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Article

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Taxonomic study of the Japanese species of the genus *Salka* Dworakowska (Hemiptera, Cicadellidae, Typhlocybinae)

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Abstract

Eight new species of the erythroneurine genus *Salka* are described and illustrated from the Ryukyu Islands, southern Japan: *S. denticulata* **sp. nov.**, *S. circumflexa* **sp. nov.**, *S. okinawana* **sp. nov.**, *S. diversa* **sp. nov.**, *S. dimorpha* **sp. nov.**, *S. maesatoensis* **sp. nov.**, *S. nusukuensis* **sp. nov.** and *S. trimaculata* **sp. nov.**

Key words: Auchenorrhyncha, Erythroneurini, taxonomy, new species, dimorphism

Introduction

The erythroneurine genus *Salka* Dworakowska, 1972 was reviewed by Sohi & Mann (1994). Subsequently, ten species were added by Dworakowska (1994, 2006) and Zhang *et al*. (2009) redescribed the genus and described nine species from China. As a result, 53 species have been recorded from the Oriental region. In the course of my taxonomic study on the Japanese typhlocybine fauna, I discovered eight new species of the genus.

The distributional range of each species is generally very narrow, and these new species are apparently endemic to the Ryukyus, southern Japan. The genus has not been recorded previously from other parts of Japan. Metcalf (1968) cited Matsumura (1934) as recording *Zygina nigricans* Matsumura (= *Salka nigricans*) from Japan but Matsumura's publication indicates that the species is from Taiwan which, in 1934, was considered part of Japan. Although the morphological characters of male genitalia and female 7th abdominal sternite are peculiar to species, the Japanese species are classified into two species groups: 1) pygofer bearing ventral process; aedeagus having apical process arising from ventral margin, lacking atrial process (seven species), and 2) pygofer not bearing ventral process; aedeagus lacking apical process, having atrial process (one species). If the present grouping were applied to all known *Salka* species, most of them would be classified into the first species group. It should be possible to classify all *Salka* species into species groups based on characters of the male genitalia, especially the configuration of the aedeagus, but this is beyond the scope of the present paper.

The depositories of the type material examined in this study are abbreviated in the text as follows: [ELKU] Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan; no abbreviation is indicated for the material preserved in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Genus *Salka* Dworakowska, 1972

Type species: *Zygina nigricans* Matsumura, 1932.
Salka Dworakowska, 1972: 778; Chiang & Knight, 1990: 229; Sohi & Mann, 1994: 31; Zhang, Yang & Huang, 2009: 23.

Body yellow to brownish black. Fore wing semitransparent with brochosome field yellow to brownish black; hind wing semitransparent, with veins darkened.

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Head as wide as or somewhat narrower than pronotum; vertex slightly produced anteriad, about twice as wide as long at dorsal mid-line, with coronal suture indistinct or short. Pronotum about twice as wide as long. Male abdominal sternal apodemes small, not or slightly exceeding 3rd sternite.

Male genitalia. Pygofer bearing 1 or more macrosetae on dorsal margin and tuft of various sized macrosetae at lower basal angle, with dorsal process, with or without ventral process. Subgenital plate triangular, bearing 2−5 macrosetae in row or arranging triangularly and numerous short stout setae on outer lateral margin. Style with apophysis variable in shape. Connective U- or Y-shaped, with or without central lobe. Aedeagus tubular, usually with 1 or more processes; shaft long, as long as or longer than preatrium; gonopore apical or subapical, usually on ventral or caudal surface. Anal tube process present or absent.

Distribution. Oriental region.

Species checklist of Japanese *Salka*

S. circumflexa N. Ohara, **sp. nov.**: figs. 2, 10, 29–40, 114. [(Ryukyus: Amami-Oshima)]
S. denticulata N. Ohara, **sp. nov.**: figs. 1, 9, 17–28, 113. [Ryukyus (Amami-Oshima, Tokunoshima)]
S. dimorpha N. Ohara, **sp. nov.**: figs. 5, 13, 68–79, 117–118. [Ryukyus (Tokunoshima, Okinawa)]
S. diversa N. Ohara, **sp. nov.**: figs. 4, 12, 53–67, 116. [Ryukyus (Amami-Oshima, Tokunoshima, Okinawa)]
S. maesatoensis N. Ohara, **sp. nov.**: figs. 6, 14, 80–90, 119. [Ryukyus (Miyako, Ishigaki)]
S. nusukuensis N. Ohara, **sp. nov.**: figs. 7, 15, 91–102, 120. [Ryukyus (Ishigaki, Iriomote)]
S. okinawana N. Ohara, **sp. nov.**: figs. 3, 11, 41–52, 115. [Ryukyus (Okinawa)]
S. trimaculata N. Ohara, **sp. nov.**: figs. 8, 16, 103–112, 121. [Ryukyus: Ishigaki, Iriomote]

Key to Japanese species of *Salka*

1.	Mesonotum pale, concolorous with vertex	2
–	Mesonotum dark, not concolorous with vertex	4
2.	Anteclypeus pale, concolorous with rest of face	3
–	Anteclypeus infuscated	***S. denticulata* sp.nov.**
3.	Black spot of vertex notched anteriad, nearly reaching laterofrontal suture	***S. circumflexa* sp. nov.**
–	Black spot slightly emarginate anteriad, not reaching laterofrontal suture	***S. okinawana* sp. nov.**
4.	Anteclypeus pale, concolorous with rest of face	5
–	Anteclypeus infuscated, not concolorous with rest of face	7
5.	Vertex with black spot only (rarely pair of black fasciae anteriorly), lorum pale	6
–	Vertex with black spot and pair of black fasciae anteriorly, lorum brownish	***S. trimaculata* sp. nov.**
6.	Black spot of vertex reaching posterior margin of vertex	***S. dimorpha* sp. nov.**
–	Black spot of vertex not reaching posterior margin of vertex	***S. diversa* sp. nov.**
7.	Black spot of vertex large, notched anteriad, nearly reaching laterofrontal suture	***S. maesatoensis* sp. nov.**
–	Black spot small, slightly emarginate anteriad or not, not nearly reaching laterofrontal suture	***S. nusukuensis* sp. nov.**

Salka denticulata sp. nov.

(Figs. 1, 9, 17–28, 113)

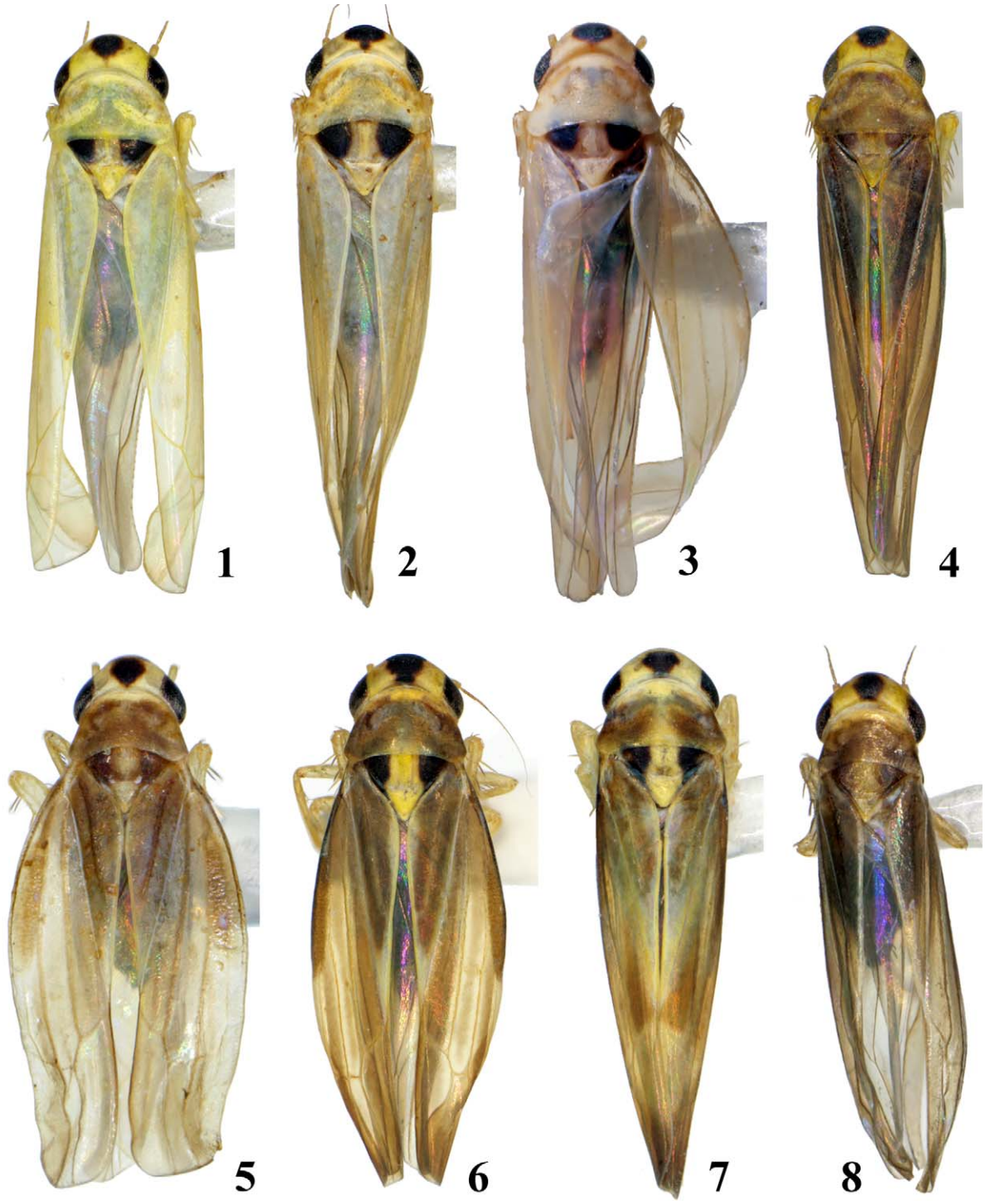
Body pale yellow to pale ochreous. Vertex with pentagonal black spot centrally; anteclypeus infuscated. Mesonotum with basal triangles black; fore wing with veins yellow. Abdomen black; male subgenital plates brown basally, gradually darkened toward apex.

Vertex 2.4 times as wide as long at dorsal mid-line; coronal suture indistinct; pronotum 1.9 times as wide as long, nearly as long as mesonotum. Male abdominal sternal apodemes reaching posterior margin of 3rd sternite. Female 7th abdominal sternite pentagonal, with posterior margin rounded, 1.5 times as long as wide. Ovipositor (3rd valvulae) extending slightly beyond pygofer.

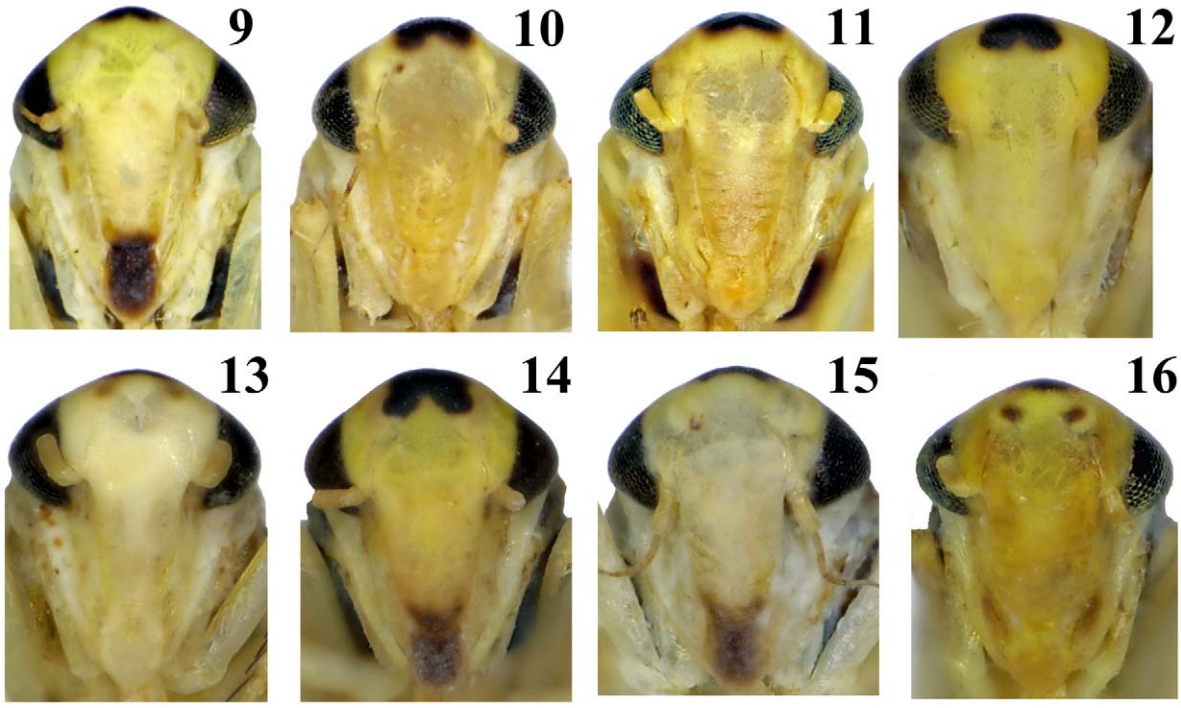
Body length (mean): ♂, 2.9–3.2 mm (3.1 mm); ♀, 3.1–3.2 mm (3.2 mm).

Male genitalia (Figs. 18–28). Pygofer bearing single macroseta on dorsal margin, tuft of short macrosetae at lower basal angle and numerous scattered short setae, with dorsal and ventral processes; dorsal process curved dor-

sad near middle, slightly exceeding caudal margin of pygofer, with distinct striations apically; ventral process small, sinuate, tapering at apex. Subgenital plate rounded apically, bearing 4–5 macrosetae. Style elongate, narrowed in basal 1/3; apical extension of apophysis with some minute furrows. Connective U-shaped, with central lobe distinct. Aedeagus strongly bent dorsad near base, slightly narrowed in apical 1/3, with pair of asymmetrical apical processes; longer apical process exceeding basal 1/3 of aedeagal shaft, gently curved ventrad, with tiny denticle throughout length except base; shorter process extending laterally, dentate except basally; preatrium short; gonopore apical on caudal surface.



FIGURES 1–8. Dorsal habitus. 1, *Salka denticulata* **sp. nov.** (Paratype ♀, body length, 3.1 mm); 2, *S. circumflexa* **sp. nov.** (Paratype ♀, 3.8 mm); 3, *S. okinawana* **sp. nov.** (Paratype ♀, 3.7 mm); 4, *S. diversa* **sp. nov.** (Paratype ♂, 3.2 mm); 5, *S. dimorpha* **sp. nov.** (Paratype ♂, 2.7 mm); 6, *S. maesatoensis* **sp. nov.** (Paratype ♂, 3.0 mm); 7, *S. nusukuensis* **sp. nov.** (Paratype ♂, 3.3 mm); 8, *S. trimaculata* **sp. nov.** (Paratype ♂, 2.3 mm).



FIGURES 9–16. Face. 9, *Salka denticulata* **sp. nov.**; 10, *S. circumflexa* **sp. nov.**; 11, *S. okinawana* **sp. nov.**; 12, *S. diversa* **sp. nov.**; 13 *S. dimorpha* **sp. nov.**; 14, *S. maesatoensis* **sp. nov.**; 15, *S. nusukuensis* **sp. nov.**; 16, *S. trimaculata* **sp. nov.**

Type series. Holotype: ♂, Higashi-inutabu, Isen, Tokunoshima Is., Ryukyus, Japan, 5. VII. 2007, M. Hayashi *et al*. Paratypes: [Amami-Oshima Is.] 1♂, Yamma, Sumiyô, 4. VII. 2005, M. Hayashi *et al*.; 2♀, Ôdana, Yamato, 6. IV. 2007, M. Hayashi *et al*.; [Tokunoshima Is.] 1♂, same date as holotype. The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Amami-Oshima Is., Tokunoshima Is.).

Remarks. The male genitalia of this new leafhopper are similar to those of *S. nigricans* (Matsumura, 1932) described from southern Taiwan (Chiayi), but differ in the following characters: ventral pygofer process short and thin; aedeagus bearing pair of asymmetrical apical processes.

Etymology. The specific name is derived from the configuration of the aedeagal process.

***Salka circumflexa* sp. nov.**

(Figs. 2, 10, 29–40, 114)

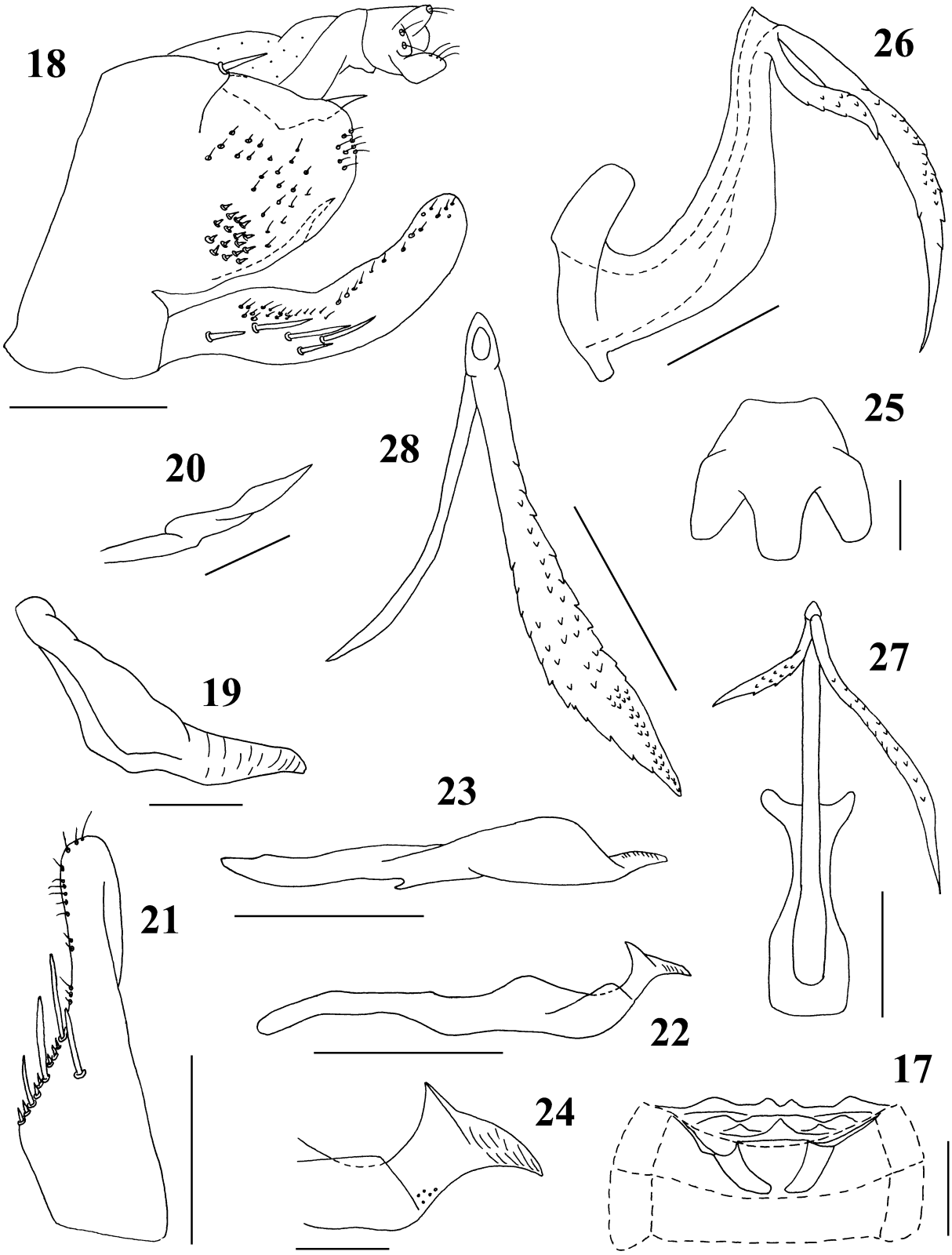
Body beige. Vertex with large black spot at center, which is roundly quadrilateral; face pale orange. Mesonotum with basal triangles black; fore wing slightly darkened apicad. Dorsum of female abdomen infuscated; pygofer brown, gradually darkened toward apex; ovipositor (3rd valvulae) brown.

Vertex 3.0 times as wide as long at dorsal mid-line; pronotum 2.0 times as wide as long, slightly shorter than mesonotum. Male abdominal sternal apodemes slightly exceeding posterior margin of 3rd sternite. Female 7th abdominal sternite rectangular with posterior margin produced caudally. Ovipositor (3rd valvulae) slightly extending beyond pygofer.

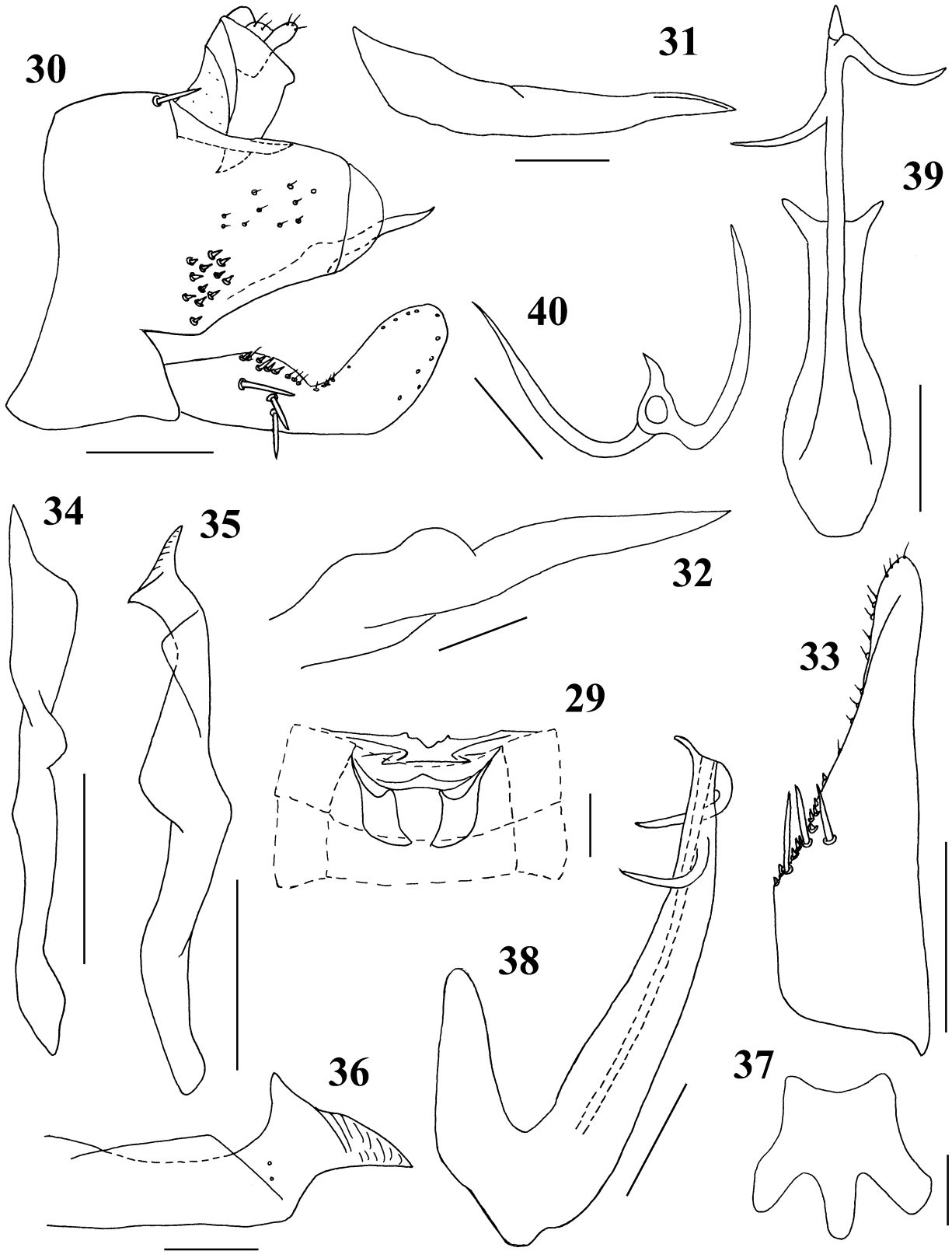
Body length: ♂, 3.6 mm; ♀, 3.8 mm.

Male genitalia (Figs. 30–40). Pygofer with caudal margin roundly produced and weakly sclerotized, bearing 1–2 macrosetae on dorsal margin, tuft of short macrosetae at lower basal angle and short setae on surface of lobe, with dorsal and ventral processes; dorsal process short, reaching caudal 1/4 of pygofer, nearly straight; ventral process long, exceeding pygofer, sinuate near base of dorsal margin. Subgenital plate widened in basal 1/3, gently narrowed in apical 2/3, bearing 3 macrosetae. Style slender, triangular at apical 1/4; apical extension of apophysis with some minute furrows. Connective U-shaped, with central lobe distinct. Aedeagus strongly bent dorsad near base, with dorsal apodeme elongate, provided with apical and subapical processes sharply curved cephalad; apical pro-

cess arising from right side of shaft, as long as subapical one; subapical process arising from apical 1/6 of left side; shaft straight, gently narrowed apicad, with small apical process dorsally; preatrium indistinct; gonopore apical.



FIGURES 17–28. *Salka denticulata* **sp. nov.** Male abdominal sternal apodemes (17) and ♂ genitalia (18–28). — 18, Pygofer in lateral view; 19, dorsal pygofer process in lateral view; 20, ventral pygofer process in lateral view; 21, subgenital plate in ventral view; 22–23, style in lateral (22) and ventral (23) views; 24, apex of style in lateral view; 25, connective in ventral view; 26–27, aedeagus in lateral (26) and caudal (27) views; 28, apex of aedeagus in apical view. Scales: 0.05 mm (19–20, 24–25), 0.1 mm (21, 26–28) and 0.2 mm (17–18, 22–23).



FIGURES 29–40. *Salka circumflexa* **sp. nov.** Male abdominal sternal apodemes (29) and ♂ genitalia (30–40). — 30, Pygofer in lateral view; 31, dorsal pygofer process in lateral view; 32, ventral pygofer process in lateral view; 33, subgenital plate in ventral view; 34–35, style in lateral (34) and ventral (35) views; 36, apex of style in lateral view; 37, connective in ventral view; 38–39, aedeagus in lateral (38) and caudal (39) views; 40, apex of aedeagus in apical view. Scales: 0.05 mm (31–32, 36–37, 40), 0.1 mm (38–39) and 0.2 mm (29–30, 33–35).

Type series. Holotype: ♂, Mt. Matsunaga-yama, Amami-Naze, Amami-Oshima Is., Ryukyus, Japan, 19. IX. 2006, M. Hayashi *et al*. Paratype: [Amami-Oshima] 1♀, same data as holotype. The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Amami-Oshima Is.).

Remarks. This species is similar to *S. asna* Dworakowska, 1976 described from southern Taiwan (Kaohsiung) and *S. triangula* Chiang et Knight, 1990 from central Taiwan (Taichung) in the structure of male genitalia. But it can be distinguished by the following characters: pygofer with lobe trapezoidal, bearing dorsal pygofer process short; aedeagal processes sharply bent cephalad.

Etymology. The specific name is derived from the characteristic shape of the aedeagal apex in apical view.

***Salka okinawana* sp. nov.**
(Figs. 3, 11, 41–52, 115)

Body pale ochreous. Vertex bearing large pentagonal black spot centrally. Pronotum with anterolateral margin slightly brownish to infuscated; mesonotum with basal triangles black. Dorsum of female abdomen infuscated; venter of female ochreous.

Vertex 2.6 times as wide as long at dorsal mid-line; pronotum 2.0 times as wide as long, as long as mesonotum. Male abdominal sternal apodemes reaching posterior margin of 3rd sternite. Female 7th abdominal sternite nearly triangular, with anterior margin digitate. Ovipositor (3rd valvulae) slightly extending beyond pygofer.

Body length: ♂, 3.8 mm; ♀, 3.7 mm.

Male genitalia (Figs. 42–52). Pygofer with caudal margin roundly produced and weakly sclerotized, bearing 2 macrosetae on dorsal margin and tuft of short macrosetae at lower basal angle, with dorsal and ventral processes; dorsal process short, reaching caudal 1/5, slightly curved dorsad near middle; ventral process long, slightly curved ventrad near middle, extending beyond pygofer. Subgenital plate broad in basal 1/3, bearing 4 macrosetae. Style elongate; subapical extension of apophysis sinuate ventrally; apical extension short, with some minute furrows. Connective U-shaped, with central lobe slender. Aedeagus bent dorsad near base, with dorsal apodeme elongate, provided with apical and subapical processes gently curved cephalad; aedeagal processes thin, tapering, reaching to apical half of shaft; apical process arising from caudal margin of shaft; subapical one arising laterally; preatrium indistinct; gonopore apical on caudal surface.

Type series. Holotype: ♂, Mt. Terukubi-yama, Kunigami, Okinawa Is., Ryukyus, Japan, 2. III. 2009, M. Hayashi *et al*. Paratype: [Okinawa Is.] 1♀, Yona, Kunigami, 21. III. 1997, M. Hayashi *et al.* The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Okinawa Is.).

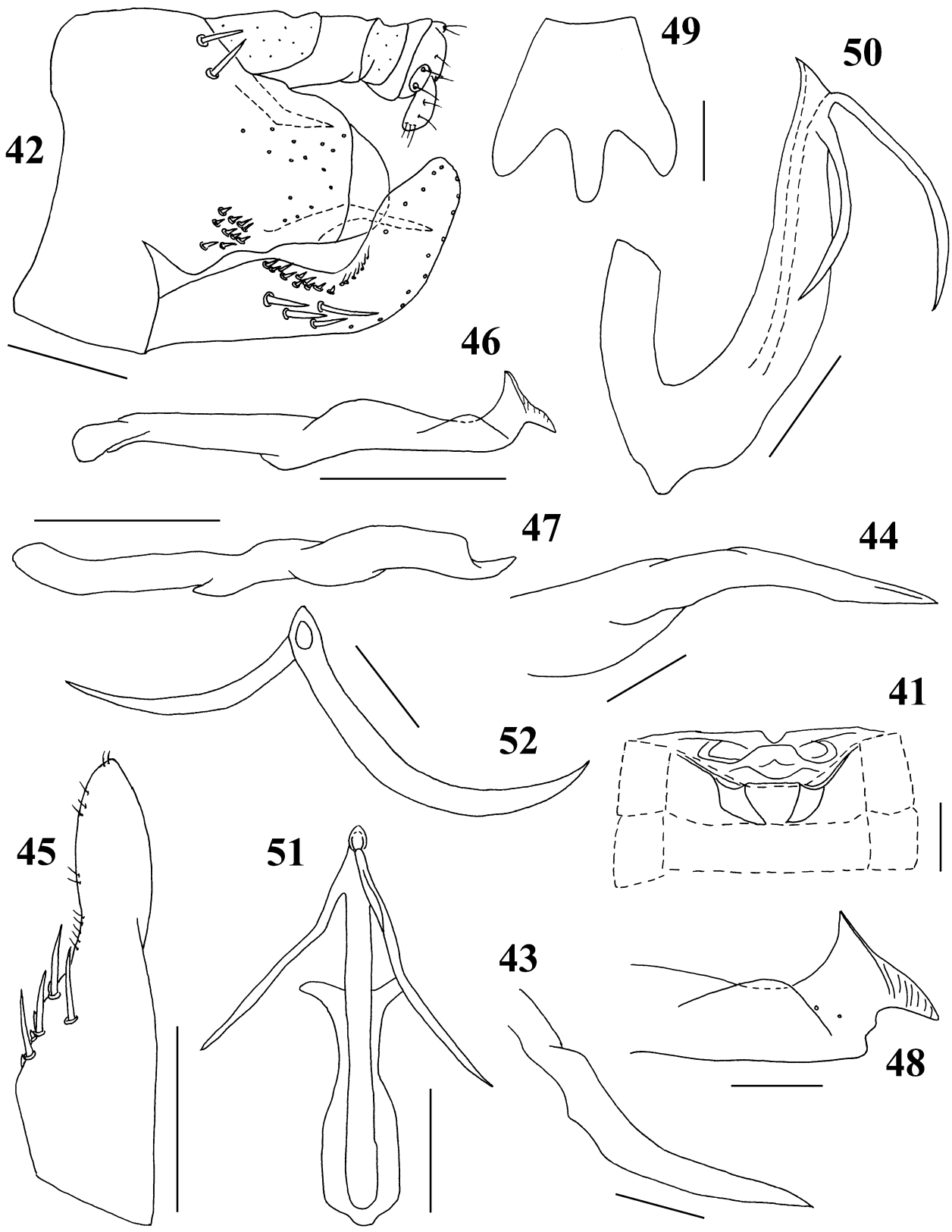
Remarks. This species and *S. circumflexa* **sp. nov.** both have the pygofer lobe weakly sclerotized caudally, but this species is distinguishable by the following features: female 7th sternite with anterior margin digitate; male ventral pygofer process curved ventrad near middle; aedeagal processes long, gently curved cephalad (not sharply curved).

Etymology. This species is named after the island of the type locality.

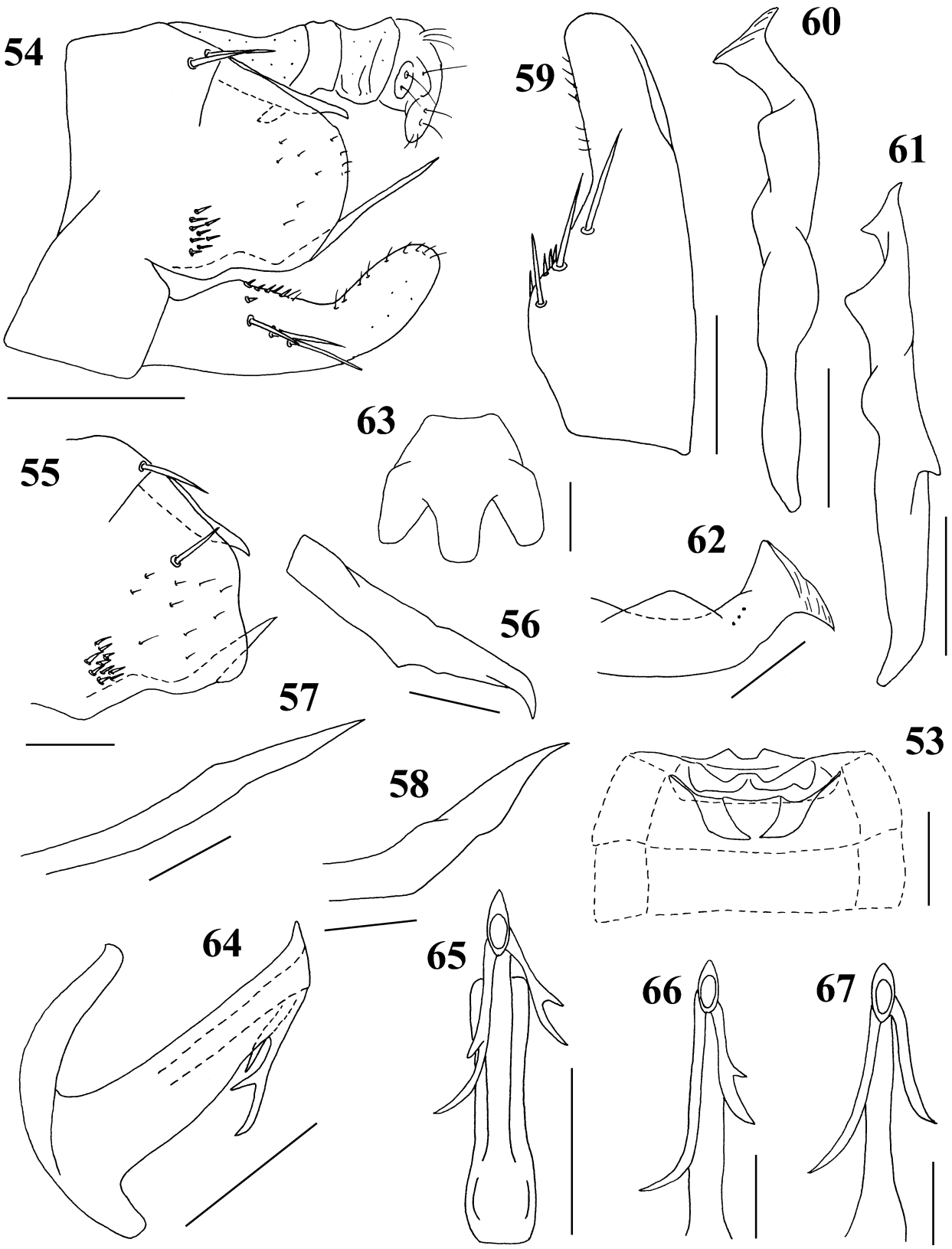
***Salka diversa* sp. nov.**
(Figs. 4, 12, 53–67, 116)

Male body brown, infuscated in some paratypes. Female often paler and yellowish, sometimes similar to male. Vertex pale yellow, bearing black spot centrally. Pronotum with anterior margin pale yellow; mesonotum pale yellow, with basal triangles brown indistinct; fore wing with brochosome field infuscated. Abdomen infuscated; male subgenital plates pale brown to brown; ovipositor (3rd valvulae) ochreous to brown.

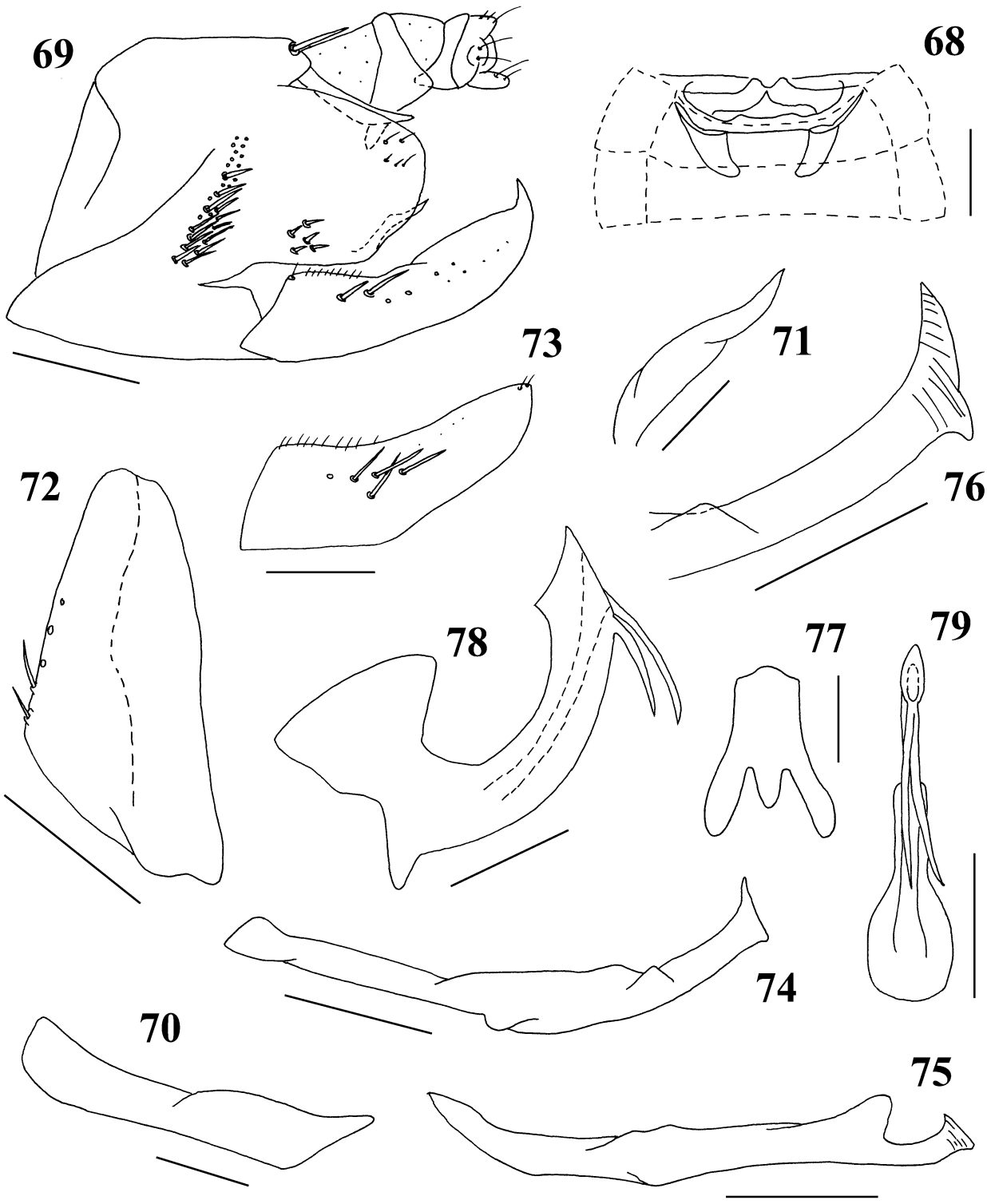
Vertex 2.0 times as wide as long at dorsal mid-line; coronal suture distinct basally. Pronotum 1.8 times as wide as long; mesonotum slightly shorter than pronotum. Male abdominal sternal apodemes not reaching posterior margin of 3rd sternite. Female 7th abdominal sternite pentagonal, with posterior margin swollen. Ovipositor (3rd valvulae) obviously extending beyond pygofer.



FIGURES 41–52. *Salka okinawana* **sp. nov.** Male abdominal sternal apodemes (41) and ♂ genitalia (42–52). — 42, Pygofer in lateral view; 43, dorsal pygofer process in lateral view; 44, ventral pygofer process in lateral view; 45, subgenital plate in ventral view; 46–47, style in lateral (46) and ventral (47) views; 48, apex of style in lateral view; 49, connective in ventral view; 50–51, aedeagus in lateral (50) and caudal (51) views; 52, apex of aedeagus in apical view. Scales: 0.05 mm (43–44, 48–49, 52), 0.1 mm (41, 50–51) and 0.2 mm (42, 45–47).



FIGURES 53–67. *Salka diversa* **sp. nov.** Male abdominal sternal apodemes (53) and ♂ genitalia (54–67). — 54–55, Pygofer in lateral view; 56, dorsal pygofer process in lateral view; 57–58, ventral pygofer process in lateral view; 59, subgenital plate in ventral view; 60–61, style in lateral (60) and ventral (61) views; 62, apex of style in lateral view; 63, connective in ventral view; 64–67, aedeagus in lateral (64) and caudal (65–67) views. Specimens from Okinawa Is. (55, 58, 66–67; paratypes). Scales: 0.05 mm (56–58, 62–63, 66–67), 0.1 mm (55, 59–61, 64–65) and 0.2 (53–54).



FIGURES 68–79. *Salka dimorpha* **sp. nov.** Male abdominal sternal apodemes (68) and ♂ genitalia (69–79). — 69, Pygofer of large individuals in lateral view; 70, dorsal pygofer process in lateral view; 71, ventral pygofer process in lateral view; 72, subgenital plate in ventral view; 73, subgenital plate of small individuals in lateral view (paratype); 74–75, style in lateral (74) and ventral (75) views; 76, apex of style in lateral view; 77, connective in ventral view; 78–79, aedeagus in lateral (78) and caudal (79) views. Scales: 0.05 mm (70–71), 0.1 mm (73, 76–79) and 0.2 mm (68–69, 72, 74–75).

Body length (mean): ♂, 2.9–3.3 mm (3.1 mm); ♀, 2.9–3.4 mm (3.2 mm).

Male genitalia (Figs. 54–67). Pygofer rounded or slightly sinuate caudally, bearing 1–3 macrosetae on dorsal margin, tuft of short macrosetae at lower basal angle, numerous short setae scattered and rarely macrosetae on disc of lobe, with dorsal and ventral processes; dorsal process slightly exceeding pygofer, weakly curved ventrad near

apex; ventral process thin, sinuate near base, tapering, extending well beyond pygofer (Figs. 54, 57; holotype) or sinuate, thick, tapering, slightly extending beyond pygofer (Figs. 55, 58; some paratypes). Subgenital plate widened in basal 2/3, bearing 3–5 macrosetae. Style almost uniform in width; apophysis of style long, ca. 0.2 times as long as style with some minute furrows apically. Connective U-shaped, with central lobe distinct. Aedeagus with dorsal apodeme elongate; shaft nearly straight bearing pair of asymmetrical apical processes; each apical process usually with small projection at middle of lateral margin (Fig. 65; holotype) or occasionally without projection (Figs. 66, 67; some paratypes); preatrium short; gonopore apical on caudal surface.

Type series. Holotype: ♂, Mt. Nesugata-yama, Amagi/Tokunoshima, Tokunoshima Is., Ryukyus, Japan, 4. VII. 2007, M. Hayashi leg. Paratypes: [Amami-Oshima Is.] 1♂, Mt. Matsunaga-yama, Amami-Naze, 19. IX. 2006, M. Hayashi *et al.*; [Tokunoshima Is.] 1♂, same data as holotype; 2♂ 1♀, Mt. Inokawa-dake, Tokunoshima, 2. VII. 2007, M. Hayashi leg.; 1♂, same data except 5. VII. 2007; [Okinawa Is.] 1♀, Mt. Terukubi-yama, Kunigami, 22. X. 1990, M. Hayashi *et al.*; 1♂, same data except 5. V. 1991; 2♂ 1♀, same data except 23. XII. 1991; 1♀, same data except 16. V. 1993; 13♂ 21♀, same data except 21.II. 2008; 1♀, same data except 2. III. 2009; 13♂ 13♀, same data except 12. XII. 2009; 2♂ 1♀, Mt. Yonaha-dake, Kunigami, 24. III. 1993, M. Hayashi *et al.*; 6♂ 6♀, same data except 8. X. 1995; 1♀, same data except 2. VII. 1996; 1♀, same data except 3. IV. 1999; 3♂ 7♀, same data except 12. IX. 2005; 2♂ 5♀, same data except 22. III. 2010, N. Ohara leg. (ELKU); 1♂ 1♀, Mt. Nishime-dake, Kunigami, 16. V. 1993, M. Hayashi *et al.*; 1♀, same data except 18. VI. 1994; 1♀, same data except 21. II. 2008; 3♂ 1♀, same data except 22. III. 2010, N. Ohara leg. (ELKU); 3♀, Oku For. Rd., Kunigami, 2. VII. 1996, M. Hayashi *et al.*; 1♂, same data except 12. IX. 2005; 3♂ 1♀, same data except 29. IX. 2007; 6♂ 4♀, same data except 2. III. 2009; 1♀, Ibu, Kunigami, 21. II. 2008, M. Hayashi *et al.*; 3♂ 1♀, Mt. Fenchiji-dake, Kunigami, 22. III. 2010, N. Ohara leg. (ELKU); 1♀, Okuma, Kunigami, 11. IX. 2005, M. Hayashi *et al.*; 1♂, Aha, Kunigami, 21. II. 2008, M. Hayashi *et al.*; 1♂, Hedo, Kunigami, 16. V. 1993, M. Hayashi *et al.*; 1♂, Henan, Ôgimi, 11. XII. 2009, M. Hayashi *et al.*; 1♀, Shioya, Ôgimi, 6. IV. 1991, M. Hayashi *et al.*; 1♂ 1♀, Mt. Nekumachiji, Ôgimi, 28. IX. 2007, M. Hayashi *et al.*; 2♀, Kawata, Higashi, 1. III. 2009, M. Hayashi *et al.*; 7♂ 2♀, Genka-Ôkawa, Nago, 28. IX. 2007, M. Hayashi *et al.*; 16♂ 10♀, same data except 20. II. 2008; 1♂ 2♀, same data except 11. XII. 2009; 1♀, Kyoda, Nago, 30. IV. 1991 (light trap), M. Hayashi *et al.*; 1♂, Ôshittai, Nago, 19. III. 2010, N. Ohara leg. (ELKU); 4♀, Mt. Katsuu-dake, Nago, 9. X. 1995, M. Hayashi *et al.*; 1♂, same data except 22. II. 2008; 1♂, Nago Central Park, Nago, 14. IX. 2005, M. Hayashi *et al.*; 1♂, Noborimata, Nakagusuku, 23. II. 2008, M. Hayashi *et al.*; 1♀, Kisembaru, Kin, 4. VII. 1996, M. Hayashi *et al.*; 1♀, Yamada, Onna, 8. IV. 1991, M. Hayashi *et al*. The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Amami-Oshima Is., Tokunoshima Is., Okinawa Is.).

Remarks. This species shows some geographical variations in the configuration of the male genitalia. The ventral pygofer process of specimens collected from Amami-Oshima Is. and Tokunoshima Is. (Figs. 54, 57) is thinner and longer. Furthermore, a pair of aedeagal apical processes is highly varied in the material from Okinawa Is.; often both apical processes have a small projection, occasionally one or rarely both apical processes have no accessory projection. This species is similar to *S. jiangshiensis* Zhang, Yang et Huang., 2009 described from southern China (Fujian), but can be distinguished by the male genitalia: aedeagus with shaft straight, provided with apical process (without ventral process).

Bionomics. This species probably inhabits the herbaceous layer along woodland paths or shady peripheries of subtropical forests, but the host plants are unknown. Adults seem to occur throughout the year.

Etymology. The specific name is derived from the variations in the configuration of male genitalia.

Salka dimorpha sp. nov.

(Figs. 5, 13, 68–79, 117–118)

Body pale brown, infuscated in some paratypes. Vertex ochreous, bearing black spot posteriorly. Pronotum ochreous anteriorly; mesonotum with basal triangles black; fore wing with brochosome field darkened. Abdomen infuscated.

Head slightly narrower than pronotum; vertex about twice as wide as median length. Pronotum about twice as wide as long; mesonotum nearly as long as pronotum. Male abdominal sternal apodemes rounded apically, exceeding posterior margin of 3rd sternite. Female 7th abdominal sternite rectangular, with posterior margin sinuate and

sharply produced posteriad at middle (Fig. 117) or with posterior margin convex near middle and rounded apically (Fig. 118). Ovipositor (3rd valvulae) determinately extending beyond pygofer.

Body length (mean): ♂, 2.6–3.3 mm (2.9 mm); ♀, 2.6–3.4 mm (3.0 mm). This species shows dimorphism of body size in both sexes. Large individuals: ♂, 3.1–3.3 mm (3.2 mm); ♀, 3.1–3.4 mm (3.2 mm). Small individuals: ♂, 2.6–2.7 mm (2.6 mm); ♀, 2.6–2.8 mm (2.7 mm).

Male genitalia (Figs. 69–79). Pygofer broad basally, with lobe quadrangular and rounded caudally, bearing single macroseta on dorsal margin, tuft of short macrosetae and irregular rows of long macrosetae at lower basal angle, with dorsal and ventral processes; base of pygofer longer than dorsal margin; dorsal process straight, tapering at apical 1/6, extending near caudal margin; ventral process thin, sinuate, extending slightly beyond pygofer. Subgenital plate trapezoidal, widened at basal 1/3, gradually narrowed apicad, bearing 5–6 macrosetae; subgenital plate of large individuals in lateral view with apex hook-like (Fig. 69; holotype); small individuals with apex obtuse (Fig. 73; some paratypes). Style long, widened at basal 2/5, gently curved dorsad at apical 1/3, with apophysis long, ca 0.2 times as long as style, with some minute furrows apically. Connective Y-shaped, with a distinct median anterior lobe; arms nearly as long as stem. Aedeagus compressed, U-shaped in lateral view; shaft bearing 2 apical processes; apical processes thin, weakly curved cephalad; shaft curved dorsad near base, with dorsal margin convex subapically; preatrium short; gonopore apical on caudal surface.

Type series. Holotype: ♂, Genka-Ôkawa, Nago, Okinawa Is., Ryukyus, Japan, 20. II. 2008, M. Hayashi *et al*. Paratypes: [Tokunoshima Is.] 1♂, Tôbe For. Rd., Amagi, 3. VII. 2007, M. Hayashi leg.; 1♂ 1♀, Mt. Inokawa-dake, Tokunoshima, 5. VII. 2007, M. Hayashi leg.; 1♀, Mt. Amagi-dake, Tokunoshima, 3. VII. 2007, M. Hayashi leg.; 1♀, Agon, Isen, 2. VII. 2007, M. Hayashi leg.; [Okinawa Is.] 1♂ 1♀, Oku, Kunigami, 30. IV. 2007, M. Hayashi *et al*.; 1♂, same data except 2. III. 2009; 1♂ 1♀, Oku For. Rd., Kunigami, 2. III. 2009, M. Hayashi *et al*.; 1♀, Mt. Terukubi-yama, Kunigami, 18. VI. 1994, M. Hayashi *et al*.; 2♂ 3♀, same data except 21. II. 2008; 1♂ 3♀, same data except 12. XII. 2009; 1♀, Yona, Kunigami, 13. XI. 1985, M. Hayashi *et al*.; 1♂, Ibu, Kunigami, 21. II. 2008, M. Hayashi *et al*.; 1♂ 2♀, Mt. Yonaha-dake, Kunigami, 15. V. 1993, M. Hayashi *et al*.; 1♂, same data except 8. X. 1995; 1♂, same data except 12. IX. 2005; 8♂ 8♀, same data as holotype; 3♂, same data except 19. III. 2010, N. Ohara leg. (ELKU); 1♂ 1♀, Takazato, Ôgimi, 30. IX. 2007, M. Hayashi *et al*.; 1♂, same data except 22. II. 2008; 3♂ 6♀, Mt. Akamata-yama, Ôgimi, 22. III. 2010, N. Ohara leg. (ELKU); 1♂ 3♀, Ôura, Nago, 15. VI. 1994, M. Hayashi *et al*.; 1♂ 1♀, same data except 6. X. 1995; 1♀, Mt. Katsuu-dake, Nago, 22. II. 2008, M. Hayashi *et al*.; 1♀, Gogayama, Nakijin, 25. III. 1993, M. Hayashi *et al*. The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Tokunoshima Is., Okinawa Is.).

Remarks. This species shows dimorphism of body size in both sexes, but large individuals (in holotype) are slightly different from smaller ones (in some paratypes) only in the configuration of female 7th sternum and the apex of the male subgenital plate. I concluded that these differences are infraspecific variations, because both size classes were observed in the same localities. This leafhopper has the following diagnostic characters of male genitalia among the Japanese congeners: pygofer broad basally and bearing irregular rows of long macrosetae.

Bionomics. The host plants are unknown, but this species probably lives in the herbaceous layer along mantle communities of subtropical forests. Adults become abundant in February to March and again in June to July.

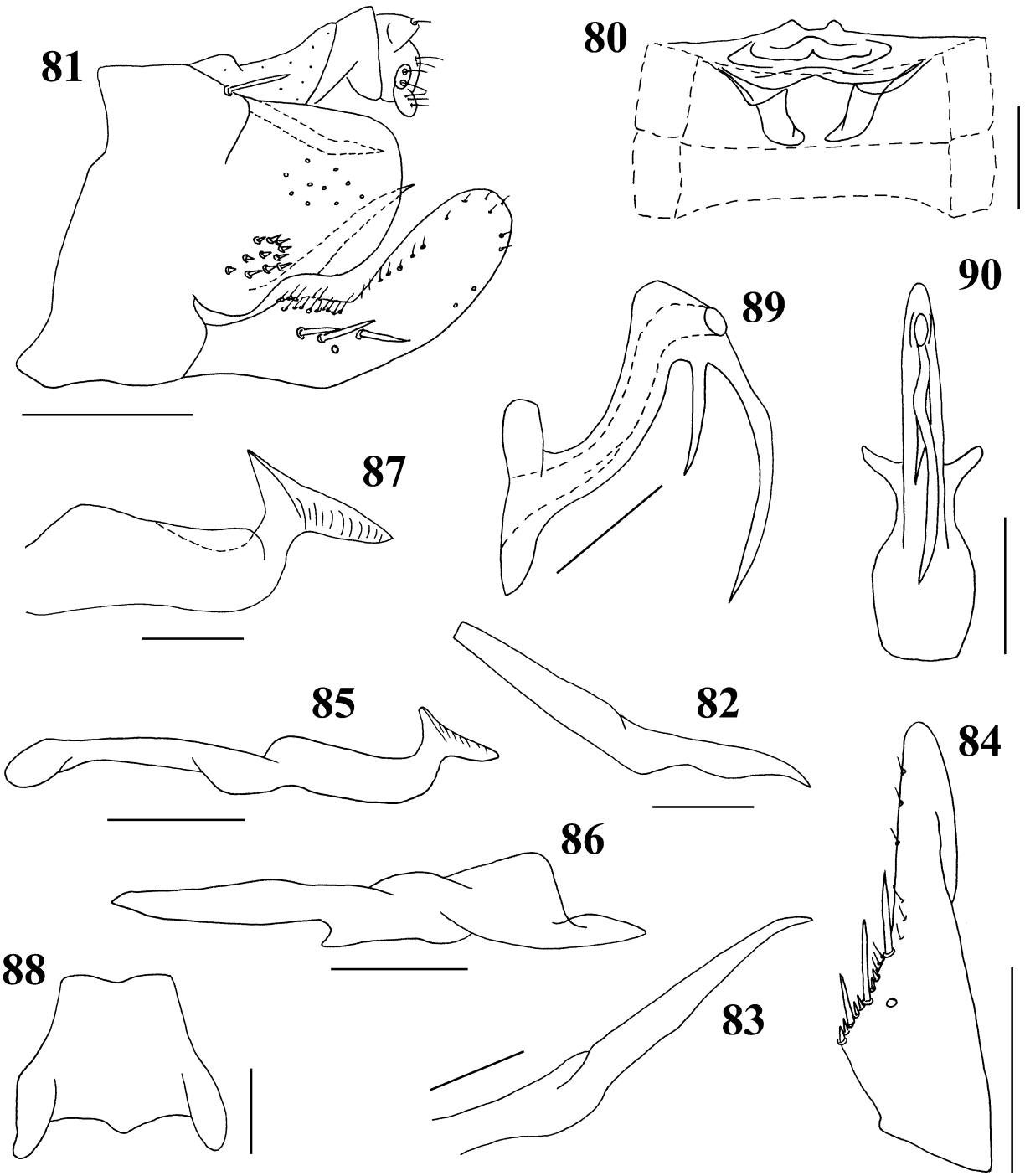
Etymology. The specific name is derived from the Greek word “dimorpha”, referring to the dimorphism of body size.

Salka maesatoensis sp. nov.

(Figs. 6, 14, 80–90, 119)

Body infuscated. Vertex pale yellow, with large black longitudinal band centrally; face pale yellow; postclypeus brown anteriorly; anteclypeus infuscated. Pronotum pale yellow anteriorly; mesonotum pale yellow with basal triangles black; fore wing with brochosome field more darkened.

Vertex 2.2 times as wide as median length; coronal suture indistinct; pronotum 1.9 times as wide as long; mesonotum as long as pronotum. Male abdominal sternal apodemes reaching posterior margin of 3rd sternite. Female 7th abdominal sternite quadrilateral with caudal margin strongly convex at middle, ornamented with pointed apex. Ovipositor (3rd valvulae) obviously extending beyond pygofer.



FIGURES 80–90. *Salka maesatoensis* **sp. nov.** Male abdominal sternal apodemes (80) and ♂ genitalia (81–90). — 81, Pygofer in lateral view; 82, pygofer process dorsal in lateral view; 83, ventral pygofer process in lateral view; 84, subgenital plate in ventral view; 85–86, style in lateral (85) and lateral (86) views; 87, apex of style in lateral view; 88, connective in ventral view; 89–90, aedeagus in lateral (89) and caudal (90) views. Scales: 0.05 mm (82–83, 87–88), 0.1 mm (85–86, 89–90) and 0.2 mm (80–81, 84).

Body length (mean): ♂, 2.8–3.1 mm (3.0 mm); ♀, 2.9–3.1 mm (3.0 mm).

Male genitalia (Figs. 81–90). Pygofer with lobe roundly quadrate, bearing 1–2 macrosetae on dorsal margin and tuft of short macrosetae at lower basal angle, with dorsal and ventral processes thin, tapering; dorsal process weakly curved dorsad at apical 1/3, reaching near caudal margin; ventral process almost straight, exceeding slightly pygofer. Subgenital plate straight in apical half, bearing 4 macrosetae and numerous short setae on outer lateral margin. Style widened at apical 1/5 in ventral view; apical extension of apophysis long, about twice as long as subapical one, with some minute furrows. Connective trapezoidal, with posterior margin concave; arms twice as

wide as stem; stem very short. Aedeagus sharply curved dorsad near base, arched at apical 1/3, bearing apical and subapical processes; apical process long, gently curved cephalad, extending to base of shaft; subapical process short, 0.5 times as long as apical process; subapex of shaft slightly produced dorsally; preatrium short; gonopore apical on caudal surface.

Type series. Holotype: ♂, Maesato For. Rd., Ishigaki Is., Ryukyus, Japan, 1. VII. 2008, M. Hayashi *et al*. Paratypes: [Miyako Is.] 1♂, Kurima Is., Shimoji, 13. V. 1995, M. Hayashi *et al*.; [Ishigaki Is.] 1♂, Mt. Nosoko-dake, 19. I. 2009, M. Hayashi *et al*.; 1♂, Mt. Yarabu-dake, 29. VI. 2008, M. Hayashi *et al*.; 1♂, Mt. Maese-dake, 24. XI. 2004, M. Hayashi *et al*.; 3♂, same data except 29. X. 2007; 2♂ 1♀, same data except 30. VI. 2008; 1♀, same data except 20. I. 2009; 1♂, same data except 27. X. 2009; 1♂, same data except 13. II. 2011; 1♀, same data except 10. III. 2011; 1♀, Mt. Omoto-dake, 2. VII. 2008, M. Hayashi *et al*.; 1♂, same data except 20. I. 2009; 32♂ 49♀, same data as holotype. The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Miyako Is., Ishigaki Is.).

Remarks. This new species resembles *S. rubronigra* Sohi et Mann, 1994 described from central Taiwan (Nantou) in the characters of male genitalia, but can be distinguished by the following features: dorsal pygofer process thin and weakly curved dorsad; aedeagus with a long process apically and a short one subapically; aedeagal shaft thin.

Bionomics. This leafhopper may inhabit mantle communities of subtropical forests or along woodland paths, and the host plant is *Trachelospermum gracilipes var. liukiuense* (Hatus.) (Apocynaceae). Adults seem to occur in June-July as the probable peak period.

Etymology. This species is named after the type locality of the holotype.

***Salka nusukuensis* sp. nov.**
(Figs. 7, 15, 91–102, 120)

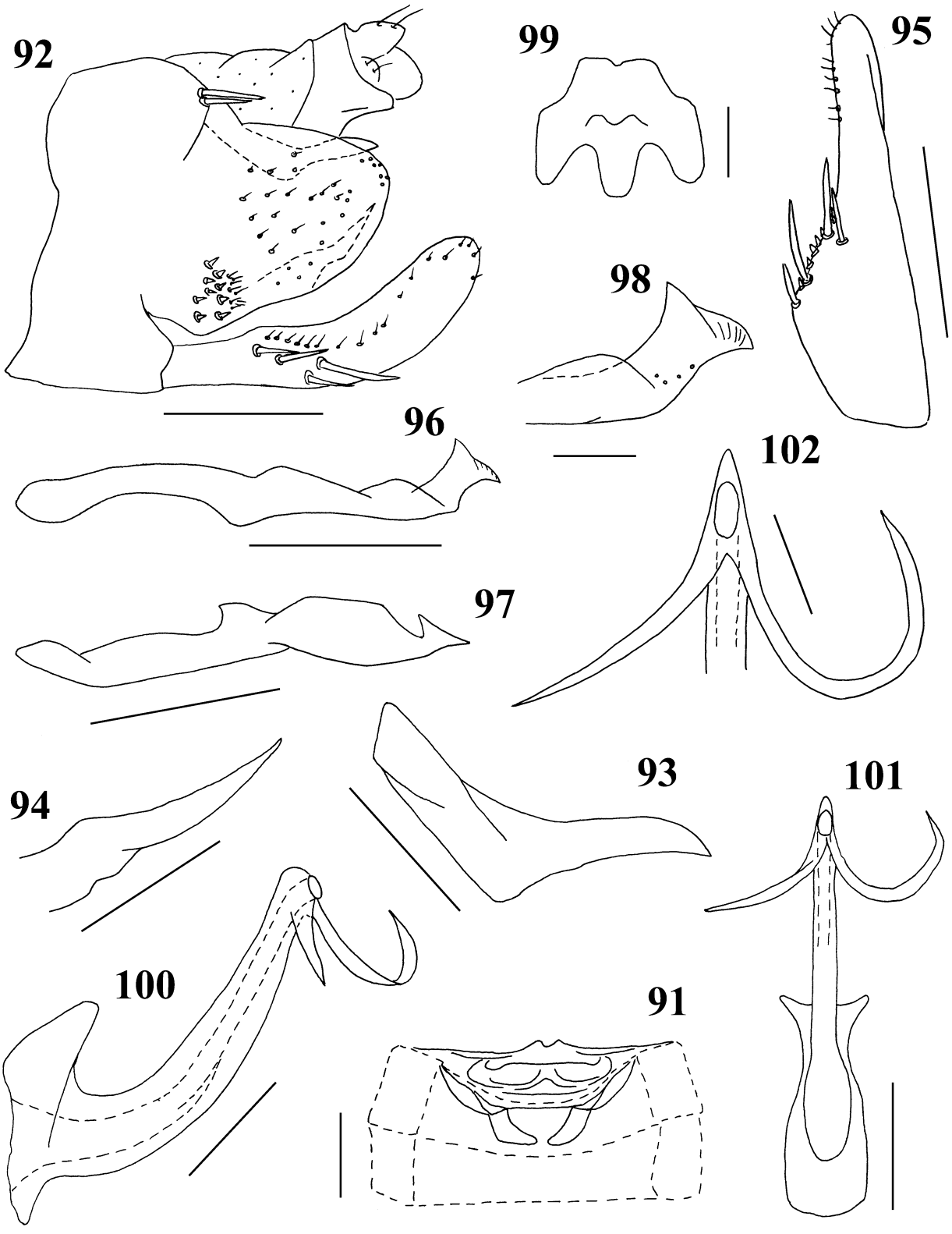
Body infuscated, brown in some paratypes. Vertex pale ochreous, creamy white in some paratypes, bearing black spot posteriorly; face pale ochreous to creamy white; postclypeus brown anteriorly; anteclypeus infuscated. Pronotum with anterior margin and longitudinal median area pale ochreous; mesonotum pale ochreous, with basal triangles black; fore wing pale brown with brochosome field infuscated. Abdomen infuscated.

Vertex 2.2 times as wide as median length; coronal suture indistinct; pronotum 1.9 times as wide as long; mesonotum about as long as pronotum. Male abdominal sternal apodemes not reaching posterior margin of 3rd sternite. Female 7th abdominal sternite quadrilateral, with posterior margin convex at middle with apex dull. Ovipositor (3rd valvulae) slightly extending beyond pygofer.

Body length (mean): ♂, 2.9–3.4 mm (3.2 mm); ♀, 2.9–3.4 mm (3.2 mm).

Male genitalia (Figs. 92–102). Pygofer oblong caudally, bearing 1–2 macrosetae on dorsal margin, tuft of short macrosetae at lower basal angle and numerous short setae scattered, with dorsal and ventral processes; dorsal process bent dorsad and narrowed at basal half, with apex obtuse; ventral process sinuate near base, tapering, nearly reaching caudal margin. Subgenital plate widened in basal half, straight in apical half, bearing 4 macrosetae. Style slender, with apical extension of apophysis short, ca 0.7 times as long as subapical one, with some minute furrows. Connective U-shaped, with central lobe distinct. Aedeagus strongly bent dorsad near base, bearing pair of asymmetrical apical processes extending laterally; longer apical process bent dorsad near middle; preatrium short; gonopore apical on caudal surface.

Type series. Holotype: ♂, Nosoko, Ishigaki Is., Ryukyus, Japan, 29. VI. 2008, M. Hayashi *et al*. Paratypes: [Ishigaki Is.] 11♂ 25♀, same data as holotype; 1♂ 3♀, same data except 3. VII. 2008; 3♂ 7♀, Mt. Nosoko-dake, 19. I. 2009, M. Hayashi *et al*.; 6♀, Itona, 2. X. 1995, M. Hayashi *et al*.; 2♂ 1♀, Tomino, 20. IV. 2005, M. Hayashi *et al*.; 1♂, Mt. Yarabu-dake, 14. V. 2000, M. Hayashi *et al*.; 12♂ 12♀, same data except 29. VI. 2008; 2♀, Mt. Maese-dake, 29. X. 2007, M. Hayashi *et al*.; 1♀, same data except 30. VI. 2008; 1♂ 1♀, same data except 27. VI. 2009; 14♂ 10♀, same data except 13. II. 2011; 1♂, same data except 10. III. 2011; [Iriomote Is.] 3♀, Funauki, 15. III. 2000, M. Hayashi leg.; 1♀, Hoshidate, 5. XI. 1985, M. Hayashi *et al*.; 1♂ 3♀, Shirahama Pass, 29. VI. 2009, M. Hayashi *et al*.; 3♀, Mitara, 9. III. 2011, M. Hayashi *et al*.; The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.



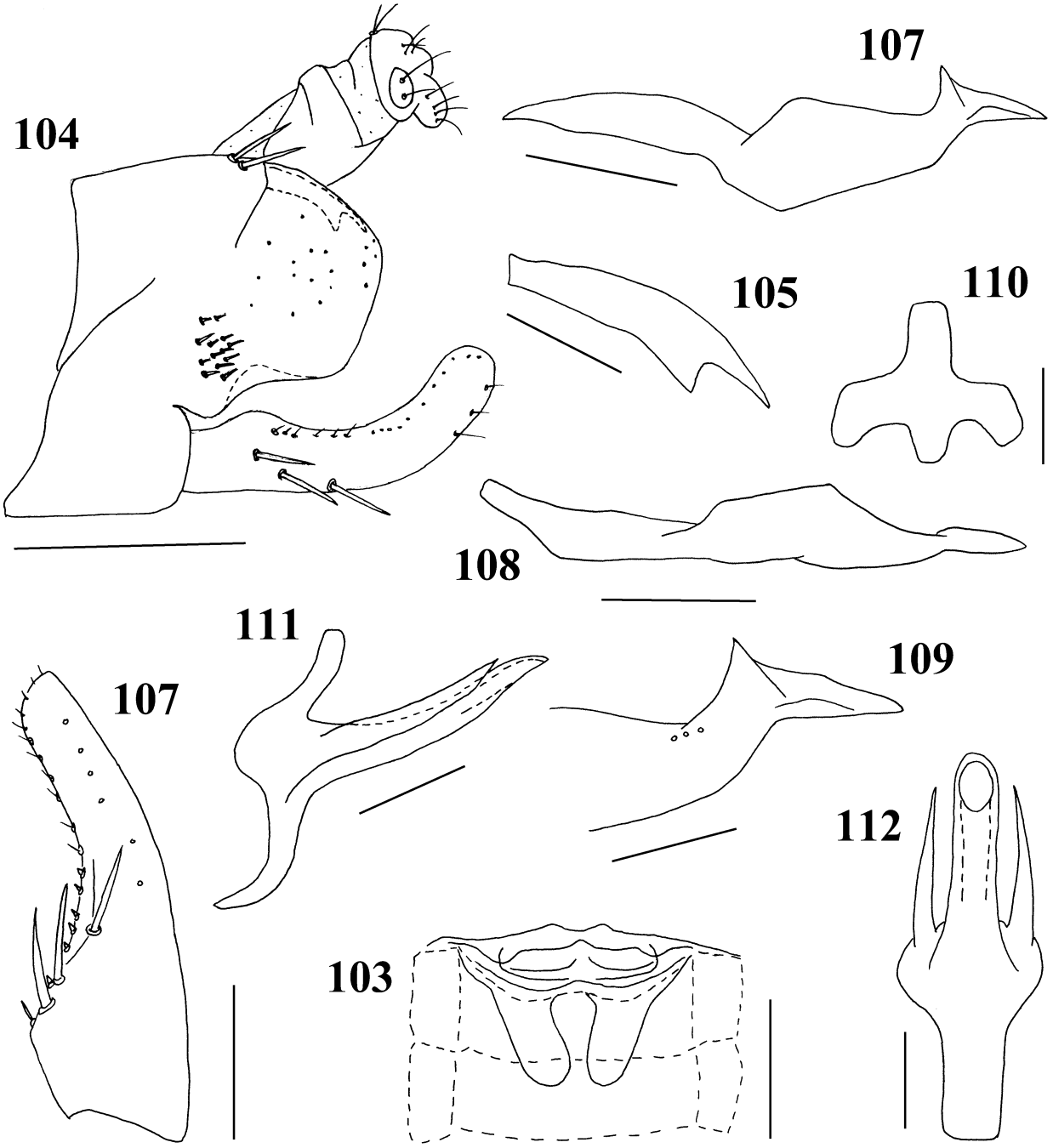
FIGURES 91–102. *Salka nusukuensis* **sp. nov.** Male abdominal sternal apodemes (91) and ♂ genitalia (92–102). — 92, Pygofer in lateral view; 93, dorsal pygofer process in lateral view; 94, ventral pygofer process in lateral view; 95, subgenital plate in ventral view; 96–97, style in lateral (96) and ventral (97) views; 98, apex of style in lateral view; 99, connective in ventral view; 100–101, aedeagus in lateral (100) and caudal (101) views; 102, apex of aedeagus in apical view. Scales: 0.05 mm (98–99, 102), 0.1 mm (93–94, 100–101) and 0.2 mm (91–92, 95–97).

Distribution. Japan (Ryukyus: Ishigaki Is., Iriomote Is.).

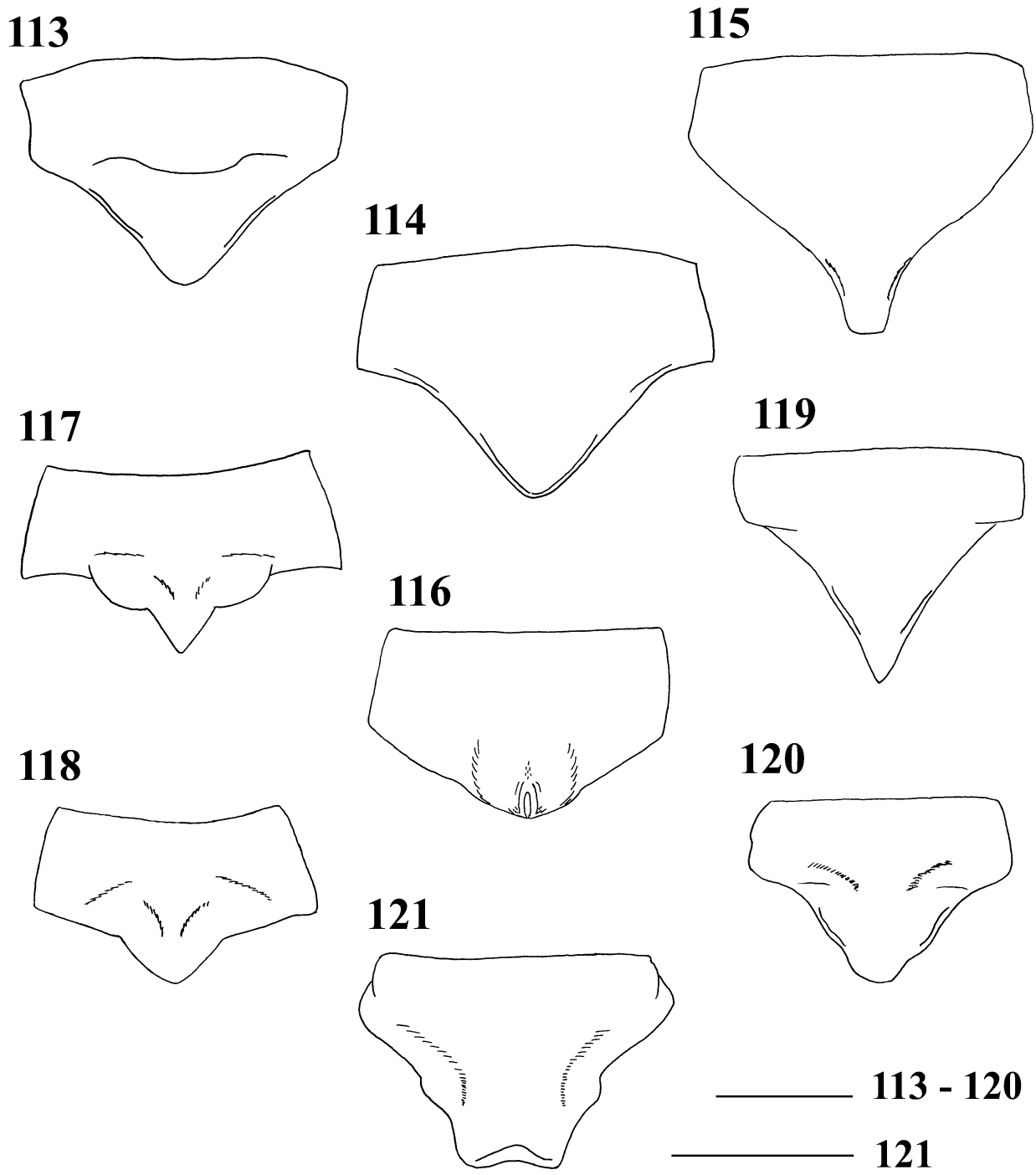
Remarks. This new species is similar to *S. maesatoensis* **sp. nov.**, but it is distinguishable by the following characters of male genitalia: dorsal pygofer process large and bent dorsad at apical half; ventral pygofer process short and sinuate; style bearing short apical part of apophysis; aedeagus with pair of apical processes (not an apical one and a subapical one); apical processes extending laterad.

Bionomics. This leafhopper may inhabit peripheries of subtropical forests. The host plants are *Viburnum odoratissimum* var. *awabuki* (K. Koch) (Caprifoliaceae) and *Zanthoxylum ailanthoides* Sieb. et Zucc. (Rutaceae). Adults seem to occur throughout the year.

Etymology. This species is named after the ancient name of the type locality of the holotype.



FIGURES 103–112. *Salka trimaculata* **sp. nov.** Male abdominal sternal apodemes (103) and ♂ genitalia (104–112). — 104, Pygofer in lateral view; 105, dorsal pygofer process in lateral view; 106, subgenital plate in ventral view; 107–108, style in lateral (107) and ventral (108) views; 109, apex of style in lateral view; 110, connective in ventral view; 111–112, aedeagus in lateral (111) and caudal (112) views. Scales: 0.05 mm (105, 109–112), 0.1 mm (106–108) and 0.2 mm (103–104).



FIGURES 113–121. Female 7th abdominal sternites. — 113, *Salka denticulata* **sp. nov.**; 114, *S. circumflexa* **sp. nov.**; 115, *S. okinawana* **sp. nov.**; 116, *S. diversa* **sp. nov.**; 117–118, large (117) and small (118) individuals of *S. dimorpha* **sp. nov.**; 119, *S. maesatoensis* **sp. nov.**; 120, *S. nusukuensis* **sp. nov.**; 121, *S. trimaculata* **sp. nov.** Scales: 0.2 mm.

***Salka trimaculata* sp. nov.**
(Figs. 8, 16, 103–112, 121)

Body infuscated, brown in some paratypes. Vertex pale yellow, bearing pentagonal black spot posteriorly and pair of small black fasciae anteriorly; face pale yellow; lorum brownish. Pronotum pale yellow anteriorly; mesonotum pale brown, with basal triangles darkened; fore wing more darkened anteriad and clavus. Abdomen infuscated; female 7th sternite murky white in caudal half.

Head as wide as pronotum; vertex 2.2 times as wide as median length. Pronotum weakly concave posteriad, 2.0 times as wide as long, as long as mesonotum. Male abdominal sternal apodemes oblong, extending beyond posterior margin of 3rd sternite. Female 7th abdominal sternite trapezoidal, sinuate laterally, with posterior margin emarginated at middle. Ovipositor (3rd valvulae) obviously extending beyond pygofer.

Body length (mean): ♂, 2.3–2.6 mm (2.4 mm); ♀, 2.3–2.6 mm (2.4 mm).

Male genitalia (Figs. 104–112). Pygofer with lobe roundly quadrate, bearing 2 macrosetae on dorsal margin, tuft of short macrosetae at lower basal angle and numerous short setae scattered, with dorsal process bifurcated apically; dorsal process tapering, curved ventrad, reaching caudal margin of pygofer. Subgenital plate widened in basal 1/3, bearing 3 macrosetae and numerous short stout setae on apical and outer lateral margins. Style widened at apical 1/3; apophysis long, 0.2–0.3 times as long as style, with apical extension long, longer than subapical one. Connective Y-shaped, with central lobe distinct; arms almost as long as stem. Aedeagus straight and elongate caudally, with pair of atrial processes; atrial process tapering, reaching subapex of shaft; shaft weakly concave at apical 1/5 of ventral margin; preatrium long, extending ventrally and curved cephalad at basal half; gonopore apex on ventral surface.

Type series. Holotype: ♂, Mt. Omoto-dake, Ishigaki Is., Ryukyus, Japan, 23. II. 2010, M. Hayashi *et al*. Paratypes: [Ishigaki Is.] 9♂ 39♀, same data as holotype except 29. VI. 1997; 12♂ 23♀, same data as holotype; 1♂, same data except N. Ohara leg. (ELKU); 1♂, same data except 10. III. 2010; 2♂, same data except 12. II. 2011, M. Hayashi *et al*.; 1♂, Mt. Yarabu-dake, 26. VI. 2000 (light Trap), M. Hayashi *et al*.; 1♀, Maesato For. Rd., 1. VII. 2008, M. Hayashi *et al*.; 1♀, Kainan, 27. VI. 1997, M. Hayashi *et al*; 1♀, Omoto/Takeda, 26. VI. 1997, M. Hayashi *et al*.; [Iriomote Is.] 1♀, Aira, 30. VI. 2000, M. Hayashi *et al*.; 2♂, same data except 13. IV. 2005; 2♀, Shirahama Pass, 29. VI. 2009, M. Hayashi *et al*. The holotype is deposited in the Department of Biology, Faculty of Education, Saitama University, Saitama, Japan.

Distribution. Japan (Ryukyus: Ishigaki Is., Iriomote Is.).

Remarks. This new leafhopper can be distinguished from other Japanese congeners by features of the male genitalia: pygofer without ventral process, and aedeagus bearing a pair of atrial processes laterally. This species resembles *S. dentata* Dworakowska, 2006 described from Brunei (Ulu Temburong), and *S. musica* Sohi et Mann, 1994 from southern Taiwan (Chiayi: Alishan), but differs from them in the following configuration of male genitalia: dorsal pygofer process bent ventrad and bifurcated apically; apophysis of style 1/4 times as long as style, provided with apical part longer than subapical part.

Bionomics. This leafhopper is frequently found along woodland paths of subtropical forests, and the host plant must be sedges (*Carex*, Cyperaceae). Adults are very abundant in February and June as the probable peak periods.

Etymology. The specific name is derived from the three black markings of the vertex.

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