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TWO NEW SPECIES OF THE GENUS EUTRICHOSIPHUM ESSIG ET KUWANA (HEMIPTERA: APHIDIDAE: GREENIDEINAE) ON LITHOCARPUS EDULIS (FAGACEAE) FROM JAPAN

By SHUN'ICHIRO SUGIMOTO

Abstract

SUGIMOTO, S., 2011. Two new species of the genus *Eutrichosiphum* Essig et Kuwana (Hemiptera: Aphididae: Greenideinae) on *Lithocarpus edulis* (Fagaceae) from Japan. *Ins. matsum. n. s.* 67: 23–32, 8 figs.

Eutrichosiphum nigrisiphon sp. nov., and *Eutrichosiphum apicifuscum* sp. nov., are described and illustrated from Japan. These species were collected from the young leaves of *Lithocarpus edulis* (Fagaceae) planted as a roadside tree and had abbreviated holocyclic life cycles. The sexual morphs of the two species appeared from mid May into early June.

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Introduction

The genus *Eutrichosiphum* Essig et Kuwana, 1918 comprises about 40 species (Blackman & Eastop, 1994; Remaudière & Remaudière, 1997). Of these, six species have been described or recorded from Japan: *E. heterotrichum* (Raychaudhuri, 1956) from *Lithocarpus edulis*, *E. narafoliae* (Shinji, 1922) from *Quercus serrata*, *E. passaniae* (Okajima, 1908) from *Castanopsis* (= *Shiia*), *E. shiicola* Takahashi, 1962 from *Castanopsis cuspidata* and *Quercus dentata*, *E. sinense* Raychaudhuri, 1956 from *C. cuspidata*, and *E. tattakanum* (Takajashi, 1925) from *Quercus* (Takahashi, 1962; Blackman & Eastop, 1994; Sugimoto, 2001).

During my recent field observation conducted at an industrial area, Kawasaki City and at a harbor area, Yokohama City, central Japan, I discovered two new species belonging to the genus *Eutrichosiphum* from *L. edulis* (Fagaceae) planted as a roadside tree in there. In the present paper, I describe and illustrate these new species with the description of their life cycle.

Materials and Methods

All specimens examined in this study were collected on *L. edulis* by me unless otherwise stated, and they were mounted on microscope slides by Martin's (1983) method. Morphological terms and measurements of body parts including appendages mainly follow Raychaudhuri (1956) except that ultimate rostral segment is used instead of "rostral segments 4+5". The definition of the genus *Eutrichosiphum* follows Ghosh (1987) and Noordam (1994). The holotype and paratypes are deposited in the collection of the Laboratory of Systematic Entomology, Hokkaido University.

Description

Eutrichosiphum nigrisiphon sp. nov.
(Figs. 1A–8A)

Apterous viviparous female (n=19). Color in life: body yellow to yellowish brown; antennae dark brown to grayish brown; eyes red; legs pale brown; siphunculi dark brown on basal half and blackish brown on distal half. Color in mounted specimen: body, antennae and legs pale brown; siphunculi brown, but apical 1/3–1/4 dark brown.

Body pear-shaped, 1.42–1.77 mm long, 1.7–1.9 times as long as its maximum width. Head smooth dorsally and ventrally, spinulated postero-ventrally; dorsum bearing 12–15 setae of different length with acuminate, blunt or furcated apices, of which the longest one is 0.05–0.08 mm long and 2.0–3.1 times as long as basal width of antennal segment III; frons slightly convex at middle; venter bearing 18–20 setae with acuminate apices on the anterior half. Antennae five-segmented, 0.43–0.54 times as long as body; segments I–II smooth, flagellum imbricated; segments I–IV bearing 6–8, 4–7, 10–16, 2–4 setae, respectively; longest seta on segment II 0.06–0.08 mm long, 2.2–2.8 times as long as basal width of segment III, and that on segment III 0.04–0.06 mm long, 1.8–2.4 times as long as basal width of the segment; processus terminalis 0.14–0.17 mm long, 1.2–1.6 times as long as base of segment V. Rostrum reaching beyond the hind coxae; ultimate rostral segment 0.17–0.21 mm long, 1.9–2.1 times as long as segment II of hind tarsus.

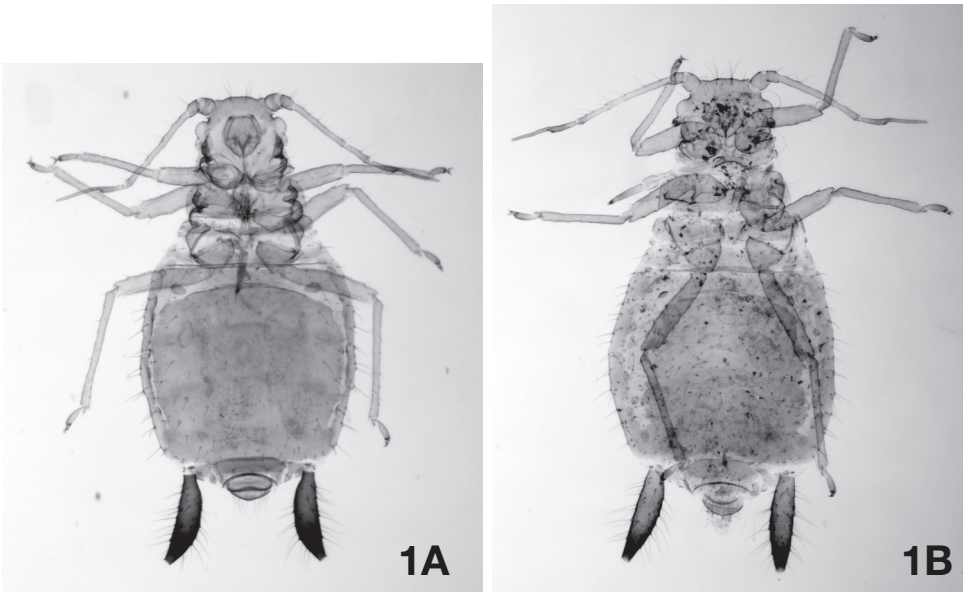
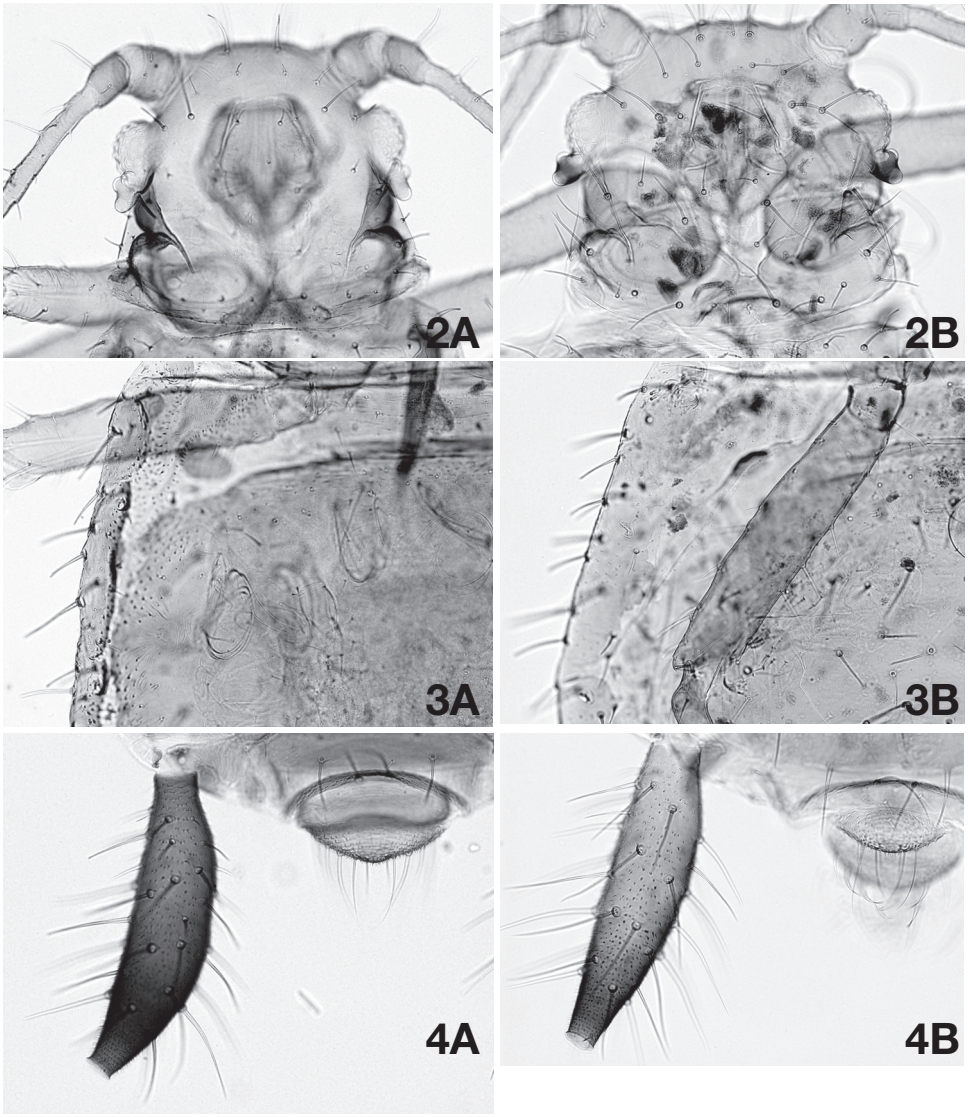


Fig. 1. Apterous viviparous females. A: *Eutrichosiphum nigrisiphon* sp. nov., B: *E. apicifuscum* sp. nov.

Prothorax fused with head; dorsum smooth, spinulated on the posterior margin. Meso- and metathoraces smooth dorsally, spinulated on the central part of anterior margin and on the vent-lateral areas. Femora smooth dorsally, imbricated ventrally. Tibiae smooth, but imbricated on the apical part; setae on outer side with blunt apices, but those on inner side with acuminate apices; longest seta on hind tibiae at most as long as middle width of the tibiae. First tarsal segments with 5 setae. Abdomen weakly wrinkled dorsally, strongly spinulated on vent-lateral margin; terga bearing many setae of different length with acuminate or furcated apices; tergite VII with a pair of long spinal setae in addition to 3–5 short setae along the posterior margin; tergite VIII bearing a pair of long setae with acuminate apices; sterna bearing many setae with acuminate apices. Siphunculi short and stout, 0.30–0.35 mm long, 0.18–0.22 times as long as body length, about 0.05 mm wide at the base, 0.10–0.11 mm wide at the middle, ratio of the middle to base 1.9–2.4, more or less straightened on the outer side and strongly rounded on the inner side, with many long and stiff setae and spinules on whole length. Cauda rounded, much wider than long and with 8–9 setae. Genital plate semi-circular, with 3–5 setae on its central area and 5–8 setae along the hind margin.

Measurements of one specimen (in mm): Body 1.77; antenna 0.84, antennal segments III: IV: V 0.32: 0.14: 0.29 (0.12+0.17); ultimate rostral segment 0.21; hind femur 0.39; hind tibia 0.57; hind tarsus (segment II) 0.10; siphunculus 0.35.

Oviparous female (n=18). Alate. Color in life: head and thorax brown; abdomen pale green with brownish dorsal band; legs brown; siphunculi black. Color in mounted specimen: antennae and siphunculi dark brown; head, thorax and legs brown; abdomen not pigmented except for dorsal patches, marginal sclerites and genital plate pale that are pale brown.



Figs. 2-4. Parts of the apterous viviparous females. 2: heads and prothoraces, 3: anterior parts of vent-lateral abdomen, 4: siphunculi and cauda. A: *Eutrichosiphum nigrisiphon* sp. nov., B: *E. apicifuscum* sp. nov.

Body 1.48–2.05 mm long, 2.1–2.9 times as long as its maximum width. Setae on body, antennae, legs and siphunculi with acuminate apices. Antennae six-segmented, 0.62–0.80 times as long as body; segments I–V with 6–8, 4–5, 7–11, 3–4, 3–4 setae, respectively; longest seta on II 0.03–0.05 mm, 1.3–2.5 times as long as basal width of segment III, and that on III 0.06–0.09 mm, 2.7–4.4 times as long as basal width of the segment; segment III with 25–39 narrow transversely secondary rhinaria arranged irregularly on whole length of the segment; segments IV and V with 4–11, 1–4 rhinaria,

respectively. Femora imbricated. Tibiae smooth, spinulated on the distal part; longest seta on outer side of hind tibiae 0.04–0.06 mm, 1.6–2.2 times as long as middle width of the tibiae. Abdomen smooth dorsally and ventrally, with transverse bands dorsally, those on segments IV–VI connected each other; tergite VII with a semicircular-shaped band, which has 5–8 setae. Siphunculi 0.57–0.74 mm long, 0.34–0.43 times as long as body length, the distal half swollen. Cauda with 8–10 setae. Genital plate with many long setae on the whole surface.

Measurements of one specimen (in mm): Body 1.74; antenna 1.20, antennal segments III: IV: V: VI 0.43: 0.16: 0.18: 0.32 (0.12+0.20); ultimate rostral segment 0.18; hind femur 0.44; hind tibia 0.71; hind tarsus (segment II) 0.10; siphunculus 0.68.

Alate viviparous female (n=3). Slightly differs from the oviparous female in having fewer setae on the genital plate such as in the apterous viviparous female.

Male (n=4). Alate. Differs from the oviparous female as follows: color in life: head and thorax yellow to pale brown; abdomen pale yellowish green. Color in mounted specimen: antennae and siphunculi brown; head, thorax and legs pale brown; abdomen not pigmented.

Body rather slender, 1.20–1.39 mm long, 2.5–2.8 times as long as its maximum width. Antennae 0.82–1.02 times as long as body; segments III–IV with 15–22 and 1–2 secondary rhinaria. Cauda triangular.

Measurements of one specimen (mm): Body 1.33; antenna 1.22, antennal segments III: IV: V: VI 0.45: 0.41: 0.18: 0.35 (0.15+0.20); ultimate rostral segment 0.17; hind femur 0.41; hind tibia 0.62; hind tarsus (segment II) 0.09; siphunculus 0.58.

Specimens examined. Holotype. An apterous viviparous female: Honmoku, Yokohama, Kanagawa Pref., 14.v.2006. Paratypes. 18 apterous viviparous females: Honmoku, 14.v.2006; Chidori-chô, Kawasaki, Kanagawa Pref., 29.v.2006 & 6.vi.2006. 3 alate viviparous females: Chidori-chô, 25.v.2006 & 6.vi.2006. 21 oviparous females: Chidori-chô, 25.v.2006 & 6.vi.2006; Honmoku, 28.v.2006. 4 males: Honmoku, 28.v.2006.

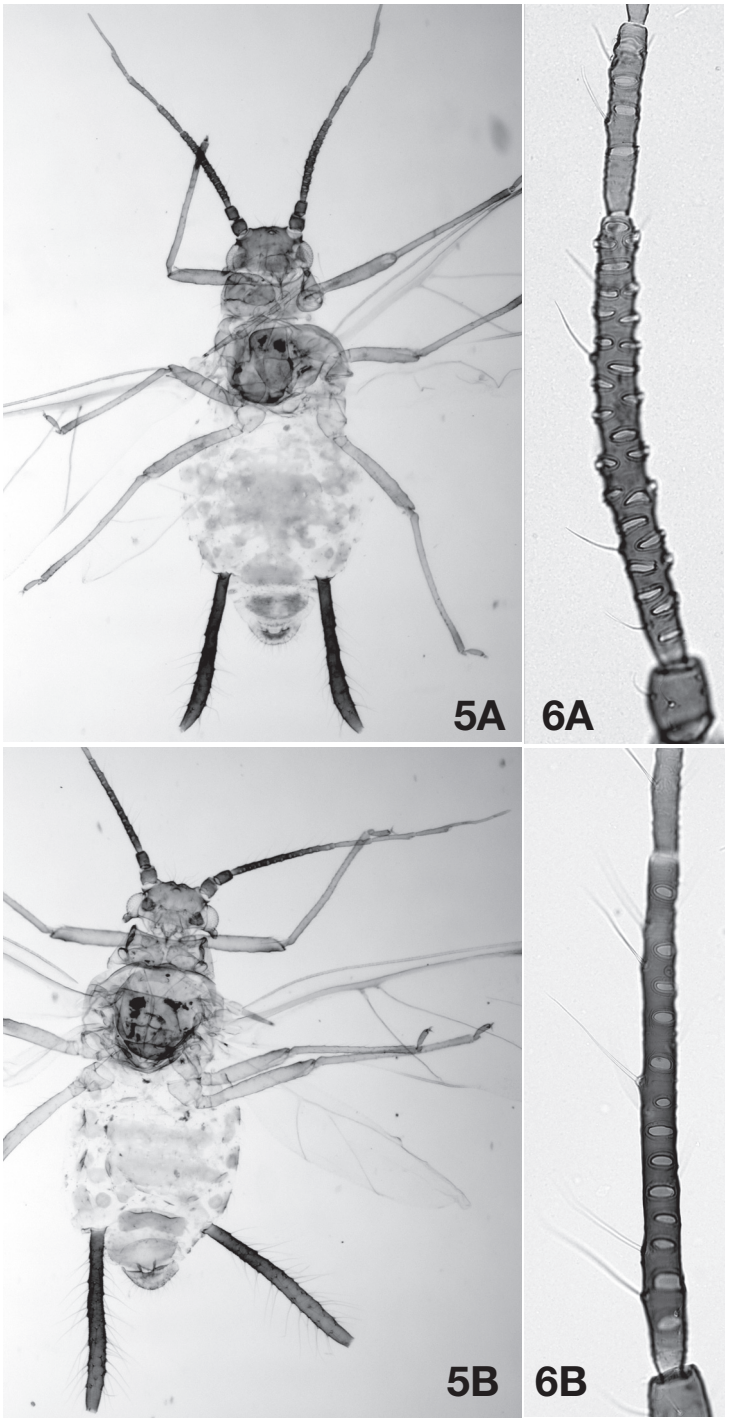
In addition to above, this species has been collected from *L. edulis* by Y. Oda from the following localities in Yokohama: Izuta-chô (1.vi.1994, apterous viviparous female and oviparous female; 10.vi.1992 male); Shinkô-chô (10.vi.1992, oviparous female); Yamashita-futô (16.vi.1992, male).

Remarks. This species has 5 setae on each first tarsal segment as in *Eutrichosiphum nigrum* Noordam. This character appears also in the species belonging to the genera *Mesotrichosiphum*, *Greenideoida* and *Pentatrichosiphum* among Greenideinae (Noordam, 1994). However, *E. nigrisiphon* differs from *E. nigrum* by yellow body color (black in *E. nigrum*), and differs from the latter species in having five-segmented antennae (four-segmented in the species of *Mesotrichosiphum*), acute ultimate rostral segment (blunt in *Greenideoida*) and hind wings with 2 oblique veins (no oblique vein in *Greenideoida*, one oblique vein in *Pentatrichosiphum*).

Etymology. The species name is derived from the Latin niger and sipho, referring to the color of siphunculi in apterous viviparous female.

Eutrichosiphum apicifuscum sp. nov.
(Figs. 1B–8B)

Apterous viviparous female (n=19). Color in life: body yellow to yellowish brown; antennae yellow to brown, the apical two segments grayish brown; eyes red; legs pale



Figs. 5, 6. Oviparous females. 5: general aspects, 6: antennae (A: segments III and VI, B: segment III). A: *Eutrichosiphum nigrisiphon* sp. nov., B: *E. apicifuscum* sp. nov.

brown; siphunculi yellowish brown on basal 2/3 and darkened toward the apex. Color in mounted specimen: body, antennae, and legs pale brown; siphunculi pale brown, but apical 1/4–1/5 dark brown.

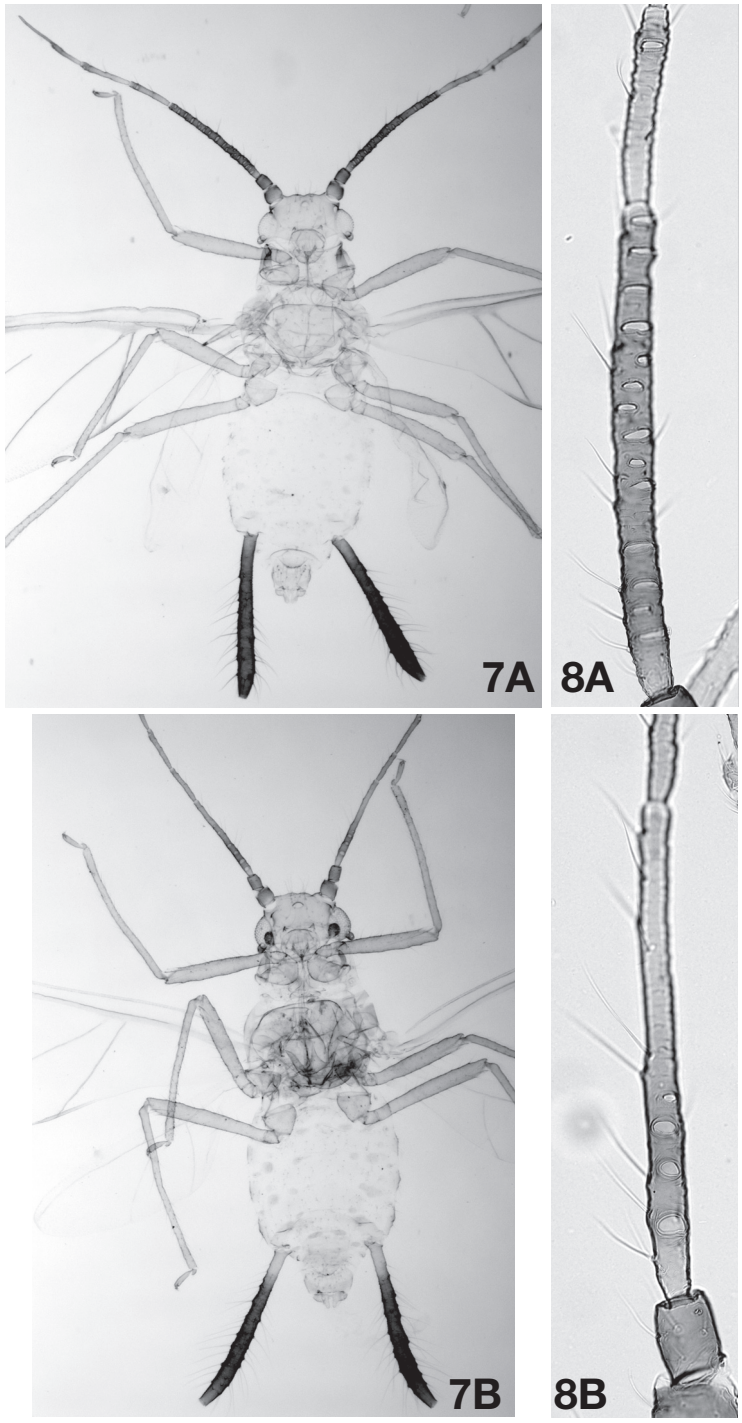
Body pear-shaped, 1.65–2.00 mm long, 1.7–2.1 times as long as its maximum width. Head smooth dorsally and ventrally, weakly sipnulated postero-ventrally; dorsum bearing 12–15 setae of different length with acuminate or furcated apices, of which the longest one is 0.09–0.12 mm long and 2.8–4.4 times as long as basal width of antennal segment III; frons slightly convex at middle; venter bearing 18–20 setae with acuminate apices on the anterior half. Antennae five- or six-segmented, 0.44–0.57 times as long as body; segments I and II smooth, flagellum imbricated; in five-segmented individuals, segments I–IV with 5–7, 4–7, 10–16, 3–4 setae, respectively, and in six-segmented ones, segment V with 3–5 setae; longest seta on segment II 0.06–0.08 mm long, 2.2–2.8 times as long as basal width of segment III, and that on segment III 0.07–0.10 mm long, 2.2–3.2 times as long as basal width of the segment; processus terminalis 0.15–0.23 mm long, 1.2–1.7 times as long as base of segment V or VI. Rostrum reaching beyond the hind coxae; ultimate rostral segment 0.16–0.20 mm long, 1.4–1.8 times as long as segment II of hind tarsus. Prothorax fused with head; dorsum including the posterior margin smooth. Meso- and metathoraces smooth dorsally, weakly or sparsely spinulated on the central part of anterior margin and on the vent-lateral areas. Femora smooth dorsally, imbricated ventrally. Tibiae smooth, but imbricated on the apical part; setae on outer side with blunt apices, but those on inner side with acuminate apices; longest seta on hind tibiae 1.1–1.6 times as long as middle width of the tibiae. First tarsal segments with 7 setae. Abdomen smooth dorsally and ventrally, weakly or sparsely spinulated on vent-lateral margin; terga bearing many setae of different length with acuminate or furcated apices; tergite VII with a pair of long spinal setae in addition to 3–5 short setae along the posterior margin; tergite VIII bearing a pair of long setae with acuminate apices; sterna bearing many setae with acuminate apices. Siphunculi more or less slender than the previous species, 0.31–0.49 mm long, 0.18–0.25 times as long as body length, 0.05–0.07 mm wide at the base, 0.08–0.11 mm wide at the middle, the ratio of the middle to base 1.5–2.0, straightened on the outer side and weakly rounded on the inner side, with many long and stiff setae and spinules on whole length. Cauda rounded, much wider than long and with 6–9 setae. Genital plate semi-circular, with 2–3 setae on its central area and 6–8 setae along the hind margin.

Measurements of one specimen with five-segmented antenna (in mm): Body 1.68; antenna 0.80, antennal segments III: IV: V 0.30: 0.15: 0.26 (0.11+0.15); ultimate rostral segment 0.18; hind femur 0.37; hind tibia 0.50; hind tarsus (segment II) 0.11; siphunculus 0.36.

Measurements of one specimen with six-segmented antenna (in mm): Body 1.73; antenna 0.99, antennal segments III: IV: V: VI 0.25: 0.12: 0.15: 0.37 (0.14+0.23); ultimate rostral segment 0.19; hind femur 0.39; hind tibia 0.55; hind tarsus (segment II) 0.11; siphunculus 0.39.

Oiviparous female (n=18). Alate. Color in life and mounted specimens as in the equivalent morph of the previous species.

Body 1.71–2.31 mm long, 2.0–2.7 times as long as its maximum width. Setae on body, antennae, legs and siphunculi with acuminate apices. Antennae six-segmented, 0.60–0.79 times as long as body; segments I–V with 6–7, 4–6, 8–17, 3–5, 3–4 setae, respectively; longest seta on segment II 0.04–0.07 mm, 1.8–3.5 times as long as basal



Figs. 7, 8. Males. 7: general aspects, 8: antennae (A: segments III and IV, B: segment III). A: *Eutrichosiphum nigrisiphon* sp. nov., B: *E. apicifuscum* sp. nov.

width of segment III, and that on III 0.10–0.13 mm, 4.8–6.5 times as long as basal width of the segment; segment III with 9–16 large oval secondary rhinaria, in a line; segment IV with 0 or 1 rhinarium. Femora imbricated. Tibiae smooth, but spinulated on the distal part; longest seta on hind tibiae 2.3–3.2 times as long as middle width of the tibiae. Abdomen with transverse bands dorsally, those on segments IV–V sometimes connected each other; tergite VII with a semicircular-shaped band, which has 5 setae. Siphunculi 0.75–0.90 mm long, 0.35–0.48 times as long as body length, the distal half swollen. Cauda with 7–10 setae. Genital plate with many long setae on the whole surface.

Measurements of one specimen (in mm): Body 2.15; antenna 1.40, antennal segments III: IV: V: VI 0.50: 0.18: 0.21: 0.40 (0.15+0.25); ultimate rostral segment 0.16; hind femur 0.54; hind tibia 0.82; hind tarsus (segment II) 0.11; siphunculus 0.89.

Male (n=4). Alate. Color in life and mounted specimens as in the equivalent morph of the previous species. Differs from the oviparous female as follows:

Body rather slender, 1.60–1.78 mm long, 2.5–3.2 times as long as its maximum width. Antennae 0.73–0.78 times as long as body; segment III with 4–6 secondary rhinaria on basal 1/2–1/3. Cauda triangular.

Measurements of one specimen (in mm): Body 1.75; antenna 1.37, antennal segments III: IV: V: VI 0.44: 0.19: 0.22: 0.41 (0.18+0.23); ultimate rostral segment 0.16; hind femur 0.54; hind tibia 0.79; hind tarsus (segment II) 0.11; siphunculus 0.70.

Specimens examined. Holotype. An apterous viviparous female: 12.v.2006, Chidori-chô, Kawasaki, Kanagawa Pref. Paratypes. 16 apterous viviparous females: 12, 16, 20, 29.v.2006 & 11.v.2007, Chidori-chô. 18 oviparous females and 4 males: 16, 20 & 29.v.2006, Chidori-chô.

Remarks. This species is similar to *E. nigrisiphon* described above and *Eutrichosiphum flavum* (Takahashi) in the general appearance, but differs from *E. nigrisiphon* in the following characters: (1) in all morphs, first tarsal segments with 7 setae (5 setae in *E. nigrisiphon*), (2) in the apterous viviparous female, the posterior margin of prothorax smooth (spinulated), the vent-lateral margin of abdomen weakly or sparsely spinulated (strongly spinulated), and siphunculi darkened toward the apex (siphunculi blackish on whole length), (3) in the alate morphs, antennae with large oval secondary rhinaria (narrow transversely rhinaria), and differs from *E. flavum* in having siphunculi darkened toward the apex and antennae with processus terminalis longer than the base of apical segment (siphunculi yellow and antennae with processus terminalis as long as the base in *E. flavum*, after Takahashi, 1941).

Etymology. The species name is derived from the Latin apicalis and fuscus, referring to the color of siphunculi in apterous viviparous female.

Biology

Above two new species resemble each other not only in their general appearance but also in the life cycle. My field observation conducted at Kawasaki and Yokohama in 2006 and 2007 showed that apterous viviparous females of these two species appeared on the underside of young leaves of the host plant from early May, and that the oviparous females and males appeared from middle to late May onward to early June. After early June in *E. nigrisiphon* and middle June in *E. apicifuscum*, however, the viviparous forms of them were not found on the host plant at all, although the plant continued to bear many young leaves on the lammas shoots during summer. This observation suggests that they have an abbreviated life cycle, probably consisting of two or three generations as in

Allotrichosiphum kashicola (Kurisaki) (Takahashi & Sorin, 1959).

The collection sites of *E. nigrisiphon* and *E. apicifuscum*, Chidori-chô, Izuta-chô, Shinko-chô, Yamashita-futô and Honmoku, are located in harbor or industrial areas that have been developed along the Tokyo Bay. The host plant *L. edulis* was artificially transplanted into there as a roadside tree at least 20 years ago. These facts suggest that the true origins of these aphid species are not in such areas but probably in certain natural distribution area of *L. edulis* in Japan. Further studies on the distribution area are needed to confirm the true origin.

Acknowledgments

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