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### Pentatrichosiphum (Sternorrhyncha: Aphididae), a generic account with the description of a new species from Hainan, China

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## ***Pentatrichosiphum* (Sternorrhyncha: Aphididae), a generic account with the description of a new species from Hainan, China**

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### **Abstract**

The aphid genus *Pentatrichosiphum* Basu, 1969 is reviewed. *Pentatrichosiphum longirostrum* n. sp. from Lauraceae in Hainan, China is described. *Pentatrichosiphum luteum* Basu, 1969 is recorded for the first time from China, the first record of this genus. Some hitherto unknown morphs of *P. luteum* are described. The genus is redefined and keys to the four known species worldwide are also provided. The taxonomic status of *Pentatrichosiphum* is discussed based on morphological characters. Type specimens are deposited in the Zoological Museum, Institute of Zoology, Chinese Academy of Sciences, Beijing, China (ZMCAS).

**Keywords:** *Aphididae*, *China*, *Greenideinae*, *Greenideoida*, *key*, *new record*, *new species*, *Pentatrichosiphum*.

### **Introduction**

*Pentatrichosiphum* was erected for *Pentatrichosiphum luteum* from India by Basu in 1969. Later, the genus was transferred to the genus *Greenideoida* van der Goot as a subgenus by Raychaudhuri and Chatterjee (1980). Most workers have accepted and followed this action (Ghosh and Agarwala 1993; Remaudière and Remaudière 1997; Wegierek and Peñalver 2002). However, Noordam (1994) regarded *Pentatrichosiphum* as a valid genus.

Raychaudhuri and Chatterjee (1980) and Ghosh and Agarwala (1993) provided keys to the subgenera and species within *Greenideoida* of India and Bhutan, including two known species of the *Pentatrichosiphum*, i.e. *Pentatrichosiphum lambersi* (Basu, 1964) and *P. luteum* Basu, 1969. Blackman and Eastop (1994) included only these two species, and Noordam (1994) re-described the type species, *P. luteum*. A third species, *P. turolensis* (Wegierek and Peñalver 2002), was discovered in lacustrine oil-shales from the Lower Aragonian (Lower Miocene, about 18–19 million years) of Rubielos de Mora Basin in Teruel, Spain by

Wegierek and Peñalver (2002). Here we treat two related species, *Pentatrichosiphum longirostrum* n. sp. and *P. luteum*, which is a new record for China.

Genus *Pentatrichosiphum* is represented by three extant species and one fossil species worldwide, of which three extant species all occur in Southeast Asia (Noordam 1994; Remaudière and Remaudière 1997; Wegierek and Peñalver 2002). In this paper, the genus *Pentatrichosiphum* is redefined. The taxonomic status of the genus is discussed based on morphological characters.

## Material and methods

Detailed descriptions and figures of the three previously described species are from Basu (1964, 1969), Ghosh and Agarwala (1993), Noordam (1994), and Wegierek and Peñalver (2002). All specimens studied are deposited in the Zoological Museum, Institute of Zoology, Chinese Academy of Sciences, Beijing, China (ZMCAS).

Aphid terminology follows Noordam (1994) and Qiao (2000). The unit of measurement is millimetres (mm). The taxonomic system of Remaudière and Remaudière (1997) is followed here.

## Taxonomic account

***Pentatrichosiphum*** Basu, 1969 (new record for China)

*Pentatrichosiphum* Basu 1969, p 182; Noordam 1994, p 139.

*Greenideoida* (*Pentatrichosiphum*): Raychaudhuri and Chatterjee 1980, p 350; Ghosh and Agarwala 1993, p 249; Remaudière and Remaudière 1997, p 176; Wegierek and Peñalver 2002, p 749.

Type species: *Pentatrichosiphum luteum* Basu, 1969.

## Diagnosis

Body elliptical, posterior of abdomen tapered. Frons convex; frontal tubercles indistinct. Eyes with numerous facets and ocular tubercle. Between the eyes with three to five hairs, two of these in the median more sturdy, the tips pointed or ramose. Antennae four- or five-segmented, about  $0.3\text{--}0.5 \times$  body length; processus terminalis about  $0.5\text{--}2 \times$  as long as base of the segment. Ultimate rostral segment long, wedge-shaped, distinctly longer than second hind tarsal segment. Mesosternal furca with two arms separated. First tarsal chaetotaxy: 5, 5, 5. Abdomen without marginal tubercles. Hairs dorsally on the abdomen with sharp points or ramose. Siphunculi long, barrel-shaped, with some spinulose imbrications on apex, without reticulation, straight or bent outwards. Cauda with a broadly rounded posterior margin, without a median process. In alates, median vein of the fore wing twice branched, hind wing with one oblique vein.

## Host plants

Fagaceae, Lauraceae, Papilionaceae, Rubiaceae, Solanaceae, Verbenaceae.

## Distribution

China, Bhutan, India, Indonesia, Spain.

*Comments*

Basu (1969) erected the genus *Pentatrichosiphum* and considered it closely related to *Greenideoida*, differing from it in having vein M in the fore wing twice-branched, and hind wing with one oblique vein. Raychaudhuri and Chatterjee (1980) considered the characters of wing vein used by Basu (1969) for separating the genus *Pentatrichosiphum* from *Greenideoida* were insufficient, and *Pentatrichosiphum* was treated as a subgenus of *Greenideoida*. The blunt ultimate rostral segment and rostral segments IV and V indistinctly divided have previously been described by Raychaudhuri and Chatterjee (1980) and Ghosh and Agarwala (1993) as being important diagnostic characters for *Greenideoida*. Except for the above diagnostic characters, Noordam (1994) reviewed *Pentatrichosiphum* from Java and used the following main diagnostic characters to differentiate it from *Greenideoida*: ultimate rostral segment 1.75–1.96 times as long as second hind tarsal segment; antennae  $0.42\text{--}0.51 \times$  as long as body; body hairs thick and long, e.g. antennal hairs 0.13–0.16 mm. While examining the specimens of *Pentatrichosiphum* from Hainan, China, we found the ultimate rostral segment of the new species was more slender and long,  $2.46\text{--}2.73 \times$  as long as second hind tarsal segment and its rostral segments IV and V were distinctly divided. On the basis of the above, we tentatively suggest that *Pentatrichosiphum* should be treated as a valid genus, and follow Noordam's view (1994).

Keys to species of *Pentatrichosiphum**Apterous viviparous females*

1. Antennae four-segmented or occasionally five-segmented; ultimate rostral segment  $0.27\text{--}0.31$  mm long,  $2.46\text{--}2.73 \times$  second hind tarsal segment . . . . . *Pentatrichosiphum longirostrum* n. sp.
- Antennae five-segmented; ultimate rostral segment at most 0.21 mm long,  $1.1\text{--}2.0 \times$  second hind tarsal segment. . . . . 2
2. Ultimate rostral segment  $1.41\text{--}2.0 \times$  second hind tarsal segment; processus terminalis  $1.21\text{--}1.93 \times$  base of the segment; longest hair on antennal segment III  $2.8\text{--}3.7 \times$  widest diameter of the segment; siphunculi 1.12–1.6 mm long,  $0.4\text{--}0.58 \times$  body length . . . . . *Pentatrichosiphum luteum* Basu, 1969
- Ultimate rostral segment  $1.1\text{--}1.4 \times$  second hind tarsal segment; processus terminalis  $0.54\text{--}0.68 \times$  base of the segment; longest hair on antennal segment III  $0.5\text{--}0.66 \times$  widest diameter of the segment; siphunculi 0.54–0.64 mm long,  $0.24\text{--}0.3 \times$  body length . . . . . *Pentatrichosiphum lambersi* (Basu, 1964)

*Alate viviparous females*

1. Antennal segment IV  $0.33\text{--}0.38 \times$  segment V; siphunculi 1.02–1.52 mm long,  $0.53\text{--}0.74 \times$  body length; longest hair on antennal segment III  $3.5 \times$  widest diameter of the segment; ultimate rostral segment  $1.55\text{--}1.8 \times$  times as long as second hind tarsal segment . . . . . *Pentatrichosiphum luteum* Basu, 1969
- Antennal segment IV at least  $0.5 \times$  segment V . . . . . 2
2. Antennal segment IV  $0.67\text{--}0.75 \times$  segment V; siphunculi 1.12–1.16 mm long,  $0.5\text{--}0.6 \times$  body length; ultimate rostral segment 1.78 times as long as second hind tarsal segment . . . . . *Pentatrichosiphum turolensis* (Wegierek and Peñalver, 2002)
- Antennal segment IV  $0.65 \times$  as long as segment V; siphunculi 0.67 mm long,  $0.34$  times as long as body; ultimate rostral segment 1.5 times as long as second hind tarsal segment . . . . . *Pentatrichosiphum lambersi* (Basu, 1964)

***Pentatrichosiphum lambersi*** (Basu, 1964)*Greenideoida lambersi* Basu 1964, p 232.*Greenideoida (Pentatrichosiphum) lambersi* Basu: Raychaudhuri and Chatterjee 1980, p 351; Ghosh and Agarwala 1993, p 260; Remaudière and Remaudière 1997, p 176.*Biology*This species infests Rubiaceae (*Hymenodictyon* sp.) and Verbenaceae (*Premora* sp.).*Notes*

All information on this species is from Basu (1964) and Raychaudhuri and Chatterjee (1980).

*Distribution*

India (Darjeeling, Kalimpong).

***Pentatrichosiphum longirostrum*** n. sp.*Type locality*

China (Hainan, 18°53'N, 109°39'E, altitude 660 m).

*Description**Apterous viviparous female.* Body yellow in life. For general measurements see Table I.

Mounted specimens: body oblong oval (Figure 14).

Head: ocular tubercles, distal one-third of antennal processus terminalis and rostral segment V pale brown, other parts colourless. Head fused with prothorax. Dorsum of head with transverse wrinkles in anterior part, antennal segments III and IV with transverse imbrications. Median portion of front slightly convex, antennal tubercles slightly developed (Figure 1). Dorsal hairs thick and long, mostly ramose on distinct tubercles; ventral hairs fine, long and pointed. Head with two pairs of frontal hairs, one or two pairs of dorsal hairs between antennae, and three or four pairs of dorsal hairs between eyes. Eyes multi-faceted, with about 18–20 facets, with ocular tubercles. Antennae four-segmented or occasionally five-segmented (Figures 2, 3), proportion of segments I–IV: 16–18, 13–16, 100, 31–32+47–53, respectively. Antennal hairs stout and long, ramose or pointed at apex, segments I–IV each with 2 or 3, 5 or 6, 11–15, 2+0 hairs, respectively; apex of processus terminalis with three to five hairs. Rostrum reaching abdominal segment II; ultimate rostral segment slender and long wedge-shaped (Figure 5), with three pairs of primary hairs and three to five pairs of secondary hairs.

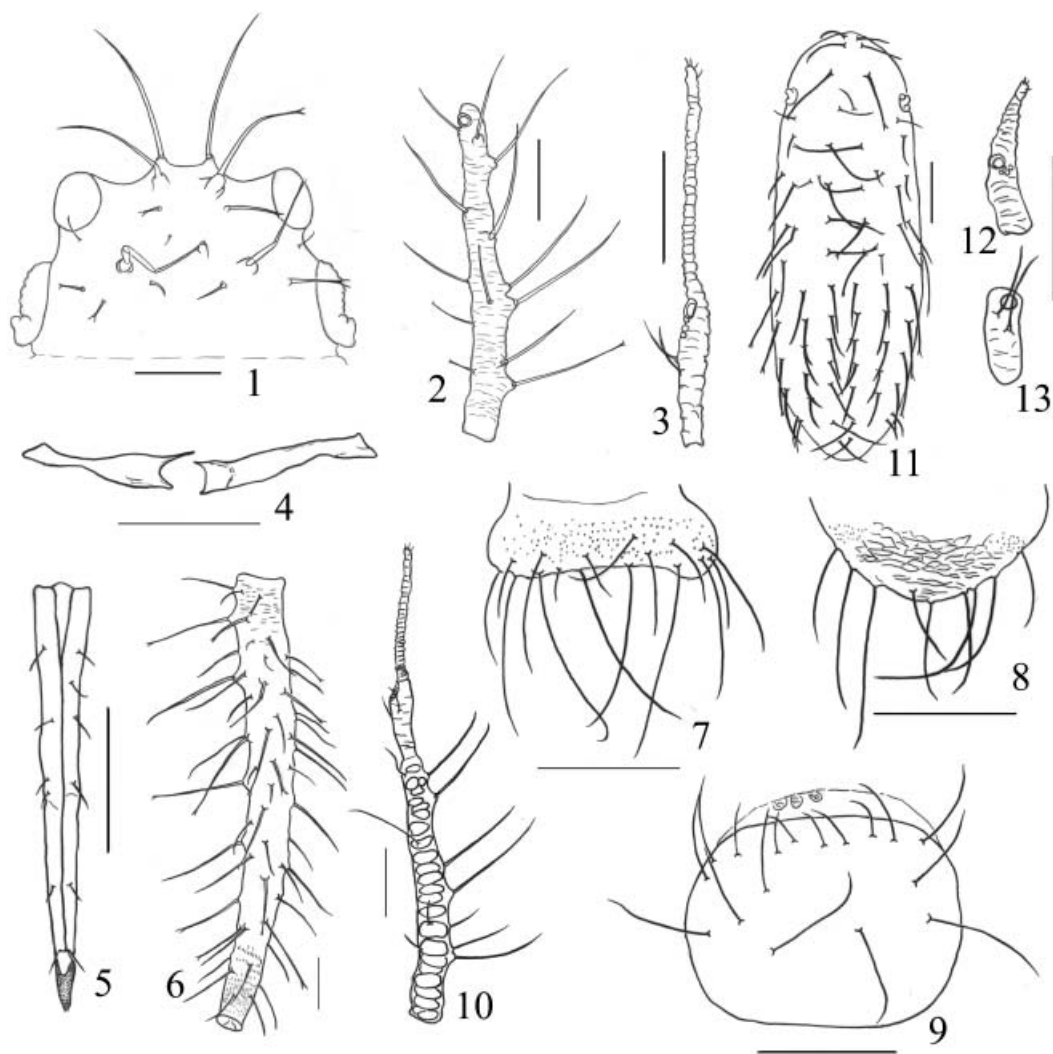
Thorax: dorsum of thorax colourless. Dorsal hairs of thorax thick and long, pointed or ramose on distinct tubercles. Pronotum with 16–20 hairs, among which two pairs of spinal and two pairs of marginal hairs distinct thick and long; mesonotum with 36–38 hairs, among which one pair of spinal, one pair of pleural, and one pair of marginal hairs distinct thick and long; metanotum with 28–30 hairs, among which one pair of spinal, two pairs of pleural, and one pair of marginal hairs distinct thick and long. Mesosternal furca weakly

Table I. Biometric data for *Pentatrichosiphum longirostrum* n. sp. (apterous viviparous female).

Part	Apterous viviparous female ( $n=5$ )		
	Mean	Range	SD
Length (mm)			
Body length	1.97	1.88–2.08	0.10
Body width	0.77	0.73–0.85	0.055
Head width	0.38	0.36–0.41	0.025
Antenna	0.91	0.83–0.99	0.077
Ant.I	0.072	0.072	0
Ant.II	0.062	0.062	0
Ant.III	0.43	0.39–0.46	0.036
Ant.IVb	0.14	0.12–0.14	0.012
PT	0.22	0.19–0.25	0.031
Length of hairs on Ant.III	0.18	0.16–0.19	0.013
Ant.IIIWD	0.041	0.041	0
URS	0.29	0.27–0.31	0.021
BW URS	0.039	0.031–0.041	0.0052
Hind femur	0.46	0.41–0.48	0.034
Hind tibia	0.65	0.57–0.70	0.059
MWhind tibia	0.039	0.031–0.041	0.0052
2HT	0.11	0.10–0.11	0.0052
Length of hairs on hind tibia	0.060	0.057–0.062	0.0027
SIPH	0.83	0.78–0.90	0.055
BW SIPH	0.097	0.088–0.10	0.006
DW SIPH	0.056	0.050–0.063	0.0072
Cauda	0.14	0.12–0.15	0.016
BW cauda	0.16	0.14–0.18	0.013
Length of cephalic hairs	0.20	0.19–0.23	0.018
Length of marginal hairs on tergum I	0.22	0.20–0.25	0.021
Dorsal hairs on tergum VIII	0.11	0.10–0.12	0.0084
Ratios			
Antenna/body	0.46	0.44–0.48	0.017
Hind femur/Ant.III	1.08	1.04–1.15	0.057
Hind tibia/body	0.34	0.30–0.39	0.038
PT/Ant.IVb	1.57	1.50–1.71	0.124
URS/BW URS	7.60	6.75–8.67	0.79
URS/2HT	2.63	2.46–2.73	0.13
SIPH/body	0.44	0.41–0.48	0.030
SIPH/cauda	6.05	5.37–7.28	1.07
SIPH/BW SIPH	8.62	7.75–9.71	0.91
Cauda/BW cauda	0.93	0.80–1.00	0.12
Length of hairs on Ant.III/Ant.IIIWD	4.34	4.00–4.63	0.32
Cephalic hairs/Ant.IIIWD	5.00	4.74–5.50	0.44
Marginal hairs on tergum I/Ant.IIIWD	5.44	4.74–6.00	0.52
Dorsal hairs on tergum VIII/Ant.IIIWD	2.75	2.50–3.00	0.20
Hairs on hind tibia/MW hind tibia	1.59	1.38–2.00	0.28
Head width/SIPH	0.46	0.45–0.47	0.006
Head width/cauda	2.79	2.50–3.33	0.47
PT/SIPH	0.26	0.24–0.27	0.018

Ant.I, Ant.II, Ant.III, Ant.IVb, antennal segments I, II, III and the base of Ant.IV, respectively; Ant.IIIWD, widest diameter of antennal segment III; PT, processus terminalis; URS, ultimate rostral segment; BW URS, basal width of ultimate rostral segment; MWhind tibia, mid-width of hind tibia; 2HT, second segment of hind tarsus; SIPH, siphunculus; BW SIPH, DW SIPH, basal width and distal width of siphunculi; BW cauda, basal width of cauda; tergum I, VIII, abdominal tergites I, VIII.



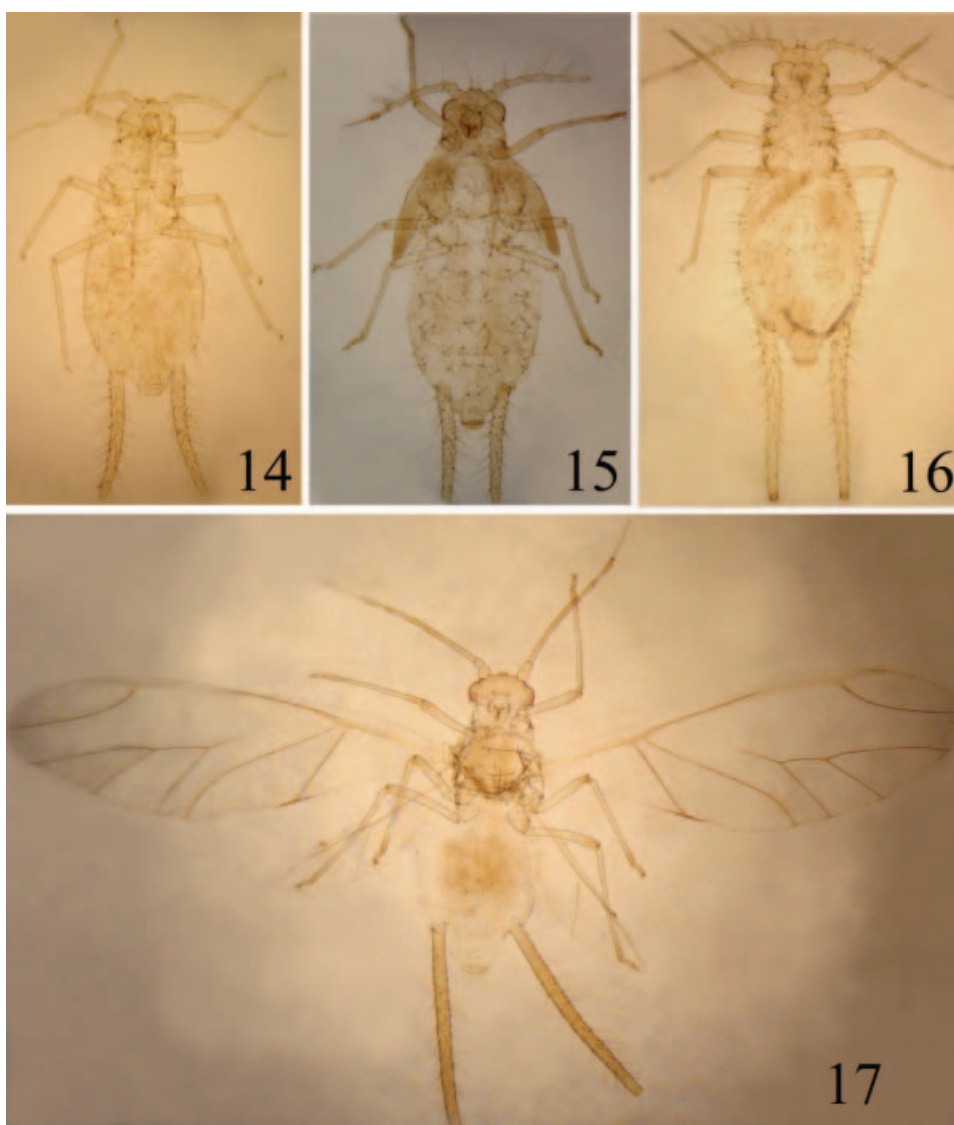


Figures 1–13. *Pentarichosiphum longirostrum* sp. nov. (1–9) Apterous viviparous female: (1) dorsal view of head; (2) antennal segment III; (3) antennal segment IV; (4) mesosternal furca; (5) ultimate rostral segment; (6) siphunculus; (7) anal plate; (8) cauda; (9) genital plate. (10) Fourth-instar alatoid nymph, antennal segments III and IV. (11–13) Embryo: (11) dorsal view of embryo; (12) antennal segment IV; (13) antennal segment III. Scale bars: 0.10 mm.

sclerotized, with arms separated (Figure 4), length of single arm 0.09–0.13 mm,  $2.57\text{--}3.25\times$  widest diameter of antennal segment III. Legs colourless, except claws brown. Femora with weakly transverse imbrications. First tarsal chaetotaxy: 5, 5, 5.

Abdomen: colourless. Dorsal hairs of abdomen thick and long, pointed or ramose, most dorsal hairs on distinct tubercles, ventral hairs fine and pointed, dorsal hairs 1.50–6.30 times as long as ventral hairs. Abdominal tergites I–V with 24–26, 38–42, 44–50, 34–38, 34–36 hairs, respectively; tergite I with one pair of spinal, and two pairs of marginal hairs thick and long; tergites II–V each with one pair of spinal, one pair of pleural, and one to three pairs of marginal hairs thick and long; tergite VI with two pairs of spinal and four pairs of pleural hairs; tergite VII with two pairs of spinal hairs; tergite VIII with one pair of spinal





Figures 14–17. (14, 15) *Pentatrachosiphum longirostrum* sp. nov.: (14) apterous viviparous female, dorsal view of body; (15) fourth-instar alatoid nymph, dorsal view of body. (16, 17) *Pentatrachosiphum luteum* Basu: (16) apterous viviparous female, dorsal view of body; (17) alate viviparous female, dorsal view of body.

hairs. The longest hair on tergites I–VIII 0.20–0.25, 0.27–0.30, 0.21–0.25, 0.20–0.24, 0.21–0.25, 0.09–0.11, 0.23–0.25, and 0.10–0.12 mm in length, respectively. Spiracles on prothorax and abdominal segments I–VII small, round, and open. Siphunculi extremely long (Figure 6), flange indistinct, densely spinulose in apical 1/8–3/17; with 72–77 long and short hairs. Cauda and anal plate spinulose. Cauda semi-round (Figure 8), with 8–11 thick and long hairs and a transverse band of cell-like markings. Anal plate transversely elliptical, the apical margin slightly indented (Figure 7), with 11–15 thick and long hairs. Genital plate transverse oval (Figure 9), with 19–21 hairs. Gonapophyses three, each with three short and pointed hairs.

*Fourth-instar viviparous nymph.* For general measurements see Table II. As in apterous vivipara but differing as follows. Appendages slightly shorter. Length of hairs on antennal segment III  $4.31 \times$  widest diameter of the segment. Hind femur  $1.29 \times$  antennal segment III; hind tibia  $0.31 \times$  body length. Length of hairs on hind tibia  $1.68 \times$  mid-diameter of the segment. Siphunculi  $0.39 \times$  body length. Eyes with five facets. Genital plate with 15 hairs.

*Fourth-instar alatoid nymph (Figure 15).* For general measurements see Table II. As in apterous vivipara but differing as follows. Antennal hairs in segments I–IV each with 3 or 4, 3 or 4, 9–11, 2+0 hairs, respectively, apex of processus terminalis with two to four hairs. Secondary rhinaria transversely elliptical, on segment III with 17–19 over its whole length (Figure 10); primary rhinaria round and weakly ciliated. Pronotum with 14 hairs, among which one pair of spinal and two pairs of marginal hairs distinct thick and long; mesonotum with 46 hairs, among which two pairs of spinal, three pairs of pleural, and four pairs of marginal hairs distinct thick and long; metanotum with 18 hairs, among which one pair of spinal, one pair of pleural, and three pairs of marginal hairs thick and long. Abdominal tergites I–V each with one pair of spinal, one pair of pleural, and three pairs of marginal weakly sclerotized patches. Abdominal tergites I–III and V each with one pair of spinal, one pair of pleural, and two or three pairs of marginal hairs distinct thick and long, respectively; tergite IV with two pairs of spinal, two pairs of pleural, and three pairs of marginal hairs distinct thick and long; tergite VI with two pairs of spinal and three pairs of pleural hairs, tergite VII with two pairs of spinal hairs, and tergite VIII with one pair of spinal hairs. Siphunculi with densely spinulose in apical 3/16; with 63–84 long and short hairs. Genital plate with 9–21 hairs.

*Embryo (in apterous viviparous female).* Body long, oval and entirely pale (Figure 11). Head fused with prothorax. Median front slightly convex, antennal tubercles indistinct. Eyes with three facets. Antennae four-segmented,  $0.29 \times$  body length, segments III and IV with transverse imbrications (Figures 12, 13); length in proportion of segments I–IV: 38: 46: 100: 69+108, respectively; processus terminalis  $1.57 \times$  base of segment IV; segments I–IV each with 0, 1, 2, 0+0 stout and long hairs, respectively; apex of processus terminalis with three hairs; length of hairs on segment III  $2.56 \times$  widest diameter of the segment. Rostrum reaching abdominal segment V; ultimate rostral segment slender and long wedge-shaped,  $4.86 \times$  basal width,  $2.43 \times$  second hind tarsal segment. Dorsal hairs thick and long, pointed or ramifying. Head with one pair of frontal hairs, one pair of dorsal hairs between antennae, and three pairs of dorsal hairs between eyes. Pronotum with one pair of spinal hairs and one pair of fine and short marginal hairs; mesonotum with one pair of spinal hairs, one pair of fine pleural hairs, and two pairs of short and pointed marginal hairs; metanotum with one pair of spinal and two pairs of marginal hairs. Abdominal tergite I with one pair of spinal and one pair of marginal hairs; tergites II–V each with one pair of spinal, one pair of pleural, and one pair of marginal hairs; tergite VI with one pair of spinal and one pair of pleural hairs; tergites VII and VIII each with one pair of spinal hairs. First tarsal chaetotaxy: 2, 2, 2. Siphunculi present.

#### *Type material examined*

Holotype: apterous viviparous female, China, Hainan, Wuzhishan Reserve Region ( $18^{\circ}53'N$ ,  $109^{\circ}39'E$ ), altitude 660 m, 16 March 2006, on Lauraceae, by D. Zhang (ZMCAS, no. 18432). Paratypes: two apterous viviparous females, one alatoid nymph, four embryos, same data as holotype (ZMCAS, no. 18432); two apterous viviparous females,

Table II. Biometric data for *Pentatrichosiphum longirostrum* n. sp. (fourth-instar alatoid nymph and fourth-instar apterous nymph).

Part	Fourth-instar alatoid nymph ( $n=3$ )			Fourth-instar apterous nymph ( $n=1$ )
	Mean	Range	SD	
Length (mm)				
Body length	1.98	1.83–2.13	0.15	1.73
Body width	0.79	0.73–0.85	0.06	0.66
Head width	0.42	0.41–0.42	0.01	0.32
Antenna	0.85	0.83–0.87	0.02	Incomplete
Ant.I	0.065	0.062–0.072	0.01	0.072
Ant.II	0.062	0.062	0	0.062
Ant.III	0.40	0.39–0.40	0.01	0.29
Ant.IVb	0.12	0.12	0	Lost
PT	0.20	0.19–0.21	0.01	Lost
Length of hairs on Ant.III	0.18	0.18–0.19	0.01	0.15
Ant.IIIWD	0.048	0.041–0.051	0.01	0.036
URS	0.27	0.26–0.27	0.003	0.28
BW URS	0.039	0.036–0.041	0.003	0.031
Hind femur	0.41	0.39–0.42	0.02	0.37
Hind tibia	0.52	0.52–0.54	0.012	0.54
MW hind tibia	0.038	0.031–0.041	0.01	0.031
2HT	0.11	0.10–0.11	0.01	0.093
Length of hairs on hind tibia	0.053	0.052–0.057	0.003	0.052
SIPH	0.76	0.74–0.77	0.02	0.68
BW SIPH	0.10	0.10	0	0.075
DW SIPH	0.055	0.052–0.057	0.003	0.050
Cauda	0.096	0.082–0.10	0.01	0.13
BW cauda	0.18	0.16–0.19	0.01	0.15
Length of cephalic hairs	0.18	0.16–0.19	0.01	0.18
Length of marginal hairs on tergum I	0.23	0.22–0.25	0.02	0.21
Dorsal hairs on tergum VIII	0.093	0.082–0.10	0.01	0.10
Ratios				
Antenna/body	0.43	0.41–0.47	0.03	No data
Hind femur/Ant.III	1.03	0.97–1.08	0.05	1.29
Hind tibia/body	0.27	0.25–0.28	0.02	0.31
PT/Ant.IVb	1.63	1.58–1.66	0.05	No data
URS/BW URS	6.86	6.50–7.44	0.51	9.00
URS/2HT	2.47	2.37–2.65	0.16	2.99
SIPH/body	0.39	0.36–0.41	0.02	0.39
SIPH/cauda	8.00	7.20–9.29	1.13	5.04
SIPH/BW SIPH	7.37	7.20–7.51	0.15	9.00
Cauda/BW cauda	0.54	0.44–0.62	0.09	0.87
Length of hairs on Ant.III/Ant.IIIWD	3.73	3.37–4.27	0.48	4.31
Cephalic hairs/Ant.IIIWD	3.75	3.17–4.51	0.69	4.86
Marginal hairs on tergum I/Ant.IIIWD	4.80	4.37–5.27	0.45	5.72
Dorsal hairs on tergum VIII/Ant.IIIWD	1.92	1.79–2.00	0.12	2.86
Hairs on hind tibia/MW hind tibia	1.46	1.27–1.84	0.33	1.68
Head width/SIPH	0.55	0.55–0.56	0.01	0.47
Head width/cauda	4.41	4.00–5.15	0.64	2.38
PT/SIPH	0.27	0.26–0.28	0.01	0.27

See Table I for abbreviations.

two alatoid nymphs, three embryos, altitude 780 m, other data same as holotype (ZMCAS, no. 18430).

### Biology

This species infests the young leaves of the host plant.

### Comments

This new species can be easily separated from other congeneric species by apterous viviparous female with antennae four-segmented; ultimate rostral segment 6.75–8.67 times as long as basal width and 2.46–2.73 times as long as second hind tarsal segment; longest hairs on antennal segment III about 4.00–4.60 times as long as widest diameter of the segment.

### *Pentatrichosiphum luteum* Basu, 1969 (new record for China)

*Pentatrichosiphum luteum* Basu 1969, p 183; Noordam 1994, p 140.

*Greenideodia* (*Pentatrichosiphum*) *luteum* (Basu): Raychaudhuri and Chatterjee 1980, p 351; Ghosh and Agarwala 1993, p 263; Remaudière and Remaudière 1997, p 176.

### Description

The morphological characters of the apterous viviparous female and alate viviparous female are the same as in the descriptions by Ghosh and Agarwala (1993) and Noordam (1994).

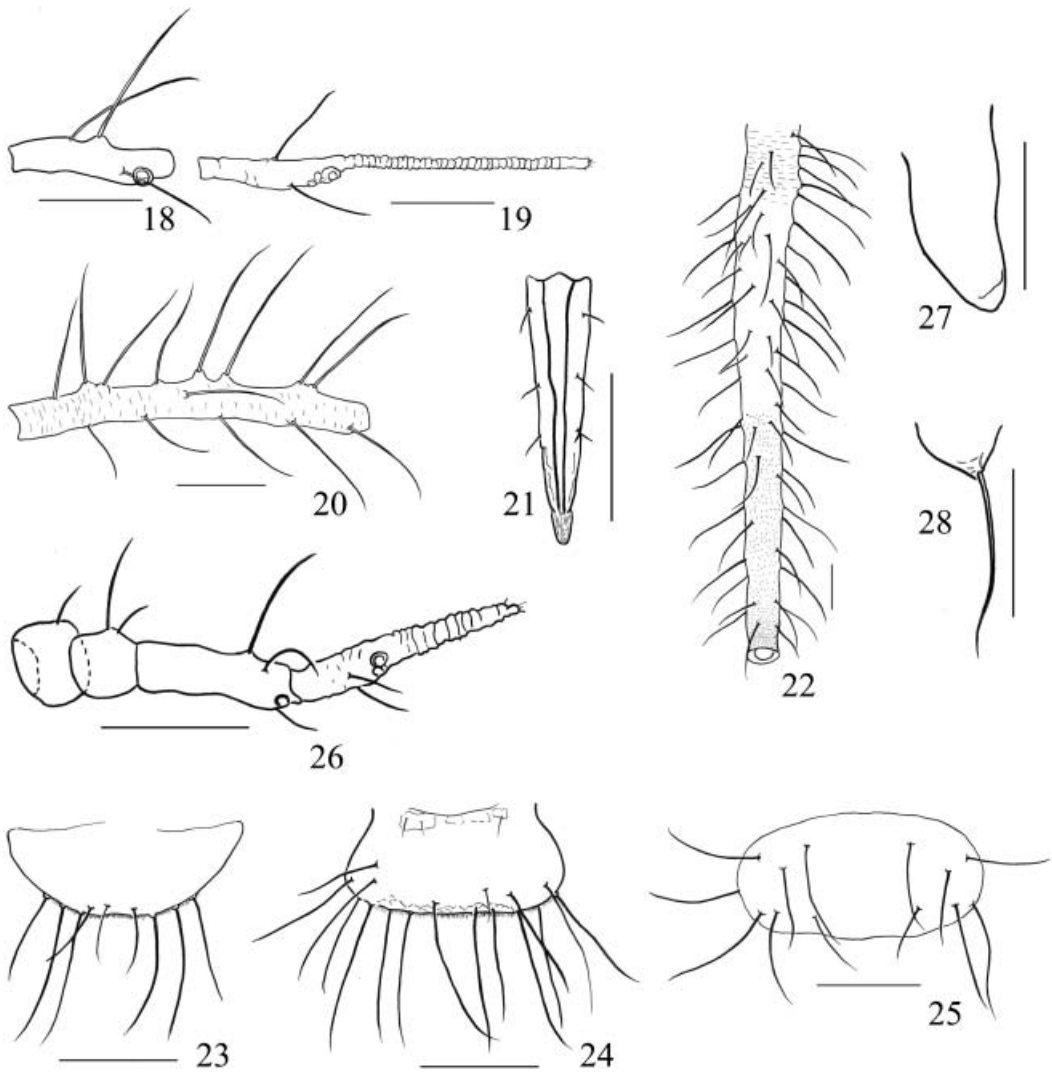
*First-instar nymph.* Body yellow in life.

Mounted specimens: body long oval,  $3.21 \times$  width. Eyes and apical part of antennal segment IV pale brown, others pale.

Head: dorsal hairs thick and long, pointed and each with a tuberculate base. Head with one pair of frontal hairs, one pair of dorsal hairs between antennae, and two pairs of dorsal hairs between eyes. Length of cephalic hairs 0.093 mm,  $3 \times$  widest diameter of antennal segment III. Eyes with three facets. Antennae four-segmented,  $0.4 \times$  body length (Figure 26). Length in proportion of segments I–IV: 36, 36, 100, 63+91, respectively; processus terminalis  $1.43 \times$  base of the segment IV. Antennal hairs stout, long and pointed, segments I–IV each with 3, 2, 3, 2+0 hairs, respectively, apex of processus terminalis with three hairs; length of hairs on segment III  $2.67 \times$  widest diameter of the segment. Rostrum reaching abdominal segment IV; ultimate rostral segment stout and short, wedge-shaped,  $4.29 \times$  basal width,  $1.67 \times$  second hind tarsal segment.

Thorax: dorsum of thorax pale. Dorsal hairs of thorax thick and long, pointed or ramose, each with a tuberculate base. Pronotum with four pairs of spinal and four pairs of marginal hairs; mesonotum and metanotum each with one pair of spinal, one pair of pleural, and one pair of marginal hairs. Legs pale, except claws brown. Tibiae with weakly transverse imbrications. Hind femur  $1.18 \times$  antennal segment III; hind tibia  $0.21 \times$  body length. Length of hairs on hind tibiae  $1.33 \times$  mid-diameter of the segment. First tarsal chaetotaxy: 2, 2, 2.

Abdomen: pale. Dorsal hairs of abdomen thick and long, pointed or ramose, most dorsal hairs with tuberculate base. Abdominal tergites I–VI each with one pair of spinal, one pair of pleural, and one pair of marginal hairs; tergite VII with one pair of cone-shaped marginal tubercles, each with one long hair at apex, and one pair of spinal hairs (Figure 28); tergite



Figures 18–28. *Pentatrichosiphum luteum* Basu. (18–25) Apterous viviparous female: (18) antennal segment IV; (19) antennal segment V; (20) antennal segment III; (21) ultimate rostral segment; (22) siphunculus; (23) cauda; (24) anal plate; (25) genital plate. (26–28) First-instar nymph: (26) antenna; (27) siphunculus; (28) marginal tubercle on abdominal tergite VII. Scale bars: 0.10 mm.

VIII with one pair of spinal tubercles, each with one long hair at apex. Length of marginal hairs on abdominal tergite I about  $4 \times$  widest diameter of antennal segment III. Siphunculi short, cone-shaped (Figure 27);  $2 \times$  basal width,  $6 \times$  distal width,  $0.13 \times$  body length. Cauda semi-round,  $0.5 \times$  basal width, with two hairs. Anal plate transversely elliptical, with four hairs.

#### *Material examined*

Three apterous viviparous females, one alate viviparous female, one first-instar nymph and 12 alatoid nymphs, China: Hainan, Mt Diaoluo Reserve ( $18^{\circ}40'N$ ,  $109^{\circ}54'E$ ), altitude

1000 m, 18 November 2006, by X. L. Huang, on Lauraceae (ZMCAS, no. 19536); one apterous viviparous female, two first-instar nymphs, China: Hainan, Mt Bawangling Reserve (19°09'N, 109°18'E), altitude 1015 m, 9 May 2007, by D. Zhang, on *Litsea cubeba* (ZMCAS, no. 19642).

### Biology

This species infests Lauraceae (*Lindera* sp., *Litsea* sp., and *Persea americana*), Fagaceae (*Quercus* sp.), and Solanaceae (*Cestrum fasciculatum*).

### Distribution

China (Hainan); India (Meghalaya, West Bengal), Bhutan (Manas Sanctuary), Indonesia (Java).

### *Pentatrichosiphum turolensis* (Wegierek and Peñalver, 2002)

*Greenideoida* (*Pentatrichosiphum*) *turolensis* Wegierek and Peñalver 2002, p 749.

This species was discovered in lacustrine oil-shales from the Lower Aragonian of Rubielos de Mora Basin.

### Notes

All the information about this species is from Wegierek and Peñalver (2002).

### Distribution

Spain (Teruel: Rubielos de Mora).

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