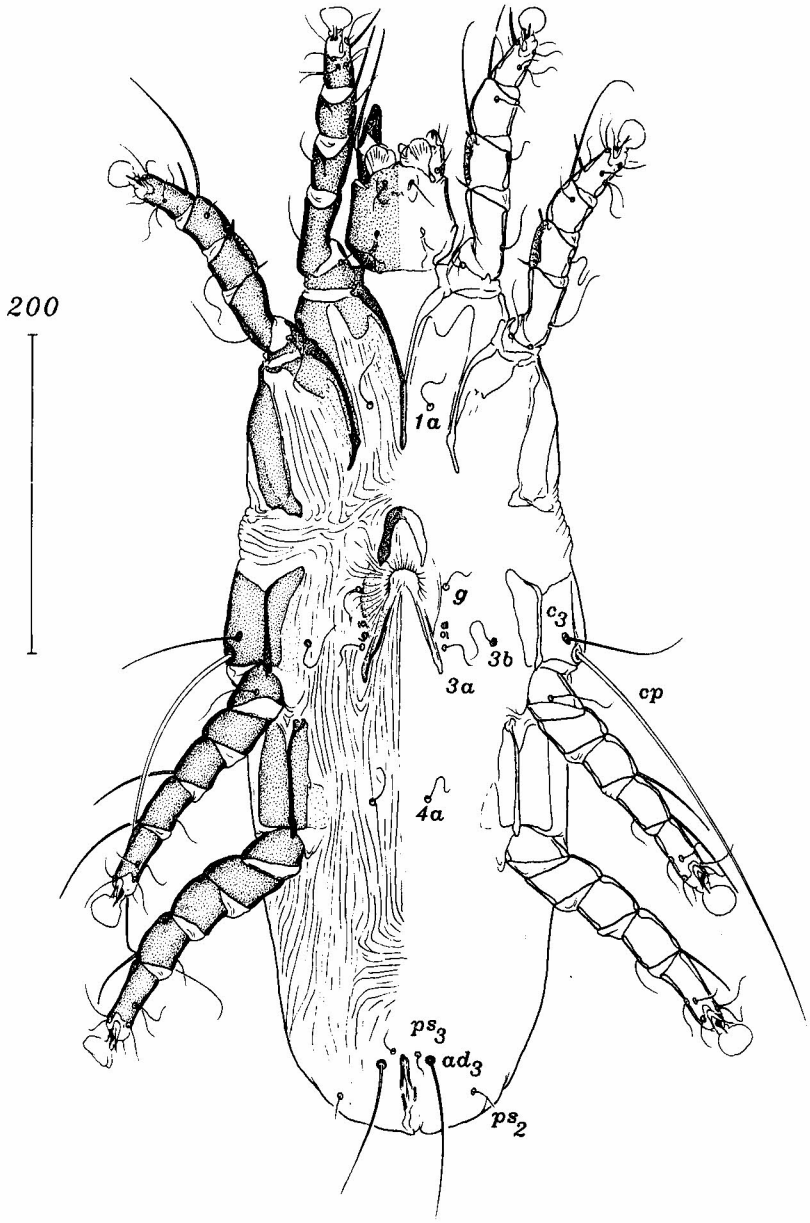
1. *Syringobia chelopus* Trouessart & Neumann, 1888: male, dorsal aspect. Designations of setae after Griffits et al. (1990)



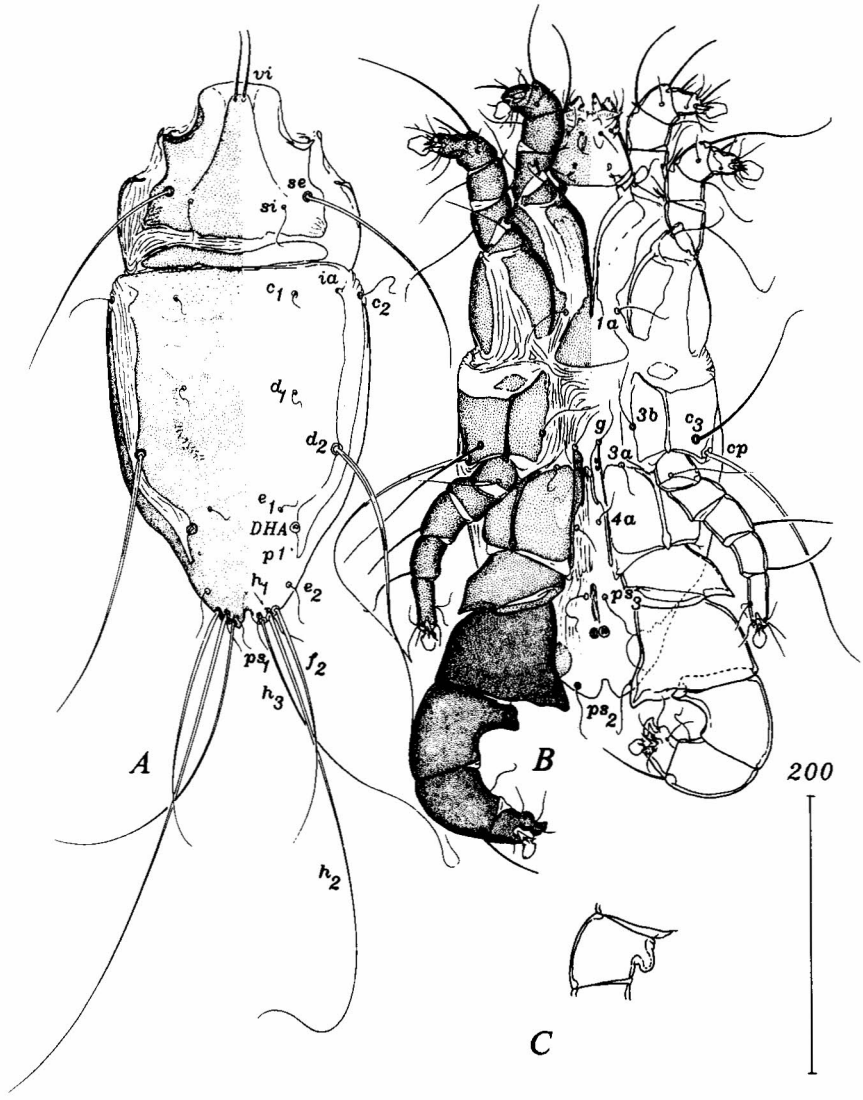
2. *Syringobia chelopus* TROUESSART & NEUMANN, 1888: male, ventral aspect



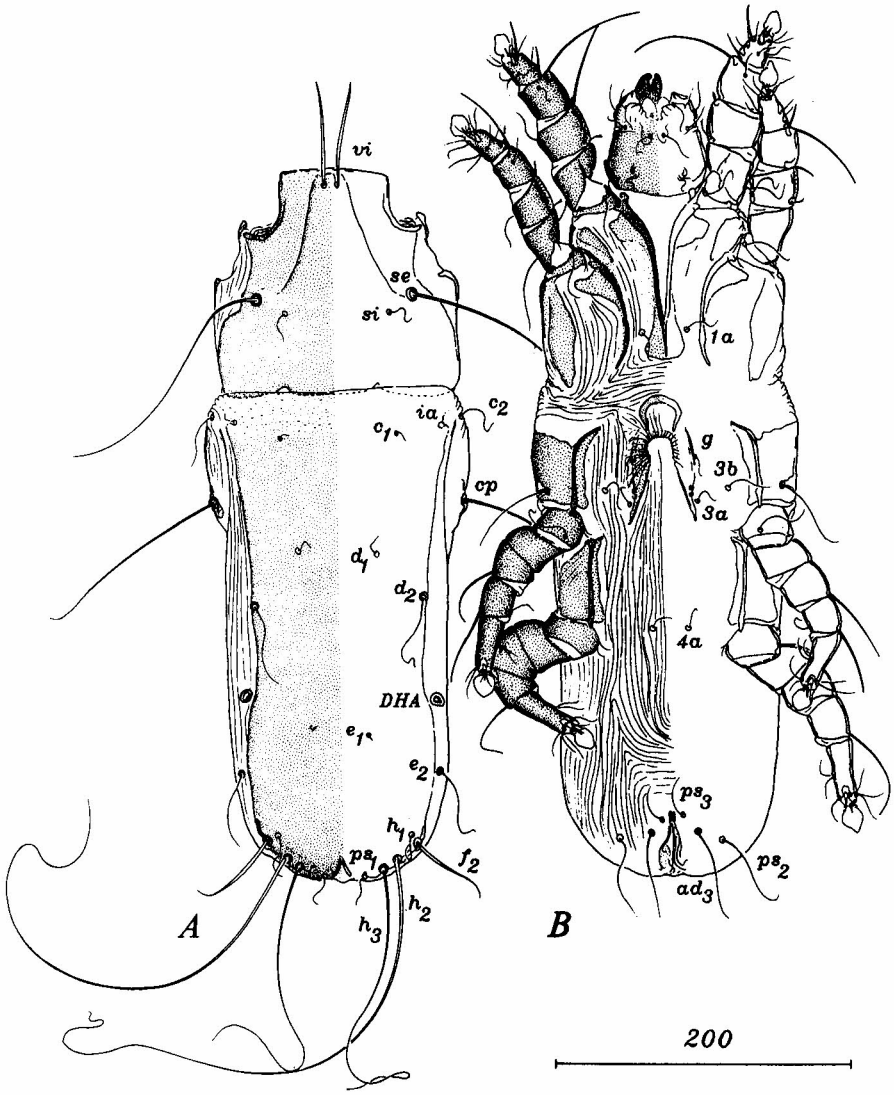
3. *Syringobia chelopus* TROUESSART & NEUMANN, 1888: female, dorsal aspect



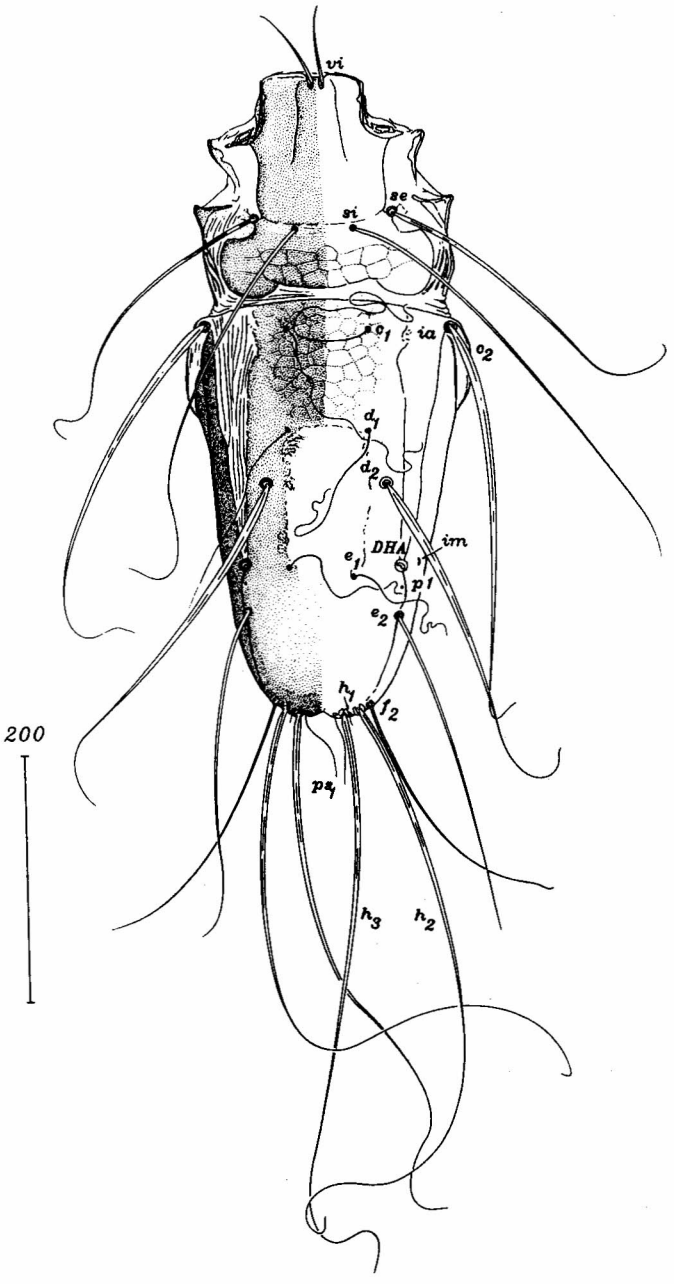
4. *Syringobia chelopus* TROUESSART & NEUMANN, 1888: female, ventral aspect



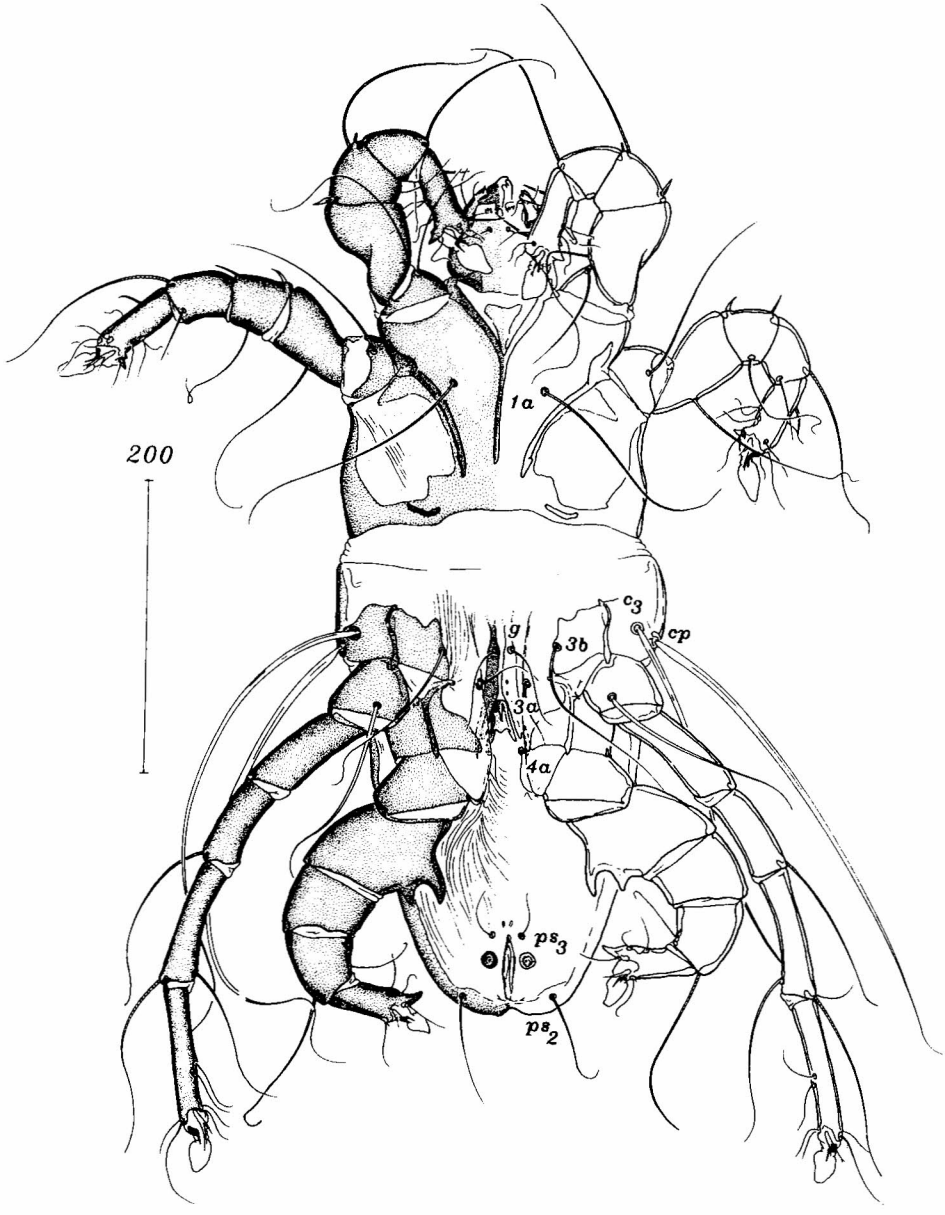
5. *Eurysyringobia spinigera* Vasjukova & Mironov, 1986: male; A - dorsal, B - ventral, C - genu IV of homomorphic male



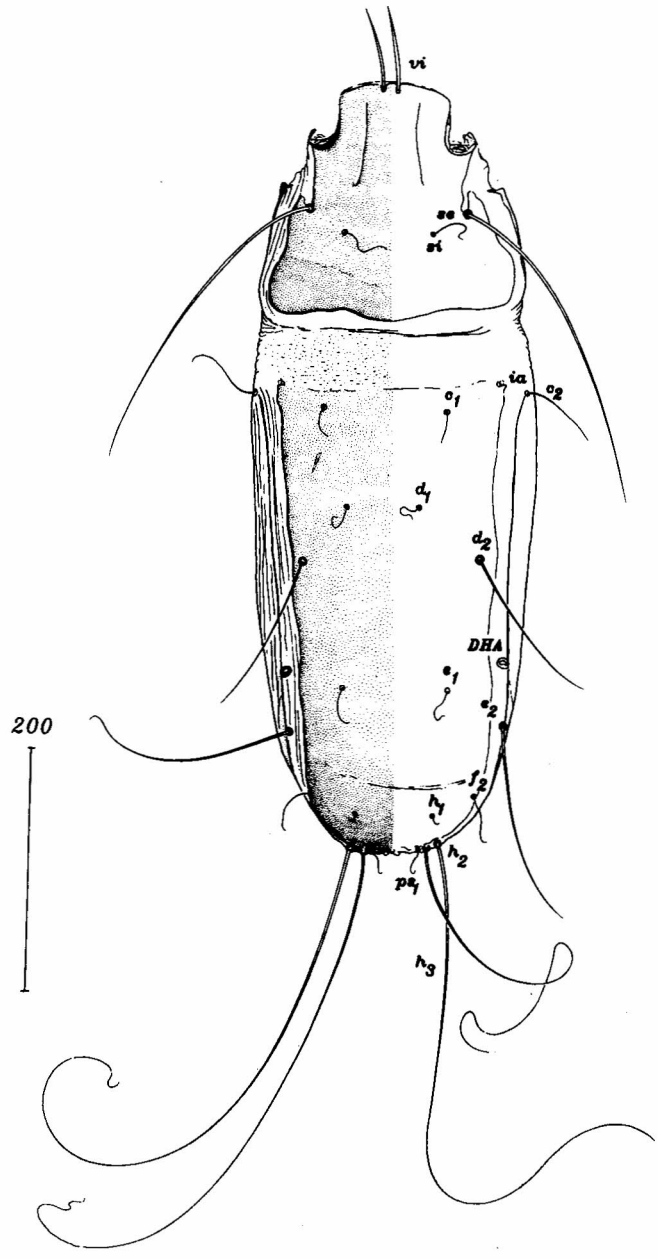
6. *Eurysyringobia spinigera* VASJUKOVA & MIRONOV, 1986: female; A - dorsal, B - ventral



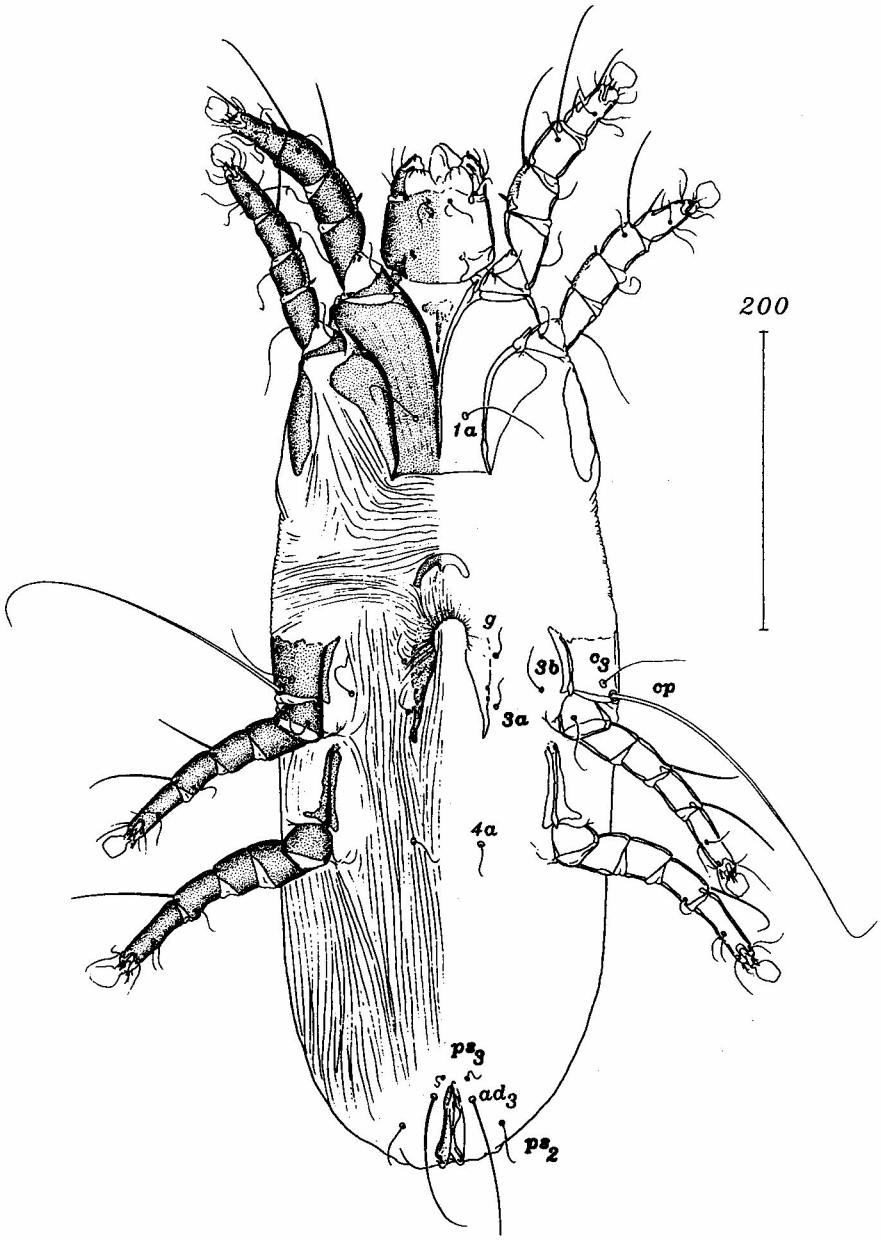
7. *Longipedia tricalcarata* TROUESSART & NEUMANN, 1888: male, dorsal aspect



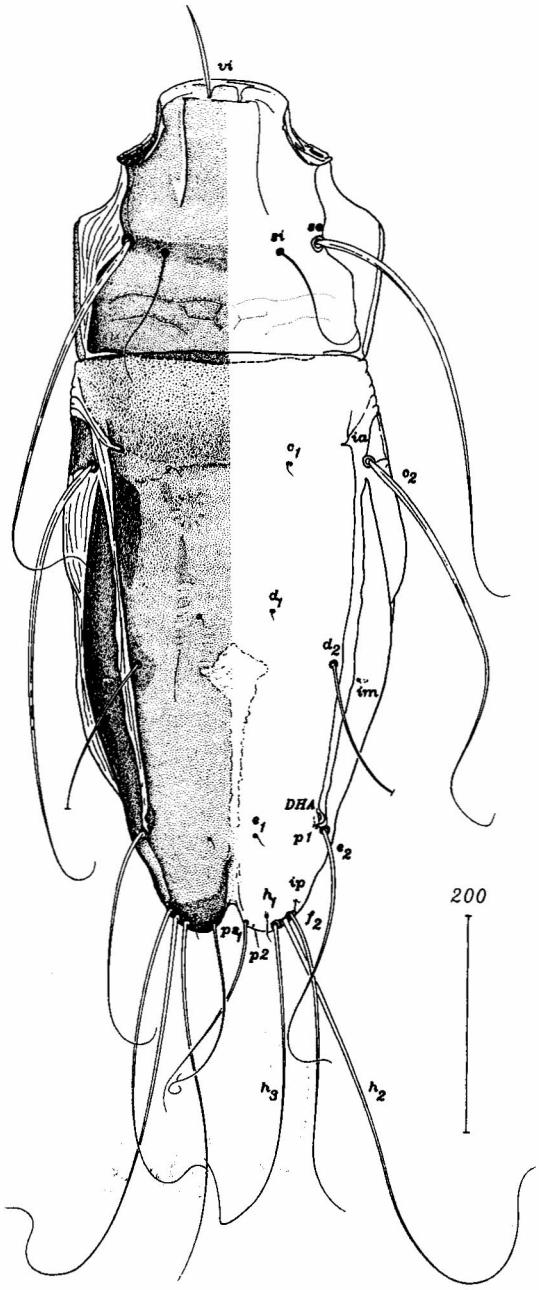
8. *Longipedia tricalcarata* TROUESSART & NEUMANN, 1888: male, ventral aspect



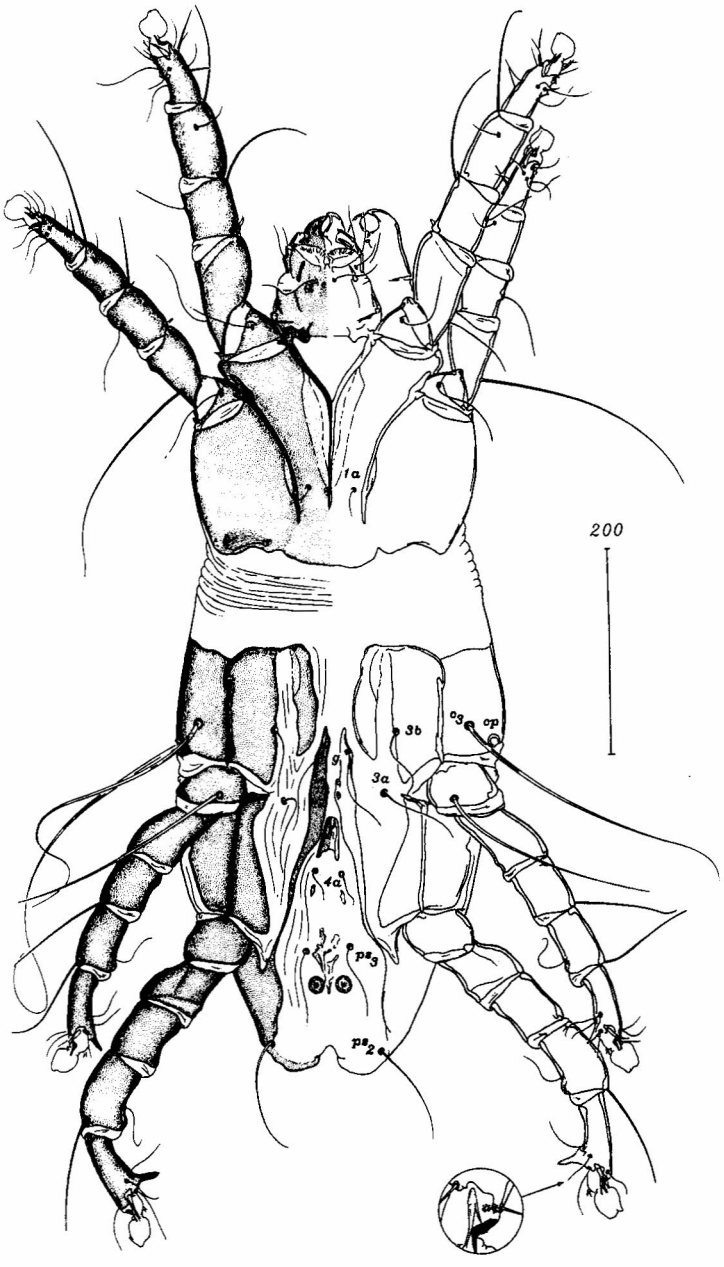
9. *Longipedia tricalcarata* Trouessart & Neumann, 1888: female, dorsal aspect



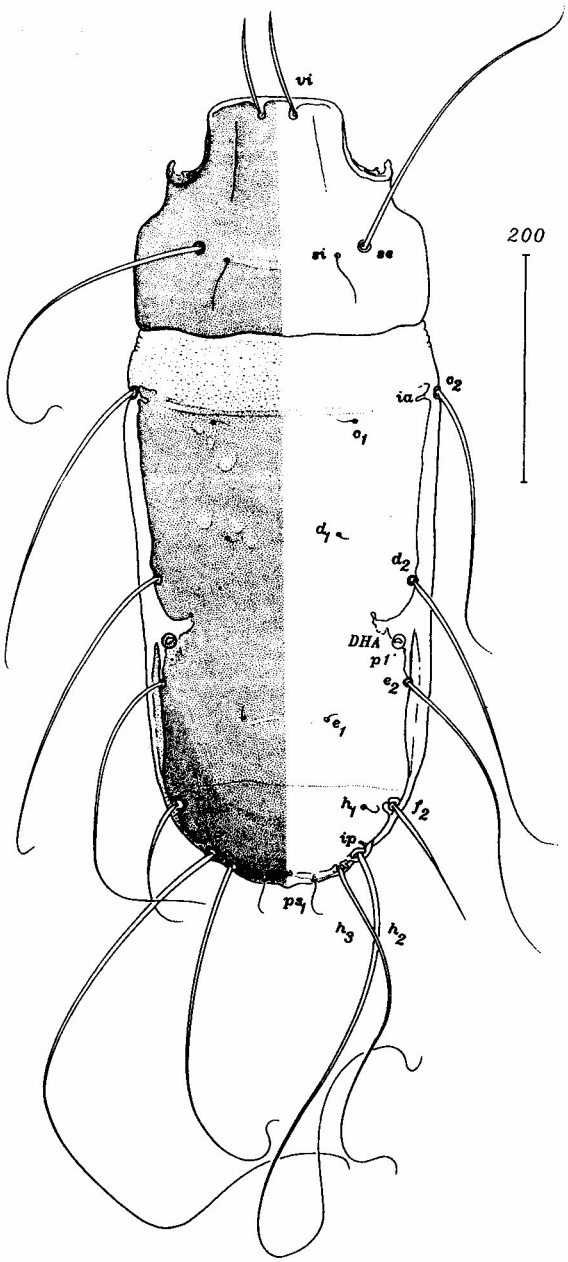
10. *Longipedia tricalcarata* TROUESSART & NEUMANN, 1888: female, ventral aspect



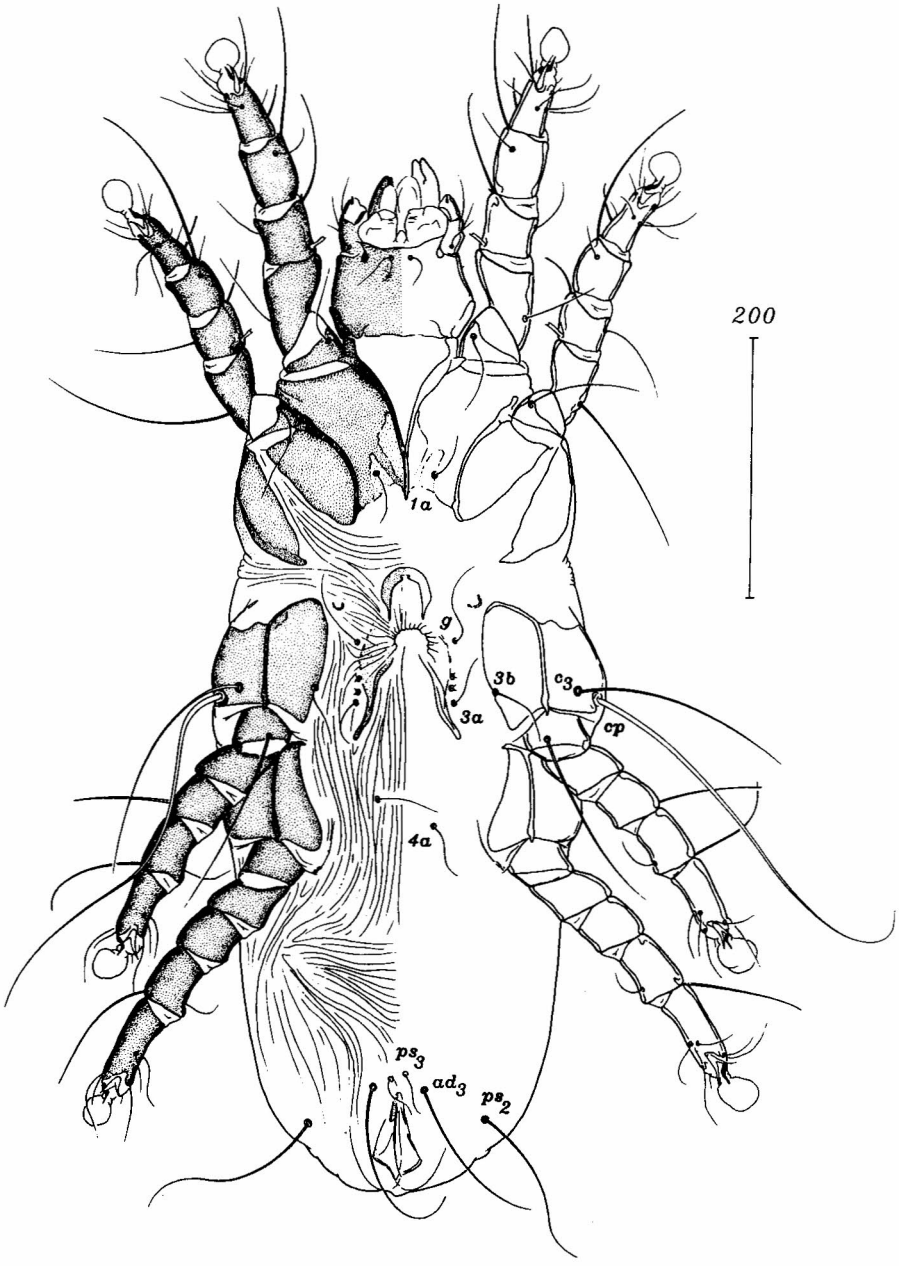
11. *Megasyringobia calceata* TROUESSART & NEUMANN, 1888: male, dorsal aspect



12. *Megasyringobia calceata* TROUESSART & NEUMANN, 1888: male, ventral aspect



13. *Megasyringobia calceata* TROUESSART & NEUMANN, 1888: female, dorsal aspect



14. *Megasyringobia calceata* TROUESSART & NEUMANN, 1888: female, ventral aspect