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A Taxonomic Study of the Genera *Harmalia* and *Opiconsiva* (Homoptera, Delphacidae) from Japan

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Abstract The delphacid planthopper genera *Harmalia* FENNAH and *Opiconsiva* DISTANT occurring in Japan are revised. Four species of *Harmalia* and two species of *Opiconsiva* are recognized from Japan. *Opiconsiva anufrievi* KWON, 1982 and *Harmalia gayasana* (KWON, 1982) described from Korea are synonymous to *H. sirokata* (MATSUMURA et ISHIHARA, 1945); *Harmalia aculeatus* (YANG, 1989) described from Taiwan is synonymous to *H. heitensis* (MATSUMURA et ISHIHARA, 1945); *Opiconsiva sameshimai* (MATSUMURA et ISHIHARA, 1945) described from Japan, *O. koreacola* (KWON, 1982) described from Korea, and *Toya yanoi* (ISHIHARA, 1952) described from Japan are synonymous to *O. albicollis* (MOTSCHULSKY, 1863); *Opiconsiva nigra* DING et TIAN, 1980 described from China is synonymous to *O. tangira* (MATSUMURA, 1900). Three species of *Harmalia* and one species of *Opiconsiva* are newly recorded from Japan. Key to Japanese species on males is also given.

Introduction

The delphacid genera *Harmalia* FENNAH, 1969 and *Opiconsiva* DISTANT, 1917 have very similar genital structures and are probably closely allied to each other. In Japan, the taxonomic study on these two genera was made by MATSUMURA & ISHIHARA (1945) with descriptions of three species under two genera; *Sogata sirokata*, *S. heitensis*, and *Kakuna sameshimai*. Afterward, the three species have been redescribed and recorded around Japan. However, they were sometimes regarded as different species (KWON, 1982; YANG, 1989; etc.), because these detailed genital structures were not described in the original descriptions. In this study, all Japanese species of *Harmalia* and *Opiconsiva* are redescribed and illustrated on consideration of synonymy, and these intraspecific variations are proposed.

At present, the genus *Harmalia* comprises 16 species mainly distributed in East Palaearctic, Indo-Malayan and Australasian regions. TIAN & DING (1980) established the genus *Paracorbulo* for some Chinese species and designated *Sogata sirokata* MATSUMURA & ISHIHARA as the type species. *Paracorbulo* was distinguished from *Harmalia* by the longer frons and the aedeagus lacking teeth (TIAN *et al.*, 1983). However, YANG (1989) synonymized *Paracorbulo* to *Harmalia* and redescribed the generic characters in Taiwanese species. The diagnostic characters of *Harmalia* are applicable to Japanese four species. On the other hand, the genus *Opiconsiva* comprises 14 species mainly distributed in East Palaearctic, Indo-Malayan and Pacific regions. ASCHE (1988) synonymized *Corbulo* FENNAH, 1965 to *Opiconsiva* and transferred several species to this genus. In the same paper, he stressed that some species of this genus need to be revised, because the differences between these species and the generic positions of them were not clearly expressed in literature. Moreover, DING (2006) noted the necessity of revisional study for some *Opiconsiva* species described from East Asia.

Materials and methods

Morphological terminology is mainly followed to ASCHE (1985) and the armature is used to the mid-dorsal structure of diaphragm (MUIR & GIFFARD, 1924) and the features of paramere are followed to METCALF (1949). Body length is measured from the apex of vertex to the tip of abdomen (excluding anal style) for brachypters and to the tip of folded fore wings for macropters.

The following abbreviations are used in the text for the depository of material: [EUMJ] Ehime University Museum, Matsuyama; [ELKU] Entomological Laboratory, Kyushu University, Fukuoka; [SUU] Saitama University, Saitama; [SF] personal collection of the author. Collector name is omitted in case the specimens collected by the author.

Taxonomy

Genus *Harmalia* FENNAH, 1969

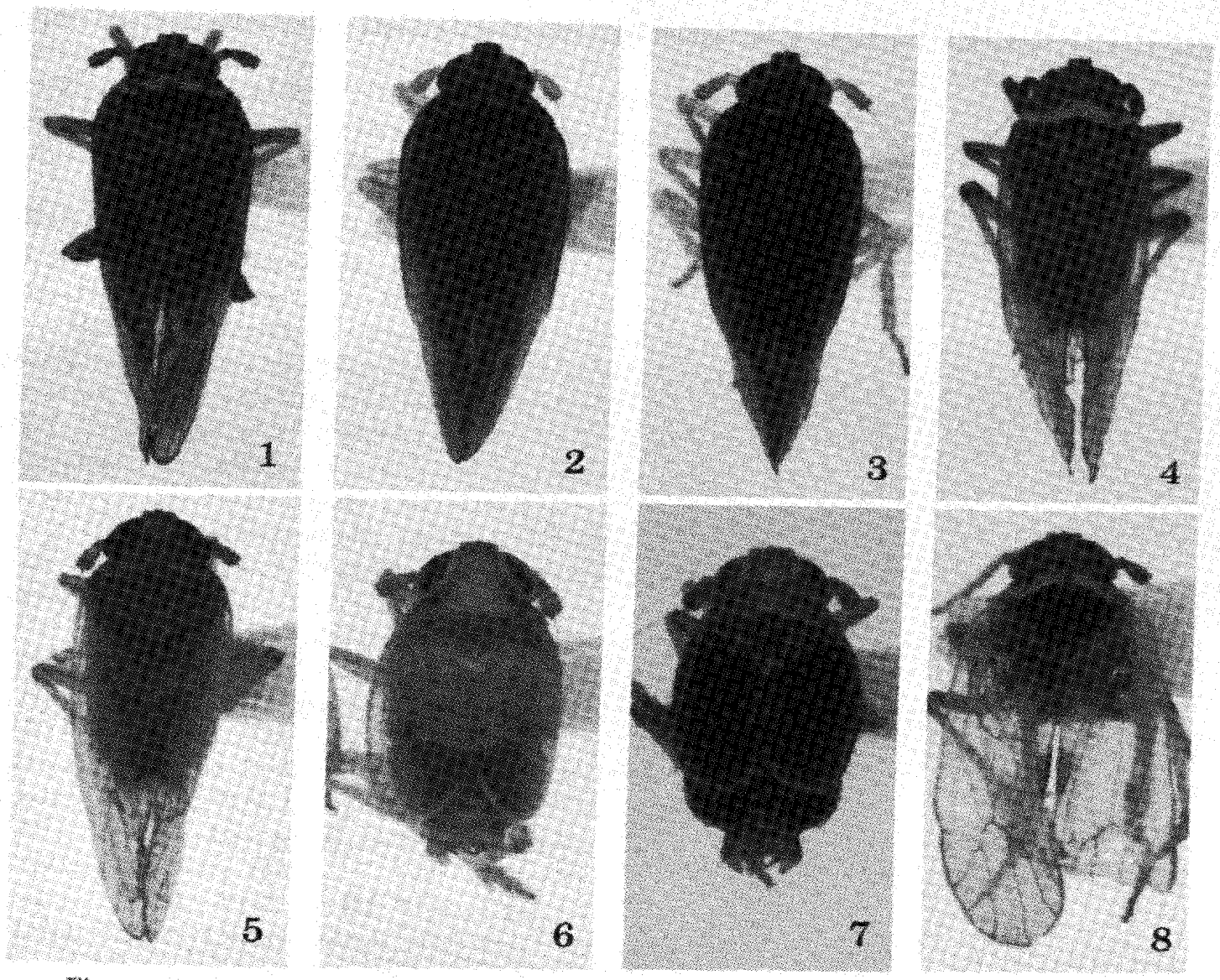
Harmalia FENNAH, 1969: 37. Type species (by original designation): *Sogata thoracica* DISTANT, 1916.

Paracorbulo TIAN et DING, 1980: 315. Type species (by original designation): *Sogata sirokata* MATSUMURA et ISHIHARA, 1945. Synonymized by YANG (1989).

Structure. Vertex slightly to distinctly longer than wide at base, parallel-sided or slightly widened posteriad, with anterior margin nearly straight or concave between median and lateral carinae, with submedian carinae uniting before anterior margin of vertex. Frons 2.3–3.0× as long as wide, widened at apical third or middle of length. Pronotum slightly wider than head. Mesonotum nearly as long as head plus pronotum in dorsal mid-line. Post tibial spur bearing about 20 teeth.

Male genitalia. Pygofer lacking medioventral process, with dorsolateral angle produced caudad and curved ventrad at apex in most species. Armature roundly or angularly produced caudad, with dense granules. Aedeagus nearly cylindrical, somewhat compressed, with short teeth on apical half or without them, with gonopore situated on dorsal or lateral subapex. Suspensorium ring-shaped basally, with apical portion short, pointed apically in caudal view. Paramere nearly straight, narrowed subapically, widened and bifurcate at apex in ventrocaudal view, with dense long setae on middle of length; basal angle generally broad and strongly developed caudad, with minute granules; inner angle generally narrow, short and subconical; outer angle flattened, variable in shape, generally wider and longer than inner angle, with 2–5 setae along lateral margin. Anal tube with ventral surface concave medially, with a pair of spines on each lateroapical angle; spines produced ventrad, contiguous basally, somewhat divergent apicad.

Female genitalia. Seventh abdominal segment lacking genital scale. Basal angle of 1st valvifer with an appendage (rarely two) short, acute and produced inwardly. First valvula with inner ramus 0.2–0.4× as long as inner margin of 1st valvula. Second valvulae bearing more than 20 teeth dorsally.



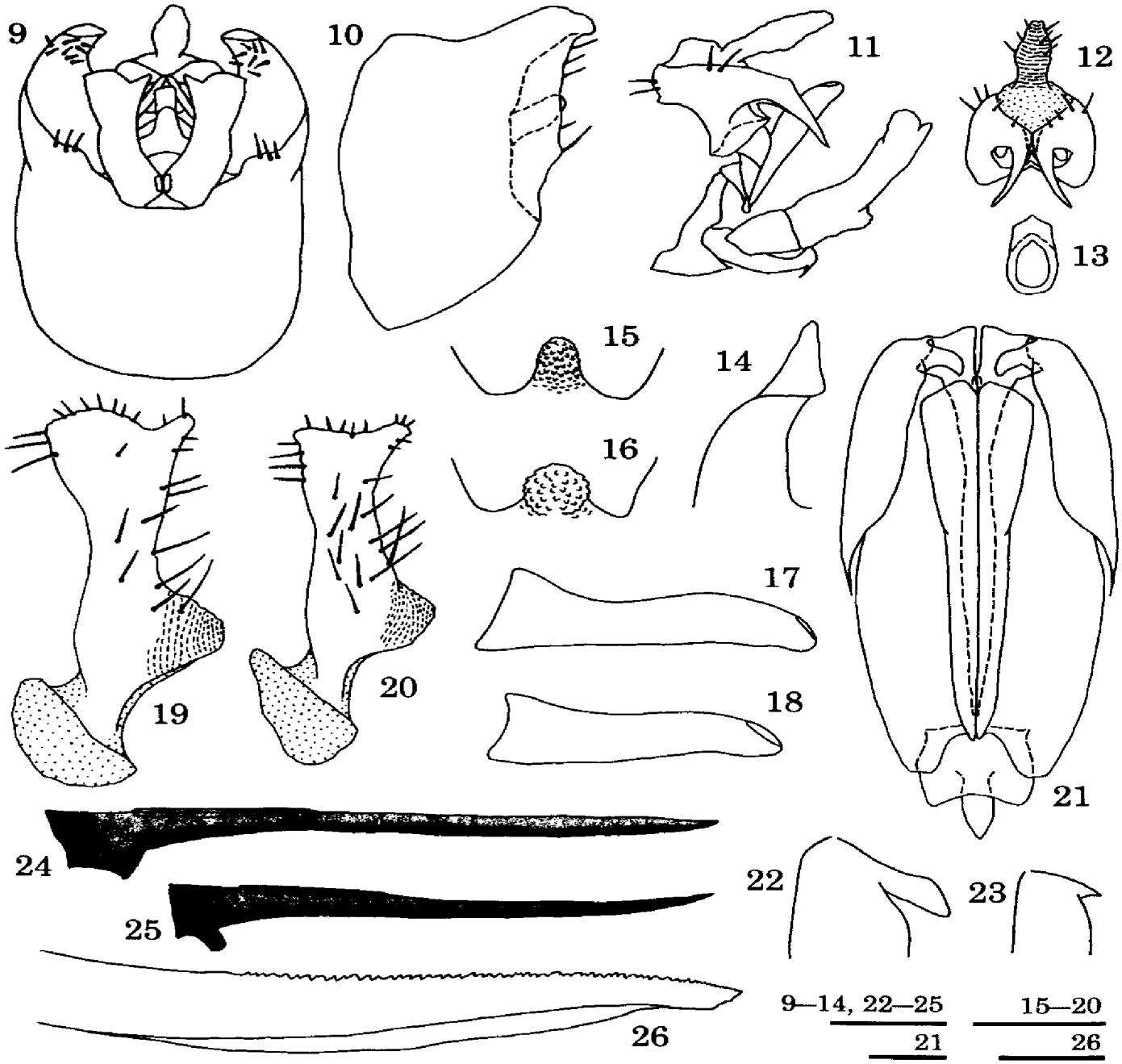
Figs. 1–8. Male habitus of *Harmalia* and *Opiconsiva*. —— 1. *H. sirokata* (3.7 mm), 2. *H. heitensis* (3.2 mm), 3. *H. commelinae* (3.0 mm), 4. *H. cordata* (2.9 mm), 5–7. *O. albicollis* (5, 2.8 mm; 6, 1.8 mm; 7, 1.6 mm), 8. *O. tangira* (2.6 mm). Specimens collected from Honshu (1, 5–6) and Iriomote Is. (2–4, 7–8).

Harmalia sirokata (MATSUMURA et ISHIHARA, 1945)
(Figs. 1, 9–26)

Sogata sirokata MATSUMURA et ISHIHARA, 1945: 64 [Type locality: Japan].
Chloriona (Sogatella) sirokata: FENNAH, 1956: 472.
Paracorbulo sirokata: TIAN et DING, 1980: 316.
Opiconsiva sirokata: KWON, 1982: 6.
Harmalia sirokata: YANG, 1989: 204.
Opiconsiva amufrievi KWON, 1982: 6 [Korea]. **syn. nov.**
Opiconsiva gayasana KWON, 1982: 6 [Korea]. **syn. nov.**

Coloration. General body color pale brown to dark brown. Posterior half of pronotum generally ivory-white; carinae on head, antenna, carinae and posterior margins of pro- and mesonota, legs, female pygofer pale brown; fore wing semi-transparent, uniformly brownish smoky, with veins darkened; hind wing semi-transparent, smoky, with veins darkened; ventral surface of 1st valvula semi-

transparent, brownish smoky, with basal area much darkened, dark area not reaching to base of inner ramus.



Figs. 9–26. *Harmalia sirokata*, male genitalia (9–20) and female genitalia (21–26). —— 9–10, male pygofer in ventrocaudal (9) and lateral (10) views; 11, male genitalia in lateral view (pygofer removed); 12, anal segment in caudal view; 13, suspensorium in caudal view; 14, dorsolateral angle of pygofer in ventrocaudal view; 15–16, armature in ventrocaudal view; 17–18, aedeagus in lateral view; 19–20, left paramere in ventrocaudal view; 21, female genitalia in ventral view; 22–23, basal angle of right 1st valvifer in ventral view; 24–25, right 1st valvula in ventral view; 26, 2nd valvulae in lateral view. Scales: 0.2 mm (9–14, 21–25), 0.1 mm (15–20, 26). Specimens collected from Honshu (9–13, 15, 17, 19, 21, 22, 24, 26), Okinawa Is. (16) and Iriomote Is. (14, 18, 20, 23, 25).

Structure. Vertex about 1.1× as long as wide at base, with features of lateral and anterior margins as in generic description. Frons about 2.5× as long as wide. Second antennal segment 2.4–2.9× as long as wide, about 2.0× as long as 1st one. Pronotum about 1.3× as wide as head. Mesonotum 1.0–1.3× as long as dorsal mid-line of head plus pronotum. Post tibial spur bearing 16–23 teeth.

Male genitalia (Figs. 9–20). Pygofer with dorsolateral angle strongly produced mediocaudad and curved ventrad at apex; apex sometimes elongate caudad. Armature spherical or subconical. Aedeagus slightly recurved. Paramere thickened in ventro-caudal view; outer angle rounded or angulate.

Female genitalia (Figs. 21–26). Basal angle of 1st valvifer with an appendage long and obtuse. First valvula with long inner ramus about 0.3× as long as inner margin of 1st valvula. Second valvulae slender, bearing 40–53 small teeth dorsally.

Type material examined. Holotype ♂ (macropter) (ELKU, dissected), Hirao, Fukuoka, Kyushu, 11. VII. 1929, ESAKI, HORI, MATSUO, FUJINO, HASHIMOTO, TAKEYA, NAKAHARA & YASUMATSU.

Body length (mean). [male] macropter, 2.8–3.9 mm (3.5 mm); brachypter, 2.0–2.4 mm (2.4 mm); [female] macropter, 3.7–4.5 mm (4.1 mm); brachypter, 2.5–3.0 mm (2.8 mm).

Other specimens examined. [Hokkaido] 7♂ 1♀ (SF), Shôtoshibetsu, Rikubetsu, 28. VII. 2012; [Honshu] 1♂ (EUMJ), Oshikiri, Higashi-tagawa, Yamagata Pref., 15. IX. 1944, K. OKAZAKI; 4♂ 4♀ (SF), Shimoakima, Annaka, Gumma Pref., 19. VI. 2011; 17♂ 8♀ (SF), Ôkawara, Hannô, Saitama Pref., 2. VI. 2012; 2♂ 4♀ (SF), Ôi, Kimitsu, Chiba Pref., 12. VIII. 2011 (at light); 9♂ 3♀ (SF), Ono, Atsugi, Kanagawa Pref., 2. VI. 2009; 3♂ (SF), Takishiri, Nanao, Ishikawa Pref., 13. IX. 2010; 2♂ 1♀ (SF), Iibama, Iwamura, Ena, Gifu Pref., 14. IX. 2010 (at light); 42♂ (SF), Okatano, Matsusaka, Mie Pref., 21. VIII. 2010 (at light); [Sado Is.] 3♂ 3♀ (SF), Hamaumedu, Sado, Niigata Pref., 3–4. VIII. 2009 (light trap); [Oki Isles (Dôgo).] 1♂ (EUMJ), Hatta, Saigo, Okinoshima, Shimane Pref., 23. VII. 1967, H. KADOWAKI; [Shikoku] 2♂ (EUMJ), Ômishima, Iyo, 17. VII. 1959, T. ISHIHARA; 1♂ (EUMJ), same data except 18. VII. 1959, M. SATÔ; 1♂ (EUMJ), Niyodo Rv., Haruno, Kochi Pref., 5. X. 2002 (light trap), M. SAKAI *et al.*; [Kyushu] 2♂ (EUMJ), Fukuoka, 17. VIII. 1945, T. SHIRÔZU; 1♂ (EUMJ), same data except 24. VIII. 1945; 1♂ (EUMJ), same data except 12. IX. 1945, T. ISHIHARA; 1♂ (EUMJ), Oita, 6. VIII. 1933, K. SAKAI; 1♂ (ELKU), Kokose For. Rd., Kobayashi, Miyazaki Pref., 27. VIII. 1994 (light trap), SUGIMOTO & MIMURA; 1♂ (ELKU), Cape Sata, Kagoshima, 28–31. VIII. 1951, S. MIYAMOTO; [Tsushima Is.] 1♂ (ELKU), Mt. Tatera, Azamo, Tsushima, 27. IX. 1959, HIDAKA *et al.*; [Amami-Oshima Is.] 4♂ 4♀ (SUU), Nankawa For. Rd., Sumiyo, 4. VII. 2005 (light trap), M. HAYASHI *et al.*; 2♂ 2♀ (SUU), Hatsuno-bashi, Setouchi, 5. VII. 2005 (light trap), M. HAYASHI *et al.*; [Tokunoshima Is.] 1♀ (SUU), Hetono, Amagi, 3. IX. 1992, M. HAYASHI; [Okinawa Is.] 6♀ (SUU), Tancha, Onna, 27. IX. 2007 (light trap), M. HAYASHI *et al.*; 6♂ 11♀ (SF), Gesashi Rv., Higashi, 4. V. 2010; 3♂ (SUU), Okuma, Kunigami, 11. IX. 2005, M. HAYASHI *et al.*; [Kita-Daito Is.] 1♂ (SUU), 21. VIII. 1992, Ryukyu University Coll.; 1♀ (SUU), same data except 17. IV. 1998, M. HAYASHI *et al.*; [Ishigaki Is.] 1♂ 1♀ (SUU), Kainan, 29. VI. 1997 (light trap), M. HAYASHI *et al.*; 4♀ (SUU), Nagura Rv., 8–9. VII. 1993 (light trap), M. HAYASHI *et al.*; [Iriomote Is.] 1♂ (SF), Ôtomi, 9. V. 2008 (at light); 2♂ 2♀ (SF), Komi, 6. IX. 2012 (light trap); 3♂ 1♀ (SF), Yonara Rv., Komi, 3. IX. 2012; [Yonaguni Is.] 1♀ (SUU), Minami-hoan, 19. III. 2006, M. HAYASHI *et al.*; 1♂ 2♀

(SUU), same data except 25–26. X. 2007; [Taiwan] 4♂ 2♀ (SF), Aijie, Yuanshan, Yilan Co., 29. IV. 2012 (light trap); 4♂ 2♀ (SF), Siji, Datong, Yilan Co., 29. IV. 2012; 25♂ 23♀ (SF), Dongyuan, Mudan, Pingtung Co., 1–7. I. 2012.

Distribution. Japan (Hokkaido, Honshu, Sado Is., Oki Isles (Dôgo), Shikoku, Kyushu, Tsushima Is., Amami-Oshima Is., Tokunoshima Is., Okinawa Is., Kita-Daito Is., Ishigaki Is., Iriomote Is., Yonaguni Is.); Far East Russia, Korea, China, Taiwan.

Remarks. Some intraspecific variations can be found in the male genitalia: apex of dorsolateral angle of pygofer sometimes elongate caudad in the specimens collected from Shikoku and more southern localities (Fig. 14); armature spherical or subconical (Figs. 15–16); outer angle of paramere rounded or angulate (Fig. 19). Both *Opiconsiva anufrievi* KWON, 1982 and *H. gayasana* (KWON, 1982) described from Korea can be recognized within the intraspecific variations as stated above. Some specimens collected from Iriomote of the S. Ryukyus have peculiar characters in the male and female genitalia: inner angle of paramere distinctly longer than outer one (Fig. 20); dark area of base of 1st valvula extending to base of inner ramus (Fig. 25); appendage of 1st valvifer relatively short and acute (Fig. 23). I tentatively treated them as variations within this species, because these features of body and other features of male and female genitalia (Fig. 18) lead to be identical to this species.

Biological notes. This species feeds on *Persicaria thunbergii* (SIEB. et ZUCC.) (Polygonaceae) in Hokkaido and Honshu, *P. biconvexum* (HAYATA) in Taiwan, *Commelina diffusa* BURM. (Commelinaceae) in the Ryukyus (Okinawa, Ishigaki, Iriomote) and Taiwan. In summer, numerous individuals are frying to the light around paddy fields in the Japan proper.

Harmalia heitensis (MATSUMURA et ISHIHARA, 1945)
(Figs. 2, 27–38)

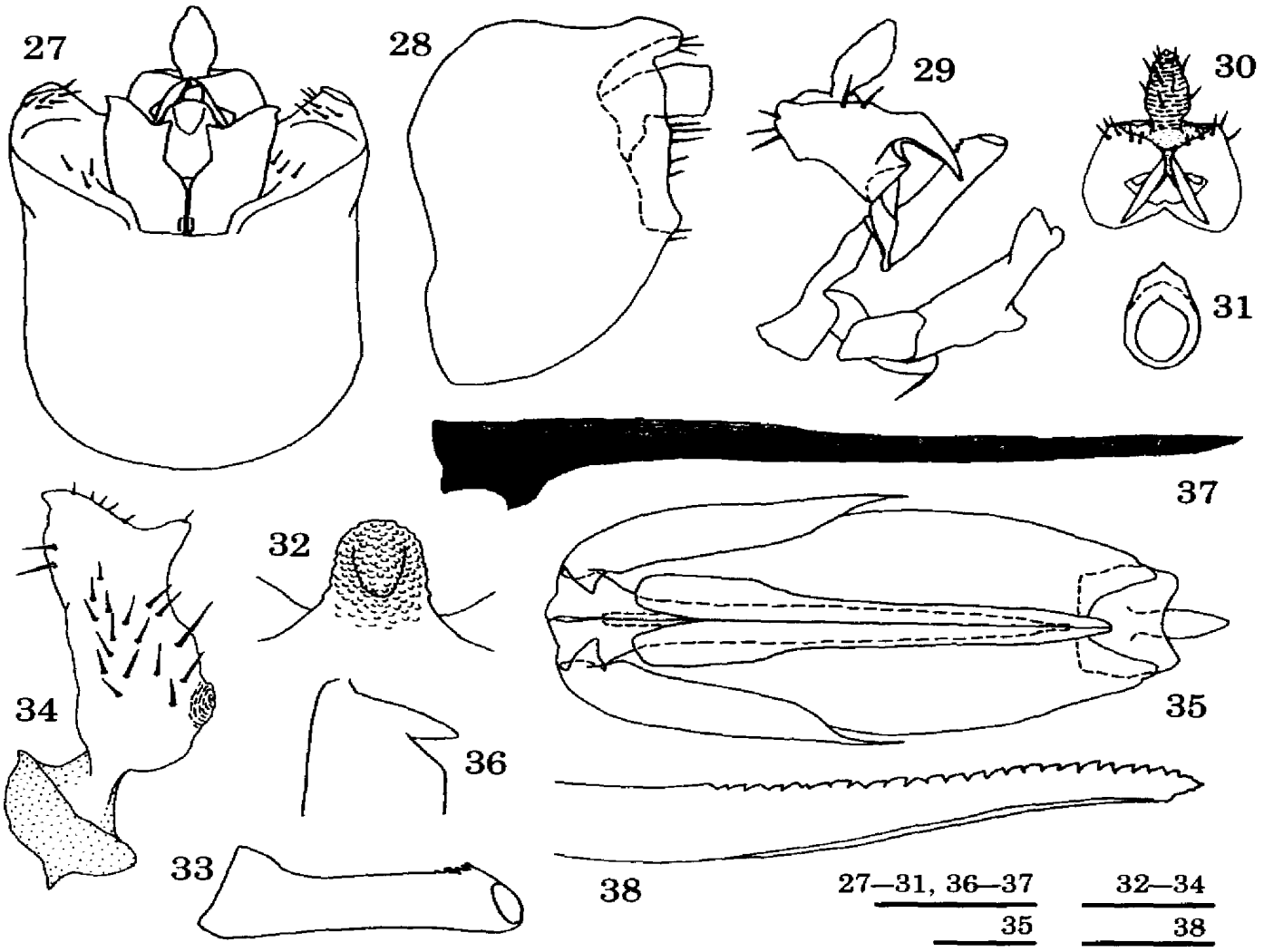
Sogata heitensis MATSUMURA et ISHIHARA, 1945: 66 [Taiwan].
Harmalia heitensis: FENNAH, 1975: 105.
Matutinus aculeatus YANG, 1989: 183 [Taiwan]. **syn. nov**.

Coloration. General body color glossy dark brown, with intersegmental membrane reddish brown; antenna, legs pale yellow to brown; fore wing semi-transparent, dark brownish smoky except along costal margin from nodal line to wing apex paler, with veins darkened; coloration of hind wing as in *H. sirokata*; ventral surface of 1st valvula semitransparent, almost uniformly brownish smoky.

Structure. Vertex about 1.2× as long as wide at base, slightly narrowed apicad, with anterior margin nearly straight; outline of vertex angularly curved into frons in lateral view. Frons about 2.7× as long as wide. Second antennal segment about 2.2× as long as wide, about 2.2× as long as 1st segment. Features of pro- and mesonota as in *H. sirokata*. Post tibial spur bearing 19–27 teeth.

Male genitalia (Figs. 27–34). Pygofer with dorsolateral angle weakly produced mediocaudad and slightly curved ventrad at apex. Armature rounded, widened apically in lateral view, with ventral surface centrally swollen. Aedeagus with 6–9 teeth near dorsal apex (sometimes on lateral or ventral sides). Paramere very thickened in ventrocaudal view; outer angle acute or acuminate.

Female genitalia (Figs. 35–38). Basal angle of 1st valvifer with an appendage short and acute. First valvula with long inner ramus about 0.4 × as long as inner



Figs. 27–38. *Harmalia heitensis*, male genitalia (27–34) and female genitalia (35–38). — 27–28, male pygofer in ventrocaudal (27) and lateral (28) views; 29, male genitalia in lateral view (pygofer removed); 30, anal segment in caudal view; 31, suspensorium in caudal view; 32, armature in ventrocaudal view; 33, aedeagus in lateral view; 34, left paramere in ventrocaudal view; 35, female genitalia in ventral view; 36, basal angle of right 1st valvifer in ventral view; 37, right 1st valvula in ventral view; 38, 2nd valvulae in lateral view. Scales: 0.2 mm (27–31, 35–37), 0.1 mm (32–34, 38). All specimens from Iriomote Is.

margin of 1st valvula. Second valvulae thickened, bearing 25–34 large teeth dorsally.

Body length (mean). [male] macropter, 2.9–3.6 mm (3.1 mm); brachypter, 2.0–2.2 mm (2.1 mm); [female] macropter, 3.5–4.0 mm (3.8 mm); brachypter, 2.4–2.7 mm (2.6 mm).

Type materials examined. Holotype ♂ (macropter) (ELKU), Heitô, Takao-shû (= Pingtung Co.), Formosa (= Taiwan), 21. VIII. 1932, R. YAMAHO. Paratypes: 2♂ 2♀ (macropter) (ELKU, dissected), same data as holotype except 12. VIII. 1932 (1♂); 15. VIII. 1932 (1♂ 1♀); 26. VIII. 1932 (1♀).

Other specimens examined. [Tokunoshima Is.] 1♂ (SUU), Nishi-Agina, Amagi, 2. IX. 1992 (light trap), M. HAYASHI *et al.*; 1♀ (SUU), Mt. Amagi-dake, 16. X. 2008 (light trap), M. HAYASHI; [Okinawa Is.] 1♂ (SF), Kawata, Higashi, 3–4. V. 2010 (at light); 2♂ (SF), Gesashi Rv., Higashi, 4. V. 2010; 20♂ 7♀ (SF), Okuma Rv., Hiji, Kunigami, 30. IV. 2010; 1♂ 2♀ (SUU), Yona, Kunigami, 17. X. 1988 (light trap), M.

HAYASHI *et al.*; 1♀ (SUU), Benoki Dam, Kunigami, 11. IX. 2005 (light trap), M. HAYASHI *et al.*; [Miyako Is.] 1♂ (SF), Kurima, 19. X. 2006, A. Yoshimatsu; [Ishigaki Is.] 22♂ 9♀ (SF), Tôro Rv., Hoshino, 16. VII. 2011; 1♂ (SUU), Miwa, 25. VI. 2000, M. HAYASHI *et al.*; 1♀ (SUU), Mt. Banna-dake, 21. VI. 1992, M. HAYASHI *et al.*; 1♀ (SUU), Yonehara, 27. VI. 1999, M. HAYASHI *et al.*; [Iriomote Is.] 1♀ (SUU), Sonai, 20. XI. 2006, M. HAYASHI *et al.*; 1♀ (SUU), Funaura, 7. XI. 1985 (light trap), M. HAYASHI *et al.*; 6♀ (SUU), same data except 23. XI, 2006; 1♀ (SUU), Mitara, 24. X. 2007, M. HAYASHI *et al.*; 2♂ 2♀ (SF), Komi, 2–6. IX. 2012; [Yonaguni Is.] 1♀ (SUU), Mt. Kubura-dake, 23. VI. 2004 (light trap), M. HAYASHI *et al.*; [Taiwan] 10♂ 10♀ (SF), Dongyuan, Mudan, Pingtung Co., 1–7. I. 2012; [Philippines] 5♂ (EUMJ), Los Baños, Laguna, 8. XI. 1966, Shamsul ALAM.

Distribution. Japan (Ryukyus: Tokunoshima Is., Okinawa Is., Miyako Is., Ishigaki Is., Iriomote Is., Yonaguni Is.); Taiwan, Philippines, Vietnam, Sri Lanka.

Remarks. Harmalia aculeatus (YANG, 1989) described from Taiwan is treated as a junior synonym because of no differences in the body shape and the configuration of male genitalia. YANG (1989) redescribed and figured *H. heitensis* under Taiwanese specimens, but his description may be judged as a variation of *H. sirokata* in the male genitalia having a strongly expanded basal angle of paramere. Furthermore, a record of *H. heitensis* from the Ryukyus by HAYASHI (1997) is for a dark colored form of *H. sirokata*. As a result of the investigations of the type-series of *H. heitensis*, some paratypes are not identical to the holotype as follows: a male identical to *Nilaparvata lugens* (STÅL, 1854); three females to *Harmalia commelinae* YANG, 1989.

Biological notes. This species is dependent exclusively on *Commelina diffusa* BURM. (Commelinaceae). Adults are frequently attracted to the light and found on the host plant in the Ryukyus. Brachypterous males are rarely found.

Harmalia commelinae YANG, 1989

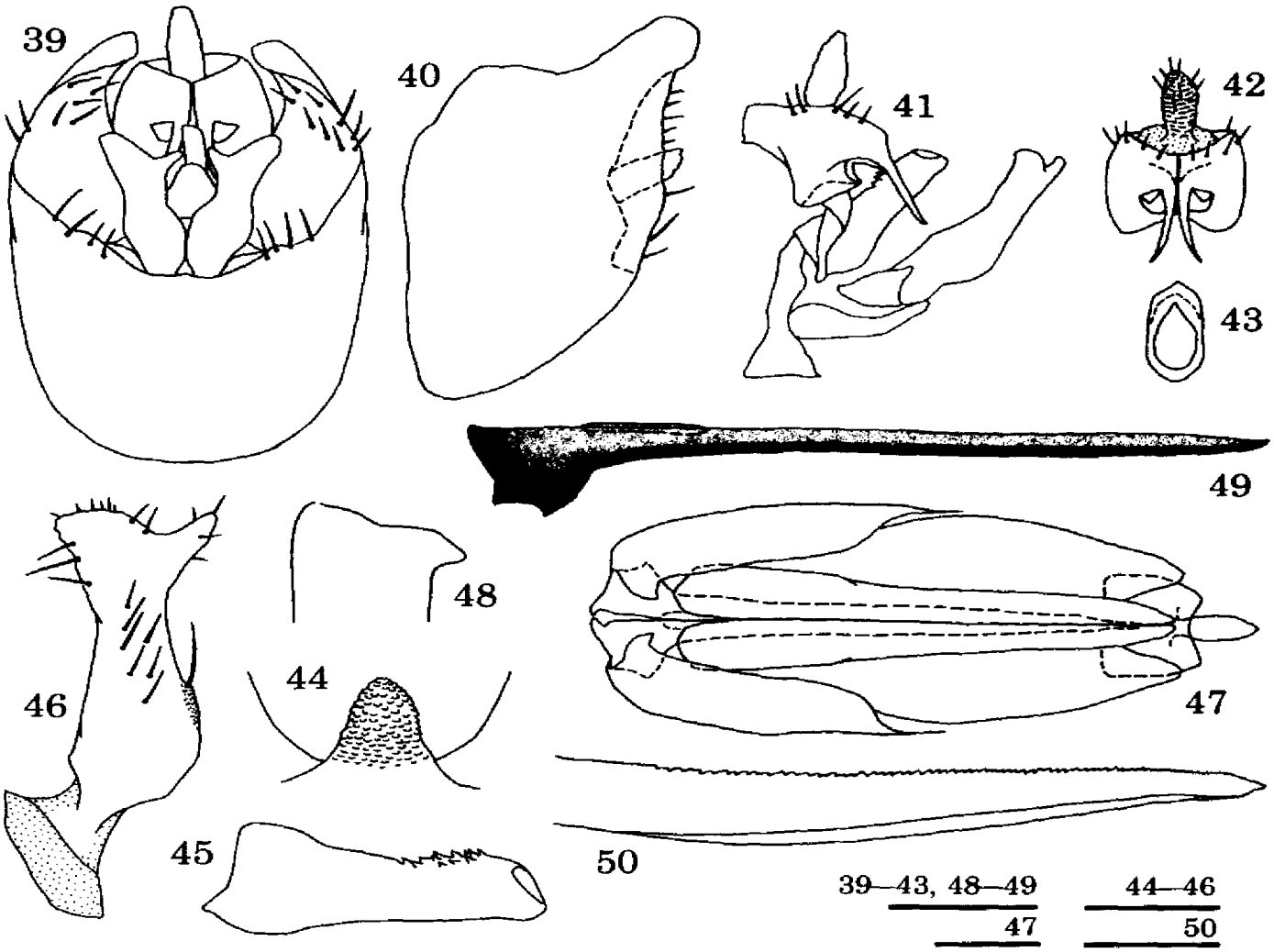
(Figs. 3, 39–50)

Harmalia commelinae YANG, 1989: 206 [Taiwan].

Coloration & Structure. General body color glossy dark brown. Carinae on vertex (in apical half) and frons, gena, clypeus, antenna, legs, anal tube pale yellow; colorations of fore and hind wing as in *H. heitensis*; ventral surface of 1st valvula semitransparent, brownish smoky, with basal area weakly darkened, dark area not reaching to base of inner ramus. General habitus as in *H. heitensis*, but outline of vertex roundly curved into frons in lateral view. Proportions of 2nd antennal segment as in *H. sirokata*. Post tibial spur bearing 20–26 teeth.

Male genitalia (Figs. 39–46). Pygofer with dorsolateral angle strongly produced mediocaudad and curved ventrad at apex. Armature subconical. Aedeagus distinctly widened at base, gradually narrowed to middle of length, with 11–17 minute teeth near dorsal apex. Paramere slender in ventrocaudal view; basal angle less developed, inner angle rather long, and outer angle rounded.

Female genitalia (Figs. 47–50). Basal angle of 1st valvifer with an appendage relatively short and obtuse. First valvula with short inner ramus about 0.2× as long as inner margin of 1st valvula. Second valvulae slender, bearing 70–80 minute teeth dorsally.



Figs. 39–50. *Harmalia commelinae*, male genitalia (39–46) and female genitalia (47–50). —— 39–40, male pygofer in ventrocaudal (39) and lateral (40) views; 41, male genitalia in lateral view (pygofer removed); 42, anal segment in caudal view; 43, suspensorium in caudal view; 44, armature in ventrocaudal view; 45, aedeagus in lateral view; 46, left paramere in ventrocaudal view; 47, female genitalia in ventral view; 48, basal angle of right 1st valvifer in ventral view; 49, right 1st valvula in ventral view; 50, 2nd valvulae in lateral view. Scales: 0.2 mm (39–43, 47–49), 0.1 mm (44–46, 50). All specimens from Iriomote Is.

Body length (mean). [Male] macropter, 2.9–3.6 mm (3.2 mm); [female] macropter, 3.6–4.0 mm (3.8 mm); brachypter, 2.5–2.7 mm (2.6 mm).

Specimens examined. [Ishigaki Is.] 6♂ 5♀ (SF), Todoroki Rv., Moriyama, 16. VII. 2011; 3♂ 3♀ (SUU), Hoshino, 27. X. 2007, M. HAYASHI *et al.*; 1♂ 2♀ (SUU), Ôsato, 28. X. 2007, M. HAYASHI *et al.*; 14♀ (SUU), Omoto/Takeda, 25. XI. 2006 (light trap), M. HAYASHI *et al.*; [Iriomote Is.] 16♂ 4♀ (SF), Yoshikera Rv., Takana, 6. IX. 2012; 6♀ (SUU), Funaura, 22–25. XI. 2006 (light trap), M. HAYASHI *et al.*; 1♀ (SF), Toyohara, 17. V. 2007 (at light); [Yonaguni Is.] 1♂ 1♀ (SUU), Mantabaru, 22. VI. 2004 (light trap), M. HAYASHI *et al.*; 1♂ (SUU), Minami-hoan, 26. X. 2007 (light trap), M. HAYASHI *et al.*; 1♀ (SUU), Mt. Kubura-dake, 23. VI. 2004 (at light), M. HAYASHI *et al.*; [Taiwan] 10♂ 10♀ (SF), Dongyuan, Mudan, Pingtung Co., 1–7. I. 2012; [Philippines] 1♀ (EUMJ), Los Baños, Laguna, 8. XI. 1966, Shamsul ALAM.

Distribution. Japan (Ryukyus: Ishigaki Is., Iriomote Is., Yonaguni Is.); Taiwan, Philippines

Remarks. This species is superficially similar to *H. heitensis*, but can be easily distinguished by the yellowish face (dark brownish except yellowish antenna in *H. heitensis*). This species is newly recorded from Japan.

Fifth instar nymphs of *H. commelinae* can be distinguished from those of other congeners by the dorsal coloration and markings: creamy white with 4 large dark brown spots and dark brown antenna in *H. commelinae*; creamy white with many small dark brown spots and dark brown antenna in *H. sirokata*; dark reddish brown with pale yellow antenna in *H. heitensis*.

Biological notes. This species is dependent exclusively on *Commelina diffusa* BURM. (Commelinaceae). *Harmalia sirokata* and *H. heitensis* are sometimes found together with this species on same host plants. Adults are often attracted to the light in the Ryukyus. Brachypterous males have not been known yet.

Harmalia cordata YANG, 1989
(Figs. 4, 51–62)

Harmalia cordata YANG, 1989: 206 [Taiwan].

Coloration & Structure. General body color as in pale colored form of *H. sirokata*, but veins of fore wing darkened distally, and dark area of base of 1st valvula more darkened and reaching to base of inner ramus. General habitus as in *H. sirokata*, but vertex and frons somewhat narrower. Post tibial spur bearing 20–25 teeth.

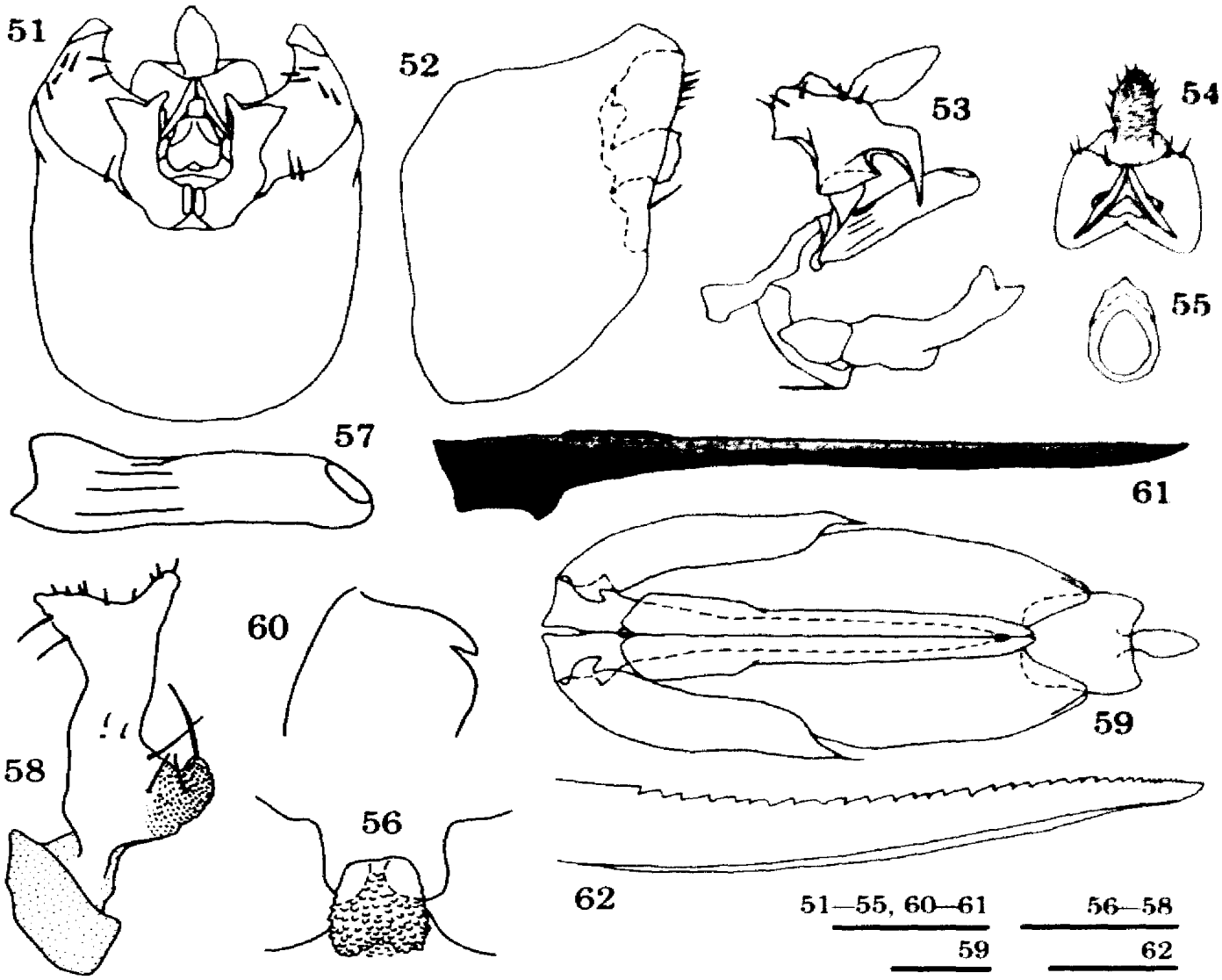
Male genitalia (Figs. 51–58). Pygofer with dorsolateral angle moderately produced mediocaudad and weakly curved ventrad at apex; inner margin of dorsolateral angle rectangularly produced inwardly in ventrocaudal view. Armature rather angulate, widened apically in lateral view; ventral surface of armature slightly emarginated medially. Aedeagus with several paralleled grooves near base of lateral sides or without them. Paramere slender in ventrocaudal view; inner angle rather long, and outer angle acute.

Female genitalia (Figs. 59–62). Basal angle of 1st valvifer with an appendage very short and acute. First valvula with short inner ramus about 0.1× as long as inner margin of 1st valvula. Second valvulae thickened, bearing 28–33 large teeth dorsally.

Body length (mean). [Male] macropter, 2.8–3.3 mm (3.1 mm); [female] macropter, 3.4–3.6 mm (3.4 mm); brachypter, 2.6 mm.

Specimens examined. [Amami-Oshima Is.] 1♂ (EUMJ), Shinmura, Sumiyô, 17. VII. 1954, S. HISAMATSU; [Okinawa Is.] 1♀ (SUU), Yona, Kunigami, 6. X. 1995 (light trap), M. HAYASHI *et al.*; [Iriomote Is.] 1♂ 4♀ (SUU), Ôtomi, 20. XI. 2004, M. HAYASHI *et al.*; 1♂ 4♀ (SF), Komi, 1. IX. 2012 (light trap); 1♂ (SUU), Funaura, 31. III. 1996 (light trap), M. HAYASHI *et al.*; [Philippines] 1♂ (EUMJ), Los Baños, Laguna, 8. XI. 1966, Shamsul ALAM; [Thailand] 1♂ (EUMJ), Khon, Kaen, 2. X. 1972, M. SATÔ; [Bangladesh] 1♂ (EUMJ), Dhaca, 5. XI. 1969, T. ISHIHARA; 1♂, same data except 7. XI. 1969; 2♂, same data except 11. XI. 1969; [Indonesia] 1♂ (ELKU), Cikaniki, Java, 14. VIII. 1997 (light trap), S. KAMITANI *et al.*; 1♂ (ELKU), same data except 24. VIII. 1997 (light trap).

Distribution. Japan (Ryukyus: Amami-Oshima Is., Okinawa Is., Iriomote Is.); Taiwan, Philippines, Thailand, Bangladesh, Indonesia (Java).



Figs. 51–62. *Harmalia cordata*, male genitalia (51–58) and female genitalia (59–62). — 51–52, male pygofer in ventrocaudal (51) and lateral (52) views; 53, male genitalia in lateral view (pygofer removed); 54, anal segment in caudal view; 55, suspensorium in caudal view; 56, armature in ventrocaudal view; 57, aedeagus in lateral view; 58, left paramere in ventrocaudal view; 59, female genitalia in ventral view; 60, basal angle of right 1st valvifer in ventral view; 61, right 1st valvula in ventral view; 62, 2nd valvulae in lateral view. Scales: 0.2 mm (51–55, 59–61), 0.1 mm (56–58, 62). Males collected from Amami-Oshima Is. and females from Iriomote Is.

Remarks. This species is very similar and closely allied to *H. anacharsis* FENNAH, 1969 described from New Caledonia, but can be separable from the latter: ventral surface of armature slightly emarginate medially (Fig. 56); basal angle of 1st valvifer with an appendage (Fig. 60).

Opiconsiva DISTANT, 1917

Opiconsiva DISTANT, 1917: 301. Type species (by original designation): *Opiconsiva fuscovaria* DISTANT, 1917.

Corbulo FENNAH, 1965: 48. Type species (by original designation): *Corbulo dilpa* KIRKALDY, 1907. Synonymized by ASCHE (1988).

Structure. Vertex nearly as long as or slightly longer than wide at base, generally parallel-sided, with anterior margin nearly straight or concave between median and lateral carinae, with submedian carinae generally uniting on anterior margin of vertex. Frons about 2.0–2.5× as long as wide, widened at apical third or middle. Pronotum slightly narrower than head. Mesonotum longer than head plus pronotum in dorsal mid-line. Post tibial spur bearing about 20 teeth.

Male genitalia. Pygofer lacking medioventral process. Armature roundly or angularly produced caudad, with dense granules. Aedeagus nearly cylindrical, generally lacking teeth, lamellate at base dorsally; gonopore situated on dorsal or lateral subapex. Suspensorium ring-like basally, apical portion short, pointed apically in caudal view. Paramere nearly straight, narrowed subapically, widened and bifurcate at apex in ventrocaudal view, with dense long setae on middle of length; basal angle generally broad and strongly developed caudad, with minute granules; inner angle generally narrow, short and subconical; outer angle flattened, variable in shape, generally wider and longer than inner angle, with 2–4 setae along lateral margin. Anal tube with ventral surface concave medially, with a pair of spines on each lateroapical angle; spines produced ventrad, contiguous basally, somewhat diverging apicad.

Female genitalia. Seventh abdominal segment lacking genital scale. Basal angle of 1st valvifer with an appendage short, acute and produced inwardly.

Remarks. *Opiconsiva* fairly resembles *Harmalia* especially in the following characters: armature roundly or angularly produced caudad, with dense granules; ventral surface of anal tube medially concave; basal angle of 1st valvifer with an (rarely two) appendage produced inwardly. However, *Opiconsiva* can be distinguished from *Harmalia* by the aedeagus having a lamellate base dorsally.

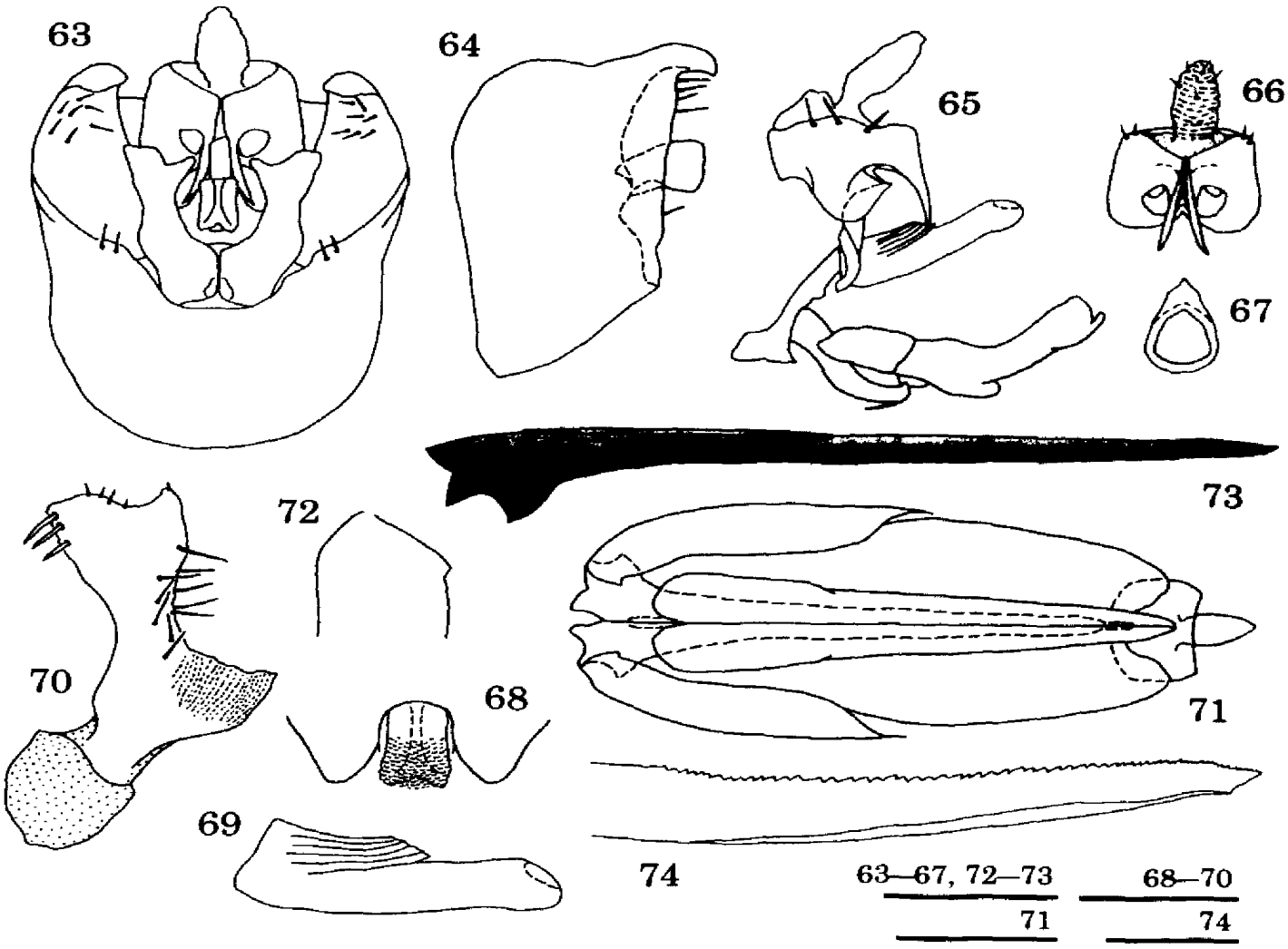
Opiconsiva albicollis (MOTSCHULSKY, 1863)

(Figs. 5–7, 63–74)

Delphax albicollis MOTSCHULSKY, 1863: 110 [Sri Lanka].
Liburnia albicollis: MELICHAR, 1903: 99.
Delphacodes albicollis: ISHIHARA, 1949: 66.
Opiconsiva albicollis: FENNAH, 1975: 112.
Kakuna sameshimai MATSUMURA et ISHIHARA, 1945: 68 [Japan]. **syn. nov.**
Sogata yanoi ISHIHARA, 1952: 42 [Japan]. **syn. nov.**
Corbulo koreacola KWON, 1982: 7 [Korea]. **syn. nov.**

Coloration. General body color pale brown to dark brown (generally pale brown in females). Posterior half of pronotum generally ivory-white, carinae on head, antenna, carinae and posterior margins of pro- and mesonota, legs pale brown; macropterous fore wing semitransparent and smoky, with veins darkened distally, and generally with clavus much darkened at tip; brachypterous fore wing semitransparent and smoky or dark brown, with costal margin ivory-white distally in dark male specimens; hind wing semitransparent and smoky, with veins darkened; ventral surface of 1st valvula semitransparent, almost uniformly brownish smoky.

Structure. Features of vertex as in generic description. Frons about 2.3× as long as wide. Second antennal segment about 2.3× as long as wide, about 2.0× as long as 1st one. Pronotum about 1.1× as wide as head. Mesonotum about 1.2× as long as head plus pronotum in dorsal mid-line. Post tibial spur bearing 14–22 teeth.



Figs. 63–74. *Opiconsiva albicollis*, male genitalia (63–70) and female genitalia (71–74). —— 63–64, male pygofer in ventrocaudal (63) and lateral (64) views; 65, male genitalia in lateral view (pygofer removed); 66, anal segment in caudal view; 67, suspensorium in caudal view; 68, armature in ventrocaudal view; 69, aedeagus in lateral view; 70, left paramere in ventrocaudal view; 71, female genitalia in ventral view; 72, basal angle of right 1st valvifer in ventral view; 73, right 1st valvula in ventral view; 74, 2nd valvulae in lateral view. Scales: 0.2 mm (63–67, 71–73), 0.1 mm (68–70, 74). All specimens from Honshu.

Male genitalia (Figs. 63–70). Pygofer with dorsolateral angle strongly produced mediocaudad and curved ventrad at apex. Armature angulate, widened apically in lateral view, with ventral surface bilobed laterally; lobes rarely widely separated each other. Aedeagus lamellate at basal half dorsally. Paramere thickened in ventrocaudal view; outer angle rounded or acute, with rather large setae on lateral side.

Female genitalia (Figs. 71–74). Basal angle of 1st valvifer with an appendage very short or missing. First valvula with long inner ramus about 0.4× as long as inner margin of 1st valvula. Second valvulae slender, bearing 43–57 small teeth dorsally.

Body length (mean). [Male] macropter, 2.7–3.2 mm (3.0 mm); brachypter, 1.6–2.1 mm (1.8 mm); [female] macropter, 2.7–3.5 mm (3.2 mm); brachypter, 1.9–2.3 mm (2.1 mm).

Specimens examined. [Honshu] 2♂, (EUMJ) Fujishima, Uzen, Yamagata, 17. VII. 1942, K. OKAZAKI; 13♂ 13♀ (SF), Ôsaka, Kimitsu, Chiba Pref., 15. VIII. 2011;

7 ♂ 3 ♀ (SF), Shigena, Tateyama, Chiba Pref., 14. VIII. 2011; 2 ♂ 4 ♀ (SF), Dôgenji, Tateyama, Toyama Pref., 12. IX. 2010; 22 ♂ 34 ♀ (SF), Shiokawa, Kani, Gifu Pref., 10. IX. 2010; 3 ♂ (SF), Nishi-hagima, Makinohara, Shizuoka Pref., 14. VIII. 2007 (at light); 1 ♂ (SF), Ôizumi, Inabe, Mie Pref., 22. VIII. 2010 (at light); [Sado Is.] 1 ♂ (SF), Hamaumedu, Sado, Niigata Pref., 3. VIII. 2009 (light trap); [Shikoku] 1 ♂ (holotype of *Sogata yanoi*, EUMJ), Dôgo, Matsuyama, 8. X. 1949, T. YANO; 1 ♂ (EUMJ), Higashino, Matsuyama, 31. X. 1953, T. ISHIHARA & K. SASAKI; 1 ♂ (EUMJ), Ômishima, Iyo, 17. VII. 1959, T. ISHIHARA; [Kyushu] 4 ♂ 1 ♀ (paratypes of *Kakuna sameshimai*, ELKU), Chikuzen, Fukuoka, Kyushu, 14. V. 1938, T. SAMESHIMA; 3 ♂ (EUMJ), Fukuoka, 24–30. VIII. 1945, T. SHIRÔZU; [Tsushima Is.] 1 ♂ 3 ♀ (SF), Uchiyama, Iduhara, Tsushima, Nagasaki Pref., 12–15. VIII. 2010 (at light); [Okinawa Is.] 25 ♂ 25 ♀ (SF), Aha, Kunigami, 1–3. V. 2010; 6 ♂ 5 ♀ (SF), Okuma, Hiji Rv., Kunigami, 30. IV. 2010; 2 ♂ (SUU), Kakinohana, Tamagusuku, 26. XI. 2004, M. HAYASHI *et al.*; [Ishigaki Is.] 7 ♂ 8 ♀ (SF), Nagura Dam, 14. VII. 2011; [Iriomote Is.] 21 ♂ 10 ♀ (SF), Komi, 2–6. IX. 2012; [Yonaguni Is.] 3 ♀ (SUU), Minami-hoan, 26. X. 2007 (light trap), M. HAYASHI *et al.*; [Taiwan] 1 ♂ (SF), Dongyuan, Mudan, Pingtung Co., 14. III. 2010; 1 ♂ (SF), same data except 1–7. I. 2012; [Bangladesh] 3 ♂ (EUMJ), Dhaca, 5–9. XI. 1969, T. ISHIHARA.

Distribution. Japan (Honshu, Sado Is., Shikoku, Kyushu, Tsushima Is., Okinawa Is., Miyako Is., Ishigaki Is., Iriomote Is., Yonaguni Is.); F. E. Russia (S. Primorsky kray), Korea, China, Taiwan, Philippines, Indonesia, Palau (Koror), S. Mariana Isles (Guam), Micronesia (Yap), Bangladesh, Sri Lanka, Turkey, Palestine, Egypt, Canary Isles, Madagascar.

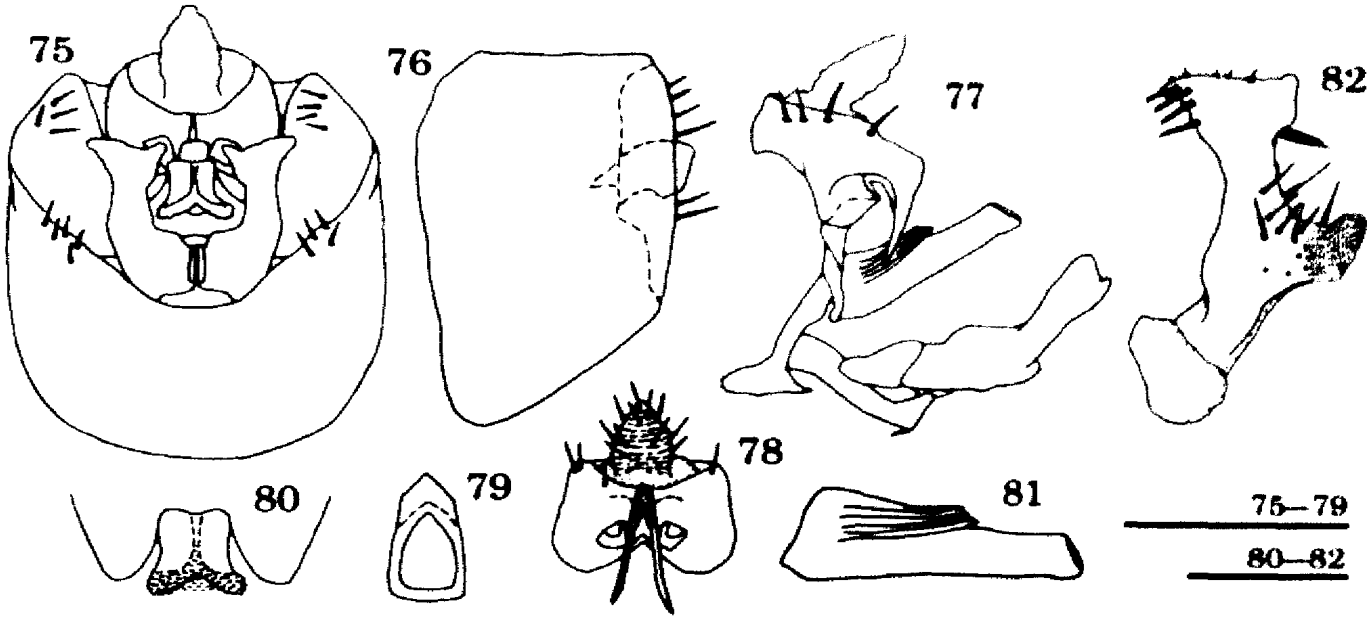
Remarks. YANG (1989) redescribed and figured *Harmalia sameshimai* (MATSUMURA et ISHIHARA, 1945) based on Taiwanese specimens, but his description may be for an undescribed species of *Harmalia*. In Japan, this species shows two geographic variations as follows (features of brachypterous males stated in parentheses): specimens collected from northern localities (Honshu to Okinawa Is.) pale brownish (with semitransparent fore wing) and large in body-size (Figs. 5–6); specimens collected from southern localities (Yaeyama Isles) darker and smaller (with concolorous fore wing fringed with a distinct whitish wing margin) (Fig. 7). *Opiconsiva sameshimai* (MATSUMURA et ISHIHARA, 1945), *Opiconsiva koreacola* (KWON, 1982), and *Toya yanoi* (ISHIHARA, 1952) seem to be a northern form as stated above.

Biological notes. This planthopper feeds on *Isachne globosa* (THUNB.) (Poaceae) in Japan and Taiwan. In summer, numerous individuals are frying to the lights around the paddy fields in Japan proper.

Opiconsiva tangira (MATSUMURA, 1900)

(Figs. 8, 75–82)

Delphax tangira MATSUMURA, 1910: 30 [Morocco].
Toya tangira: NAST, 1975: 6.
Corbulo tangira: KWON, 1982: 7.
Opiconsiva tangira: ASCHE, 1988: 197.
Chloriona (Sogatella) paludum: FENNAH, 1958: 490.
Opiconsiva nigra DING et TIAN, 1980: 39 [China]. **syn. nov.**



Figs. 75–82. Male genitalia of *Opiconsiva tangira*. 75–76, male pygofer in ventrocaudal (75) and lateral (76) views; 77, male genitalia in lateral view (pygofer removed), 78, anal segment in caudal view; 79, suspensorium in caudal view, 80, armature in ventrocaudal view; 81, aedeagus in lateral view; 82, left paramere in ventrocaudal view. Scales: 0.2 mm (75–79), 0.1 mm (80–82).

Coloration & Structure. General body color dark brown as in dark colored form of *O. albicollis*. General habitus as in *O. albicollis*. Female unknown.

Male genitalia (Figs. 75–82). Pygofer with dosolateral angle not produced caudad. Features of armature as in widely bilobed form of *O. albicollis*, but minute granules relatively concentrate on ventral surface of armature. Aedeagus and paramere as in *O. albicollis*, but inner margin of paramere relatively angulate subapically.

Body length (mean). [male] macropter, 2.6–3.2 mm (2.9 mm).

Specimens examined. [Iriomote Is.] 1♂ (SF), Funaura, 4. IX. 2012; [Thailand] 1♂ (EUMJ), Chiang Mai, 20. XII. 1957, K. YODA; 1♂ (EUMJ), Khon, Kaen, 6. X. 1972, M. SATO; [Bangladesh] 1♂ (EUMJ), Dhaca, 11. XI. 1969, T. ISHIHARA; [India] 1♂ (EUMJ), Hyderabad, 3. X. 1969, T. ISHIHARA; 1♂ (EUMJ), Punjab, 9. III. 1969, J. A. LOWE; 1♂ (EUMJ), Rewa, VII. 1969, J. A. LOWE; [Sri Lanka] 2♂ (EUMJ), Gannoruwa, Peradeniya, 16. XII. 1972, H. SANTA.

Distribution. Japan (Ryukyus: Iriomote Is.); China, Bangladesh, India, Sri Lanka, Palestine, Italy, Morocco, Guinea, Côte d'Ivoire, Nigeria, Sudan (Equatoria, Blue Nile).

Remarks. This species is very similar and closely allied to *O. albicollis*, but can be distinguished by the dorsolateral angle of pygofer not produced caudad (Fig. 76). This species is newly recorded from the Ryukyus, Japan. *Opiconsiva nigra* DING et TIAN, 1980 described from China is recognized as a junior synonym because of no differences in the body shape and the configuration of male genitalia.

Key to Japanese species of *Harmalia* and *Opiconsiva*

1. Aedeagus lamellate at base dorsally ..... 2 (*Opiconsiva*)
– Aedeagus not lamellate at base dorsally ..... 3 (*Harmalia*)
2. Dorsolateral angle of pygofer distinctly produced caudad .....

..... *O. albicollis* (MOTSCHULSKY)
– Dorsolateral angle of pygofer not produced caudad ..... *O. tangira* (MATSUMURA)
3. Aedeagus with small teeth in apical half 4
– Aedeagus not dentate 5
4. Face almost entirely pale yellow ..... *H. commelinae* YANG
– Face dark brown except antenna pale yellow to brown.....
..... *H. heitensis* (MATSUMURA et ISHIHARA)
5. Dorsolateral angle of pygofer with inner margin rectangularly produced inwardly
..... *H. cordata* YANG
– Dorsolateral angle of pygofer with inner margin smooth .....
..... *H. sirokata* (MATSUMURA et ISHIHARA)

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