

Revision of the Genus *Sangariola* Jacobson (Coleoptera: Chrysomelidae: Galerucinae: Alticini)

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Abstract

Lee, C. F. 2014. Revision of the genus *Sangariola* Jacobson (Coleoptera: Chrysomelidae: Galerucinae: Alticini). J. Taiwan Agric. Res. 63(3):188–204.

Five species of *Sangariola* Jacobson are recognized as valid. *Sangariola hirashimai* Kimoto, 1970, *Sangariola fortunei* (Baly 1888), and *Sangariola punctatostrata* (Motschulsky 1861) are redescribed. *Sangariola costata* Chûjô, 1935b is removed from synonymy with *S. punctatostrata* (Motschulsky 1861). A new species, *Sangariola yuae* sp. nov., is described from Taiwan. *Charidea nigrosuturalis* var. *obliterata* Pic, 1937 is proposed as a new synonym of *S. fortunei* (Baly 1888). Lectotypes are designated for *Charidea fortunei* Baly, 1888, *Charidea nigrosuturalis* Pic, 1937, *Galeruca* (sic!) *punctatostrata* Motschulsky, 1861, *Galeruca* (*Adimonia*) *multicostata* Jacoby, 1885, and *Sangariola costata* Chûjô, 1935b.

Key words: Taxonomy, Flea beetle, *Lilium*.

INTRODUCTION

The genus *Sangariola* was erected for *Galeruca punctatostrata* Motschulsky, 1861 by Jacobson (1922). Although the genus *Charidea* was erected earlier (Baly 1888), it is an unavailable name because of the junior homonymy of *Charidea* Dalman, 1816 (Lepidoptera: Thyrididae). Another genus, *Allophyla* Weise, was erected earlier (Weise 1889), but it also is an unavailable name because of the junior homonymy of *Allophyla* Loew, 1864 (Diptera: Heleomyzidae). Hincks (1949) apparently did not know about publication of the available name (*Sangariola*). He proposed an unnecessary replacement name, *Lophallya*, for *Allophyla*.

Sangariola currently comprises three valid species: *Sangariola punctatostrata*

(Motschulsky 1861), *Sangariola fortunei* (Baly 1888), and *Sangariola hirashimai* Kimoto, 1970. However, a number of names have been synonymized with these species. *Galeruca* (*Adimonia*) *multicostata* Jacoby, 1885, *Charidea regularis* Pic, 1928, *Sangariola costata* Chûjô, 1935b, and *S. punctatostrata aequicostata* Chûjô, 1938 were placed as synonymies of *S. punctatostrata* (Motschulsky 1861). *Allophyla auora* Weise, 1889, *Charidea bicostata* Pic, 1928, *Charidea nigrosuturalis* Pic, 1937, *Charidea pieli* Pic, 1937, *Charidea bicostata* var. *atriceps* Pic, 1938, and *Sangariola fortunei* var. *unicoloripennis* Chûjô, 1941 were synonymized with *S. fortunei* (Baly 1888). Taxonomic statuses of all available names were re-evaluated through type examinations.

S. punctatostrata and *S. fortunei* were re-

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ported to feed on leaves of *Lilium* spp. (Chûjô & Kimoto 1961; Yu 1996) used as cut flowers commercially. All *Sangariola* species occur in Taiwan (Kimono & Chu 1996). Specimens of the genus have been extensively collected and studied by the Taiwan Chrysomelid Research Team (TCRT), and food plants documented. The results are presented here. The TCRT was founded in 2005 and comprises ten members. All are amateurs interested in inventorying all species of Chrysomelidae in Taiwan.

MATERIALS AND METHODS

Nearly two hundred specimens and types have been examined. Most of them were collected by members of the TCRT and deposited at the Taiwan Agricultural Research Institute (TARI). Others are deposited in the historical collection at the same institute. To prepare drawings of the adult reproductive systems, the abdomens of adults were separated, boiled in a 10% KOH solution, cleared in distilled water, and then mounted on microscope slides in glycerin for observation. Drawings were made using a Leica M165 stereomicroscope or a Nikon ECLIPSE 50i compound microscope. Body parts were then stored in glycerin tubes with the dry mounted specimens.

Host plants were recorded by observing adult feeding behavior in the field. Plants were identified by Chih-Kai Yang.

The type specimens examined are deposited in the following collections: BMNH [Natural History Museum, London, United Kingdom (Michael Geiser)]; BPBM [Bernice P. Bishop Museum, Hawaii, USA (Shepherd Myers)]; CAS [California Academy of Sciences, California, USA (David H. Kavanaugh)]; KMNH [Kitakyushu Museum of Natural History, Kitakyushu, Japan (Kyoichiro Ueda)]; KUEC [Kyushu University, Fukuoka, Japan (Munetoshi Maruyama)]; MCZC [Museum of Comparative

Zoology, Harvard University, Massachusetts, USA (Philip D. Perkins)]; MNHN [Muséum National d'Histoire Naturelle, Paris, France (Antoine Mantilleri)]; NHRS [Naturhistoriska Riksmuseet, Stockholm, Sweden (Johannes Bergsten)]; NMNS [National Museum of Natural Science, Taichung, Taiwan (Ming-Luen Jeng)]; TARI (Taiwan Agricultural Research Institute, Taichung, Taiwan); ZMUM [Zoological Museum, Moscow State University, Russian (L. N. Medvedev)].

Exact label data are cited for all type specimens; a double slash (//) divides the data on different labels and a single slash (/) divides the data in different rows. Other comments and remarks are indicated as follow: (p)-preceding data are printed, (h)- preceding data are handwritten, (w)- white label, (y)- yellow label, (b)- blue label, and (r)- red label.

RESULTS AND DISCUSSION

Genus *Sangariola* Jacobson, 1922

Charidea Baly 1888: 157. Type species: *Galeruca punctatostriata* Motschulsky, 1861. (junior homonym of *Charidea* Dalman, 1816).

Allophyla Weise 1889: 624. Type species: *Allophyla aurora* Weise, 1889. (junior homonym of *Allophyla* Loew, 1864).

Sangariola Jacobson 1922: 522. Type species: *Galeruca punctatostriata* Motschulsky, 1861.

Lophallya Hincks 1949: 616. (replacement name for *Allophyla* Weise).

Diagnosis (modified after Konstantinov & Vandenberg 1996). Body large, elongate, dorsally flattened. Color reddish or dark reddish brown.

Head oval, more or less convex in lateral view. Frontal ridge replaced by short longitudinal furrow between antennal sockets. Antennal calli longitudinal, raised, triangular, broadly

connected. Orbital line deeply impressed. Eye small. Interantennal space subequal to diameter of antennal socket. Antenna 11-segmented, filiform.

Pronotum more or less narrow, flat with transverse and longitudinal antebasal impressions and with few more impressions on disk. Procoxal cavity closed behind.

Elytron flat or carinate, with large, deep punctures forming striae. Humeral callus well developed. Epipleuron more or less vertical, almost reaching elytral apex.

Metafemur slightly swollen. Metatibia cylindrical, slightly expanded distally; apex oblique. Metatarsus inserted apically. First metatarsal segment short, shorter than following two segments combined.

Key to species of *Sangariola* Jacobson

1. Elytron flat, no visible ridges between striae *Sangariola hirashimai*
Elytron carinate, with visible ridges between striae 2
2. Pronotum and elytron pubescent 3
Pronotum and elytron glabrous 4
3. Pubescence on elytron longer; antenna wider; only sides of ventral disc at apex of penis membranous
..... *Sangariola yuae* sp. nov.
Pubescence on elytron shorter; antenna narrower; central park of apex of ventral disc at apex of penis membranous
..... *Sangariola fortunei*
4. Elytron without elevated ridges between striae; penis slender
..... *Sangariola punctatostriata*
Elytron with elevated ridges between striae 3 and 4, 7 and 8; penis wide
..... *Sangariola costata*

***Sangariola hirashimai* Kimoto, 1970**

***Sangariola hirashimai* Kimoto 1970: 213.**

Type Specimens (n = 2). Holotype ♀ (KUEC): “(Taiwan) /Alishan, 2,300 m/Chiayi Hsien (p, w) //9 (h). iv.1965 (p) /Y. Hirashima (p, w) //Japan-U.S./Co-op. Sci./Programme (p, y) // *Sangariola/hirashimai*/Kimoto, n. sp. (h, w) //HOLOTYPE (p, r)”. Paratype: 1 ♀ (KMNH): “(Taiwan) /Alishan, 2,300 m/Chiayi Hsien (p, w) //6. (h) vii. 1965 (p) /T. Nakane (p, w) //Japan-U.S./Co-op. Sci./Programme (p, y) // *Sangariola/hirashimai*/Kimoto, n. sp. (h, w) //PARATYPE (p, b)”.

Specimens Examined (n = 41). TAIWAN:

Chiayi: 1 ♂, Alishan, 12.V.2011, leg. C.-F. Lee (TARI); Hualien: 1 ♂, Pilu, 31.V.2011, leg. M.-H. Tsou (TARI); Kaoshiung: 1 ♂, Tengchih, 1.X.2008, leg. C.-T. Yao (TARI); 1 ♂, 1 ♀, same locality, 2.III.2009, leg. C.-T. Yao (TARI); 1 ♀, same locality, 23.III.2009, leg. H. Lee (TARI); 1 ♂, same locality, 24.III.2009, leg. S.-F. Yu (TARI); 1 ♀, 8.IV.2011, leg. J.-C. Chen (TARI); 1 ♂, 1 ♀, same locality, 6.VII.2013, leg. W.-C. Liao (TARI); Nantou: 1 ♀, Lienhuachih, 24.XI.2007, leg. M.-H. Tsou (TARI); 2 ♂♂, same locality, 25.II.2009, leg. Y.-C. Lin (TARI); 1 ♂, Tatchia, 9.V.2011, leg. C.-F. Lee (TARI); 1 ♀, Tungpu, 20-22.VI.1980, leg. C. C. Chen (TARI); 1 ♀, same locality, 16-20.IV.1984, leg. K. C. Chou & C. H. Yang (TARI); 1 ♂, Tunyuan, 29.IV.1992, leg. W. T. Yang (NMNS); 2 ♂♂, 1 ♀, Wushe, 19-22.IV.1983, leg. K. C. Chou & S. P. Huang (TARI); 1 ♂, same locality, Pingtung: 2 ♂♂, Lilungshan, 5.XI.2009, leg. J.-C. Chen or M.-H. Tsou (TARI); 1 ♂, Nanjenhu, 15.III.2010, leg. M.-H. Tsou (TARI); 1 ♀, same locality, 3.I.2011, leg. J.-C. Chen (TARI); 1 ♂, Peihulushan, 4.XI.2009, leg. M.-H. Tsou (TARI);

1♂, 1♀, Peitawushan, 22.IX.2012, leg. J.-C. Chen (TARI); 2♀♀, Tahanshan, 12.XI.2009, leg. J.-C. Chen (TARI); 1♂, same locality, 17.IX.2010, leg. J.-C. Chen (TARI); 1♂, 1♀, same locality, 4.X.2010, leg. J.-C. Chen (TARI); 1♀, same locality, 31.X.2011, leg. J.-C. Chen (TARI); 1♀, same locality, 1.X.2012, leg. J.-C. Chen (TARI); 1♂, same locality, 30.VII.2013, leg. B.-X. Guo (TARI); 1♀, same locality, 15.X.2013, leg. Y.-T. Chung (TARI); 1♂, Wanlite, 7-28.II.2010, leg. M.-L. Jeng (TARI); Taitung: 2♂♂, 2♀♀, Litao, 6.X.2010, leg. M.-H. Tsou (BMNH).

Remarks. *Sangariola hirashimai* is characterized by the flat elytron with extremely long pubescence.

Male. Length 4.1–6.5 mm, width 1.7–2.5 mm. General color (Figs. 1–2) dark brown; pronotum and elytron yellowish brown; lateral margins and suture black; some individuals with black stripes reduced and ventral surface brown (Figs. 3–4); antennae and legs black. Body covered with long, scattered pubescence. Antenna filiform (Fig. 5), length ratio of antennomere 3 to 11 about 1.0 : 1.2 : 1.2 : 0.9 : 1.0 : 1.0 : 1.0 : 0.9 : 1.3; ratio of length to width from antennomere 3 to 11 about 2.1 : 2.4 : 2.8 : 2.4 : 2.5 : 2.7 : 2.7 : 2.4 : 4.0. Pronotum flat, without swellings or grooves; with dense and random large punctures. Elytral punctures arranged into 11 longitudinal striae, arrangement of striae 1



Figs. 1–4. Color habitus of *Sangariola hirashimai*. 1. Female, dorsal view; 2. Ditto, ventral view; 3. Male, dorsal view, color variation; 4. Ditto, ventral view, color variation.

to 3 confused; without distinctive ridges between striae. Penis (Figs. 7–8) slender, about 6.0 times longer than wide; abruptly narrowed near apex, apex truncate; parallel sided; slender in lateral view.

Female. Length 4.9–7.1 mm, width 2.2–3.3 mm. Similar to male. Antenna filiform (Fig. 6), length ratio of antennomere 3 to 11 about 1.0 : 1.1 : 1.1 : 1.0 : 1.0 : 1.0 : 1.0 : 1.0 : 1.4; ratio of length to width from antennomere 3 to 11 about 2.1 : 3.1 : 3.1 : 2.8 : 2.9 : 2.8 : 2.5 : 2.6 : 3.6. Gonocoxae (Fig. 10) curved at middle, each gonocoxa with nine setae from apical 1/4 to apex. Sternite VIII (Fig. 9) weakly sclerotized; with dense short setae along apex, disc scattered with less longer setae; spiculum slender, base slightly widened. Sperma-

thecal receptaculum (Fig. 11) slightly swollen, straight; pump strongly curved; spermathecal duct long.

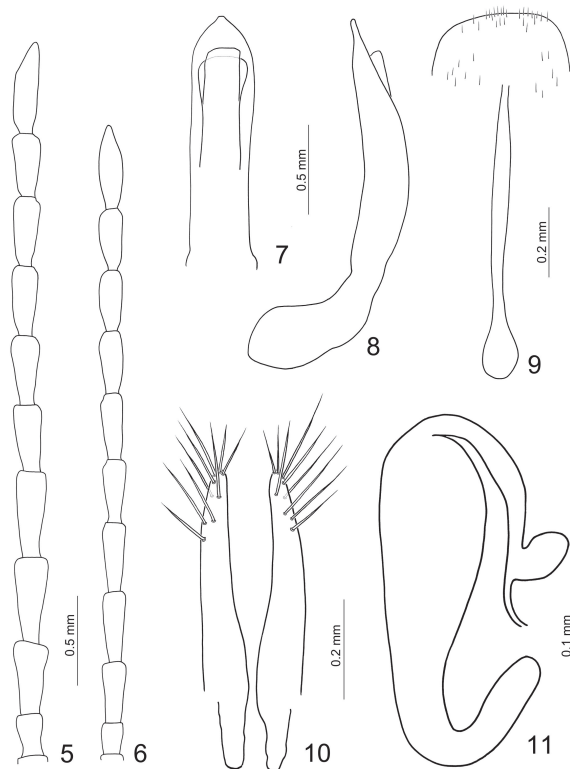
Host plants. Smilacaceae: *Smilax lanceifolia* Roxb. and *Smilax luei* T. Koyama.

Distribution. Endemic to Taiwan. *Sangariola hirashimai* is a common and widespread species in Taiwan (Fig. 12). Most populations inhabit lower elevation habitats (0–1,500 m).

***Sangariola yuae* Lee, sp. nov.**

Sangariola fortunei: Chûjô 1935b: 394 (misidentification); Kimoto 1970: 214; Kimoto 1989: 261.

Type Specimens Examined (n = 21). Holotype ♂ (TARI): Taiwan: Kaoshiung: Tengchih, 26.V.2009, leg. C.-F. Lee. Paratypes:



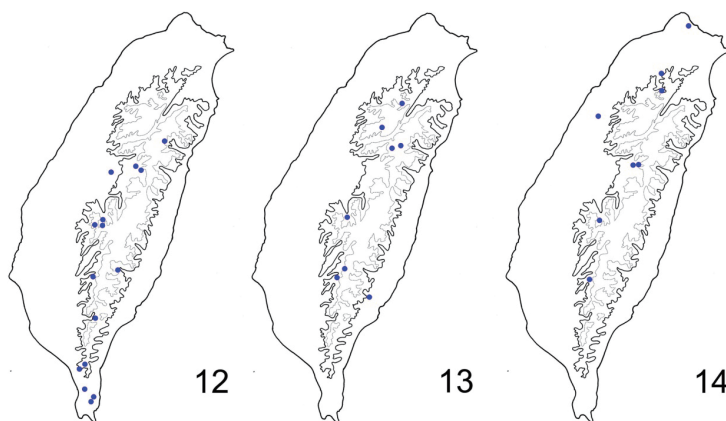
Figs. 5–11. *Sangariola hirashimai*. 5. Antenna, male; 6. Antenna, female; 7. Penis, dorsal view; 8. Penis, lateral view; 9. Sternite VIII; 10. Gonocoxae; 11. Spermatheca.

2♀♀ (TARI), same data as holotype; 1♂ (TARI), same locality, 24.V.2005, leg. C.-F. Lee; 2♀♀ (BMNH), same locality, 2-5.VI.2008, leg. C.-F. Lee; 2♂♂, 1♀ (TARI), same locality, 25.V.2009, leg. S.-F. Yu; 1♀ (TARI), same locality, 26.V.2009, leg. H. Lee; 1♂ (TARI), Chungchihkuan, 15.IV.-10.X.2012, leg. L.-P. Hsu; Hsinchu: 1♂, 2♀♀ (TARI), Mamei, 4.V.2008, leg. S.-F. Yu; Hualien: 1♂ (TARI), Tayuling, 9-16.VI.1980, leg. K. S. Lin & B. H. Chen; Nantou: 1♂ (TARI), Hsitou, 6.V.2009, leg. C.-F. Lee; 1♂ (TARI), Meifeng, 7-9.V.1981, leg. K. S. Lin & S. C. Lin; Taichung: 1♂ (TARI), Anmashan, 21.IV.2010, leg. C.-F. Lee; 1♀ (TARI), Tahsuehshan, 23.VII.2011, leg. J.-C. Chen; 1♂ (TARI), Wuwoweishan, 5.VI.2011, leg. J.-C. Chen; Taitung: 1♂ (TARI), Yanping, 17.VI.2010, leg. J.-C. Chen.

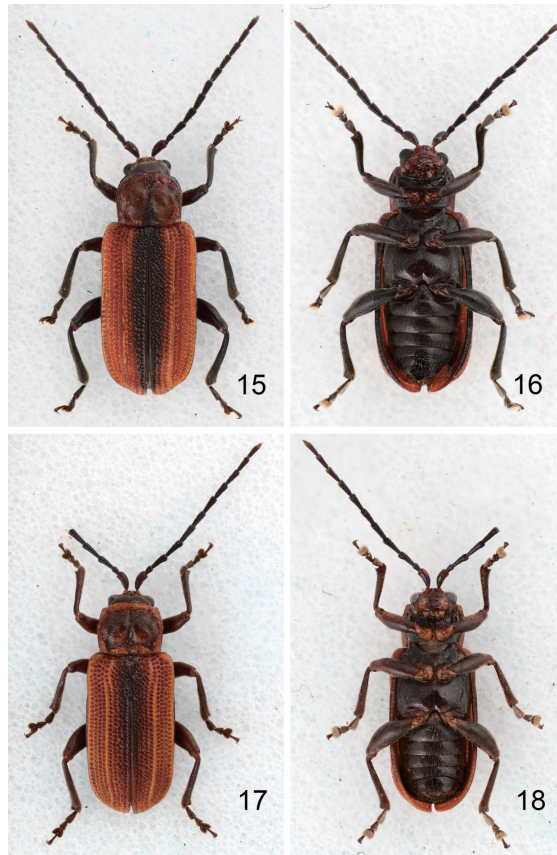
Remarks. This new species is similar to *Sangariola fortunei* with dense pubescence and the elevated interstices 4 and 8 on elytra. It can be distinguished from the latter by the longer pubescence on the elytra, the wider antenna, the membranous sides of ventral surface at apex of the penis, and

the wider penis in lateral view.

Male. Length 6.1–6.3 mm, width 2.4–2.6 mm. General color (Figs. 15–16) blackish brown; pronotum and elytron reddish brown; elytra with a median longitudinal black stripe from suture to stria 3, elytral epimeron black. Body covered with dense pubescence; disc of head and pronotum with micro-reticulation. Antenna filiform (Fig. 19), length ratio of antennomere 3 to 11 about 1.0 : 1.3 : 1.2 : 1.1 : 1.1 : 1.1 : 1.1 : 1.1 : 1.3; ratio of length to width from antennomere 3 to 11 about 2.0 : 2.8 : 2.8 : 2.5 : 2.6 : 2.8 : 2.8 : 3.0 : 3.9. Pronotum with two large strongly elevated, subrounded swellings occupying much of disc, separated medially by a narrow groove; sometimes with lateral groove dividing into two swellings; disc with large punctures but reduced on swellings. Elytral punctures arranged into 10 longitudinal striae, arrangement of striae 1 to 3 not a little confused; with interstices 4 and 8 strongly elevated. Penis (Figs. 21–22) wide, about 4.3 times longer than wide; abruptly narrowed near apex, apex truncate; parallel sided; strongly widened



Figs. 12–14. Distribution map of *Sangariola* species, solid line: 1,000 m, broken line: 2,000 m. 12. *S. hirashimai*; 13. *S. yuae* sp. nov.; 14. *S. costata*.



Figs. 15–18. Color habitus of *Sangariola* species. 15. *S. yuae* sp. nov., male, dorsal view; 16. Ditto, ventral view; 17. *S. fortunei*, male, dorsal view; 18. Ditto, ventral view.

at middle in lateral view; ventral disc with sides of apical 1/3 membranous.

Female. Length 5.5–6.1 mm, width 2.1–2.5 mm. Similar to male. Antenna filiform (Fig. 20), length ratio of antennomere 3 to 11 about 1.0 : 1.2 : 1.3 : 1.2 : 1.2 : 1.1 : 1.1 : 1.1 : 1.3; ratio of length to width from antennomere 3 to 11 about 2.2 : 2.6 : 3.2 : 2.7 : 2.8 : 2.8 : 2.9 : 2.9 : 3.7. Gonocoxae (Fig. 24) curved inwards at apical 1/4, each gonocoxa with nine setae from apical 1/4 to apex. Sternite VIII (Fig. 23) weakly sclerotized; with dense short setae along apex, disc scattered with less longer setae; spiculum slender, base strongly widened. Spermathecal receptaculum (Fig.

25) slightly swollen and curved; pump strongly curved; spermathecal duct long.

Color variation. In some individuals the pronotum is dark brown but the rest of the body is reddish brown. Reddish brown areas on the head are extremely variable.

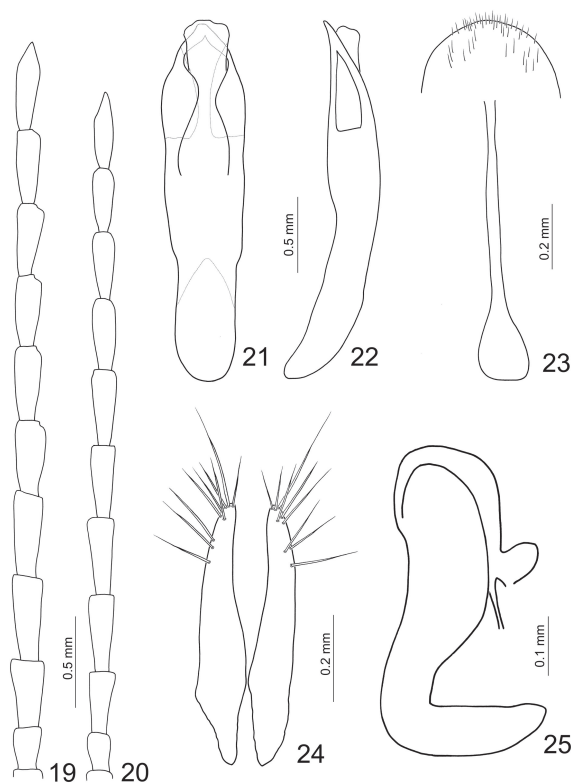
Host plant. Smilacaceae: *Smilax lanceifolia* Roxb.

Distribution. Endemic to Taiwan. This species has a scattered distribution in Taiwan. Most populations inhabit mountain areas (1,000–2,500 m) (Fig. 13).

***Sangariola fortunei* (Baly 1888)**

Charidea fortunei Baly 1888: 158.

Allophyla auora Weise 1889: 626; Weise 1905:



Figs. 19–25. *Sangariola yuae* sp. nov. 19. Antenna, male; 20. Antenna, female; 21. Penis, dorsal view; 22. Penis, lateral view; 23. Sternite VIII; 24. Gonocoxae; 25. Spermatheca.

188 (as synonym of *fortunei*).

Charidea bicostata Pic 1928: 32; Döberl 2010:

558 (as synonym of *fortunei*).

Sangariola fortunei: Chen 1933: 230.

Charidea nigrosuturalis Pic 1937: 176; Gressitt and Kimoto 1963: 755 (as synonym of *fortunei*).

Charidea nigrosuturalis var. *obliterata* Pic 1937: 176. new synonym

Charidea pieli Pic 1937: 175; Döberl 2010: 558 (as synonym of *fortunei*).

Charidea bicostata var. *atriceps* Pic 1938: 18; Gressitt and Kimoto 1963: 755 (as synonym of *fortunei*).

Sangariola fortunei var. *unicoloripennis* Chûjô 1941: 173 (Korea).

Type Specimens (n = 8). *Charidea fortunei*:

Lectotype ♀ (BMNH), here designated, pinned and mounted on small card, labeled: “Type (p, circle label with red border) //N. China (h, w) //Journ. Linn. Soc /XX p. 158 (h, w) //Charidealfortunei, Baly/Type (h, w; on back of previous label) //Baly Coll. (p, w) //SYN-/TYPE (p, circle label with blue border) //BMNH(E) /#1024880 (p, w)”. Paratype: 1 (sex undetermined), labeled: “N. China (h, w) //SYN-/TYPE (p, circle label with blue border) //Baly Coll. (p, w)”.

Allophyla auora: Unavailable for study. They are not presented in the NHRS nor in the Zoogisches Institut und Zoologisches Museum der Universität Hamburg.

Charidea bicostata: Holotype ♂ (MNH), mounted on triangular card, labeled:

“Chapa (h, w) //Ongles/appendiculès/près genre Laboissierea (h, w) //type (h, w) // *Charidea/bicostata* n sp (h, w) //Muséum Paris/1958/Coll. Pic (p, y') //TYPE (p, r) //HOLOTYPE (p, r) //HOLOTYPE/*Charidea/bicostata* Pic, 1928 (p, w) //MNHN/EC4381 (p, w)”.

Charidea bicostata var. *atriceps*: Holotype ♂ (NHRS), pinned and labeled: “China/Aders (p, w) //Prov./Anhui (p, w) //bico-staca Pic (h, w) //v. *atriceps* mihi (h, w) //NHRS-JLKB/000022855 (p, w)”.

Charidea nigrosuturalis: Lectotype ♂ (MNHN), here designated, pinned and labeled: “T'iemio (p) u (h) Shan (p) /Musée Heude (p, y) //P. (h) /462 (p, gray label) //17.6.36 (h) /O. PIEL, coll. (p, w) // *Charidea/nigrosuturalis/nm* (h, w) //Muséum Paris/1958/Coll. Pic (p, y') //SYNTYPE (p, r) //SYNTYPE/*Charidea/nigrosuturalis* Pic, 1937 (p, w) //MNHN/EC4384 (p, w)”. Paralectotype: 1 ♀ (MNHN): “Mokan Shan/Musée Heude (p, y) //P. (h) /462 (p, gray label) //30.4.36 (h) /O. PIEL, coll. (p, w) //Muséum Paris/1958 /Coll. Pic (p, y') //SYNTYPE (p, r) //SYNTYPE/*Charidea/nigrosuturalis* Pic, 1937 (p, w) //MNHN/EC4385 (p, w)”.

Charidea nigrosuturalis var. *obliterata*: Holotype ♀ (MNHN), pinned and labeled: “Mokan Shan/Musée Heude (p, y) //P. (h) /463 (p, gray label) //13.3.36 (h) /O. PIEL, coll. (p, w) //v. *obliterata*/mihi (h, w) //Muséum Paris/1958/Coll. Pic (p, y') //SYNTYPE (p, r) //SYNTYPE/*Charidea/nigrosuturalis*/var. *obliterata* Pic, 1937 (p, w) //MNHN/EC4386 (p, w)”.

Charidea pieli: Holotype ♂ (MNHN), pinned and labeled: “Mokan Shan/Musée Heude (p, y) //P. (h) /461 (p, gray label) //6.5.36 (h) /O. PIEL, coll. (p, w) //Muséum Paris/1958/Coll. Pic (p, y') // *Charidea/pieli*

nm (h, w) //HOLOTYPE (p, r) //HOLOTYPE/*Charidea/pieli* Pic, 1937 (p, w) //MNHN/EC4383 (p, w)”.

Sangariola fortunei var. *unicoloripennis*: Holotype ♂ (TARI): “Kôryô, Yôsyû-Gun/Keiki-Dô (h) /COREA (p) /16.V.1937 (h) /COL. (p) T. KusanagiI (h, w) //Holotype (letters faded, circle label) // *Sangariola/fortunei* Baly/var. *unicoloripennis*/Chûjô (h) /DET. M. CHUJO (p, w) //2235 (p, w)”.

Specimens Examined (n = 22). CHINA: Fujian: 1 ♀, Chanting, Niuling, 21.IV.1941, leg. T. C. Maa (CAS); 12 exs., Foochoo, VI.1935, leg. M. S. Yang (BMNH); 1 ♂, Shaowu, Tachulan, 12.V.1942, leg. T. Maa (CAS); 1 ♂, same locality, 6.V.1945, leg. T. C. Maa (BPBM); 1 ♂, 3 ♀♀, Shaowu, Shuipeikai, 11.IV.1943, leg. T. C. Maa (CAS); 1 ♂, same locality, V.1944, leg. T. C. Maa (CAS); Zhejiang: 1 ♀, 18.V.1923, leg. Van Dyke (CAS); 1 ♂, Yian City, Changhua, 16.V.2010, leg. Y.-F. Hsu (TARI).

Remarks. *Sangariola fortunei* is similar to *S. yuae* sp. nov. with dense pubescence and the elevated interstices 4 and 8 on elytra, but can be distinguished from the latter by the shorter pubescence on the elytra, the narrower antenna, and the membranous central part of the ventral surface at apex of penis.

Male. Length 5.0–6.3 mm, width 2.2–2.5 mm. General color (Figs. 17–18) dark brown; pronotum and elytron reddish brown; elytra with a median longitudinal black stripe from suture to stria 3, elytral epimeron black. Body covered with dense pubescence; disc of head and pronotum with micro-reticulation. Antenna filiform (Fig. 26), length ratio of antennomere 3 to 11 about 1.0 : 1.3 : 1.3 : 1.2 : 1.2 : 1.2 : 1.2 : 1.1 : 1.3; ratio of length to width from

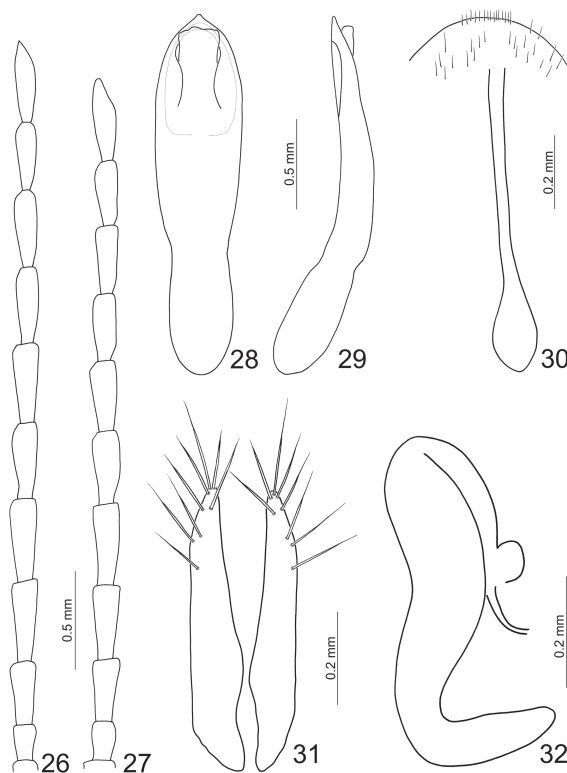
antennomere 3 to 11 about 2.5 : 3.1 : 3.1 : 3.1 : 3.1 : 3.2 : 3.4 : 3.3 : 3.9. Pronotum with two large strongly elevated, rounded swellings occupying much of disc, separated medially by a narrow groove; sometimes with lateral groove dividing into two swellings; disc with large punctures but reduced on swellings. Elytral punctures arranged into 10 longitudinal striae, arrangement of striae 1 to 3 a little confused; with interstices 4 and 8 strongly elevated. Penis (Figs. 28–29) wide, about 4.1 times longer than wide; abruptly narrowed near apex, apex truncate; widest at apical 1/3; slender in lateral view; ventral disc with apical 1/3 membranous.

Female. Length 5.3–5.9 mm, width 2.3–2.4 mm. Similar to male. Antenna filiform (Fig. 27), length ratio of antennomere 3

to 11 about 1.0 : 1.3 : 1.3 : 1.2 : 1.2 : 1.1 : 1.1 : 1.0 : 1.3; ratio of length to width from antennomere 3 to 11 about 2.3 : 3.0 : 3.0 : 3.0 : 2.9 : 3.1 : 3.0 : 3.0 : 3.9. Gonocoxae (Fig. 31) straight, each gonocoxa with eight setae from apical 1/4 to apex. Sternite VIII (Fig. 30) weakly sclerotized; with one row of short setae along apex, disc scattered with less longer setae; spiculum slender, base strongly widened. Spermathecal receptaculum (Fig. 32) slightly swollen and curved; pump strongly curved; spermathecal duct long.

Host plants. Smilacaceae: *Smilax* spp.; Liliaceae: *Lilium* spp.; Araceae: *Symplocarpus* spp. (Yu 1996).

Distribution. China (Fujian, Guangdong, Guizhou, Hunan, Yunnan, Zhejiang), Korea, Vietnam.



Figs. 26–32. *Sangariola fortunei*. 26. Antenna, male; 27. Antenna, female; 28. Penis, dorsal view; 29. Penis, lateral view; 30. Sternite VIII; 31. Gonocoxae; 32. Spermatheca.

Notes. No papers officially treated *Charidea bicostata* Pic, 1928 and *C. pieli* Pic, 1937 as synonyms of *Sangariola fortunei* (Baly 1888), but Döberl (2010) listed them as junior synonyms. Gressitt and Kimoto (1963) proposed *Charidea bicostata* var. *atriceps* Pic, 1938 as a junior synonym of *S. fortunei* but they also indicated that the original description of *C. bicostata* was not traced. Actually, *C. bicostata* was published by Pic (1928).

***Sangariola punctatostrata* (Motschulsky 1861)**

Galleruca (sic!) *punctatostrata* Motschulsky 1861: 25.

Galeruca (*Adimonia*) *multicostata* Jacoby 1885: 746; Chûjô 1935a: 86 (as synonym of *punctatostrata*).

Charidea regularis Pic 1928: 31; Chûjô and Kimoto 1961: 191 (as synonym of *multicostata*).

Sangariola punctatostrata: Chûjô 1935a: 86 (Okinawa island).

Sangariola punctatostrata aequicostata Chûjô 1938: 10; Chûjô and Kimoto 1961: 191 (as synonym of *punctatostrata*).

Type Specimens (n = 15). *Galleruca* (sic!) *punctatostrata*: Lectotype and one paralectotype (sex undetermined) (ZUMU), designated by Medvedev (2006), mounted on card and with same pin, labeled: “*Galleruca/punctatostrata* Motsch/Japan (h, w)”; 1♀ (BMNH), pinned on small card, labeled: “Jap (h) // *Galleruca/punctatostrata* Motsch/Japan (h, w) // *Charidea* (h, w) // Baly coll (p, w)”.

Galeruca (*Adimonia*) *multicostata*: Lectotype (sex undetermined) (BMNH), mounted on card, here designated and labeled: “(back of card mounted with lectotype) *Lilium/*

auratum/May (18) 80 (with pencil) // Jacoby Coll./1909–28a (p, w)”. Paralec-
totypes: 1 (sex undetermined) (BMNH):
“Suyama./20.IV-22.IV (p, w; posterior
half cut off) // Japan./G. Lewis. /1910–320.
(p, w) // on *Lilium auratum* & *L. lancifolium*
(h, w) // SYN- /TYPE (p, circle label
with blue border)”; 1 (sex undetermined)
(BMNH): “Japan./G. Lewis./1910–320. (p,
w) // SYN- /TYPE (p, circle label with blue
border)”; 2 (sex undetermined) (BMNH):
“Japan./G. Lewis./1910–320. (p, w)”; 1
(sex undetermined) (BMNH), same but
with additional label: “IX.8, small beetle
(written in Chinese)”; 2 (sex undeter-
mined) (MCZC): “Japan/Lewis (h, w) //
Type./Sp. figured. (p, w) // 1st Jacoby/
Coll. (p, w) // *A. multicostata* (h, purple
label) // Type (p) /18208 (h, red label)”;
1 (sex undetermined) (TARI): “Ichiuchi
(h) /JAPAN (p) /30.IV.1881 (h) /Col. G.
LEWIS (p, w) // CO/Type (p, yellow letter,
circle label with yellow border) // Cotype
of *Galeruca/multicostata* Jacoby (h, w) //
Sangariola/punctatostrata/Motschulsky
(h) /DET. M. CHUJO (p) //1421 (p, w)”; 1
(sex undetermined) (TARI): “Ichiuchi (h) /
JAPAN (p) /30.IV.1881 (h) /Col. G. Lewis
(p, w) // CO/Type (p, yellow letter, circle
label with yellow border) // *Galeruca/mul-
ticostata* Jac. (h) /Det. T. Shiraki (p, w) //
Sangariola/punctatostrata/Motschulsky
(h) /DET. M. CHUJO (p, w)”.

Charidea regularis: Holotype ♂ (MNHN):
“Kioto/Japon (h, w) // type (h, w) // *Chari-
dea/regularis* Pic (h, w) // Muséum Paris
/1958/Coll. Pic (p, y’) // SYNTYPE (p, r)
// SYNTYPE/*Charidea/regularis* Pic, 1928
(p, w) // MNHN/EC4382 (p, w)”.

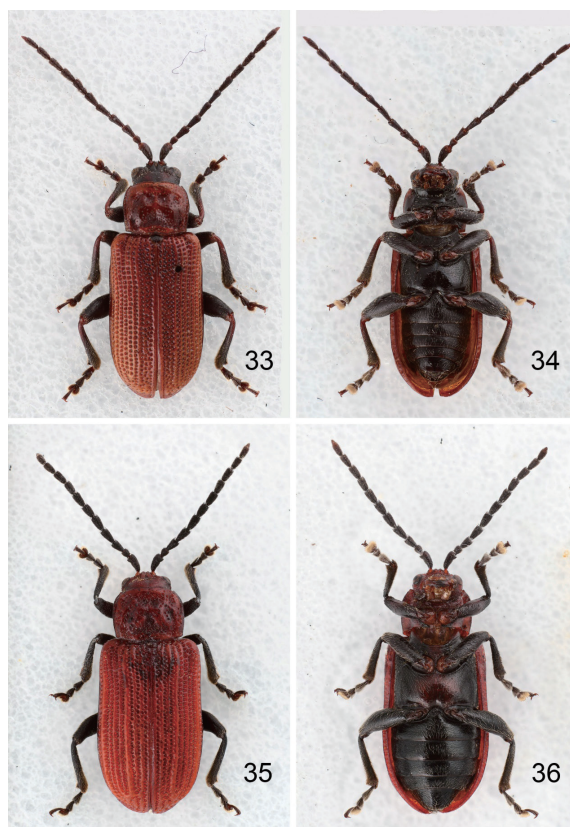
Sangariola punctatostrata aequicostata: Ho-
lotype ♀ (TARI) (automatically fixed
by monotype): “Sobosan (h) /KYÛSHÛ,

JAPAN (h) /4.VII.1937 (h) /Coll. S. Is-siki (h, w) //Typus (h) // *Sangariola* (h) / *punctatostriata* (h) Motschulsky subsp. (h) / *aequicostata* CHUJO (h) /DET. M. Chûjô (p, pink label) //2927 (p, w)".

Specimens Examined (n = 12). JAPAN: Sikoku: 3♂♂, 4♀♀, Kooti-Ken, 26.III.1934-16.VI.1935, leg. I. Okubo (TARI); Kyushu: 1♂, Mt. Inunaki, Fukuoka-Ken, 5.V.1940, leg. S. Nishiguchi (TARI); Okinawa: 1♂, V.1925, leg. S. Sakaguchi (TARI); Hokkaido: 1♀, Dôyako, III.1928, leg. Y. Miwa (TARI); RUSSIA: 1♂, Saghalien, leg. K. Tamanuki (BMNH).

Remarks. *Sangariola punctatostriata* and *S. costata* are characterized by lacking pubescence on the pronotum and elytra. *S. punctatostriata* may be distinguished from the latter by more (11) elytral striae (10 striae in *S. costata*), without elevated ridges between striae on elytron (with elevated ridges between striae 3 and 4, 7 and 8 in *S. costata*), and confused striae 1 to 3 (all striae regularly arranged in *S. costata*).

Male. Length 5.1–6.1 mm, width 2.3–2.8 mm. General color (Figs. 33–34) dark brown to blackish brown; but pronotum and elytron reddish brown. Body covered with dense pubescence except pronotum and elytron; disc of head and pronotum with micro-

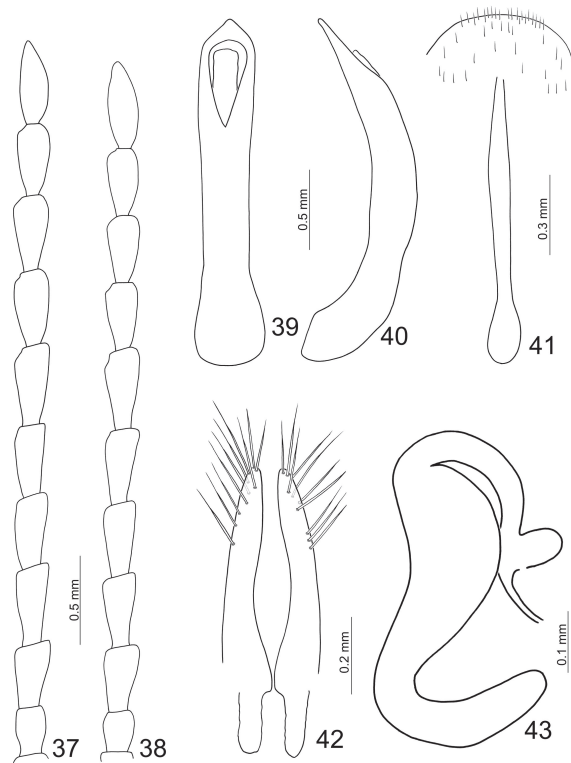


Figs. 33–36. Color habitus of *Sangariola* species. 33. *S. punctatostriata*, male, dorsal view; 34. Ditto, ventral view; 35. *S. costata*, female, dorsal view; 36. Ditto, ventral view.

reticulation. Antenna filiform (Fig. 37), length ratio of antennomere 3 to 11 about 1.0 : 1.3 : 1.1 : 1.1 : 1.3 : 1.2 : 1.2 : 1.2 : 1.4; ratio of length to width from antennomere 3 to 11 about 1.8 : 2.4 : 2.2 : 2.3 : 2.3 : 2.2 : 2.1 : 2.2 : 2.9. Pronotum with dense and large punctures, arrangement of punctures not regular, density greatest near basal and apical margin, with medial and lateral grooves punctate. Elytral punctures arranged into 11 longitudinal striae, arrangement of striae 1 to 3 confused, without elevated interstices; shape extremely variable from 1.6 to 1.9 times longer than wide. Penis (Figs 39–40) extremely slender, about 6.6 times longer than wide; parallel sided, abruptly narrowed near apex, apex narrowly rounded; slender in lateral view, moderately curved at middle.

Female. Length 5.3–6.6 mm, width 2.2–3.3 mm. Similar to male. Antenna filiform (Fig. 38), length ratio of antennomere 3 to 11 about 1.0 : 1.2 : 1.2 : 1.2 : 1.3 : 1.1 : 1.1 : 1.1 : 1.4; ratio of length to width from antennomere 3 to 11 about 1.8 : 2.2 : 2.2 : 2.2 : 2.3 : 2.0 : 2.0 : 2.0 : 3.5. Gonocoxae (Fig. 42) curved inwards at middle, each gonocoxa with ten setae from apical 1/3 to apex. Sternite VIII (Fig. 41) weakly sclerotized; with dense short setae along apex, disc scattered with less longer setae; spiculum slender, base strongly widened. Spermathecal receptaculum (Fig. 43) slightly swollen and curved; pump strongly curved; spermathecal duct long.

Host plants. Liliaceae: *Lilium cordatum* (Thunb.) Koidz.; *Lilium Leichtlinii* Hook. fil. var. *tigrinum* (Regal) Nicols.; and *Ery-*



Figs. 37–43. *Sangariola punctatostrata*. 37. Antenna, male; 38. Antenna, female; 39. Penis, dorsal view; 40. Penis, lateral view; 41. Sternite VIII; 42. Gonocoxae; 43. Spermatheca.

thronium japonicum Decen. Smilacaceae: *Smilax China* Linn. (Chûjô and Kimoto 1961).

Distribution. Russia, Korea, Japan.

Notes. One specimen bears the holotype label and is deposited at the BMNH. It is labeled: “Type/H. T. (p, circle label with red border) //Japan/G. Lewis/1910–320 (p, w) //Yokohama./20.III.-14.IV.80 (p, w) // *Adimonia/multicostata* Jac. (h, purple label)”, is excluded from the type series because critical information is missing from the description “Yokohama”. *Galleruca* is a wrong spelling for “*Galeruca*” but Motschulsky kept using it.

***Sangariola costata* Chûjô, 1935 stat. recur.**

Sangariola costata Chûjô 1935b: 394; Kimoto 1970: 214 (as synonym of *punctatostriata*).

Sangariola punctatostriata: Kimoto 1970: 214 (misidentification); Kimoto 1987: 191; Kimoto and Chu 1996: 95.

Type Specimens (n = 3). *Sangariola costata*:

Lectotype ♂ (TARI), here designated and labeled: “Formosa./Musha (= Wushe, in Nantou county), 1919/V 18 – VI 19, /T. OKUNI, (p, w) //CO/Type (p, yellow letters, circle label) // *Sangariola/costata* /Chûjô (h) /DET. M. CHUJO (p, b) //1661 (p, w)”. Paralectotypes: 1♂ (TARI), same as holotype but with “1938”; 1♀ (TARI): “Kappanzan (= Chiaopanshan, in Taoyuan county) (h) /FORMOSA (p) /26.IV.1933 (h) /COL. T. MITONO (p, w) //CO/Type (p, yellow letters, circle label) // *Sangariola/costata* /Chûjô (h) /DET. M. CHUJO (p, blue label) //708 (p, w)”

Specimens Examined (n = 54). Taiwan: Kaoshiung: 1 ex., Chungchihkuan, 16.IV.2012, leg. L.-P. Hsu (TARI); Miaoli. 5 exs., Tahu, 7.IV.2013, leg. D. Lu

(BMNH); Nantou: 1♀, Lushan, 27–31.V.1980, leg. K. S. Lin & L. Y. Chou (TARI); 1♀, Tungpu, 20–22.VI.1980, leg. C. C. Chen (TARI); 2♂♂, 1♀, same locality, 28.IV.–2.V.1981, leg. T. Lin & C. J. Lee (TARI); 9♂♂, 2♀♀, same locality, 16–20.IV.1984, leg. K. C. Chou & C. H. Yang (TARI); 3♀♀, Wushe, 19–22.IV.1983, leg. K. C. Chou & S. P. Huang (TARI); 1♂, 1♀, same locality, 7.V.1984, leg. K. C. Chou & C. C. Pan (TARI); 3 exs., Wanfengtsun, 18.IV.2011, leg. W.-T. Liu (TARI); Taipei: 1 ex., Chinshan, 20.III.2010, leg. C.-C. Cheng (TARI); Taoyuan: 5♀♀, Paling, 3–5.V.1983, leg. K. C. Chou & C. C. Pan (TARI); 4 exs., same locality, 21.III.2010, leg. M.-H. Tsou (TARI); 7 exs., Tungyanshan, 10.V.2009, leg. S.-F. Yu or M.-H. Tsou (TARI); 1 ex., same locality, 12.VI.2009, leg. H. Lee (TARI); 5 exs., same locality, 8.IV.2012, leg. M.-H. Tsou (TARI).

Remarks. *Sangariola costata* is similar to *S. punctatostriata*. For diagnosis of both species, see remarks under *S. punctatostriata*.

Male. Length 5.4–6.3 mm, width 2.5–2.8 mm. General color (Figs. 35–36) black; but head, pronotum, prothorax, scutellum, and elytron reddish brown. Body covered with dense pubescence except pronotum and elytron; disc of head and pronotum with micro-reticulation. Antenna filiform (Fig. 44), length ratio of antennomere 3 to 11 about 1.0 : 1.2 : 1.2 : 1.1 : 1.2 : 1.1 : 1.2 : 1.2 : 1.5; ratio of length to width from antennomere 3 to 11 about 1.8 : 2.0 : 2.3 : 2.1 : 2.1 : 2.1 : 2.4 : 2.7 : 3.4. Pronotum with dense and large punctures, arrangement of punctures not regular, most dense near basal and apical margin, with medial and lateral grooves punctate. Elytral punctures

arranged into ten longitudinal striae, with elevated interstices between striae 3 and 4, 7 and 8. Penis (Figs. 46–47) extremely wide, about 3.4 times longer than wide; parallel sided, abruptly narrowed near apex, apex narrowly rounded; wide in lateral view, widest at apical 1/3, strongly curved at middle.

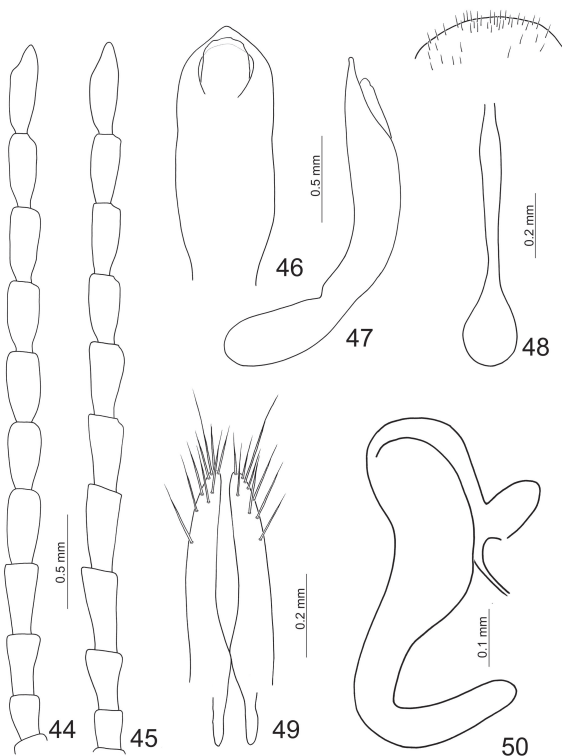
Female. Length 5.1–6.4 mm, width 2.3–3.1 mm. Similar to male. Antenna filiform (Fig. 45), length ratio of antennomere 3 to 11 about 1.0 : 1.4 : 1.4 : 1.2 : 1.3 : 1.2 : 1.2 : 1.2 : 1.3; ratio of length to width from antennomere 3 to 11 about 1.6 : 2.3 : 2.4 : 2.0 : 2.2 : 2.1 : 2.4 : 2.6 : 3.2. Gonocoxae (Fig. 49) curved inwards at middle, each gonocoxa with nine setae from apical 1/4 to apex. Sternite VIII (Fig. 48) weakly

sclerotized; with dense short setae along apex, disc scattered with shorter setae; spiculum slender, base strongly widened. Spermathecal receptaculum (Fig. 50) slightly swollen and curved; pump strongly curved; spermathecal duct long.

Host plant. Liliaceae: *Lilium longiflorum* var. *formosanum* Baker.

Distribution. Endemic to Taiwan. It is a widespread species closely associated with its host plant.

Notes. Kimoto (1970) treated *Sangariola costata* as a synonym of *S. punctatostriata* which is widespread in east Asia. Actually, *S. costata* is a distinct species and endemite to Taiwan.



Figs. 44–50. *Sangariola costata*. 44. Antenna, male; 45. Antenna, female; 46. Penis, dorsal view; 47. Penis, lateral view; 48. Sternite VIII; 49. Gonocoxae; 50. Spermatheca.

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細角葉蚤屬的分類修訂 (鞘翅目：金花蟲科：螢金花蟲亞科：葉蚤族) 標本名錄

李奇峰^{1,*}

摘要

李奇峰。2014。細角葉蚤屬的分類修訂 (鞘翅目：金花蟲科：螢金花蟲亞科：葉蚤族)。台灣農業研究 63(3):188–204。

本文針對細角葉蚤屬 *Sangariola* 做全世界的種類的分類修訂，共有五個種類被視為有效種，其中重新描述 *Sangariola hirashimai* Kimoto, 1970、*Sangariola fortunei* (Baly 1888) 及 *Sangariola punctostriata* (Motschulsky 1861)；而 *Sangariola costata* Chûjô, 1935b 本來為 *S. punctostriata* (Motschulsky 1861) 的同物異名，現被移出而視為獨立的種類；此外描述一產於台灣的新種：*Sangariola yuae* sp. nov.。 *Charidea nigrosuturalis* var. *obliterata* Pic, 1937 為 *S. punctostriata* (Motschulsky 1861) 新的同物異名。本文並指定下列的種類的選模標本 (lectotype)：*Charidea fortunei* Baly, 1888、*Charidea nigrosuturalis* Pic, 1937、*Galleruca* (sic!) *punctostriata* Motschulsky, 1861、*Galleruca* (*Adimonia*) *multicostata* Jacoby, 1885 及 *Sangariola costata* Chûjô, 1935b。

關鍵詞：分類學、金花蟲、百合。

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