



HOKKAIDO UNIVERSITY

Title	A REVISION OF THE GENUS GREENIDEA SCHOUTEDEN IN JAPAN (HOMOPTERA: APHIDIDAE: GREENIDEINAE)
Author(s)	Sugimoto, Shun'ichiro; Sugimoto, Shun'ichiro
Citation	Insecta matsumurana. New series : journal of the Faculty of Agriculture Hokkaido University, series entomology., 64, 53-79
Issue Date	2008-03
Doc URL	https://hdl.handle.net/2115/33008
Type	departmental bulletin paper
File Information	53-79.pdf



**A REVISION OF THE GENUS *GREENIDEA* SCHOUTEDEN IN JAPAN
(HOMOPTERA: APHIDIDAE: GREENIDEINAE)**

By SHUN'ICHIRO SUGIMOTO

Abstract

SUGIMOTO, S. 2008. A revision of the genus *Greenidea* Schouteden (Homoptera: Aphididae: Greenideinae) in Japan. *Ins. matsum. n. s.* 64: 53–79, 9 figs.

Japanese species of the genus *Greenidea* Schouteden are revised. Ten species are recognized, of which one (*G. prinicola*) is new to science and one (*G. myricae*) new to Japan. Nine species except *G. isensis* are described and illustrated to clarify the identity of each species. A key to the species is provided for apterous and alate viviparous females.

Author's address. Kawasaki Branch, Yokohama Plant Protection Station, 12-3 Chidori-cho, Kawasaki-ku, Kawasaki, 210-0865 Japan.

INTRODUCTION

The genus *Greenidea* comprises about 45 species, which are recorded mainly from East Asia (Blackman & Eastop, 2000). From Japan, six species (*G. carpini*, *G. ficicola*, *G. formosana*, *G. kuwanai*, *G. nipponica* and *G. okajimai*) were listed in “A Check List of Japanese Insects” (Hirashima, 1989). Subsequently, one species (*G. nigra*) was recorded from Moritsu collection preserved in Yamaguchi University (Hamasaki *et al.*, 2000), and one (*G. isensis*) was described as new to science (Sorin & Agarwala, 2002). Moreover, some researchers including Raychaudhuri (1956) pointed out that there are two other species (*G. anonae* and *G. brideliae*) in Japan.

However, some faunistic problems and taxonomic confusion still remain on the *Greenidea* species recorded or described from Japan. Firstly, the records of *G. anonae* and *G. brideliae* from Japan are doubtful, because no collection data of both species from Japan have hitherto been published. Secondly, the identity of *G. kuwanai* is unclear. For example, the number of secondary rhinaria on the 3rd antennal segment of the alate viviparous female, a key character for species identity, has not been stable among authors: 8–15 (Kurisaki, 1920; Okamoto & Takahashi, 1927; Shinji, 1941; Raychaudhuri, 1956), or 25–30 (Okajima, 1908; Maki, 1917; Takahashi, 1962; Sorin, 1976). This suggests that *G. kuwanai* might be confused with several related species.

Since 2000, I have conducted a taxonomic study of the Japanese species of *Greenidea*. As a result, ten species were recognized from Japan, of which one species is new to science and one new to Japan. Moreover, *G. anonae* and *G. brideliae* should be excluded from the Japanese fauna of *Greenidea* for the reason mentioned later. In this paper, I describe and illustrate nine species except *G. isensis*, which was recently described in detail, and provide keys to all the ten species.

MATERIALS AND METHODS

Most of the specimens examined in this study were collected by me, unless otherwise stated, and they were mounted on microscope slides by Martin's (1983) method. The types and reference specimens deposited in the collection of the following institutions were examined: Laboratory of Systematic Entomology, Hokkaidô University (SEHU), Laboratory of Applied Entomology, Utsunomiya University (AEUU), Department of Biological and Environmental Sciences, Yamaguchi University (BSYU), Entomological Laboratory, Wageningen University (ELWU), Natural History Museum, London (BMNH), and US National Museum, Washington DC (USNM).

Morphological terms and measurements of body including appendages mainly follow Raychaudhuri (1956) except for “ultimate rostral segment” used instead of “rostral segments 4+5.”

DESCRIPTION

Genus *Greenidea* Schouteden

Greenidea Schouteden, 1905: 181; Takahashi, 1931: 27; Raychaudhuri, 1956: 23; Ghosh & Agarwala, 1993: 168; Noordam, 1994: 63 & 83; Blackman & Eastop, 1994: 708.

Type species: *Siphonophora artocarpi* Westwood, 1890.

The genus *Greenidea* is distinguished from other genera belonging to Greenideinae by the combination of the following characters: (1) antennae 6-segmented; (2) siphunculi elongated with many long setae; (3) cauda rounded with a median processus; (4) first tarsal chaetotaxy 7: 7: 7.

This genus is divided into four subgenera: *Paragreenidea* Raychaudhuri, 1956, *Neogreenidea* Raychaudhuri, Ghosh, Banerjee & Ghosh, 1973, *Trichosiphum* Pergande, 1906 and the nominate subgenus *Greenidea* (Raychaudhuri & Chatterjee, 1980; Ghosh, 1987; Ghosh & Agarwala, 1993). According to these authors, of the species recorded from Japan, *G. brideliae* and *G. ficicola* belong to the subgenus *Greenidea*, which is characterized by the siphunculi reticulated almost on the whole length except for the apical part in the apterous viviparous female, and the remaining species belong to the subgenus *Trichosiphum*, which is characterized by the siphunculi reticulated only near the base in the same morph. However, in case of alate viviparous female, there is no difference in the extent of reticulation on the siphunculi between the two subgenera. Moreover, as mentioned below, among the apterous viviparous females of *G. carpini*, *G. formosana* and *G. myricae*, which are regarded as members of *Trichosiphum*, I found some individuals with the siphunculi reticulated on the basal 1/3–1/2. These facts suggest that the extent of reticulation is inadequate as a character to distinguish the two subgenera. In this paper, therefore, all the ten species are treated as members belonging to the genus *Greenidea*.

Greenidea carpini Takahashi
(Fig. 1A–H)

Greenidea (Trichosiphum) carpini Takahashi, 1963: 159; Eastop & Hille Ris Lambers, 1976: 210; Blackman & Eastop, 1994: 709; Remaudière & Remaudière, 1997: 174.

Apterous viviparous female (n=26). Body 1.57–3.08 mm long, 1.6–2.0 times as long as its maximum width. Head (Fig. 1A) smooth dorsally, with 10–15 setae. Antennae (Fig. 1F) 0.53–0.75 times as long as body; processus terminalis 1.7–2.5 times as long as the base of 6th; 3rd–6th imbricated; 3rd–5th with 10–19, 4–8 and 4–6 setae, respectively; the longest seta on 3rd 3.3–5.0 times as long as the basal width of this segment. Ultimate rostral segment 1.3–2.0 times as long as 2nd segment of hind tarsus. Siphunculi (Fig. 1B) reticulated at the base (in some larger individuals, reticulated on the basal 2/5); 0.19–0.27 times as long as body; 3.3–5.5 times and 6.1–9.5 times as long as its maximum and basal width, respectively. Cauda with 8–11 (mostly 8) setae. Genital plate (cf. Fig. 1E) with 2 setae on its central area and with 4–6 long setae on each side and 3–9 short ones along the central part of the hind margin.

Measurements of one specimen (mm): Body 2.05; antenna 1.35, antennal segments III: IV: V: VI 0.33: 0.17: 0.17: 0.55 (0.17+0.38); ultimate rostral segment 0.24; hind femur 0.46; hind tibia 0.66; hind tarsus (2nd segment) 0.13; siphunculus 0.50.

Oviparous female (n=19). Alate. Body 1.53–2.38 mm long, 2.0–2.6 times as long as its maximum width. Antennae 0.8–1.0 times as long as body; 3rd segment (cf. Fig. 1G) with 6–16 secondary rhinaria on the basal 2/3. Abdomen with transverse bands dorsally, those on 3rd–5th segments connected to each other; 7th tergite with a semicircular band (cf. Fig. 1D), which has 6–9 setae; 8th tergite with 8–17 setae. Siphunculi 0.58–0.69 times as long as body. Genital plate, anal plate and cauda large and with many setae.

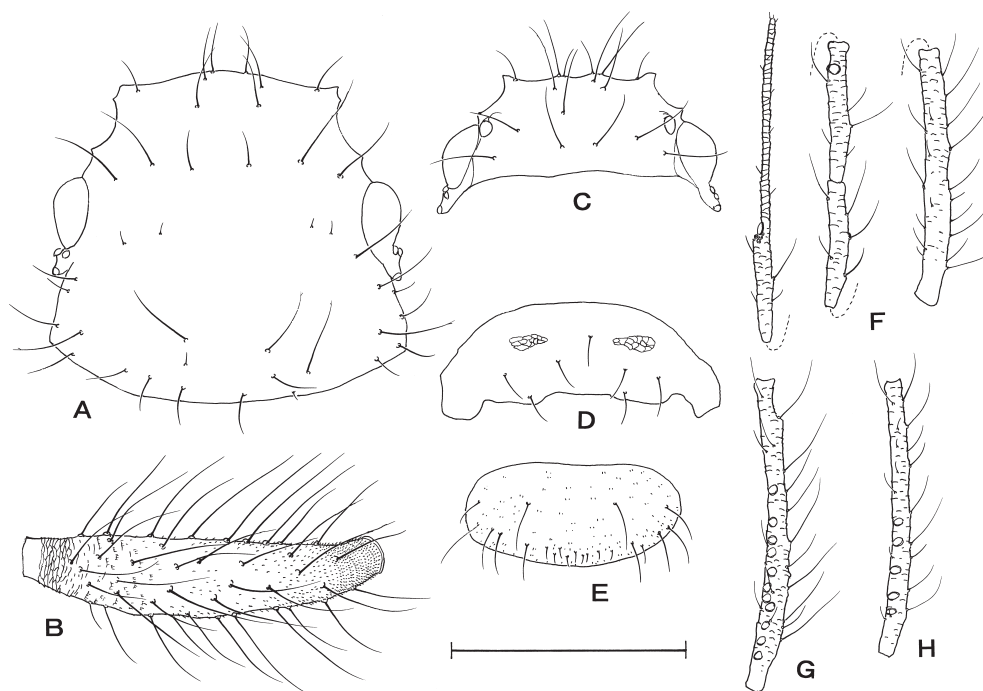


Fig. 1. *G. carpini*. A: head and prothorax (apterous viviparous female; apt.), B: siphunculus (apt.), C: head (altate viviparous female; alt.), D: dorsal band between siphunculi (alt.), E: genital plate (alt.), F: 3rd to 6th antennal segments (apt.), G: 3rd antennal segment (alt.), H: 3rd antennal segment (male). Scale: 40 μ m.

Cauda without a median processus.

Measurements of one specimen (mm): Body 2.28, antenna 2.07, antennal segments III: IV: V: VI 0.58: 0.30: 0.29: 0.74 (0.24+0.50); ultimate rostral segment 0.24; hind femur 0.72; hind tibia 1.10; hind tarsus (2nd segment) 0.14; siphunculus 1.44.

Alate viviparous female (n=2). This morph of the species is described here for the first time. Similar to the oviparous female, but differs from the latter in having 2 setae on the 8th abdominal tergite and fewer setae on the genital plate (Fig. 1E), anal plate and cauda, and in the presence of a median processus on cauda.

Measurements of one specimen (mm): Body 2.18, antenna 1.89, antennal segments III: IV: V: VI 0.55: 0.28: 0.26: 0.65 (0.22+0.43); ultimate rostral segment 0.26; hind femur 0.63; hind tibia 1.01; hind tarsus (2nd segment) 0.15; siphunculus 1.36.

Male (n=4). Alate. Differs from the alate viviparous female mainly in the following characters: body 1.59–1.74 mm long; 3rd antennal segment (Fig. 1H) with 5–8 secondary rhinaria on the basal half; abdomen with pale dorsal bands, which are not connected to each other; cauda triangular.

Measurements of one specimen (mm): Body 1.71, antenna 1.58, antennal segments III: IV: V: VI 0.43: 0.21: 0.20: 0.60 (0.19+0.41); ultimate rostral segment 0.22; hind femur 0.53; hind tibia 0.84; hind tarsus (2nd segment) 0.12; siphunculus 1.04.

Specimens examined. Apterous viviparous female: Utsunomiya, Tochigi Pref. (5. vii. 1981 & 11. v. 1985, *Carpinus laxiflora*, S. Takahashi leg.); Kashiwa, Chiba Pref. (26. iv. 2001, ex *Carpinus tschonokii*, Y. Matsumoto leg.); Hadano, Kawasaki & Hiratsuka, Kanagawa Pref. (6, 13 & 19. v. 2001, ex *C. tschonokii*). Oviparous female: Utsunomiya (11. v. 1985, *C. laxiflora*, S. Takahashi

leg.); Kashiwa (as above); Hadano (4. v. 2003, ex *C. tschonokii*); Hiratsuka (6. v. 2003, ex *C. tschonokii*). Alate viviparous female: Utsunomiya (11. v. 1985, *C. laxiflora*, S. Takahashi leg.); Hiratsuka (6. v. 2003, ex *C. tschonokii*). Male: Hiratsuka (6. v. 2003, ex *C. tschonokii*).

Host plants. *Carpinus* spp. (including *C. laxiflora* and *C. tschonokii*).

Distribution. Japan (Honshū).

Remarks. This species is similar to *G. okajimai* morphologically and in the sexual morphs appearing from late April to May, but differs from the latter in the base of the 6th antennal segment shorter, being 0.15–0.21 mm (0.21–0.25 mm in *G. okajimai*) in the apterous viviparous female and 0.18–0.25 mm (0.27–0.31 mm) in the alate viviparous female.

Greenidea ficicola Takahashi
(Fig. 2A–G)

Trichosiphum formosanum Maki, 1917 (1916): 13 (partim).

Greenidea ficicola Takahashi, 1921: 66; Takahashi, 1923: 116, 1930: 322, 1931: 28, 1936: 596 & 1950: 588; Sugimoto, 1995:14; Halbert, 2004:160.

Greenidea (Greenidea) ficicola: Raychaudhuri, 1956: 35; Takahashi, 1962: 66; Eastop & Hille Ris Lambers, 1976: 208; Liao, 1978: 350; Ghosh & Agarwala, 1993: 181; Blackman & Eastop, 1994: 709, 2000: 277; Noordam, 1994: 64; Remaudière & Remaudière, 1997: 174; Tao, 1991: 116.

Apterous viviparous female (n=18). Color in life: body pale brown; head, antennae and legs pale brown; siphunculi brown. Color in cleared specimens: body pale brown; abdominal large ventral plate brown; siphunculi pale brown, the apical 1/4 darker.

Body 1.82–2.46 mm long, 1.7–2.0 times as long as its maximum width, with many long setae; most of the dorsal setae stout with branched or multifid apices, and setae on 8th abdominal tergite thin with fine apices. Head (Fig. 2A) with 9–12 long dorsal setae on the anterior half and with 2–7 short dorsal setae on the posterior part. Antennae (Fig. 2F) 0.9–1.1 times as long as body; 3rd segment as long as head width across eyes, 0.51–0.63 times as long as 6th; process terminalis 2.0–2.5 times as long as the base of 6th; 3rd–6th imbricated; 3rd–5th with 18–28 (mostly more than 20), 7–16 and 7–13 setae, respectively; the longest seta on 3rd 2.7–3.4 times as long as the basal width of this segment. Ultimate rostral segment 1.6–2.0 times as long as 2nd segment of hind tarsus, 0.69–0.93 times as long as the base of 6th antennal segment. Femora imbricated, with a pair of rather stout subapical setae on the anterior margin. Tibiae striate-imbricated. Abdomen smooth dorsally and ventrally. Siphunculi (Fig. 2B) reticulated except for the apical part, 0.30–0.37 times as long as body, 6.4–8.8 times and 10.0–14.2 times as long as its maximum width and basal width, respectively. Cauda with 7–11 (mostly 8) setae. Genital (cf. Fig. 2E) plate with 2 setae on its central area and with 2–4 long setae on each side and 2–6 short setae along the central part of the hind margin.

Measurements of one specimen (mm): Body 2.25; antenna 2.11, antennal segments III: IV: V: VI 0.47: 0.30: 0.32: 0.87 (0.26+0.61); ultimate rostral segment 0.22; hind femur 0.60; hind tibia 0.85; hind tarsus (2nd segment) 0.12; siphunculus 0.70.

Alate viviparous female (n=4). Differs from the apterous viviparous female mainly in coloration: Color in cleared specimens: head, antennae and thorax brown; 3rd–7th abdominal tergites brown; siphunculi dark brown.

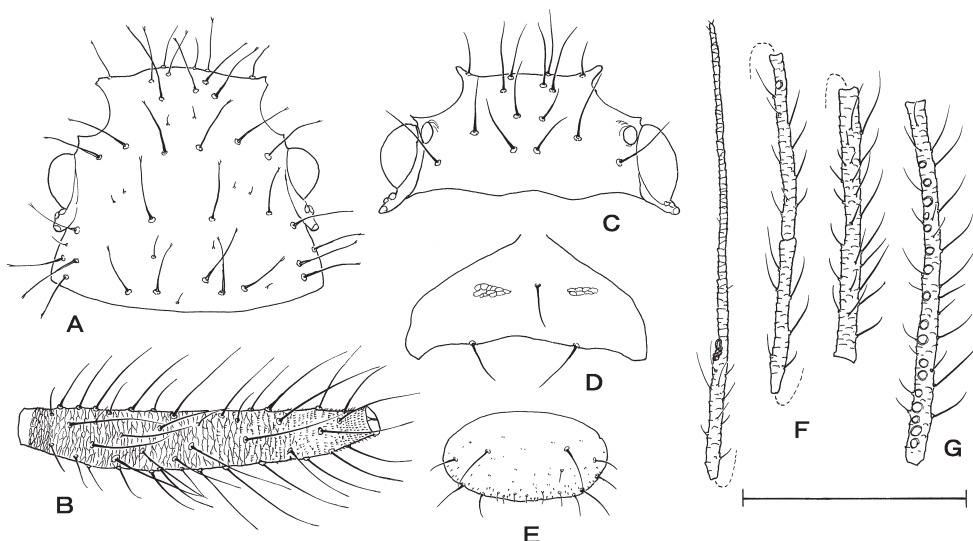


Fig. 2. *G. ficicola*. (Symbols and scale as Fig. 1).

Body 2.15–2.28 mm long, 2.0–2.3 times as long as its maximum width, bearing many setae with fine apices. Antennae 1.1 times as long as body; 3rd segment (Fig. 2G) with 16–24 secondary rhinaria on the basal 7/9, which are arranged with regulated intervals. Abdomen with transverse bands dorsally, those on 3rd and 4th segments connected to each other; 7th tergite with a triangular or semicircular band (Fig. 2D), which has 3 setae (one anterior seta in the center and 2 posterior setae on the hind margin). Siphunculi weakly reticulated, almost cylindrical, 0.59–0.69 times as long as body.

Measurements of one specimen (mm): Body 2.18; antenna 2.46, antennal segments III: IV: V: VI 0.64: 0.37: 0.38: 0.91 (0.26+0.65); ultimate rostral segment 0.25; hind femur 0.73; hind tibia 1.17; hind tarsus (2nd segment) 0.12; siphunculus 1.50.

Specimens examined. Apterous viviparous female: Amami-Ōshima Is., Kagoshima Pref. (6. vi. 1960, ex *Ficus retusa* (= *F. microcarpa*), R. Takahashi leg., SEHU); Naha, Okinawa Is., Okinawa Pref. (13. i. 1984, ex *Ficus virgata*; 13. vi. 2002, ex *F. microcarpa*, M. Masumoto leg.); Ishigaki Is., Okinawa Pref. (6–25. i. & 2. ii. 2002, ex *F. septica*, T. Yamazaki leg.; 3. ii. 2002, ex *F. microcarpa*, T. Yamazaki leg.); Iriomote Is., Okinawa Pref. (9. ii. 1986, ex *Ficus septica*). Alate viviparous female: Amami-Ōshima Is. (as above); Ishigaki Is. (25. i. 2002, ex *F. septica*, T. Yamazaki leg.; 3. ii. 2002, ex *F. microcarpa*, T. Yamazaki leg.).

Host plants. *Ficus* spp. (including *F. microcarpa*, *F. septica* & *F. virgata*; *F. thunbergii* (after Sorin, 1994)).

Distribution. Japan (Ryūkyū; Honshū (Sorin, 1994)); India, Bangladesh, eastern Siberia, China, Taiwan, Philippines, Indonesia (Java; Sumatra), Malaya & Australia (Blackman & Eastop, 1994); USA (Halbert, 2004).

Remarks. The Japanese specimens examined differ slightly from the Javanese ones described by Noordam (1994) in having more setae on the antennae (the Javanese specimens in parentheses): 18–28 (14–21) setae on the 3rd segment and 7–16 (5–10) on the 4th in the apterous viviparous female, 19–23 (14–19) setae on the 3rd and 11–14 (5–9) on the 4th in the alate viviparous female.

Greenidea formosana (Maki)
(Fig. 3A–G)

Trichosiphum formosanum Maki, 1917 (1916): 13 (partim).

Greenidea formosanum (sic!): Takahashi, 1921: 65 & 1923: 115.

Greenidea formosana: Takahashi, 1930: 322 & 1931: 29; Sugimoto, 1995: 14.

Greenidea (*Trichosiphum*) *formosana*: Raychaudhuri, 1956: 53; Eastop & Hille Ris Lambers, 1976: 210; Blackman & Eastop, 1994: 710, 2000: 277; Remaudière & Remaudière, 1997: 174; Tao, 1991: 118.

Greenidea (*Trichosiphum*) *formosana formosana*: Ghosh & Agarwala, 1993: 217.

Greenidea psidii van der Goot, 1917: 138 (not seen); Takahashi, 1936: 596 & 1937a: 92.

Greenidea (*Trichosiphum*) *psidii*: Noordam, 1994: 106; Halbert, 2004: 159.

Apterous viviparous female (n=28). Color in life: body pale brown with a dark brown band on the anterior part of dorsal abdomen; siphunculi dark brown. Color in cleared specimens: body pale brown; abdominal large ventral plate brown but paler on mesial area; siphunculi brown.

Body 1.57–2.40 mm long, 1.5–1.9 times as long as its maximum width, with many long setae; most of the dorsal setae stout with branched or multifid apices, and setae on 8th abdominal tergite thin with fine apices. Head (Fig. 3A) with 10–14 long dorsal setae on the anterior half and with 4–8 short dorsal setae on the posterior part. Antennae (Fig. 3F) 0.84–1.30 times as long as body; 3rd segment as long as head width across eyes, 0.48–0.68 times as long as 6th; processus terminalis 1.9–2.8 times as long as the base of 6th; 3rd–6th imbricated; 3rd–5th with 13–21 (mostly less than 20), 6–10 and 5–8 setae, respectively; the longest seta on 3rd 2.8–3.7 times as long as the basal width of this segment. Ultimate rostral segment 1.8–2.2 times as long as 2nd segment of hind tarsus, 0.74–1.00 times as long as the base of the 6th antennal segment. Femora imbricated, with a pair of rather stout subapical setae on the anterior margin. Tibiae striate-imbricated. Abdomen smooth dorsally and ventrally. Siphunculi (Fig. 3B) reticulated at the base (in some individuals, reticulated on the basal half), 0.29–0.42 times as long as body, 5.7–7.8 times and 8.6–11.7 times as long as its maximum width and basal width, respectively. Cauda with 7–11 (mostly 8) setae. Genital plate (cf. Fig. 3E) with 2 setae on its central area and with 2–5 long setae on each side and 2–7 short ones along the central part of the hind margin.

Measurements of one specimen (mm): Body 2.10; antenna 2.03, antennal segments III: IV: V: VI 0.48: 0.24: 0.30: 0.86 (0.26+0.60); ultimate rostral segment 0.26; hind femur 0.59; hind tibia 0.85; hind tarsus (2nd segment) 0.12; siphunculus 0.62.

Alate viviparous female (n=1). Differs from the apterous viviparous female mainly in coloration: Color in cleared specimen: head, antennae and thorax brown; 3rd–7th abdominal tergites brown; siphunculi dark brown.

Body with filiform setae. Antennae with 3rd segment (Fig. 3G) bearing 23–26 secondary rhinaria, which are close to each other. Abdomen with transverse bands dorsally, those on 3rd–5th segments connected to each other; 7th tergite with a semicircular band (Fig. 3D), which has 3 setae (one anterior seta in the center and 2 posterior setae on the hind margin). Siphunculi weakly reticulated except for apical part, almost cylindrical, 0.69 times as long as body.

Measurements of one specimen (mm): Body 2.30; antennal segments III: IV: V: VI

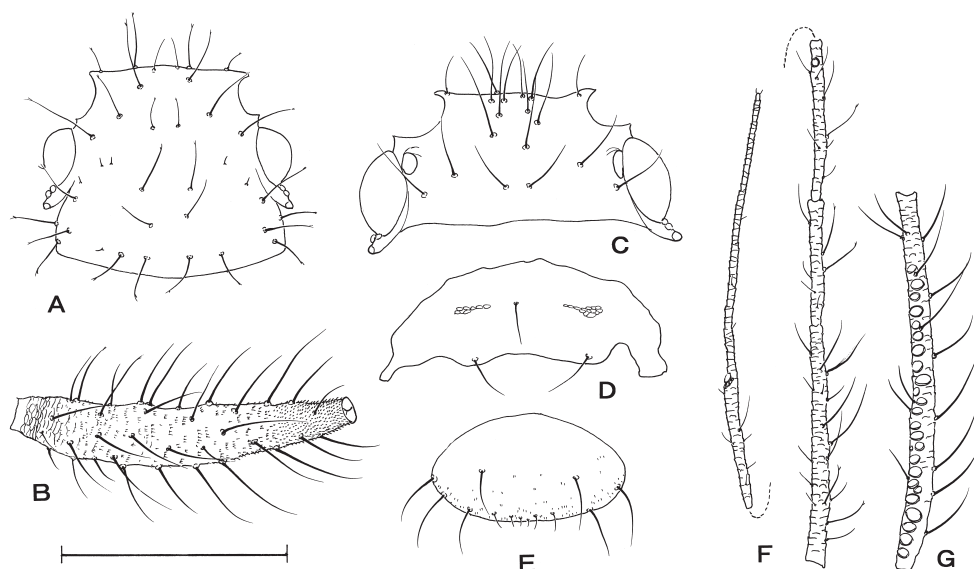


Fig. 3. *G. formosana*. (Symbols and scale as Fig. 1).

0.75: 0.35: 0.44, (lacking); ultimate rostral segment 0.25; hind femur 0.74; hind tibia 1.18; hind tarsus (2nd segment) 0.12; siphunculus 1.60.

Specimens examined. All collected from *Psidium guajava*. Apterous viviparous female: Chichi-jima Is., Bonin Islands (9. iii. 2002, J. Yamada leg.; 9. i. 2004); Kita-nakagusuku, Okinawa Is., Okinawa Pref. (22. v. 1984); Naha, Okinawa Is. (23. vi. 2003, N. Uchida leg.); Tomishiro, Okinawa Is. (25. vi. 2003, N. Uchida leg.); Ishigaki Is., Okinawa Pref. (20. i. 2002, T. Yamazaki leg.). Alate viviparous female: Ishigaki Is. (as above).

Host plants. *Psidium guajava*. In countries outside Japan this aphid is recorded from the following plants: *Eugenia jambos* (Takahashi, 1937a), *Eugenia operculata* (Takahashi, 1936), *Eugenia spicata* & *Melaleuca leucadendron* (Raychaudhuri, 1956), *Rhamnus nepalensis* (Ghosh & Agrawala, 1993) & *Rhodomyrtus tomentosa* (Takahashi, 1923).

Distribution. Japan (the Bonin Islands; Ryûkyû); Bangladesh, China, India, Indonesia (Java; Sumatra), Nepal, Philippines & Taiwan (Blackman & Eastop, 1994); USA (Halbert, 2004).

Remarks. The male of this species is described under the name *G. psidii* by Takahashi (1936). This species is similar to *G. ficicola*, but is distinguishable from the latter by the range of reticulation on the siphunculi in the apterous viviparous female and by the number and arrangement of secondary rhinaria on the 3rd antennal segment in the alate viviparous female. This species is recorded for the first time from the Bonin Islands.

Greenidea isensis Sorin & Agarwala

Greenidea (Trichosiphum) isensis Sorin & Agarwala, 2002: 27.

Host plants. *Quercus gilva* (after Sorin & Agarwala, 2002).

Distribution. Japan (Honshû).

Remarks. I have not examined this species. According to the original description given by Sorin & Agarwala (2002), this species is readily distinguished from any other

congeneric species in having blackish or dark brown spots on the legs and siphunculi.

Greenidea kuwanai (Pergande)
(Fig. 4A–H)

Trichosiphum kuwanai Pergande, 1906: 209; Okajima, 1908: 20 (partim); Essig & Kuwana, 1918: 97; Kurisaki, 1920: 397 (partim).

Greenidea kuwanai: Takahashi, 1925: 30 & 1931: 30; Okamoto & Takahashi, 1927: 140.

Greenidea (Trichosiphum) kuwanai: Sorin 1976: 22 (partim); Tao, 1991: 119.

Greenidea (Trichosiphum) nipponica (nec Suenaga): Paik, 1972: 554 (partim); Sorin, 1976: 21 (partim).

Apterous viviparous female (n=40). Color in life: body dark brown, head and distal half of abdomen dark reddish brown; siphunculi reddish brown, both ends blackish brown. Color in cleared specimens: body dark brown; antennae pale brown, the basal two segments and distal two segments darker; legs dark brown, distal half of tibiae paler; siphunculi dark brown.

Body 2.03–3.00 mm long, 1.4–1.7 times as long as its maximum width, bearing numerous dorsal setae with fine apices. Head (Fig. 4A) smooth dorsally, with 20–33 setae; the longest seta 2.4–3.3 times as long as the basal width of 3rd antennal segment. Antennae (Fig. 4F) 6-segmented, 0.56–0.73 times as long as body; 3rd segment 0.8–1.2 times as long as head width across eyes, 1.1–1.3 times as long as 6th; processus terminalis 1.5–2.4 times as long as the base of 6th; 3rd smooth except on the apical 1/2–1/3 which are weakly imbricated, 4th–6th imbricated; 3rd–5th with 31–54, 4–12 and 4–8 setae, respectively; the longest seta on 3rd 2.7–4.0 times as long as the basal width of this segment. Ultimate rostral segment 1.6–2.1 times as long as 2nd segment of hind tarsus. Abdomen smooth dorsally and ventrally, but sometimes weakly spinulose ventrally; 8th tergite with 2 setae. Siphunculi (Fig. 4B) reticulated at the base, 0.20–0.29 times as long as body, 0.8–1.3 times as long as head width across eyes, 3.7–5.5 times and 5.5–8.0 times as long as its maximum and basal width, respectively. Cauda with 5–9 setae. Genital plate (cf. Fig. 4E) with 5–23 setae on its central area and with 5–10 long setae on each side and 6–14 short ones along the central part of the hind margin.

Measurements of one specimen (mm): Body 2.61; antenna 1.59, antennal segments III: IV: V: VI 0.62: 0.17: 0.18: 0.46 (0.16+0.30); ultimate rostral segment 0.25; hind femur 0.70; hind tibia 1.04; hind tarsus (2nd segment) 0.13; siphunculus 0.63.

Alate viviparous female (n=20). Differs from the apterous viviparous female mainly in coloration: Color in life: head and thorax black; abdomen dark brown; antennae and siphunculi black. Color in cleared specimens: head and thorax dark brown; dorsal patches and marginal sclerites on abdominal segments brown.

Body elongated, 2.28–3.30 mm long, 1.9–2.2 times as long as its maximum width. Antennae 0.63–0.71 times as long as body; 3rd segment (Fig. 4G) with 11–18 circular to slightly oval secondary rhinaria on the basal 2/3–3/4. Abdomen with transverse bands dorsally, those on 3rd–6th segments connected to each other; 7th tergite with a semicircular band (Fig. 4D), which has 7–14 setae. Siphunculi weakly reticulated except for the apical part, almost cylindrical, 0.43–0.54 times as long as body.

Measurements of one specimen (mm): Body 2.80; antenna 1.89, antennal segments III: IV: V: VI 0.74: 0.22: 0.21: 0.55 (0.18+0.37); ultimate rostral segment 0.26; hind

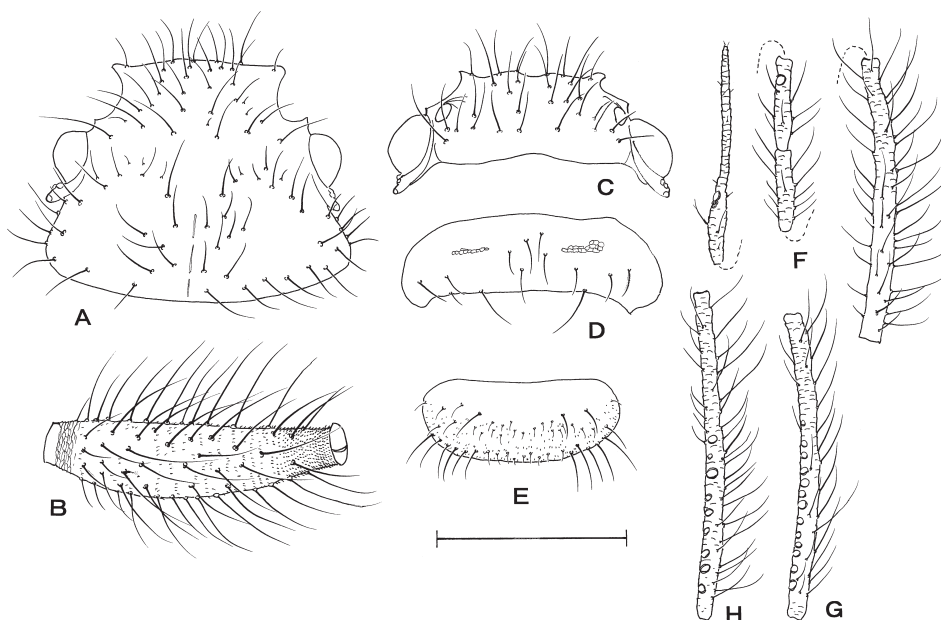


Fig. 4. *G. kuwanai*. (Symbols and scale as Fig. 1).

femur 0.77; hind tibia 1.30; hind tarsus (2nd segment) 0.15; siphunculus 1.35.

Oviparous female (n=18). Alate. Much similar to the alate viviparous female, but differs from the latter in having 2–12 setae (usually more than 4) on the 8th abdominal tergites and more setae on the genital plate, anal plate and cauda, which are larger than those of the alate viviparous female. Cauda without a median processus.

Measurements of one specimen (mm): Body 2.95; antenna 1.98, antennal segments III: IV: V: VI 0.75: 0.24: 0.24: 0.57 (0.19+0.38); ultimate rostral segment 0.26; hind femur 0.80; hind tibia 1.35; hind tarsus (2nd segment) 0.14; siphunculus 1.54.

Male (n=33). This morph is described here for the first time. Alate. Differs from the alate viviparous female mainly in coloration: Color in life: head and thorax brown; abdomen pale green.

Body rather slender, 1.86–2.47 mm long, 2.3–2.8 times as long as its maximum width. Antennae 0.71–0.83 times as long as body; 3rd segment (Fig. 4H) with 7–14 secondary rhinaria on basal 1/2–2/3. Abdomen pale with brown intersegmental areolations on pleural and submarginal areas; 3rd–5th tergites without transverse bands; 7th tergite with a semicircular band bearing 4–8 setae. Cauda triangular, sometimes without a median processus.

Measurements of one specimen (mm): Body 2.14; antenna 1.76, antennal segments III: IV: V: VI 0.63: 0.22: 0.23: 0.53 (0.18+0.35); ultimate rostral segment 0.25; hind femur 0.74; hind tibia 1.12; hind tarsus (2nd segment) 0.13; siphunculus 1.22.

Fundatrix (n=4). Apterous. Similar to the apterous viviparous female, but differs in the following characters: antennae 0.50–0.52 times as long as body; 3rd antennal segment (0.52–0.55 mm) and siphunculi (0.60–0.65 mm) shorter than those of the same sized apterous viviparous female (0.57–0.73 mm and 0.69–0.80 mm, respectively); abdomen strongly convex.

Measurements of one specimen (mm): Body 2.92; antenna 1.50, antennal segments III: IV: V: VI 0.52: 0.16: 0.20: 0.44 (0.18+0.26); ultimate rostral segment 0.27; hind

femur 0.69; hind tibia 1.03; hind tarsus (2nd segment) 0.16; siphunculus 0.60.

Specimens examined. Apterous viviparous female: Sendai, Miyagi Pref. (16. vi. 1999, ex *Quercus acutissima*, N. Yamaguchi leg.); Nishigahara, Tōkyō (29. vi. 1905 & 2. viii. 1905, ex *Q. serrata*, I. Kuwana leg., USNM, cotypes of *G. kuwanai*); Yamato, Kanagawa Pref. (25. v. 1995, ex *Q. acutissima*, Y. Oda leg.; 24. v. 2001, ex *Q. acutissima*); Hadano, Kanagawa Pref. (19. v. & 29. x. 2000, ex *Q. acutissima*; 7. x. 2001, ex *Q. acutissima*); Yamaguchi, Yamaguchi Pref. (6. vii. 1976, ex *Q. acutissima*, K. Kitagawa leg.); Tokushima, Tokushima Pref. (21. viii. 1999, ex *Q. acutissima*, K. Nakashiba leg.); Fukuoka, Fukuoka Pref. (18. vi. 1943, ex *Q. acutissima*, BSYU; 3. vii. 1943, ex *Castanea crenata*, BSYU). Alate viviparous female: Sendai (as above); Yamato (24. v. 2001, ex *Q. acutissima*); Hadano (25. vi. & 15. vii. 2000 ex *Q. acutissima*; 6. v. & 7. x. 2001, ex *Q. acutissima*); Tokushima (as above). Fukuoka (as above). Oviparous female: Hadano (8. x. 2000, ex *Q. acutissima*; 7. x. 27. x. & 11. xi. 2001, ex *Q. acutissima*). Male: Hadano (29. x. & 4. xi. 2000, ex *Q. acutissima*; 11. xi. 2001, ex *Q. acutissima*). Fundatrix: Yokohama, Kanagawa Pref. (6. iv. 2002, ex *Q. acutissima*; 20. iv. 2003, ex *Q. acutissima*).

Host plants. *Castanea crenata* & *Quercus acutissima*.

Distribution. Japan (Honshū; Shikoku; Kyūshū); Korea (Okamoto & Takahashi, 1927); Taiwan (Takahashi, 1931).

Remarks. This species was originally described by Pergande (1906) based on apterous viviparous females and larvae collected from *Quercus serrata*. As mentioned in the introduction, however, it is possible that researchers after Pergande have confused *G. kuwanai* with several related species. Comparing the cotypes of *G. kuwanai* preserved in USNM with the specimens examined in the present study, I found that specimens from *Q. acutissima* (Japanese name: kunugi) rather than those from *Q. serrata* (Japanese name: konara) agree with the cotypes. Concerning the host plant, it appears that “*Q. serrata*” in Pergande (1906) does not correspond to “konara” but to “kunugi”, because the name *Q. serrata* was applied to “kunugi” by authors in early 1900s (cf. Essig & Kuwana, 1918; Kurisaki, 1920). This species is readily distinguished from any other *Quercus*-infesting species from Japan in having tibiae dark brown on the basal half and pale brown on the distal half. Judging from this point, the aphids in the photographs indicated as *G. nipponica* by Paik (1972: fig. 11, p. 555) and Sorin (1976: fig. IV-16, p. 7) should be *G. kuwanai*.

Greenidea myricae Takahashi (Fig. 5A–G)

Greenidea myricae Takahashi, 1925: 31; Takahashi, 1931: 28.

Greenidea (Trichosiphum) myricae: Raychaudhuri, 1956: 58; Eastop & Hille Ris Lambers, 1976: 210; Liao, 1978: 348; Blackman & Eastop, 1994: 711; Remaudière & Remaudière, 1997: 175; Tao, 1991: 121.

Apterous viviparous female (n=27). Color in life: body yellowish green, slightly dusky on dorsal abdomen; antennae pale brown, the distal two segments dark brown; eyes red; legs pale brown; siphunculi brown with darker apex. Color in cleared specimens: body pale brown; abdominal large ventral plate brown; siphunculi brown, the apical half darker.

Body 1.95–2.52 mm long, 1.8–2.1 times as long as its maximum width, with many long setae; most of the dorsal setae branched or multifid apices, and setae on 8th

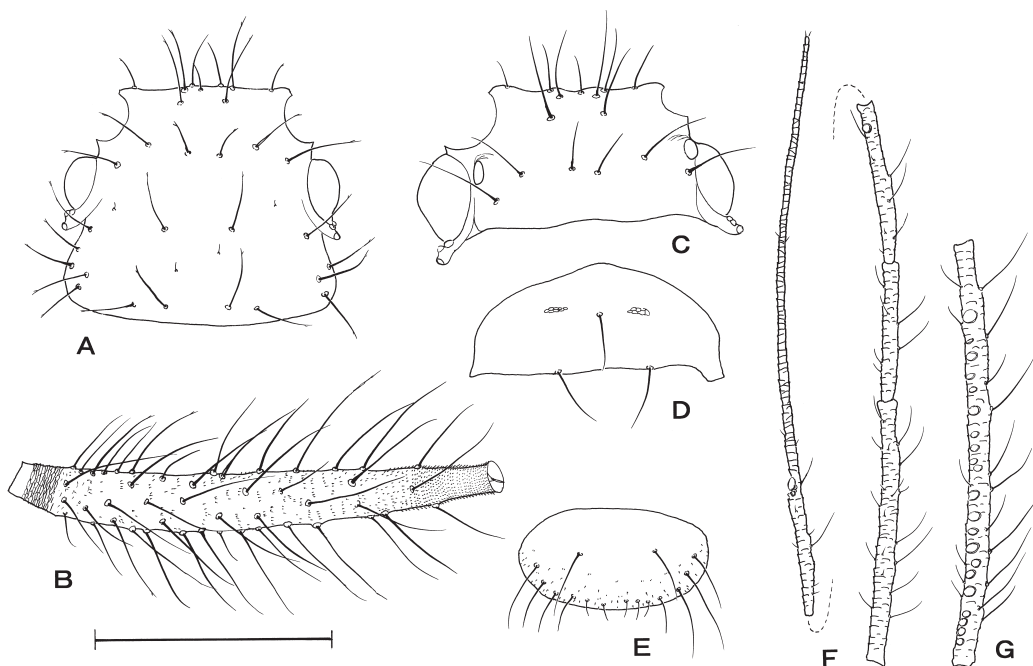


Fig. 5. *G. myricae*. (Symbols and scale as Fig. 1).

abdominal tergite thin with fine apices. Head (Fig. 5A) smooth, with 8–12 long dorsal setae on the anterior half, and 0–3 short dorsal setae on the posterior part. Antennae (Fig. 5F) 0.90–1.1 times as long as body; 3rd segment 0.86–1.1 times as long as head width across eyes, 0.52–0.63 times as long as 6th; processus terminalis 2.1–3.0 times as long as the base of 6th; 3rd–6th imbricated; 3rd–5th with 17–24, 4–10 and 4–9 setae, respectively; the longest seta on 3rd 2.6–3.4 times as long as the basal width of this segment. Ultimate rostral segment 1.5–1.9 times as long as 2nd segment of hind tarsus, 0.8–1.0 times as long as the base of 6th antennal segment. Femora imbricated, with a pair of rather stout, long subapical setae on the anterior margin. Tibiae striate-imbricated. Abdomen smooth dorsally and ventrally; the longest seta on the anterior tergites and that on 8th tergite 3.5–4.0 times and 1.4–2.0 times as long as the basal width of 3rd antennal segment, respectively. Siphunculi (Fig. 5B) reticulated on the basal 1/10 (in some individuals, reticulated on the basal 1/3), rather long and slender, 0.34–0.46 times as long as body, 1.4–1.9 times as long as head width across eyes, 7.0–10.0 times and 10.0–14.3 times as long as its maximum width and basal width, respectively. Cauda with 8–11 (mostly 8) setae. Genital plate(cf. Fig. 5E) with 2 setae on its central area and with 2–5 long setae on each side and 2–6 short ones along the central part of the hind margin.

Measurements of one specimen (in mm): Body 2.23; antenna 2.26, antennal segments III: IV: V: VI 0.51: 0.28: 0.32: 0.99 (0.25+0.74); ultimate rostral segment 0.21; hind femur 0.66; hind tibia 1.00; hind tarsus (2nd segment) 0.12; siphunculus 0.90.

Alate viviparous female (n=7). Differs from the apterous viviparous female mainly in coloration: Color in life: head and thorax pale brown; abdomen pale green with a brownish dorsal band; siphunculi black except at extreme base; legs brown. Color in cleared specimens: head and thorax pale brown; dorsal patches and marginal sclerites on abdominal segments pale brown; antennae and siphunculi brown.

Body 2.06–2.67 mm long, 2.5–2.8 times as long as its maximum width, with many long setae which are filiform. Antennae 1.1–1.3 times as long as body; 3rd segment (Fig. 5G) with 17–23 secondary rhinaria on the basal 2/3–4/5. Abdomen with transverse bands dorsally, those on 3rd–5th segments connected to each other; 7th tergite with a semicircular band, which has 3 setae (one anterior seta in the center and 2 posterior setae along the hind margin). Siphunculi weakly reticulated except for the apical part, 0.72–0.83 times as long as body.

Measurements of one specimen (in mm): Body 2.35; antenna 2.80, antennal segments III: IV: V: VI 0.70: 0.36: 0.38: 1.19 (0.29+0.90); ultimate rostral segment 0.22; hind femur 0.80; hind tibia 1.29; hind tarsus (2nd segment) 0.13; siphunculus 1.88.

Specimens examined. Apterous viviparous female: Hayama, Kanagawa Pref. (23. vi. 2002, *Quercus phillyraeoides*; 12. vi. 2004, ex *Myrica rubra*); Yokohama, Kanagawa Pref. (12. vi. 2004, ex *M. rubra*); Komatsujima, Tokushima Pref. (25. v. 2004, ex *M. rubra*, N. Ichiryu leg.); Shibushi, Kagoshima Pref. (20. v. 2003, ex *M. rubra*, T. Ide & Y. Mahara leg.). Alate viviparous female: Hayama (23. vi. 2002, ex *Q. phillyraeoides*); Komatsujima (as above). Larva: Komatsujima (10. v. 1998, ex *M. rubra*, K. Nakashiba leg.); Shibushi (28. v. 1999, ex *M. rubra*, H. Tsukamoto leg.)

Host plants. *Myrica rubra*.

Distribution. Japan (Honshū; Shikoku; Kyūshū); Taiwan (Takahashi, 1925).

Remarks. This species is recorded from Japan for the first time. The specimens collected on *Quercus phillyraeoides* in Kanagawa Prefecture are indistinguishable from those on *Myrica rubra*. Since I could not collect additional specimens from *Q. phillyraeoides*, this plant may be a temporary host plant for this species.

Greenidea nigra (Maki)

(Fig. 6A–H)

Trichosiphum nigra Maki, 1917: 10, Maki, 1918: 338.

Greenidea nigra: Takahashi, 1931: 30; Liao, 1978: 348; Hamasaki *et al.*, 2000: 40.

Greenidea nigra var. *kanzanensis* Takahashi, 1937b: 3. syn. nov.

Greenidea (*Trichosiphum*) *nigra*: Tao, 1991: 122.

Trichosiphum kuwanai (nec Pergande): Okajima, 1908: 20 (partim); Maki, 1917: 9. Maki, 1918: 337.

Greenidea kuwanai (nec Pergande): Suenaga, 1934: 793.

Greenidea (*Trichosiphum*) *kuwanai* (nec Pergande): Takahashi, 1962 (partim): 66; Sorin, 1976: 22 (partim).

Greenidea nipponica (nec Suenaga): Moritsu, 1983: 197.

Apterous viviparous female (n=60). Color in life: brown to dark brown, reddish brown on posterior half of abdomen. Legs dark brown. Siphunculi black. Color in cleared specimens: body, legs and siphunculi dark brown; antennae brown, the basal two segments darker.

Body pear-shaped, 1.63–3.60 mm long, 1.5–1.9 times as its maximum width, bearing numerous dorsal setae with fine apices. Head (Fig. 6A) smooth dorsally, with 21–47 setae of different lengths; the longest seta 2.8–4.3 times as long as the basal width of 3rd antennal segment. Antennae (Fig. 6F) 6-segmented, 0.60–0.80 times as long as body; 3rd segment 0.8–1.2 times as long as head width across eyes, 1.1–1.4 times as long as 6th; processus terminalis 1.4–2.2 times as long as the base of 6th; 3rd smooth except at the apex weakly imbricated, 4th–6th imbricated; 3rd–5th with 23–53, 4–13 and 4–8

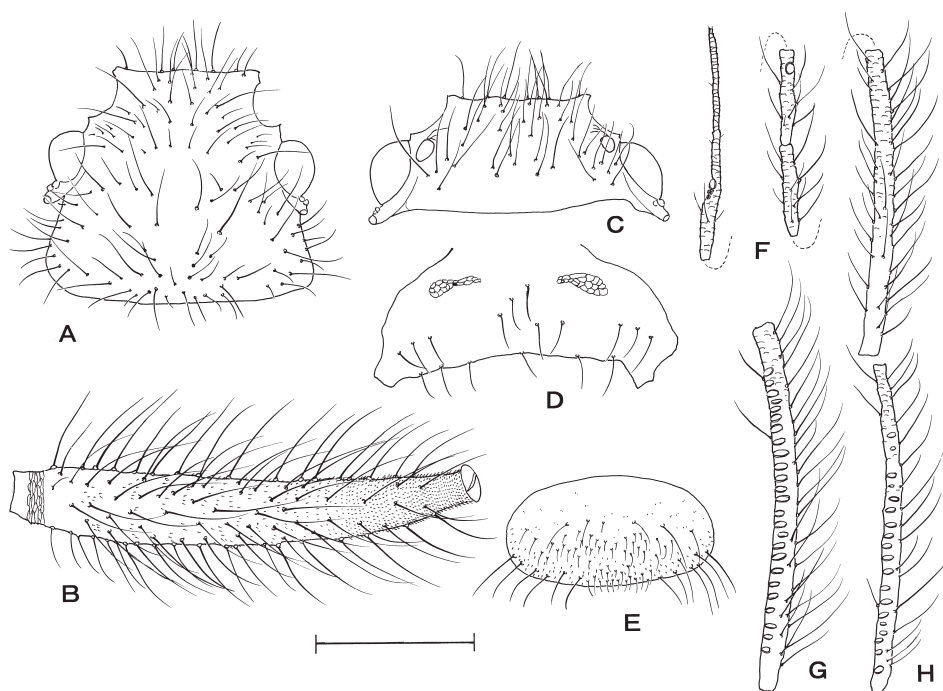


Fig. 6. *G. nigra*. (Symbols and scale as Fig. 1).

setae, respectively; the longest seta on 3rd 3.5–5.1 times as long as the basal width of this segment. Ultimate rostral segment 1.5–1.8 times as long as 2nd segment of hind tarsus. Thorax smooth dorsally, strongly spinulose between coxae. Abdomen smooth dorsally, strongly spinulose ventrally; 8th abdominal tergite with 2 setae. Siphunculi (Fig. 6B) reticulated at the base, slightly curved outward, 0.27–0.37 times as long as body, 1.0–1.7 times as long as head width across eyes, 3.9–6.8 times and 6.1–10.8 times as long as its maximum and basal width, respectively. Cauda broadly round with a median process, with 5–9 (mostly 6–8) setae. Genital plate (cf. Fig. 6E) with 5–38 setae on its central area and with 6–10 long setae on each side and 8–12 short ones along the central part of the hind margin.

Measurements of one specimen (in mm): Body 3.36; antenna 2.14, antennal segments III: IV: V: VI 0.82: 0.26: 0.26: 0.59 (0.21+0.38); ultimate rostral segment 0.26; hind femur 0.97; hind tibia 1.40; hind tarsus (2nd segment) 0.18; siphunculus 1.20.

Alate viviparous female (n=11). Differs from the apterous viviparous female mainly in coloration: Color in life: head and thorax black; abdomen dark brown; antennae and siphunculi black. Color in cleared specimens: head, antennae, and thorax brown; siphunculi dark brown; dorsal patches and marginal sclerites on abdominal segments brown.

Body elongated, 2.15–3.75 mm long, 1.6–2.4 times as long as its maximum width. Head smooth, with numerous setae of different lengths; the longest seta 4.3–6.7 times as long as the basal width of 3rd antennal segment. Antennae 0.67–0.91 times as long as body; 3rd segment (Fig. 6G) with 22–35 transversely oval secondary rhinaria on the basal 6/7 to whole length; 4th rarely with one rhinarium. Abdomen with transverse bands dorsally, those on 3rd–6th segments connected to each other; 7th tergite with

a semicircular band (Fig. 6C), which has 10–29 setae; Ventral abdomen weakly but conspicuously spinulose. Siphunculi spinulose at the apex, almost cylindrical, 0.58–0.68 times as long as body.

Measurements of one specimen (in mm): Body 3.35; antenna 2.99, antennal segments III: IV: V: VI 0.90: 0.31: 0.30: 0.62 (0.20+0.42); ultimate rostral segment 0.28; hind femur 1.08; hind tibia 1.80; hind tarsus (2nd segment) 0.18; siphunculus 2.27.

Oviparous female (n=5). This morph is described here for the first time. Alate. Similar to the alate viviparous female, but differs from the latter in having 2–6 setae on the 8th abdominal tergite and more setae on the genital plate, anal plate and cauda, which are larger than those of the alate viviparous female. Cauda without a median process.

Measurements of one specimen (in mm): Body 2.38; antenna 1.67, antennal segments III: IV: V: VI 0.68: 0.21: 0.23: 0.40 (0.17+0.23); ultimate rostral segment 0.23; hind femur 0.68; hind tibia 1.11; hind tarsus (2nd segment) 0.14; siphunculus 1.47.

Male (n=22). This morph is described here for the first time. Alate. Differs from the alate viviparous female mainly in coloration: Color in life: head and thorax brown; abdomen pale green.

Body rather slender, 2.16–2.84 mm long, 2.2–2.8 times as long as its maximum width. Antennae 0.75–0.83 times as long as body; 3rd segment (Fig. 6H) with 13–23 secondary rhinaria on the basal 2/3–3/4. Abdomen pale with brown intersegmental areolations on pleural and submarginal areas; 3rd–5th tergites without transverse bands; 7th tergite with a semicircular band, which has 7–14 setae. Cauda triangular, without a median process.

Measurements of one specimen (mm): Body 2.72; antenna 1.00, antennal segments III: IV: V: VI 0.84: 0.32: 0.29: 0.59 (0.21+0.38); ultimate rostral segment 0.25; hind femur 0.97; hind tibia 1.47; hind tarsus (2nd segment) 0.15; siphunculus 1.82.

Specimens examined. Apterous viviparous female: Yokohama, Kanagawa Pref. (7. 14. vi. 2004, ex *Quercus myrsinaefolia*; 14. vi. 2004, *Quercus glauca*); Amanosan, Ōsaka Pref. (1. vi. 1957, ex *Q. glauca*, R. Takahashi, SEHU, identified as *G. kuwanai* by R. Takahashi); Kawachi-Nagano, Ōsaka Pref. (3. v. 1958, ex *Q. glauca*, R. Takahashi, SEHU, identified as *G. kuwanai* by R. Takahashi); Mt. Iwawaki, Ōsaka Pref. (29. v. 1960, ex *Q. glauca*, R. Takahashi, SEHU, identified as *G. kuwanai* by R. Takahashi); Mt. Ōtô-san, Wakayama Pref. (25. vii. 1972, ex *Quercus acuta*, T. Tanaka leg. AEUU); Ehime Pref. (13. v. 2000, ex *Quercus salicina*, K. Kume leg.); Kokura, Fukuoka Pref. (4. v. 2000, ex *Lithocarpus edulis*, M. Okumura leg.); Hakata, Fukuoka Pref. (21. v. 2000, ex *L. edulis*, J. Iwamoto leg.). Alate viviparous female: Utsunomiya, Tochigi Pref. (25. v. 1982, S. Takahashi leg.); Yokohama (as above); Amanosan (as above); Kawachi-Nagano (as above); Mt. Iwawaki (as above); Mt. Kongô, Ōsaka Pref. (labelled as “N. Japan, Pl. *Quercus*, Loc. Mt. Kongô, Ōsaka, Date. 29. v. 1964” in right side and “*Greenidea* (*Trichosiphum*) *kuwanai* Perg., Det. D. H. R. L. BM 1984-340” in left side, BMNH); Shimonoseki, Yamaguchi Pref. (5. v. 2000, ex *L. edulis*, M. Okumura leg.); Kokura (7. v. 2000, ex *Q. glauca*, M. Okumura leg.); Munakata, Fukuoka Pref. (16. v. 2000, ex *L. edulis*, J. Iwamoto leg.). Oviparous female: Utsunomiya (16. xi. 1966, ex *Q. glauca*, T. Tanaka leg., AEUU).

Host plants. *Lithocarpus edulis*, *Quercus acuta*, *Q. glauca*, *Q. myrsinaefolia* & *Q. salicina*.

Distribution. Japan (Honshû; Shikoku; Kyûshû); Taiwan (Takahashi, 1931).

Remarks. *G. nigra* has been confused with *G. kuwanai* for a long time. *G. nigra* differs from *G. kuwanai* in having the tibiae dark brown on the whole length in the all morphs, in having 22–35 transversely oval secondary rhinaria on the 3rd antennal

segment in the alate viviparous and oviparous females, and in infesting evergreen oaks. Judging from the number of secondary rhinaria on the 3rd antennal segment, *G. kuwanai* in Okajima (1908), Maki (1917), Takahashi (1962) and Sorin (1976) should be *G. nigra*. *G. kuwanai* in Suenaga (1934) is also identical to *G. nigra* because he lists three evergreen oaks as its host plants. Moreover, the aphids in the photographs indicated as *G. nipponica* by Moritsu (1983, *vide* fig. 207, p. 197) should be referred to *G. nigra* in having the tibiae dark brown on the whole length and in infesting *Q. glauca*. Takahashi (1937b) distinguished *G. nigra* var. *kanzanensis* because the nominate variety bears long fine setae on the body. However, such a variation is also known in another greenideine aphid, *Eutrichosiphum heterotrichum* (Raychaudhuri) (Sugimoto, 2001).

Greenidea nipponica Suenaga
(Fig. 7A–H)

Greenidea nipponica Suenaga, 1934: 794; Shinji, 1941: 1145; Paik, 1972: 554 (partim); Moritsu, 1983: 433.

Greenidea (Trichosiphum) nipponica: Takahashi, 1962: 66 (partim); Eastop & Hille Ris Lambers, 1976: 210; Sorin, 1976: 21 (partim); Blackman & Eastop, 1994: 711; Remaudière & Remaudière, 1997: 175.

Apterous viviparous female (n=72). Color in life: body dark brown; siphunculi blackish brown. Color in cleared specimens: body dark brown; antennae pale brown, the basal two segments and the distal two segments darker; legs dark brown, tibiae pale on the whole length; siphunculi dark brown.

Body 1.92–2.54 mm long, 1.4–1.7 times as long as its maximum width, bearing numerous dorsal setae with fine apices. Head (Fig. 7A) smooth dorsally, with 15–27 long setae and 6–23 fine setae; the longest seta 2.7–3.8 times as long as the basal width of 3rd antennal segment. Antennae (Fig. 7F) 6-segmented, 0.63–0.79 times as long as body; 3rd segment 0.7–1.2 times as long as head width across eyes, 1.0–1.5 times as long as 6th; processus terminalis 1.4–1.9 times as long as the base of 6th; 3rd smooth except on the apical 1/2–1/3 weakly imbricated, 4th–6th imbricated; 3rd–5th with 28–47, 5–12 and 4–7 setae, respectively; the longest seta on 3rd 3.3–4.3 times as long as the basal width of this segment. Ultimate rostral segment 1.5–1.9 times as long as 2nd segment of hind tarsus. Abdomen smooth dorsally and spinulose ventrally; 8th tergite with 2 setae. Siphunculi (Fig. 7B) reticulated at the base, 0.22–0.32 times as long as body, 0.8–1.1 times as long as head width across eyes, 3.6–5.6 times and 6.0–9.3 times as long as its maximum and basal width, respectively. Cauda with 6–8 setae. Genital plate (cf. Fig. 7E) with 10–21 setae on its central area and with 5–7 long setae on each side and 4–9 short ones along the hind margin.

Measurements of one specimen (mm): Body 2.25; antenna 1.50, antennal segments III: IV: V: VI 0.50: 0.19: 0.21: 0.46 (0.19+0.27); ultimate rostral segment 0.24; hind femur 0.60; hind tibia 0.89; hind tarsus (2nd segment) 0.13; siphunculus 0.59.

Alate viviparous female (n=25). Differs from the apterous viviparous female mainly in coloration: Color in life: head and thorax black; abdomen dark brown; antennae and siphunculi black. Color in cleared specimens: head and thorax dark brown; dorsal patches and marginal sclerites on abdominal segments brown.

Body elongate, 2.16–2.78 mm long, 1.8–2.3 times as long as its maximum width.

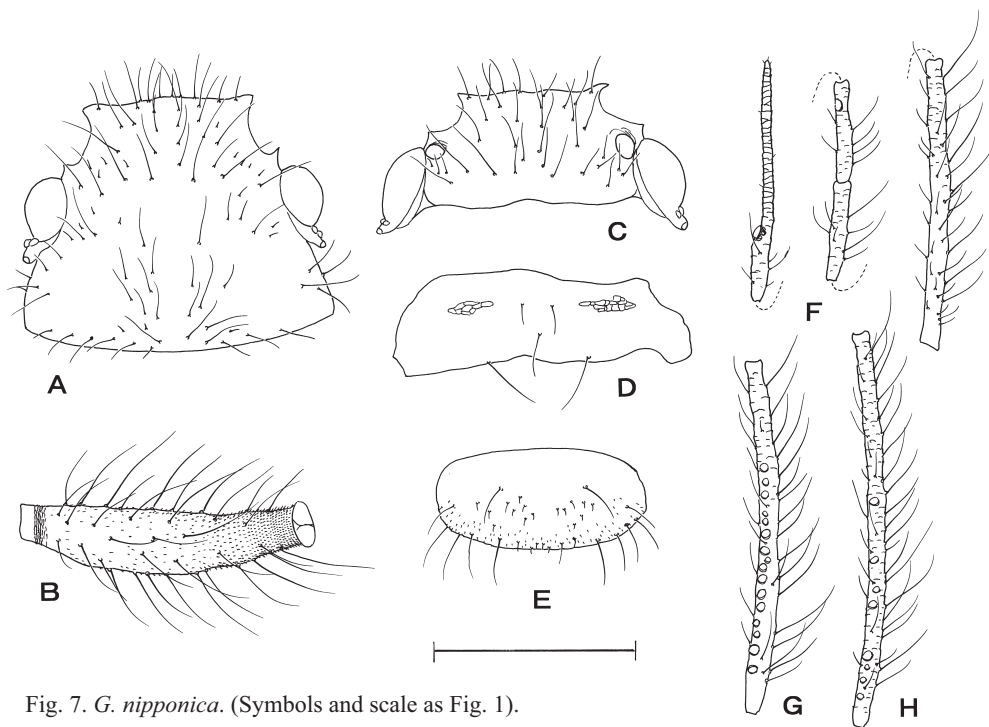


Fig. 7. *G. nipponica*. (Symbols and scale as Fig. 1).

Head with 28–38 setae dorsally. Antennae 0.57–0.78 times as long as body; 3rd segment (Fig. 7G) with 7–16 circular to slightly oval secondary rhinaria on the basal 1/2–2/3. Abdomen with transverse bands dorsally, those on 3rd–6th segments connected to each other; 7th tergite with a semicircular band (Fig. 7D), which has 5–9 setae (2–4 anterior setae and the remainders along the hind margin). Siphunculi weakly reticulated except for the apex, almost cylindrical, 0.47–0.62 times as long as body.

Measurements of one specimen (mm): Body 2.52; antenna 1.76, antennal segments III: IV: V: VI 0.63: 0.24: 0.24: 0.50 (0.18+0.32); ultimate rostral segment 0.24; hind femur 0.69; hind tibia 1.20; hind tarsus (2nd segment) 0.14; siphunculus 1.32.

Oviparous female (n=4). Alate. Similar to the alate viviparous female, but differs from the latter in having 5–10 setae on the 8th abdominal tergite and more setae on the genital plate, anal plate and cauda, which are larger than those of the alate viviparous female. Cauda without a median processus.

Measurements of one specimen (mm): Body 2.66; antenna 1.95, antennal segments III: IV: V: VI 0.75: 0.23: 0.25: 0.56 (0.21+0.35); ultimate rostral segment 0.27; hind femur 0.70; hind tibia 1.14; hind tarsus (2nd segment) 0.14; siphunculus 1.45.

Male (n=16). Alate. Differs from the alate viviparous female mainly in coloration: Color in life: head and thorax pale brown; abdomen pale green.

Body rather slender, 2.12–2.44 mm long, 2.2–2.8 times as long as its maximum width. Antennae 0.77–0.92 times as long as body; 3rd segment (Fig. 7H) with 4–14 secondary rhinaria on basal 1/2–2/3. Abdomen pale with brown intersegmental areolations on pleural and submarginal areas; 3rd–5th tergites without transverse bands; 7th tergite with a semicircular band, which has 3–5 setae. Cauda triangular, without a median processus.

Measurements of one specimen (mm): Body 2.20; antenna 1.94, antennal segments III: IV: V: VI 0.77: 0.27: 0.24: 0.51 (0.20+0.31); ultimate rostral segment 0.23; hind

femur 0.77; hind tibia 1.22; hind tarsus (2nd segment) 0.15; siphunculus 1.47.

Fundatrix (n=2). Apterous. Similar to the apterous viviparous female, but differs in the following characters: antennae 0.55–0.60 times as long as body; abdomen strongly convex.

Measurements of one specimen (mm): Body 2.62; antenna 1.44, antennal segments III: IV: V: VI 0.54: 0.19: 0.21: 0.35 (0.17+0.18); ultimate rostral segment 0.24; hind femur 0.60; hind tibia 0.89; hind tarsus (2nd segment) 0.15; siphunculus 0.63.

Specimens examined. Apterous viviparous female: Tôkyô (9. viii. 1958, ex *Quercus acutissima*, R. Takahashi leg., SEHU); Yokohama Kanagawa Pref. (20. v. 1994, ex *Quercus phillyraeoides*); Hiratsuka, Kanagawa Pref. (1. vii, 15. vii, 12 viii, 11. ix, & 8. x. 2000 ex *Q. phillyraeoides*; 7. x, & 1. x. 2001, ex *Q. phillyraeoides*); Hayama, Kanagawa Pref. (23. vi. 2002, ex *Q. phillyraeoides*); Ôsaka (5. vi. 1958, ex *Quercus acutissima*, R. Takahashi leg., SEAU); Kôbe, Hyôgo Pref. (2. vi. 1998, ex *Q. phillyraeoides*); Komatsujima, Tokushima Pref. (14. v. 1999, ex *Q. phillyraeoides*, K. Nakashiba leg.). Alate viviparous female: Hiratsuka (28. v, 25. vi, 1. vii, & 8. x. 2000, ex *Q. phillyraeoides*); Hayama (as above); Komatsujima (as above). Oviparous female: Hiratsuka (11. xi. 2000 & 1. xi. 2001, ex *Q. phillyraeoides*). Male: Hiratsuka (11. xi. 2000 & 1. xi. 2001, ex *Q. phillyraeoides*). Fundatrix: Hiratsuka (22. iv. 2001, ex *Q. phillyraeoides*).

Host plants. *Quercus acutissima* & *Q. phillyraeoides*.

Distribution. Japan (Honshû; Shikoku); Korea (Paik, 1972).

Remarks. In my field survey, this species was collected mainly from *Q. phillyraeoides*. This species is readily distinguished from other *Quercus*-infesting species from Japan by the abdomen bearing spinules ventrally and the tibiae pale in color.

Greenidea okajimai Suenaga

(Fig. 8A–H)

Greenidea okajimai Suenaga, 1934: 791; Shinji, 1941: 1145; Sorin, 1977: 4; Moritsu, 1983: 198 & 434; Sugimoto, 1995: 14.

Greenidea (*Trichosiphum*) *okajimai*: Takahashi, 1962: 66; Ghosh *et al.*, 1971: 212; Eastop & Hille Ris Lambers, 1976: 210; Sorin, 1977: 4; Blackman & Eastop, 1994: 712; Remaudière & Remaudière, 1997: 175; Matsumoto, 2000: 90.

Greenidea (*Trichosiphum*) *kuwanai* (nec Pergande): Raychaudhuri, 1956: 56 (partim).

Apterous viviparous female (n=26). Color in life: body dark brown; head brown; siphunculi wholly blackish brown or dark brown with a blackish tinge at the base and apical half. Color in cleared specimens: body brown; abdominal large ventral plate dark brown; antennae brown, the apex of 4th segment, the distal half of 5th and the whole length of 6th dark brown, but in individuals collected in winter dark brown on the whole length; legs dark brown, sometimes femora paler than tibiae; siphunculi brown, sometimes the apical 1/3 darker than the basal 2/3.

Body 2.05–2.79 mm long, 1.6–1.9 time as long as its maximum width, with many long setae; most of the dorsal setae stout with branched or multifid apices, and those on 8th abdominal tergite thin with fine apices. Head (Fig. 8A) with 9–14 long dorsal setae on the anterior half, and 2–8 short dorsal setae on the posterior part. Antennae (Fig. 7F) 0.68–0.94 times as long as body; 3rd segment 0.7–1.0 times as long as head width across eyes, 0.59–0.80 times as long as 6th; processus terminalis 1.8–2.5 times as long as the base of 6th; 3rd–6th imbricated; 3rd–5th with 13–22, 6–10 and 4–8 setae, respectively;

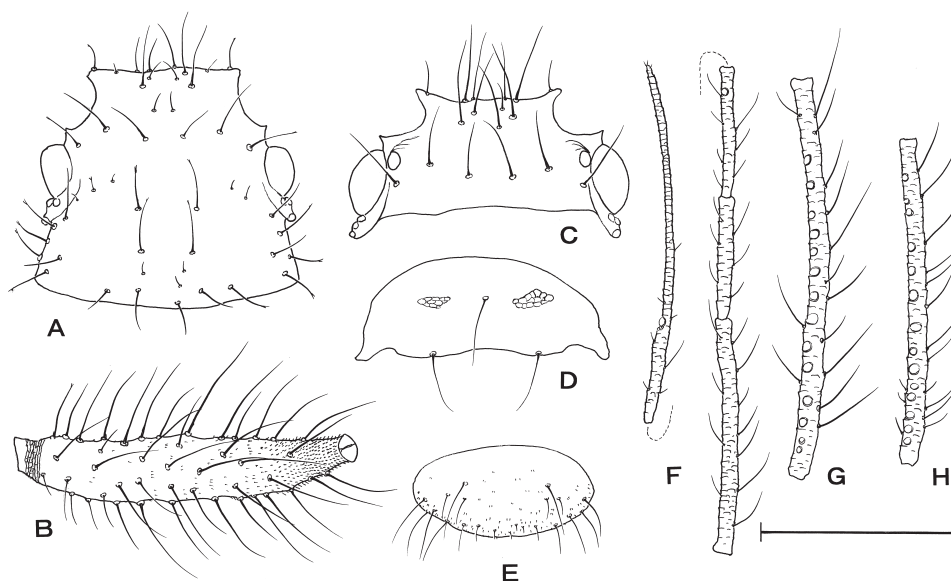


Fig. 8. *G. okajimai*. (Symbols and scale as Fig. 1).

the longest seta on 3rd 2.8–4.0 times as long as the basal width of this segment. Ultimate rostral segment 1.3–1.8 times as long as 2nd segment of hind tarsus, 0.8–1.0 times as long as the base of 6th antennal segment. Femora imbricated with a pair of rather stout subapical setae on the anterior margin. Tibiae striate-imbricated. Abdomen spinulose ventrally; 8th tergite with 2 setae. Siphunculi (Fig. 7B) reticulated at the base, 0.24–0.37 times as long as body, 4.5–7.5 times and 7.5–11.6 times as long as its maximum width and basal width, respectively. Cauda with 7–11 (mostly 8) setae. Genital plate (cf. Fig. 7E) with 2–9 setae on its central area and with 3–5 long setae on each side and 6–10 short ones along the central part of the hind margin.

Measurements of one specimen (mm): Body 2.50; antenna 2.02, antennal segments III: IV: V: VI 0.53: 0.27: 0.31: 0.75 (0.25+0.50); ultimate rostral segment 0.22; hind femur 0.67; hind tibia 0.90; hind tarsus (2nd segment) 0.13; siphunculus 0.75.

Alate viviparous female (n=14). Differs from the apterous viviparous female mainly in coloration: Color in life: head and thorax brown; antennae and siphunculi black; abdomen greenish brown. Color in cleared specimens: head and thorax brown; antennae dark brown; 3rd–7th abdominal tergites brown; siphunculi dark brown.

Body 1.90–2.69 mm long, 2.0–2.2 times as long as its maximum width, with many long setae with fine apices. Antennae 1.0–1.2 times as long as body; 3rd segment (Fig. 7G) with 12–18 secondary rhinaria on the basal 3/4–7/8. Abdomen with transverse bands dorsally, those on 3rd–5th segments connected to each other; 7th tergite with a semicircular band (fig. 7D), which has 3 setae (one (sometimes 2) anterior seta in the center and 2 posterior setae on the hind margin). Siphunculi weakly reticulated except for the apical part, 0.63–0.79 times as long as body.

Measurements of one specimen (mm): Body 2.50; antenna 2.65, antennal segments III: IV: V: VI 0.75: 0.40: 0.43: 0.88 (0.30+0.58); ultimate rostral segment 0.22; hind femur 0.83; hind tibia 1.26; hind tarsus (2nd segment) 0.14; siphunculus 1.73.

Oviparous female (n=8). Alate. Similar to the alate viviparous female, but differs from the latter in having 6–15 setae on the 8th abdominal tergite and more setae on the

genital plate, anal plate and cauda, which are larger than those of the alate viviparous female. Cauda without a median processus.

Measurements of one specimen (mm): Body 2.62; antenna 2.52, antennal segments III: IV: V: VI 0.71: 0.38: 0.38: 0.87 (0.27+0.60); ultimate rostral segment 0.21; hind femur 0.75; hind tibia 1.17; hind tarsus (2nd segment) 0.13; siphunculus 1.65.

Male (n=13). Alate. Differs from the alate viviparous female mainly in coloration: Color in life: abdomen pale green. Color in cleared specimens: body, antennae and legs paler; 3rd–7th abdominal tergites colorless; marginal sclerites and a triangular patch between siphunculi extremely pale.

Body rather slender, 1.85–2.35 mm long, 2.5–3.0 times as long as its maximum width. Antennae with many setae: 24–34, 12–16 and 8–12 setae on 3rd–5th segments, respectively.

Measurements of one specimen (mm): Body 2.03; antenna 2.51, antennal segments III: IV: V: VI 0.66: 0.40: 0.41: 0.86 (0.29+0.57); ultimate rostral segment 0.19; hind femur 0.77; hind tibia 1.20; hind tarsus (2nd segment) 0.12; siphunculus 1.43.

Specimens examined. Apterous viviparous female: Utsunomiya, Tochigi Pref. (20. v. 1987, ex *Castanopsis cuspidata*, S. Takahashi leg.); Tōkyō (labelled as “*Trichosiphum kuwanai* Perg., *Quercus*, 23. v. 08, Tōkyō, Japan” in right side and “Theobald Coll., B. M. Reg. No. 1930-204” on left side, BMNH), Yokohama, Kanagawa Pref. (3. v. 2000, 7. iv. & 6. v. 2001 & 2. ii. 2002, ex *C. cuspidata*); Hadano, Kanagawa Pref. (7. x. 2001, ex *C. cuspidata*); Hayama, Kanagawa Pref. (19. x. 2002, ex *C. cuspidata*); Kitakyūshū, Fukuoka Pref. (7. v. 2000, ex *C. cuspidata*, M. Okumura leg.); Ishigaki Is., Okinawa Pref. (12. ii. 1986, ex *Castanopsis sieboldii*, 19. iv. 1986, ex *Quercus glauca* var. *amamiana*). Alate viviparous female: Tōkyō (as above); Yokohama (22–30. iv, 6. v, & 22. x. 2000, ex *C. cuspidata*); Hadano (1–7. xi. 2001, ex *C. cuspidata*). Oviparous female: Yokohama (22. iv, & 30. iv. 2000, ex *C. cuspidata*). Male: Yokohama (30. iv, & 3–6. v. 2000, ex *C. cuspidata*).

Host plants. *Castanopsis cuspidata*, *C. sieboldii* & *Quercus glauca* var. *amamiana*.

Distribution. Japan (Honshū; Kyūshū; Ryūkyū); India (West Bengal) (Ghosh *et al.*, 1971).

Remarks. Sexual morphs appear in May (Takahashi & Sorin, 1959; Takahashi, 1962; Matsumoto, 2000). During my field survey in Tōkyō and Yokohama, central Japan, they were found from late April till middle May. In addition to the holocyclic life cycle, the parthenogenetic morphs were also observed throughout the seasons including the winter of 2001–2002 in Yokohama.

Takahashi (1962) mentioned that the description of *G. kuwanai* by Raychaudhuri (1956) partly includes characters of *G. okajimai*. Having examined the slide of Theobald's collection (labelled as *G. kuwanai*) preserved in BMNH, London, which is a part of “available material” of *G. kuwanai* by Raychaudhuri (1956), I have confirmed that the specimens in the slide are in fact *G. okajimai*.

Greenidea prinicola sp. nov.

(Fig. 9A–H)

Greenidea (Trichosiphum) nipponica (nec Suenaga): Takahashi, 1962: 66 (partim).

Apterous viviparous female (N=40). Color in life: body pale brown to brown; siphunculi brown, the distal half darker. Color in cleared specimens: body brown to dark

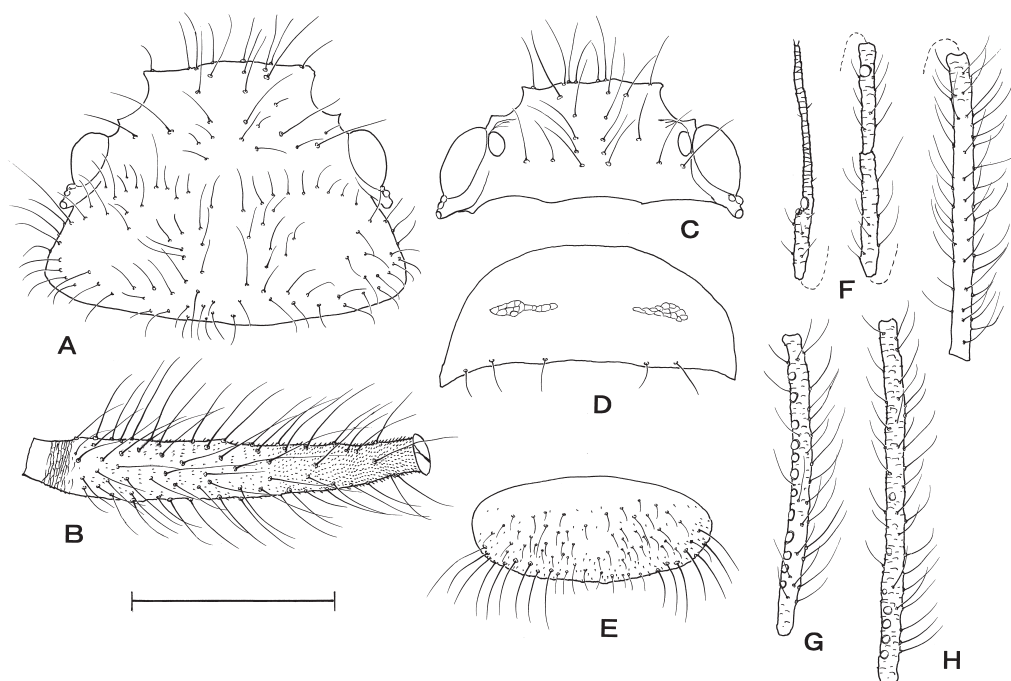


Fig. 9. *G. prinicola* sp. nov. (Symbols and scale as Fig. 1).

brown; antennae pale brown, the basal two segments, the apex of 5th and the whole length of 6th darker; legs pale brown, femora, tarsi and the tip of tibiae darker; siphunculi brown to dark brown.

Body 1.95–2.74 mm long, 1.5–1.8 times as long as its maximum width, bearing numerous dorsal setae with fine apices. Head (Fig. 9A) smooth dorsally, with 19–45 setae; the longest seta 2.8–4.3 times as long as the basal width of 3rd antennal segment. Antennae (Fig. 9F) 6-segmented, 0.60–0.73 times as long as body; 3rd segment 0.52–0.93 times as long as head width across eyes, 0.83–1.3 times as long as 6th; processus terminalis 1.3–2.1 times as long as the base of 6th; 3rd smooth except on the apical 1/2–1/3, which are weakly imbricated, 4th–6th imbricated; 3rd–5th with 27–67, 8–19 and 7–17 setae, respectively; the longest seta on 3rd 3.0–4.7 times as long as the basal width of this segment. Ultimate rostral segment 1.7–2.1 times as long as 2nd segment of hind tarsus. Abdomen smooth dorsally and ventrally, but sometimes weakly spinulose on ventrum; 8th tergite with 2 setae. Siphunculi (Fig. 9B) reticulated at the base, 0.23–0.29 times as long as body, 0.8–1.0 times as long as head width across eyes, 4.6–6.7 times and 6.9–11.0 times as long as its maximum and basal width, respectively. Cauda with 8–14 setae. Genital plate (cf. Fig. 9E) with 33–48 setae on its central area and with 7–12 long setae on each side and about 10 short ones on the central part of the hind margin.

Measurements of one specimen (mm): Body 2.42; antenna 1.47, antennal segments III: IV: V: VI 0.49: 0.18: 0.20: 0.48 (0.17+0.31); ultimate rostral segment 0.28; hind femur 0.62; hind tibia 0.99; hind tarsus (2nd segment) 0.15; siphunculus 0.64.

Alate viviparous female (n=12). Differs from the apterous viviparous female mainly in coloration: Color in life: head and thorax black; abdomen fuscous; siphunculi black except at extreme base; legs fuscous, fore femora pale brown. Color in cleared specimens: head and thorax dark brown; dorsal patches and marginal sclerites on

abdominal segments brown.

Body elongate, 2.30–2.98 mm long, 1.9–2.2 times as long as its maximum width. Antennae 0.65–0.77 times as long as body; 3rd segment (Fig. 9G) with 11–20 circular secondary rhinaria on the basal 3/4 to whole length. Abdomen with transverse bands dorsally, those on 3rd–6th segments connected to each other; 7th tergite with a semicircular band (Fig. 9D), which has 5–14 setae along the hind margin. Siphunculi weakly reticulated except for the apex, almost cylindrical, 0.47–0.56 as long as body.

Measurements of one specimen (mm): Body 2.76; antenna 1.89, antennal segments III: IV: V: VI 0.64: 0.26: 0.27: 0.59 (0.21+0.38); ultimate rostral segment 0.30; hind femur 0.76; hind tibia 1.27; hind tarsus (2nd segment) 0.15; siphunculus 1.45.

Oviparous female (n=40). Alate. Similar to the alate viviparous female, but differs from the latter in having 2–9 setae (usually more than 4) on the 8th abdominal tergite and having more setae on the genital plate, anal plate and cauda, which are larger than those of the alate viviparous female. Cauda without a median processus.

Measurements of one specimen (mm): Body 2.54; antenna 1.74, antennal segments III: IV: V: VI 0.57: 0.26: 0.24: 0.52 (0.19+0.33); ultimate rostral segment 0.27; hind femur 0.68; hind tibia 1.11; hind tarsus (2nd segment) 0.14; siphunculus 1.40.

Male (n=23). Alate. Differs from the alate viviparous female mainly in coloration: Color in life: head and thorax pale brown; abdomen pale green.

Body rather slender, 2.00–2.61 mm long, 2.3–2.7 times as long as its maximum width. Antennae 0.73–0.90 times as long as body; 3rd segment (Fig. 9H) with 3–13 secondary rhinaria on the basal 1/2–2/3. Abdomen pale with brown intersegmental areolations on pleural and submarginal areas; 3rd–5th tergites without transverse bands; 7th tergite with a semicircular band, which has 3–6 setae. Cauda triangular, sometimes without a median processus.

Measurements of one specimen (mm): Body 2.47; antenna 1.95, antennal segments III: IV: V: VI 0.66: 0.30: 0.30: 0.55 (0.20+0.35); ultimate rostral segment 0.28; hind femur 0.81; hind tibia 1.31; hind tarsus (2nd segment) 0.17; siphunculus 1.42.

Fundatrix (n=4). Apterous. Similar to the apterous viviparous female, but differs in the antennae 0.38–0.52 times as long as the body and the abdomen strongly convex.

Measurements of one specimen (mm): Body 2.69; antenna 1.28, antennal segments III: IV: V: VI 0.45: 0.18: 0.16: 0.34 (0.14+0.20); ultimate rostral segment 0.26; hind femur 0.63; hind tibia 0.95; hind tarsus (2nd segment) 0.16; siphunculus 0.55.

Specimens examined. Holotype: apterous viviparous female, Hadano, Kanagawa Pref., 25. v. 2000. Paratypes: 19 apterous and 9 alate viviparous females, Hadano, 28. v. 2000, 1. vii. 2000, 15. vii. 2000 & 19. v. 2001; Kawasaki, Kanagawa Pref., 13. v. 2001. All the specimens were collected from *Quercus serrata* by me. The holotypes and paratypes are deposited in the collection of SEHU. Besides those listed above, the following specimens have been examined. Apterous viviparous female: Sapporo, Hokkaidô (2. viii. 1960, ex *Quercus dentata*, R. Takahashi leg., SEHU, identified as *G. nipponica*); Utsunomiya (20. vii. 1982, ex *Q. serrata*, S. Takahashi leg.); Hadano, Kanagawa Pref. (4. vi, 25. vi, & 8. x. 2000, ex *Q. serrata*; 13. v, & 7. x. 2001, ex *Q. serrata*); Mt. Ikoma, Nara Pref. (20. vi. 1958, ex *Q. dentata*, M. Sorin leg., SEHU, identified as *G. nipponica*). Alate viviparous female: Utsunomiya (as above); Hadano (25. vi. 2000 & 6. v. 2001, ex *Q. serrata*). Oviparous female: Hadano (8. x, 29. x, 11. xi. & 19. xi. 2000 ex *Q. serrata*; 27. x. & 1. xi. 2001, ex *Q. serrata*); Kotoni, Hokkaidô (24. vii. 1924, ex *Q. dentata*, H. Hori leg., SEHU, identified as *G. nipponica*); Sapporo (24. viii. 1924, ex *Q. dentata*, H. Hori leg., SEHU, identified as *G. kashicola*). Male: Hadano (11. xi. 2000 ex *Q. serrata*; 7. x, 27. x & 1. xi. 2001, ex *Q. serrata*). Fundatrix:

Hadano (22. iv. 2001, ex *Q. serrata*); Hiratsuka, Kanagawa Pref. (4. v. 2001, ex *Q. serrata*).

Host plants. *Quercus dentata* & *Q. serrata*.

Distribution. Japan (Hokkaidô; Honshû).

Remarks. This species is confused with *G. nipponica* in the key given by Takahashi (1962). It differs from *G. nipponica* in lacking spinules on ventral abdomen and in having more setae on the genital plate and cauda.

Etymology. The specific name is derived from *Prinus*, a section in the genus *Quercus* (Kitamura & Murata, 1984), which includes the host plants of this aphid; *prinicola* is a masculine noun meaning “*Prinus*-inhabitant”.

SPECIES EXCLUDED FROM THE JAPANESE FAUNA OF GREENIDEA

Greenidea anonae (Pergande, 1906)

Greenidea (Trichosiphum) anonae: Raychaudhuri, 1956: 47; Raychaudhuri & Chatterjee, 1980: 345; Ghosh & Agarwala, 1993: 207; Blackman & Eastop, 1994: 708, 2000: 276.

Remarks. See below.

Greenidea brideliae Takahashi, 1928

Greenidea brideliae: Raychaudhuri, 1956: 31; Blackman & Eastop, 1994: 709.

Remarks. Although *G. anonae* and *G. brideliae* were recorded from Japan as given above, no collection data of Japanese materials has been published. Raychaudhuri (1956), who first recorded *G. anonae* and *G. brideliae* from Japan, mentioned BMNH and ELWU as the depositories of both specimens examined by him. I asked these institutes about the presence of specimens of *G. anonae* and *G. brideliae* collected from Japan. Dr. Brown (BMNH) and Dr. Jongema (ELWU) kindly replied me (as personal communications) that BMNH (including Hille Ris Lambers collection) and ELWU do not have any specimens of them from Japan. Probably, Raychaudhuri (1956) misread the records of both these species from Taiwan (Takahashi, 1931) as the record from Japan. Therefore, at present it seems better for us to exclude the two species from the Japanese fauna of *Greenidea*.

KEY TO THE SPECIES OF THE GENUS GREENIDEA IN JAPAN

Apterous viviparous females

1. Tibiae striate-imbricated 2
- Tibiae smooth 5
2. Abdomen spinulose ventrally. Legs dark brown. On *Castanopsis* *G. okajimai*
- Abdomen smooth ventrally. Legs pale brown 3
3. 6th antennal segment and the distal half of 5th segment dark brown, and the remains of antennal segments pale brown. Body green in life. On *Myrica* *G. myricae*
- All the antennal segments pale brown. Body brown to pale brown in life 4
4. Siphunculi reticulated on the whole length. 3rd antennal segment with 18–28 (mostly more than 20) setae. On *Ficus* *G. ficicola*
- Siphunculi reticulated usually at the base. 3rd antennal segment with 13–21 (mostly less than 20) setae. On *Psidium* *G. formosana*

5. Head with 10–15 setae dorsally. 3rd antennal segment imbricated on the whole length. On *Carpinus* *G. carpini*
- Head with more than 20 setae dorsally including short ones. 3rd antennal segment smooth at least the basal half. On Fagaceae 6
6. Abdomen smooth ventrally. If weakly spinulose, then each spinule on ventral surface shorter than the diameter of setal sockets. On deciduous *Quercus* 7
- Abdomen strongly spinulose ventrally, each spinule as long as the diameter of setal sockets on ventral setae. On evergreen *Quercus* & *Lithocarpus* 8
7. Tibiae dark brown on the basal half and pale brown on the distal half. Cauda with 5–9 setae. Mainly on *Q. acutissima* *G. kuwanai*
- Tibiae pale brown, dark at the apex. Cauda with 8–14 setae. On *Q. dentata* & *Q. serrata* *G. prinicola* sp. nov.
8. Tibiae pale brown with blackish or dark brown spots (after Sorin & Agarwala's (2002) description). On *Q. gilva* *G. isensis*
- Tibiae without such spots 9
9. Tibiae pale brown. Mainly on *Q. phillyraeoides* *G. nipponica*
- Tibiae dark brown. On *Q. acuta*, *Q. glauca*, *Q. myrsinaefolia*, *Q. salicina* & *Lithocarpus* *G. nigra*

Alate females (viviparae and oviparae)

1. Semicircular band between siphunculi usually with 3 setae (in *okajimai*, sometimes with 4 setae). Tibiae striate-imbricated 2
- Semicircular band between siphunculi with more than 5 setae. Tibiae smooth 5
2. Abdomen spinulose ventrally. Legs dark brown. On *Castanopsis* *G. okazimai*
- Abdomen smooth ventrally. Legs pale brown 3
3. 6th antennal segment about 1.7 times as long as 3rd segment. Processus terminalis about 3 times as long as the base of 6th segment. On *Myrica* *G. myricae*
- 6th antennal segment at most 1.4 times as long as 3rd segment. Processus terminalis less than 2.5 times as long as the base of 6th segment 4
4. 3rd antennal segment with 19–23 setae and with 16–24 secondary rhinaria which are arranged with regular intervals. On *Ficus* *G. ficicola*
- 3rd antennal segment with 16–17 setae and with 23–26 secondary rhinaria which are close to each other. On *Psidium* *G. formosana*
5. Head with 10–15 setae dorsally. On *Carpinus* *G. carpini*
- Head with more than 20 setae dorsally. On Fagaceae 6
6. 3rd antennal segment with 22–35 transversely oval secondary rhinaria. On *Q. acuta*, *Q. glauca*, *Q. myrsinaefolia*, *Q. salicina* & *Lithocarpus* *G. nigra*
- 3rd antennal segment with 7–20 circular to slightly oval secondary rhinaria 7
7. Ultimate rostral segment about 2.6 times as long as 2nd segment of hind tarsus (after Sorin & Agarwala's (2002) description). On *Q. gilva* *G. isensis*
- Ultimate rostral segment 1.5–2.1 times as long as 2nd segment of hind tarsus 8
8. Tibiae dark brown on the basal half and pale brown on the distal half. On *Q. acutissima* *G. kuwanai*
- Tibiae pale brown on the whole length or at most dark at the apex 9
9. Abdomen smooth ventrally. Cauda with 9–12 setae. On *Q. dentata* & *Q. serrata* *G. prinicola* sp. nov.
- Abdomen spinulose ventrally. Cauda with 6–8 setae. On *Q. phillyraeoides* *G. nipponica*

ACKNOWLEDGEMENTS

I wish to express my sincere thanks to Dr. P. A. Brown (BMNH) and Dr. G. L. Miller (USDA) for the loan of specimens of *Greenidea* species collected from Japan and the loan of the cotypes of *G. kuwanai* preserved in USNM, respectively, to Dr. P. A. Brown and Dr. Y. Yongema (ELWU) for their search for specimen from Japan of *G. anonae* and *G. brideliae*, to Dr. S. Akimoto (SEHU), Dr. Y. Takematsu (BSYU) and Mr. S. Takahashi (AEUU) for their kindness in giving me the opportunities to examine R. Takahashi collection, M. Moritsu collection and T. Tanaka collection, respectively, to Dr. M. Sorin of the Kogakkan University for his taxonomic comments, and to Dr. S. Takagi and Dr. S. Akimoto for their critical review of the manuscript. Many thanks are also due to the late Prof. Emeritus T. Tanaka, Dr. M. Inaizumi and Mr. S. Takahashi, all of the Utsunomiya University, for their kind guidance. Acknowledgements are made to Messrs. T. Ide, J. Iwamoto, K. Kitagawa, K. Kume, Y. Mahara, M. Masumoto, Y. Matsumoto, K. Nakashiba, Y. Oda, M. Okumura, H. Tsukamoto, N. Yamaguchi, N. Uchida, J. Yamada and the late T. Yamazaki for their kindness in offering valuable specimens.

REFERENCES

- Blackman, R. L. & Eastop, V. F. 1994. Aphids on the World's Trees. An Identification and Information Guide. CAB International, Wallingford.
- Blackman, R. L. & Eastop, V. F. 2000. Aphids on the World's Crops. An Identification and Information Guide, Second edition. John Wiley & Sons Ltd., England.
- Eastop, V. F. & Hille Ris Lambers, 1976. Survey of the World's Aphids. W. Junk, The Hague.
- Essig, E. O. & Kuwana, S. I. 1918. Some Japanese Aphididae. Proceeding of California Academy Sciences, 4th series, 8: 35–112.
- Ghosh A. K. 1987. Biotaxonomy of Greenideinae (Homoptera: Aphidoidea). In Holman et al. (eds.) Population Structure, Genetics and Taxonomy of Aphids and Thysanoptera: 273–292. APB Academic Publishing.
- Ghosh, A. K. & Agarwala, R. K. 1993. The Fauna of India and the Adjacent Countries, Part 6, Homoptera, Aphidoidea, Subfamily: Greenideinae. Zoological Survey of India, Calcutta.
- Ghosh, A. K., Ghosh, M. R. & Raychaudhuri, D. N. 1971. Studies on the aphids (Homoptera: Aphididae) from eastern India, VII. New species and new records from West Bengal. Oriental Insects, 5: 209–222.
- Halbert S. E. 2004. The genus *Greenidea* (Rhynchota: Aphididae) in the United States. Florida Entomologist, 87: 159–163.
- Hamasaki, S., Katoh, A., Ikumura, S. Kagoshima, K. & Uehara, K. 2000. A list of the aphid specimens collected by Magoshiro Moritsu. Rostris, 49: 1–54. (In Japanese.)
- Hirashima, Y. (superv.) 1989. A Check List of Japanese Insects. Isseido, Fukuoka. (In Japanese.)
- Kitamura, S. & Murata, G. 1984. Colored Illustrations of Woody Plants of Japan. Vol. II. Revised edition. Hoikusha, Ôsaka. (In Japanese.)
- Kurisaki, M. 1920. Studies on some aphids. Zoological Magazine, 32: 377–388. (In Japanese.)
- Liao, H. 1978. The *Greenidea* aphids of Taiwan (Homoptera: Aphididae). Journal Agricultural Research of China, 24: 345–354.
- Maki, M. 1917. Three new species of *Trichosiphum* in Formosana. In A Collection of

- Essays for Mr. Yasushi Nawa: 9–22, Gifu.
- Maki, M. 1918. On the *Trichosiphum* of Formosa and a new species of the genus. Formosan Agricultural Report, 138: 337–345. (In Japanese.)
- Martin, J. H. 1983. The identification of common aphid pests of tropical agriculture. Tropical Pest Management, 29: 395–411.
- Matsumoto, Y. 2000. Aphids (Insecta, Homoptera, Sternorrhyncha) of the Imperial Place, Tokyo, Japan. Memory of the Natural Science and Museum, 36: 83–98. (In Japanese with English summary.)
- Moritsu, M. 1983. Aphids of Japan in Colors. Zenkoku Nôson Kyôiku Kyôkai, Tôkyô. (In Japanese.)
- Noordam, D. 1994. Greenideinae from Java (Homoptera: Aphididae). Zoologische Verhandelingen, 296: 1–284.
- Okajima, G. 1908. Contributions to the study of Japanese Aphididae. II. Three new species of *Trichosiphum* in Japan. Bulletin of the College of Agriculture, Tokyo Imperial University, 8: 19–26.
- Okamoto, H. & Takahashi, R. 1927. Some Aphididae from Korea. Insecta Matsumurana, 1: 130–148.
- Paik, W. H. 1972. Illustrated Encyclopaedia of Fauna and Flora of Korea Vol 13, Insecta 5. Ministry of Education, Seoul. (In Korean.)
- Pergande, T. 1906. Description of two new genera and three new species of Aphididae. Entomological News, 17: 205–210.
- Raychaudhuri, D. N. 1956. Revision of *Greenidea* and related genera (Homoptera, Aphididae). Zoologische Verhandelingen, 31: 1–106.
- Raychaudhuri, D. N. & Chatterjee, M. 1980. Subfamily Greenideinae. In Raychaudhuri (ed.) Aphids of North East India and Bhutan: 314–358. The Zoological Society, Calcutta.
- Remaudière, G. & Remaudière, M. 1997. Catalogue of the World's Aphididae. INRA, Paris.
- Shinji, O. 1941. Monograph of Japanese Aphididae. Shûkyôsha, Tôkyô. (In Japanese.)
- Sorin, M. 1976. Aphids on trees, part 4. Forest Insects, 25: 16–23. (In Japanese.)
- Sorin, M. 1977. Aphids on trees, part 6. Forest Insects, 26: 4–13. (In Japanese.)
- Sorin, M. 1994. Aphids of Mie Prefecture. Hirakura, 38: 51–86. (In Japanese.)
- Sorin, M. & Agarwala, B. K. 2002. A new species of the genus *Greenidea* (Homoptera, Aphididae) from Japan. The Japanese Journal of Systematic Entomology, 8: 27–31.
- Sugimoto, S. 1995. Aphids (Homoptera: Aphididae) collected in the Ryûkyû Islands, Japan, with their host plants and localities. Rostria, 44: 5–16. (In Japanese with English summary.)
- Sugimoto, S. 2001. Morphological variation of *Eutrichosiphum heterotrichum* (Raychaudhuri) (Homoptera: Aphididae: Greenideinae) newly recorded from Japan, with description of its hitherto unknown morphs. Entomological Science, 4: 477–484.
- Suenaga, H. 1934. Die Greenidenen-blattläuse Japans (Hemipt., Aphididae). Bulletin of the Kagoshima Imperial College, Agriculture and Forestry, Dedicated to the twenty-five anniversary, 1: 789–804. (In German.)
- Takahashi, R. 1921. Aphididae of Formosa, Part 1. Agricultural Experimental Station, Government of Formosa, Special Report, 20: 1–97.
- Takahashi, R. 1923. Aphididae of Formosa, Part 2. Report, Government Research Institute, Department of Agriculture, Formosa, 4: 1–173.
- Takahashi, R. 1925. Aphididae of Formosa, Part 4. Report, Government Research Institute, Department of Agriculture, Formosa, 16: 1–65.
- Takahashi, R. 1930. Some Aphididae of Loochoo. Transactions of the Natural History

- Society of Formosa, 20: 317–327.
- Takahashi, R. 1931. Aphididae of Formosa, Part 6. Report, Government Research Institute, Department of Agriculture, Formosa, 53: 1–127.
- Takahashi, R. 1936. Some Aphididae from south China and Hainan (Homoptera), 1. Lingnan Science Journal, 15: 595–606.
- Takahashi, R. 1937a. Some oriental Aphididae (Homoptera), II. Konowia, 16: 90–96.
- Takahashi, R. 1937b. Additions to the aphid fauna of Formosa (Homoptera), IV. The Philippine Journal of Science, 63: 1–19.
- Takahashi, R. 1950. List of the Aphididae of the Malay Peninsula, with descriptions of the new species (Homoptera). Annals of the Entomological Society of America, 43: 587–607.
- Takahashi, R. 1962. Key to genera and species of Greenideini of Japan, with descriptions of a new genus and three species (Homoptera: Aphididae). Transactions of the Shikoku Entomological Society, 7: 65–73.
- Takahashi, R. 1963. Two new genera and five new or little-known species of Aphididae from Japan (Homoptera). Kontyû, 31: 159–168.
- Takahashi, R. & Sorin, M. 1959. Biology of the aphid, *Paratrachosiphum kashicola* (Kurisaki) (Aphididae, Homoptera). Insect Ecology, 7: 129–132. (In Japanese with English summary).
- Tao, C. C. 1991. Aphid Fauna of Taiwan Province. Taipei, Taiwan Provincial Museum. (In Chinese.)