



Taxonomic Review of Cicadidae (Hemiptera, Auchenorrhyncha) from Taiwan, Part 2. Dundubiini (A Part of Cicadina) with Two New Species

Young June LEE* and Masami HAYASHI¹⁾

Laboratory of Insect Systematics, School of Agricultural Biotechnology, Seoul
National University, Suwon 441-744, Korea; E-mail: cicadero@unitel.co.kr

¹⁾Department of Biology, Faculty of Education, Saitama University,
Saitama 338-8570, Japan; E-mail: mh@post.saitama-u.ac.jp

Abstract As the second part of the taxonomic review of Cicadidae (Hemiptera, Auchenorrhyncha) from Taiwan, 17 species belonging to six genera in a cicadine tribe, Dundubiini (a part of the subtribe Cicadina), are treated in this paper. Two new species, *Euterpnosia elongata* Lee and *Euterpnosia laii* Lee, are described. Informations on the biology and male chirpings are also provided. The distribution data of all known species is given.

Key words description, distribution, fauna

INTRODUCTION

This series of papers aims to cover and provide the available information on the taxonomy, biology, and distribution of the cicadid species in Taiwan. In this study, however, only adult specimens are examined. A total of 55 species belonging to 21 genera are listed as the Taiwanese cicadas, including a new genus and four new species throughout the present study. Five species are synonymized. Three species are newly considered as erroneous records from Taiwan due to mislabeling or misidentification.

In the first part of this study, 20 species under nine genera with four cicadine tribes, Platyleurini, Tibicenini, Polyneurini, and Dundubiini (subtribe Dundubiina) were included (Lee and Hayashi, 2003). As the second part, this paper includes 17 species under six genera in a cicadine tribe, Dundubiini (a part of the subtribe Cicadina). The third part will include 18 species under six genera in cicadine tribes, Dundubiini (another part of the subtribe Cicadina) and Moganiini, and a tibicinine tribe, Huechysini.

MATERIALS AND METHODS

Collection and examination of specimens

This study is based mainly on the specimens collected and kept by the first author (YJL) in Taiwan in September of 1997, June of 1999, June of 2000, July of 2001, May of 2002, and

* To whom correspondence should be addressed.

August of 2002. The second author also visited Taiwan twice in June–July of 1973 and June of 2002. The specimens collected by him and offered by some Japanese entomologists were also examined for this study, which are preserved in Saitama University, Saitama, Japan (SUU).

A part of the specimens examined are from the collections in the following institutions: National Museum of Natural Science, Taichung, Taiwan (NMNS); National Taiwan Museum, Taipei, Taiwan (NTM); Taiwan Forestry Research Institute, Taipei, Taiwan (TFRI); Taiwan Agricultural Research Institute, Wufeng, Taiwan (TARI); Center for Insect Systematics, Kangwon National University, Chuncheon, Korea (CIS); and Kyushu University, Fukuoka, Japan (KUF).

As no type specimens of Kato's species are available for the scientific study, the identifications of the species described by Kato were based on all available information found from his works including original descriptions of their external morphology, photographs, biological information (including notes on chirping sounds), etc.

Names of the counties and localities of Taiwan

In the text of this paper, the names of the counties of Taiwan are abbreviated as follows:

TP : Taipei County	TY : Taoyuan County
HC : Hsinchu County	IL : Ilan County
ML : Miaoli County	TC : Taichung County
HL : Hualien County	NT : Nantou County
CH : Changhua County	YL : Yunlin County
PH : Penghu County	CI : Chiai County
KH : Kaohsiung County	TN : Tainan County
TT : Taitung County	PT : Pingtung County
UN : Unidentified localities	

SYSTEMATICS

Subtribe Cicadina

Key to the known genera of Cicadina

1. Lateral surfaces of male 3rd and 4th abdominal sterna without tubercle-like projections or oval protuberances 2
 - Each lateral surface of male 3rd and often 4th abdominal sterna with a tubercle-like projection or an oval protuberance 5
2. Small- to medium-sized, male body shorter than 33 mm; lateral margin of pronotum not dentate; male opercula longer than wide and apart from each other; costal margin of forewing slightly concave at just apical part of node 3
 - Large-sized, male body longer than 35 mm; lateral margin of pronotum dentate; male opercula wider than long and nearly contiguous to each other; costal margin of forewing hardly concave 4
3. Tymbal mostly concealed with rather big tymbal covering in dorsal view; lateral parts of male 4th abdominal tergum without molar-like projections; ovipositor not protruding beyond pygofer; male pygofer without ventral lobes; uncus lobe not narrowed apically *Leptosemia*
 - Tymbal mostly exposed from small tymbal covering in dorsal view; each lateral part of male 4th abdominal tergum with a molar-like projection; ovipositor protruding far beyond pygofer; male pygofer with a pair of ventral lobes well developed; uncus lobe narrowed

- apically *Euterpnosia*
4. Male abdomen swollen near middle; tymbal mostly exposed from small tymbal covering in dorsal view; male 8th abdominal tergum mostly covered with white pollinosity *Semia*
 – Male abdomen gradually tapering to apex; larger part of tymbal concealed with tymbal covering; male 8th abdominal tergum with no or little white pollinosity *Pomponia*
5. Vertex very long, its anterior end situated far beyond level of anterior margin of eyes; lateral margin of pronotum anteriorly dentate; male abdomen about as long as distance from head to cruciform elevation; a pair of tubercle-like projections each on male 3rd and 4th abdominal sterna nearly longitudinally protruding posteriorly *Purana*
 – Vertex normal, its anterior end situated at similar level of anterior margin of eyes; lateral margin of pronotum not dentate; male abdomen distinctly longer than distance from head to cruciform elevation; a pair of tubercle-like projections or oval protuberances each on male 3rd and sometimes on 4th abdominal sterna not longitudinal 6
6. Male abdomen very long, normally $1.75-1.8\times$ of distance from head to cruciform elevation; tymbal partly exposed in dorsal view; a pair of oval protuberances on male 3rd and 4th abdominal sterna, which are not protruding laterally; apical cells of forewing comparatively long *Taiwanosemia*
 – Male abdomen normally shorter than $1.6\times$ of distance from head to cruciform elevation; tymbal mostly concealed in dorsal view; a pair of tubercle-like projections on male 3rd and sometimes on 4th abdominal sterna protruding laterally; apical cells of forewing comparatively short *Tanna*

Genus *Leptosemia* Matsumura, 1917

Leptosemia Matsumura, 1917: 196. Type species: *Leptopsaltria sakaii* Matsumura, 1913 (Formosa).

Diagnosis. Head slightly wider than or about as wide as base of mesonotum; frontoclypeus slightly prominent anteriorly; inner area of pronotum generally concolorous to outer dilatation; pronotum distinctly shorter than mesonotum, lateral margin moderately amplified but hardly sinuate or dentate; male abdomen cylindrical, much longer than distance from head to cruciform elevation, with 4th segment with no projections laterally; female abdomen nearly conical, about as long as the distance; male tymbal covering semicircular, mostly concealing tymbal; lateral parts of male 4th abdominal segment without molar-like projections; ovipositor not protruding beyond pygofer; male operculum small, scale-like, apart from each other, and not beyond 2nd abdominal sternum; wings hyaline; costal margin of forewing slightly concave at just apical part of node.

Leptosemia sakaii (Matsumura, 1913)

(Figs. 1, 2)

Leptopsaltria sakaii Matsumura, 1913: 75 [TL: Horisha, Formosa].

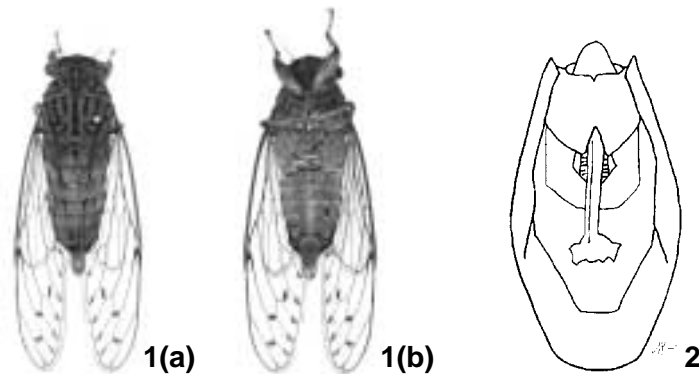
Leptosemia sakaii: Matsumura, 1917: 196; Kato, 1925a: 25; Kato, 1925c: 95; Kato, 1926b: 173; Kato, 1927a: 25; Kato, 1930: 53, 67; Kato, 1932: 355; Schmidt, 1932: 124; Kato, 1933, pl. 28; Kato, 1938a: 21; Kato, 1939: 1; Duffels and van der Laan, 1985: 155; Chou *et al.*, 1997: 213.

Cicada sakaii: Kato, 1956: 116, 135, 189.

Terpnosia fuscolimbata Schumacher, 1915: 111 [TL: Kosempo, Formosa]; Kato, 1925a: 30 (*Terpnosia* (*Euterpnosia*?)); Kato, 1927a: 32 (*Terpnosia*?); Kato, 1930: 52, 66 (*Terpnosia*?).

Leptosemia conica Kato, 1926a: 27 [TL: Hori = Horisha, Formosa]; Kato, 1927a: 25; Kato, 1930: 53, 67.

Diagnosis. Head and thorax greenish ochreous; head with an irregular marking at ocellar area, a marking at inner margin of each eye, and irregular markings at anterior and lateral outsides of ocellar area, black; pronotum with a pair of central longitudinal stripes, broadened



Figs. 1-2. 1. A male *Leptosemia sakaii* in dorsal (a) and ventral (b) views; 2. Male pygofer of *Leptosemia sakaii* in ventral view.

both anteriorly and posteriorly, markings along furrows of inner area, and two spots at each posterolateral part of outer dilatation, black; mesonotum with a central longitudinal stripe, of which posterior 1/2 a little broadened and reaching to cruciform elevation, a small roundish spot at each side of posterior end of central stripe, a pair of shorter and a little inwardly curved stripes at outer sides of anterior 1/2 of central one, a pair of long stripes next to inwardly curved stripes, and a pair of posterolateral small spots, which are often fused with long stripes, blackish; cruciform elevation mostly greenish except for narrowly blackish posterior margin; abdomen ochreous; 2nd tergum with a longitudinal black marking centrally; 3rd, 4th, 5th, 6th, and 7th terga with a small black spot in each lateral margin; anterior 1/2 of 8th tergum, black. Ventral parts of head and thorax pale greenish; male abdomen ochreous. Forewing transverse veins at base of 2nd, 3rd, and 5th apical areas infuscated; small spots at apices of longitudinal veins to apical areas, fuscous; apical cells of forewing short. See also the descriptions by Matsumura (1913), Kato (1932), and Chou *et al.* (1997).

Male genitalia (Fig. 2). Pygofer oblong in ventral view; ventral lobes absent; uncus lobe wide with apex triangular and strongly incised; aedeagus slender and very much protruding out of apex of uncus lobe. See also the figure by Chou *et al.* (1997).

Measurements. Body length: ♂ 21.5–24.5 mm, ♀ 19–20.5 mm. Total length: ♂ 32–35 mm, ♀ 33–35.5 mm.

Material examined. [TP] 1♂, Shihding (= Shrding 石碇), 4 VI–2 VII 2001, Malaise trap, HT Shih (TARI); 1♂, Wulai, 7 VI 1975, light trap, K Ueda and K Setoya (SUU); 1♂, 1♀, same locality, 22 VI 1999, YJ Lee (YJL); 1♀, same locality, 25 VI 2000, YJ Lee (YJL); 14♂, 1♀, same locality, 16 V 2002, YJ Lee (YJL); [ML] 2♂, 2♀, Mt. Shihtoushan, 3 VI 1976, H Makihara (SUU); 2♂, same data except 4 VI 1976 (SUU); [NT] 2♂, Nanshanchi, 8 VI 1965, T Shirozu (SUU); 1♂, same locality, 30 V 1972, R Kano (SUU); [KH] 3♂, Liukuei, 3 VI 1973, WL Chen (SUU); 1♂, Tsai Tieh Ku, near Liukui (= Liouguei), 2 VI 1986, K Baba (SUU).

Biology. This species is locally distributed in low mountainous areas of Taiwan. Adults appear from May to July. They usually perch on low branches or trunks of various broad-leaved trees inside the forest. Males prefer to sing in the sunshine. Singing males are very wary, and it is difficult to get close to them before they fly away. When males are frightened by an approaching human, they produce a short “zik!” sound before flying off. After a flight of 2–5 m in distance, they often come back to the same tree or sit on the next tree. See also

the information for the Taiwanese population given by Kato (1933, 1956).

Male chirping. A chirping starts with an introductory “ghee—” sound of 2–3 sec. long and smoothly continues to a burst like “jagajagajagajaga...” of 4–7 sec. long, which gradually ascends and suddenly diminishes just after the climax. The burst is heard like a weaker and shorter version of the chirping of *Graptopsaltria nigrofuscata* in Japan, Korea, and China. The passage of “ghee— jagajagajagajaga...” is normally repeated 4–6 times without interruption. See also the descriptions given by Kato (1932, 1956).

Localities. [TP] Shrding (new), Wulai (Kato, 1925c); [HC] Beipu (Kato, 1925c); [IL] Mt. Taipingshan (Kato, 1926b); [ML] Mt. Shrtoushan (new); [NT] Nanshanchi (new), Puli (Matsumura, 1913), Shueilikeng (Kato, 1932); [KH] Jiashian (Schumacher, 1915), Liouguei (new), Tsai Tieh Ku near Liouguei (new); [TN] Guantzling (Matsumura, 1917).

Distribution. Taiwan and China.

Chinese name. 南細蟬 (Chou *et al.*, 1997).

Genus *Euterpnosia* Matsumura, 1917

Euterpnosia Matsumura, 1917: 202. Type species: *Euterpnosia chibensis* Matsumura, 1917 (Honshu, Japan).

Diagnosis. Similar to *Terpnosia* Distant, 1892 or *Leptosemia*, but distinguishable by ovipositor protruding far beyond pygofer. This genus can be distinguished from *Leptosemia* by the following characteristics: Frontoclypeus moderately or substantially prominent anteriorly; male tymbal covering much smaller, scale-like, mostly exposing tymbal in dorsal view; male pygofer with a pair of ventral lobes well developed; uncus lobe slender apically. The peculiar characteristic only for this genus is that each lateral part of the male 4th abdominal segment has a molar-like projection.

Male pygofer oval in ventral view; ventral lobe with or without a subapical projection on inner side; uncus lobe pointed or rounded at apex; aedeagus very slender and very much protruding out of apex of uncus lobe.

Key to the species of *Euterpnosia*

1. A pair of ventral lobes of male genitalia with no subapical projection on each inner side 2
 - A pair of ventral lobes of male genitalia with a distinct or indistinct subapical projection on each inner side 4
2. Frontoclypeus with distinct longitudinal black stripes centrally; male abdomen longer than $1.7\times$ of distance from head to cruciform elevation; male uncus lobe comparatively slender apically with wide basement and with apex incised in ventral view 3
 - Frontoclypeus with few marking; male abdomen normally shorter than $1.6\times$ of distance from head to cruciform elevation; male uncus lobe comparatively thick apically without distinctly wider basement and with apex hardly incised in ventral view *viridifrons*
3. Lateral modifications on 4th abdominal sternum distinct; a distinct small infuscation appearing on each apical portion of veins R_{4+5} , M_1 , M_2 , M_3 , M_4 , and CuA_1 ; vein M_2 very long; male pygofer oval; uncus lobe gradually tapering to apex with conical apex *varicolor*
 - Lateral modifications on 4th abdominal sternum comparatively small; infuscation on each apical portion of veins R_{4+5} , M_1 , M_2 , M_3 , M_4 , and CuA_1 indistinct or absent; vein M_2 not so long; male pygofer conical, narrowed at apical part; uncus lobe with triangular apex *elongata*
4. Male abdomen excluding molar-like projections distinctly widest across 4th abdominal segment 5

- Male abdomen excluding molar-like projections slightly widest across 4th abdominal segment or nearly parallel-sided 6
- 5. Male 8th abdominal tergum covered with white pollinosity densely; male operculum with an inner angle acute; subapical projection on each inner side of ventral lobes of male genitalia more distinctly prominent than in *suishana* *hoppo*
- Male 8th abdominal tergum without white pollinosity; male operculum with an obtuse and roundish inner angle; subapical projection on each inner side of ventral lobes of male genitalia slightly prominent *suishana*
- 6. Molar-like projections on male 4th abdominal segment substantially and acutely projected like a canine tooth in dorsal view *arisana*
- Molar-like projections on male 4th abdominal segment rather moderately and obtusely projected often in triangular shape in dorsal view 7
- 7. Head wide and not swollen anteriorly; forewing very short *kotoshoensis*
- Head comparatively narrow and moderately swollen anteriorly; forewing not so short 8
- 8. Pronotum with much reduced anterolateral part of outer dilatation and much developed posterolateral part of outer dilatation; frontoclypeus usually with a pair of longitudinal black stripes centrally, which are separate from each other and interrupted before clypeus *olivacea*
- Pronotum with not so reduced anterolateral part of outer dilatation and not so developed posterolateral part of outer dilatation; frontoclypeus usually with a longitudinal black stripe centrally, which comprises a narrower longitudinal yellowish or greenish stripe inside and reaches anterior part of clypeus 9
- 9. Dorsal body with bright colors (greenish ochreous or ochreous) predominant to dark colors (blackish); male operculum small and oblique, which makes posterolateral part of tymbal well revealed in ventral view; male 6th abdominal sternum with a semicircular protrusion on mid-posterior part; a pair of ventral lobes of male pygofer with a substantially prominent subapical projection on each inner side *gina*
- Dorsal body with dark colors (blackish) predominant to bright colors (greenish or olivaceous); male operculum rather big and rather longitudinal, which makes posterolateral part of tymbal mostly screened in ventral view; male 6th abdominal sternum flat without the semicircular protrusion; a pair of ventral lobes of male pygofer with zigzag or waved inner sides and with an indistinct subapical projection on each inner side *laili*

***Euterpnosia varicolor* Kato, 1926**

(Figs. 3, 4, 5)

Euterpnosia varicolor Kato, 1926b: 174 [TL: Mt. Taihei near Rato, Formosa]; Kato, 1927a: 33; Kato, 1930: 53, 66; Kato, 1932: 291; Kato, 1933, pl. 30; Kato, 1938a: 12; Kato, 1956: 116, 134, 187, 271; Duffels and van der Laan, 1985: 104; Chou *et al.*, 1997: 203.

Diagnosis. Head and thorax black with irregular greenish and sometimes ochreous markings, much more developed in some cases; male abdomen black with irregular ochreous markings, especially at lateral parts, at each of 2nd–7th terga; 7th tergum sometimes mostly blackish; 8th tergum black and covered with white pollinosity at posterior margin or entirely. Ventral parts of head and thorax light green or greenish ochreous with irregular fuscous markings; frontoclypeus with a central longitudinal black stripe sometimes comprising a narrower longitudinal yellowish stripe inside; legs with irregular fuscous markings; male operculum sometimes very narrowly margined with black; male abdomen ochreous with fuscous parts; 2nd sternum entirely blackish. Veins thick and strong but venation unstable; forewing tinged with yellowish brown; areas along 1st, 2nd, 3rd, and 4th cross veins

(sometimes 3rd and 4th faintly or not) infuscated in most cases; a distinct small infuscation appearing on each apical portion of veins R_{4+5} , M_1 , M_2 , M_3 , M_4 , and CuA_1 , forming a series of spots on subapical margin of forewing; vein M_2 very long. Head narrower than base of mesonotum; frontoclypeus moderately prominent anteriorly; posterolateral corner of pronotum much developed; male abdomen excluding projections nearly parallel-sided, each lateral part of male 4th abdominal segment with a distinct molar-like projection, in triangular shape in dorsal view; male operculum mostly screening posterolateral part of tymbal in ventral view; 6th abdominal sternum nearly rectangular; posterior margin of 7th abdominal sternum incised at middle. See also the description by Kato (1932).

Male genitalia (Fig. 5). Pygofer oval in ventral view; a pair of ventral lobes well developed and longest among the Taiwanese *Euterpnosia* spp. to reach base of uncus lobe with no subapical projection on each inner side; uncus lobe apically slender and gradually tapering to apex with wide base and conical apex which is much incised in ventral view; aedeagus very slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ approximately 31 mm, ♀ 22–23 mm. Total length: ♂ approximately 39 mm, ♀ 36–38 mm.

Material examined. [TP] 1♂, Mt. Lalashan, 1–22 VI 1975, HL Huang (SUU); [IL] 1♂, Taiheizan, 1 VII 1936, S Ueno (KUF); [HL] 1♀, Chien (慈恩) (2,100 m alt.), 20 VI 1982, HY Wang (NTM); 1♀, same locality, 26 V 1999, HY Wang (NTM); 1♂, 1♀, Tiensiang (= Tienhsiang), 7 V 1977, S Saito (SUU); 1♂, 1♀, same data except 8 V 1977; 1♀, Biliushamu (碧綠神木), 17 VI 2002, CH Lai (YJL); [NT] 1♀, Piluchi (2,300 m alt.), 10 V 1988, HY Wang (NTM); 1♂, same locality, 6 V 1997, by hand, MM Yang (NMNS); 1♀, same locality, 15–30 V 1997, Malaise trap, MM Yang, NMNS ENT 2708–475 (NMNS); 1♂, Dayuling (大禹嶺), 13 V 2002, YJ Lee (YJL); 1♂, Mt Howangshan (= Mt. Hewangshan), 24 V (year and

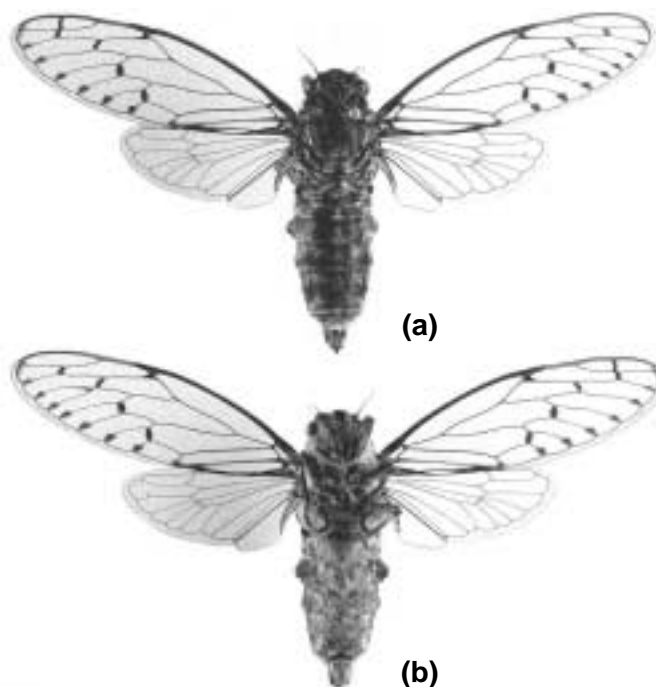
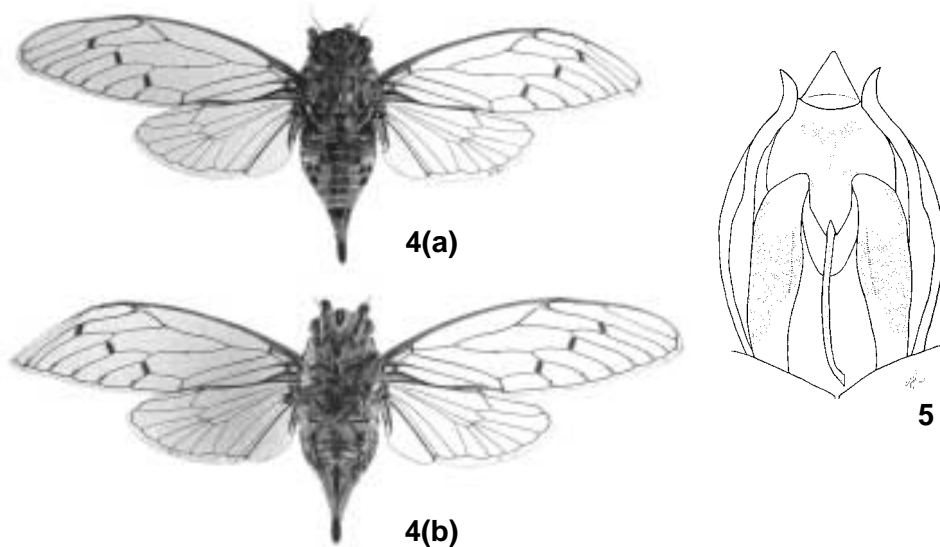


Fig. 3. A male *Euterpnosia varicolor* in dorsal (a) and ventral (b) views (National Museum of Natural Science).



Figs. 4-5. 4. A female *Euterpnosia varicolor* in dorsal (a) and ventral (b) views (National Museum of Natural Science); 5. Male pygofer of *Euterpnosia varicolor* in ventral view.

collector unknown) (SUU); 1 ♀, Sungchuankang, 24 VI 1976, light trap, H Makihara (SUU); 1 ♀, Chunyang, 28 IV 1995, Mercury light, ML Chan and WT Yang (NMNS); [KH] 1 ♂, Mt. Pa Yun Shan, near Liu Kui, 1 VIII 1989, K Baba (SUU).

Biology. This species inhabits mountainous areas (1,000–2,800 m) of Taiwan. Adults appear from April to early August. They perch on various trees but seem to prefer coniferous trees such as cedar and pine trees, etc. It is often observed that adults perch on high places of tall trees, but they are also often observed perching on short trees. Males frequently sing on sunny days, but they were also observed to sing in chorus at dusk. They start to sing around 0730h in the sunny morning. Their flight is not speedy, but they are able to fly through a sigmoid course. They do not readily fly away from the tree they perch on. It was often observed that they walked down through the branches still producing chirping sounds when humans approach. Both sexes are attracted to electric light. See also the information given by Kato (1956).

Male chirping. The chirping sounds like “chikuchikuchikuchiku...”. The sound “chiku” is repeated at a very high rate of repetition. When the “chikuchikuchikuchiku...” sound is produced, “takatakatakataka...” sound is also heard at the same time. A call normally lasts for up to several tens of minutes when uninterrupted. Kato (1926b, 1932, 1956) indicated that males of this species sing like “mee—n mee—n mee—n mee—n” very slowly, but this description is quite different from the actual chirping sound.

Localities. [TP] Mt. Lalashan (= Mt. Taguanshan) (new); [IL] Mt. Taipingshan (Kato, 1926b), Suyuanyakou (思源埡口) (♂ (confirmed by male chirping, not by specimen)) (new); [TC] Suyuan (♂) (new); [HL] Chien (2,100 m alt.) (new), Tienhsiang (new), Biliushamu (new); [NT] Piluchi (2,300 m alt.) (new), Dayuling (new), Mt. Hewangshan (new), Sungchuankang (new), Chunyang (new); [KH] Mt. Pa Yun Shan near Liouguei (new).

Distribution. Taiwan.

Chinese name. 異色真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia elongata* Lee, sp. nov.**

(Figs. 6, 7, 8)

Diagnosis. Very similar to greenish form of *E. varicolor*, but can be distinguished by the following characteristics: Lateral swellings on 4th abdominal segment comparatively small and triangular; 6th abdominal sternum trapezoid; wing veins comparatively thin and weak; infuscation on each apical portion of veins R_{4+5} , M_1 , M_2 , M_3 , M_4 , and CuA_1 indistinct or absent; vein M_2 shorter than in *E. varicolor*; male pygofer conical, narrowed toward apex; uncus lobe with triangular apex.

Description. Body sparsely covered with short silvery hairs; head and thorax greenish or ochreous; head with a conical but large irregular marking at ocellar area and a few irregular spots between eyes, black; pronotum with a pair of central longitudinal stripes, broadened both anteriorly and posteriorly, usually wide markings along furrows of inner area, and two or three spots at each posterolateral part of outer dilatation, black; mesonotum with a central longitudinal stripe, of which posterior 1/2 a little broadened and reaching to cruciform elevation, a small roundish spot at each side of posterior end of central stripe, a pair of shorter and inwardly curved stripes at outer sides of anterior 1/2 of central one, a pair of stripes next to inwardly curved stripes, which are curved outwardly and expanded at posterior part (and sometimes interrupted in middle), and a pair of small longitudinal, triangular markings between anterior ends of inwardly curved and outwardly curved stripes, black; cruciform elevation mostly greenish; male abdomen greenish dark ochreous with irregularly blackish posterior margins at each of 2nd–6th terga; anterior margin of male tymbal covering narrowly black; each of 3rd–6th terga with a pair of roundish blackish spots laterally; male 7th tergum mostly fuscous; male 8th tergum entirely covered with white pollinosity. Ventral parts of head and thorax light green; frontoclypeus with a pair of central longitudinal stripes, which are fused each other posteriorly and reaches clypeus, and sometimes with one long and a few very short stripes along anterior transverse striations, black; lorum with an irregular black marking; legs with some irregular blackish markings; male operculum very narrowly margined with black; male abdomen dark ochreous, sparsely covered with tiny white hairs and white pollinosity; male 2nd sternum entirely fuscous; female abdomen greenish with blackish posterior margin at each sternum. Areas along 1st, 2nd, 3rd, and sometimes 4th cross veins of forewing infuscated. Head about as wide as or slightly narrower than base of mesonotum; frontoclypeus moderately prominent anteriorly; lateral margin of pronotum not so constricted in middle and with somewhat developed posterolateral part of outer dilatation; male abdomen

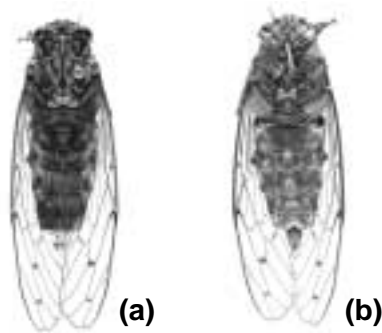
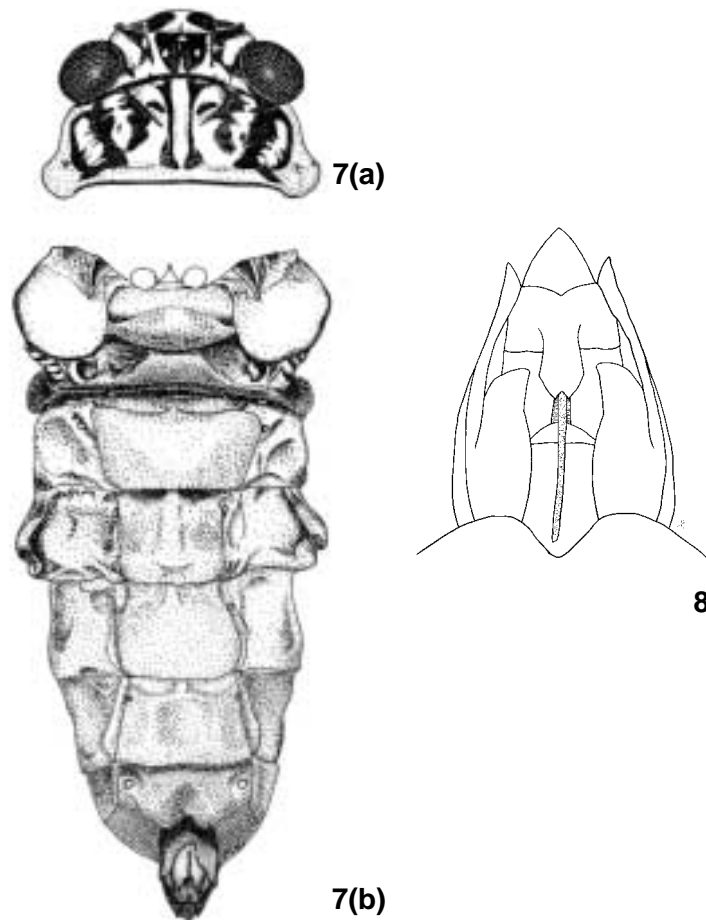


Fig. 6. A male *Euterpnosia elongata* (holotype) in dorsal (a) and ventral (b) views (National Museum of Natural Science).



Figs. 7-8. 7. Head and pronotum in dorsal view (a) and male abdomen in ventral view (b) of *Euterpnosia elongata*; 8. Male pygofer of *Euterpnosia elongata* in ventral view.

longer than $1.65 \times$ of distance from head to cruciform elevation, and nearly parallel-sided excluding projections; each lateral part of male 4th abdominal segment with a distinct molar-like projection, in triangular shape in dorsal view; male operculum roundish and oblique; posterior margin of 7th abdominal sternum incised at middle.

Male genitalia (Fig. 8). Pygofer conical in ventral view; a pair of ventral lobes well developed with waved inner sides without subapical projections on inner sides; uncus lobe apically slender with wide base and triangular apex which is incised in ventral view; aedeagus very slender and much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 27.5 mm, ♀ 20–22 mm. Total length: ♂ 36 mm, ♀ 32.5–37.5 mm.

Etymology. The specific name refers to the long and slender body of the male.

Types. Holotype: ♂, [TY] Shangbaling (= Shangpaleng), 21–23 VI 1989, light trap, CS Lin, NMNS ENT 732–527 (NMNS). Paratypes: [TY] 1 ♀, Mt. Taguanshan, 21 VI 1996, HY Wang (NTM); 2 ♀, Shangpaleng, 23 VI 1995, HY Wang (NTM). The holotype is deposited in the National Museum of Natural Science, Taichung, Taiwan and paratypes in the National

Taiwan Museum, Taipei, Taiwan.

Localities. [TY] Mt. Taguanshan, Shangpaleng.

Distribution. Taiwan.

Taiwanese name. 長麗真寧蟬 (新稱).

***Euterpnosia koshunensis* Kato, 1927**

Euterpnosia koshunensis Kato, 1927b: 277 [TL: Kuraru near Koshun, Formosa]; Kato, 1930: 53, 66; Kato, 1932: 293; Kato, 1933, pl. 31; Kato, 1938a: 13; Kato, 1956: 116, 134, 271; Duffels and van der Laan, 1985: 104; Chou *et al.*, 1997: 203.

Diagnosis. See the descriptions by Kato (1927b, 1932).

Measurements (Kato, 1927b). Body length: 23 mm. Expanse of forewings: 56 mm.

Material examined. No specimen was available.

Male chirping. See the description given by Kato (1927b).

Locality. [PT] Hengchuen (Kato, 1927b).

Distribution. Taiwan.

Chinese name. 臺南真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia viridifrons* Matsumura, 1917**

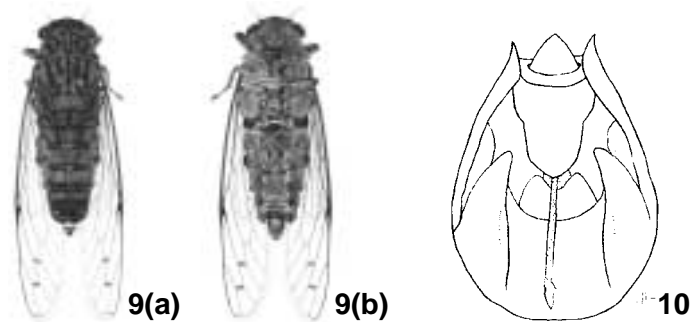
(Figs. 9, 10)

Euterpnosia viridifrons Matsumura, 1917: 204 [TL: Kanshirei, Formosa]; Kato, 1925a: 31; Kato, 1925c: 95; Kato, 1926b: 174; Kato, 1927a: 32; Kato, 1930: 53, 66; Kato, 1931: 220; Kato, 1932: 283; Schmidt, 1932: 129; Kato, 1933, pl. 31; Kato, 1938a: 12; Kato, 1956: 116, 134, 187; Hayashi, 1979: 262; Duffels and van der Laan, 1985: 104; Chou *et al.*, 1997: 202.

Euterpnosia viridifrons var. *a* Kato, 1927a: 32 [TL: Sozan, Formosa]; Kato, 1930: 66; Kato, 1932: 284; Kato, 1938a: 12; Kato, 1956: 271 (*viridifrons* f.); Duffels and van der Laan, 1985: 104 (*viridifrons* f.).

Diagnosis. Differing from *E. varicolor* and *elongata* by the following characteristics: Frontoclypeus normally without markings; male abdomen normally shorter than $1.6 \times$ of distance from head to cruciform elevation; tooth-like projection on each lateral part of male 4th abdominal segment small, less prominent; posterior margin of 7th abdominal sternum not incised at middle; uncus lobe of male genitalia comparatively thick with apex hardly incised.

Description. Body sparsely covered with short golden hairs; head and thorax green or olivaceous with some irregular fuscous markings; head with a large irregular black marking at ocellar area, which is contiguous to inner margin of eye; pronotum with a pair of central longitudinal fasciae, markings along furrows of inner area, and a spot at each posterolateral part of outer dilatation, black; mesonotum with a central longitudinal stripe, which reaches to cruciform elevation, a small roundish spot at each side of posterior end of central stripe, a pair of shorter and inwardly curved stripes at outer sides of anterior 1/2 of central one, a pair of a little outwardly curved stripes next to inwardly curved stripes, and a pair of small longitudinal, triangular markings between anterior ends of inwardly curved and outwardly curved stripes, blackish; cruciform elevation mostly greenish; male abdomen olivaceous or greenish with a central longitudinal stripe at 2nd tergum, irregular posterior marginal areas at each of 2nd–6th terga, a spot at each lateral part of each of 3rd–5th terga, fuscous; male 7th tergum often entirely blackish; anterior margin of male tymbal covering narrowly black; male 8th tergum entirely fuscous and covered with white pollinosity at posterior margin. Ventral parts of head and thorax light green or light olivaceous and covered with short white hairs and white pollinosity; frontoclypeus green (ochreous in discolored dry specimens) without markings, but rarely with a pair of central longitudinal rows of small fuscous spots or a pair of obscure central longitudinal stripes; lorum mostly black; legs with some irregular blackish



Figs. 9-10. 9. A male *Euterpnosia viridifrons* in dorsal (a) and ventral (b) views; 10. Male pygofer of *Euterpnosia viridifrons* in ventral view.

markings; male operculum very narrowly margined with black; male abdomen olivaceous (ochreous in discolored dry specimens) with 2nd and 7th sterna entirely fuscous; tooth-like projection on each lateral part of male 4th abdominal segment mostly blackish. Areas along 1st and 2nd cross veins of forewing infuscated. Head about as wide as base of mesonotum; frontoclypeus moderately prominent anteriorly; male abdomen excluding tooth-like projections nearly parallel-sided. See also the description by Kato (1932).

Male genitalia (Fig. 10). Pygofer oval in ventral view; a pair of ventral lobes well developed with no subapical projection on each inner side; uncus lobe comparatively thick, becoming gradually slenderer to apex, with conical or roundish apex which is hardly incised; aedeagus very slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 20–22 mm, ♀ 16–21 mm. Total length: ♂ 28–30.5 mm, ♀ 25–32 mm.

Material examined. [TP] 1♂, Mt. Mientienshan, 2 VII 1972, S Nakamura (SUU); 6♂, 1♀, same data except 9 VII 1972 (SUU); 2♂, 1♀, Mt. Yangmingshan, 15 VII 1968, H Fukuda (SUU); 1♂, same locality, 23 VII 1971, S Nakamura (SUU); 4♂, same locality, 23 VI 1973, M Hayashi (SUU); 1♀, same data except 17 VII 1973 (SUU); 1♀, same locality, 14 VII 2001, YJ Lee (YJL); 1♂, Wulai, 6 VII 1991, HC Hsu (YJL); [TY] 1♀, Upper Palin (= Shangpaleng) (2,260 m alt.), 11–12 VII 1996, KT Park and JS Lee (CIS); [ML] 1♂, Shihtoushan, 17 VII 1968, H Fukuda (SUU); [NT] 2♀, Chingching Grassland, VII 2000, CH Lai (YJL); 1♂, same locality, 23 VI 2001, CH Lai (YJL); 1♂, same locality, 9 VII 2001, YJ Lee (YJL); 1♂, Hotso, 26–29 VI 1973 (SUU); 1♀, Chunyan, 27–29 VII 1993, UV light, CS Lin and WT Yang (NMNS); 1♀, Wushe, 23–26 VI 1992, UV light trap, CS Lin (NMNS); 1♂, Lienhuachih, 27 V 1972, K Kojima (SUU); 1♀, Sun Moon Lake, VI 1999, CH Lai (YJL); 1♂, same locality, 26 VI 2000, YJ Lee (YJL); 1♂, Shueishe, 8 VII 2001, YJ Lee (YJL); [KH] 1♀, Shanping (750 m alt.), 11–15 IV 1988, light-trap, Lin and Huang (NMNS).

Biology. This species is widely distributed from lowlands to mountainous areas of Taiwan. Adults appear from April to August. Adults prefer to perch on cedar trees (*Cryptomeria* sp.). They often sing on short trees but sometimes sing at very high places of tall trees. Males sing all day long until the complete darkness comes at about 1900h. Both sexes are sometimes attracted to electric light at night. See also the information given by Kato (1956).

Male chirping. The chirping is a monotonous and rather weak sound heard like “jing jing jing jing...”. A song is fragmented into a regular succession of the short burst of “jing” repeated at a rate of about 3–5 bursts per second. A call often lasts for up to several tens of minutes when uninterrupted. See also the descriptions given by Kato (1932, 1956).

Localities. [TP] Mt. Mientienshan (Hayashi, 1979), Mt. Yangmingshan (Kato, 1925c; Hayashi, 1979), Wulai (Kato, 1925c); [TY] Shangpaleng (new); [HC] Hsinchu (Kato, 1927a), Beipu (Kato, 1925c); [IL] Mt. Taipingshan (Kato, 1926b); [ML] Mt. Shrtoushan (new); [TC] Guguan (鬮) (new); [NT] Chingching Grassland (new), Hetzuo, Lushan (new), Chunyang (new), Wushe (new), Lienhuachr (Hayashi, 1979), Sun Moon Lake (new), Shueishe (new), Waichecheng (外車埕) (Kato, 1932), Shueilikeng (Kato, 1927a), Neimaopu (Kato, 1927a); [CI] Jiauliping (Kato, 1925a), Juchi (Kato, 1925a), Mt. Dakengshan (Kato, 1927a); [KH] Shanping (new); [TN] Guantzling (Matsumura, 1917).

Distribution. Taiwan.

Chinese name. 綠額真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia hohoguro* Kato, 1933**

Euterpnosia hohoguro Kato, 1933, pl. 25 [TL: Karenko, Formosa]; Kato, 1938a: 13; Kato, 1956: 116, 133, 272; Duffels and van der Laan, 1985: 103.

Diagnosis. See the description by Kato (1933).

Measurements (Kato, 1933). Body length: ♀ 21 mm.

Material examined. No specimen was available.

Remarks. This species was described by Kato (1933) with only one female specimen from Hualien Port [HL], but there has not been any additional record of this species for about 70 years since the first record. This species needs to be reconsidered, but it is very pity that the type female specimen is not available for scientific study and there has not been any record of male specimen. In view of the original description and the photograph by Kato (1933), especially with the phrase of 'frons concolorous', this species is thought to be a variant of *E. viridifrons*.

Locality. [HL] Hualien Port (Kato, 1933).

Distribution. Taiwan.

***Euterpnosia hoppo* Matsumura, 1917**

(Figs. 11, 12)

Euterpnosia hoppo Matsumura, 1917: 204 [TL: Hoppo, Formosa]; Kato, 1925a: 31; Kato, 1927a: 32; Kato, 1928: 187; Kato, 1930: 52, 66; Kato, 1931: 220; Kato, 1932: 286; Schmidt, 1932: 129; Kato, 1933, pl. 30; Kato, 1938a: 12; Kato, 1956: 116, 133, 187; Duffels and van der Laan, 1985: 103; Chou *et al.*, 1997: 202.

Euterpnosia sozanensis Kato, 1925c: 95 [TL: Sozan, Formosa]; Kato, 1927a: 33.

Diagnosis. Differing from the previous species, *E. varicolor*, *elongata*, and *viridifrons*, by the following characteristics: Each inner side of ventral lobe of male genitalia with subapical projection; male abdomen excluding molar-like projections distinctly widest across 4th abdominal segment; molar-like projection on each lateral part of male 4th abdominal segment smaller (comparatively smaller than *viridifrons*).

Description. Male. Body covered with short silvery hairs; head greenish ochreous with irregular blackish markings; pronotum with a pair of central longitudinal stripes, broadened both anteriorly and posteriorly, markings along furrows of inner area, and two spots at each posterolateral part of outer dilatation, black; mesonotum black with irregular greenish ochreous markings; cruciform elevation greenish with a blackish marking at mid-posterior margin; abdomen greenish ochreous with some fuscous markings, especially at anterior and posterior marginal areas of each of 2nd–6th terga; 7th tergum mostly fuscous; 8th tergum entirely blackish and densely covered with white pollinosity entirely or only at posterior 1/2. Ventral part of body light greenish olivaceous and covered with white short hairs and some

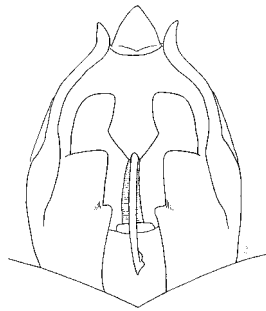


Fig. 11. Male pygofer of *Euterpnosia hoppo* in ventral view.

white pollinosity; frontoclypeus with a central longitudinal wide stripe, which comprises a roundish marking and a longitudinal narrow yellowish green stripe inside, and with a marking along anterior 4–5 transverse striations, black; lorum and clypeus mostly black and densely covered with short yellowish hairs except for central yellowish part of clypeus; legs with some fuscous markings; operculum very narrowly margined with black; 2nd sternum fuscous; molar-like projection on each lateral part of 4th abdominal segment fuscous. Areas along 1st and 2nd cross veins of forewing infuscated. Head about as wide as or slightly narrower than base of mesonotum; frontoclypeus substantially prominent anteriorly; posterolateral corner of pronotum developed; operculum oblique; posterior margin of 7th abdominal sternum nearly straight. See also the description by Kato (1932).

Male genitalia (Fig. 11). Pygofer oval in ventral view; a pair of ventral lobes well developed with distinctly prominent subapical projection on each inner side; uncus lobe apically slender with wide base and triangular apex which is incised in ventral view; aedeagus very slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ approximately 30 mm. Total length: ♂ approximately 38.5 mm.

Material examined. [TY] 2♂, 3♀, Daman Bridge (大曼橋) (800 m alt.), 13 IV 1998, HY Wang (NTM); 1♂, Chihtuan, near Palin (= Paleng), 29 IV 1978, N Yashiro (SUU); [IL] 2♂, Fushan, 27 IV 1995, JJ Hsiao (TFRI); 1♂, same locality, 27 IV 1995, WC Yeh (TFRI); 1♂, 1♀, same locality, 28 IV 1995, WC Yeh (TFRI); [NT] 1♂, Mt. Kantoushan, 1 V 1983, M Nishimura (SUU).

Biology. This species is distributed in northern and central Taiwan. Adults appear in April and May. Males like to sing on branches of the trees inside the forest on sunny days. When approached by humans, they readily stop singing. See also the information given by Kato (1956).

Male chirping. The chirping sounds like “charururuk oo—ng charururuk oo—ng charururuk oo—ng ...” or “shrrurak oo—ng shrrurak oo—ng shrrurak oo—ng ...”. A song is composed of a regular succession of the burst of “charururuk oo—ng” repeated at a rate of about 14–16 bursts per 10 sec. A call normally lasts for up to several minutes when uninterrupted. See also the descriptions given by Kato (1925c, 1932, 1956).

Localities. [TP] Mt. Yangmingshan (Kato, 1925c); [TY] Daman Bridge (800 m alt.) (new), Chihtuan near Paleng (new); [HC] Beipu (Matsumura, 1917); [IL] Fushan (new); [NT] Mt. Kantoushan (new).

Distribution. Taiwan.

Chinese name. 合浦真寧蟬 (Chou *et al.*, 1997) (This will be better to be corrected to ‘北埔

真寧蟬' as '*hoppo*' means '北埔').

***Euterpnosia suishana* Kato, 1930**

(Figs. 13, 14)

Euterpnosia suishana Kato, 1930: 53, 67, 71 [TL: Suisha, Formosa]; Kato, 1932: 290; Kato, 1933, pl. 31; Kato, 1938a: 12; Kato, 1956: 116, 134, 271; Duffels and van der Laan, 1985: 104; Chou *et al.*, 1997: 203.

Diagnosis. This species also has the abdomen excluding molar-like projections distinctly widest across 4th abdominal segment, but can be distinguished from *E. hoppo* by the following characteristics: Male 8th abdominal tergum without white pollinosity, and its posterior 1/2 densely covered with silvery hairs; head slightly wider than base of mesonotum; molar-like projection on each lateral part of male 4th abdominal segment distinct, much bigger; male operculum with an obtuse and roundish inner angle; posterior margin of 7th abdominal sternum distinctly incised at middle; subapical projection on each inner side of ventral lobes of male genitalia slightly prominent.

Description. Male. Body greenish ochreous (pale ochreous in discolored dry specimens) and covered with short silvery and fuscous hairs; head with an irregular marking at ocellar area, a marking at inner margin of each eye, irregular markings at anterior and lateral sides of ocellar

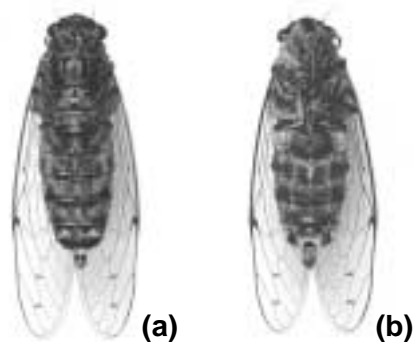
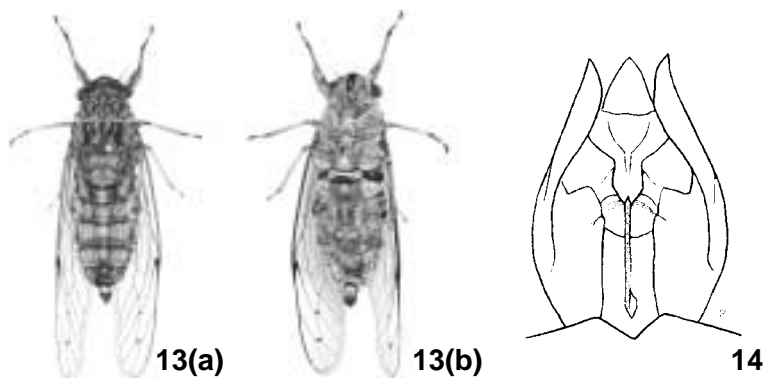


Fig. 12. A male *Euterpnosia hoppo* in dorsal (a) and ventral (b) views (National Taiwan Museum).



Figs. 13-14. 13. A male *Euterpnosia suishana* in dorsal (a) and ventral (b) views; 14. Male pygofer of *Euterpnosia suishana* in ventral view.

area, and a small marking at posterior margin, black; coloration and marking-pattern on pronotum similar to those of *E. hoppo*; mesonotum with a central longitudinal stripe, of which posterior 1/2 a little broadened and reaching to cruciform elevation, a small roundish spot at each side of posterior end of central stripe, a pair of shorter and inwardly curved stripes at outer sides of anterior 1/2 of central one, a pair of outwardly curved stripes next to inwardly curved stripes, and a pair of small longitudinal, triangular markings between anterior ends of inwardly curved and outwardly curved stripes, blackish; cruciform elevation mostly greenish except for very narrowly blackish posterior margin. Ventral part of body light greenish ochreous and covered with short hairs and white pollinosity; frontoclypeus with a central longitudinal stripe, which comprises a narrower longitudinal yellowish stripe inside, and with some stripes along anterior transverse striations, black; lorum and clypeus mostly black and densely covered with short white hairs; 2nd sternum fuscous; molar-like projection on each lateral part of 4th abdominal segment with two fuscous markings anteriorly and posteriorly. See also the description by Kato (1932).

Male genitalia (Fig. 14). Similar to that of *E. hoppo*, but subapical projection on each inner side of ventral lobes less prominent than in *hoppo*. Pygofer oval in ventral view; a pair of ventral lobes well developed with slightly but distinctly prominent subapical projection on each inner side; uncus lobe apically slender with wide base and triangular apex which is incised in ventral view; aedeagus very slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 28.5 mm. Total length: ♂ 38 mm.

Material examined. [NT] 1 ♂, Sun Moon Lake, V 1999, CH Lai (YJL).

Male chirping. According to Kato (1932), the song sounds like “carrrrr—! ke ke ke ke ke ke ke... (staccato)”.

Localities. [NT] Sun Moon Lake (new), Shueishe (Kato, 1930).

Distribution. Taiwan.

Chinese name. 臺中真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia arisana* Kato, 1925**

Euterpnosia arisana Kato, 1925a: 31 (*arisanus*) [TL: Arisan, Formosa]; Kato, 1927a: 33; Kato, 1930: 53, 66; Kato, 1932: 288; Kato, 1933, pl. 32; Kato, 1938a: 12; Kato, 1956: 116, 133, 270; Duffels and van der Laan, 1985: 101; Chou *et al.*, 1997: 202.

Diagnosis. See the descriptions by Kato (1925a, 1932).

Material examined. No specimen was available.

Locality. [CI] Alishan (Kato, 1925a).

Distribution. Taiwan.

Chinese name. 阿里真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia kotoshoensis* Kato, 1925**

(Figs. 15, 16)

Euterpnosia kotoshoensis Kato, 1925a: 32 [TL: Kotosho Island, Formosa]; Kato, 1927a: 33; Kato, 1930: 57, 66; Kato, 1932: 282; Kato, 1933, pl. 31; Kato, 1938a: 12; Kato, 1956: 116, 134, 270; Duffels and van der Laan, 1985: 104; Chou *et al.*, 1997: 202.

Diagnosis. This species has subapical projection on each inner side of ventral lobes of male genitalia like *E. hoppo* or *suishana*, although it is not so distinct, but its male abdomen excluding molar-like projections is only slightly widest across 4th abdominal segment. The head is wide and not swollen anteriorly, and the forewing is very short, unlike other Taiwanese congeners.

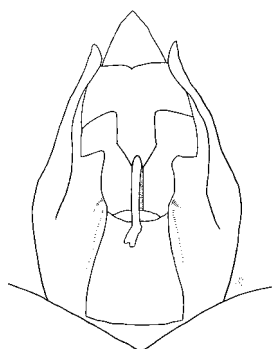


Fig. 15. Male pygofer of *Euterpnosia kotoshoensis* in ventral view.

Description. Body yellowish dull olivaceous and covered with short golden hairs; head with a large irregular marking at ocellar area, which is contiguous to inner side of each eye, and a pair of markings at lateral outsides of top of frontoclypeus, black; coloration and marking-pattern on pronotum similar to those of *E. hoppo* or *suishana*; coloration and marking-pattern on mesonotum similar to those of *E. suishana*; cruciform elevation mostly yellowish dull olivaceous except for anterior margin; abdomen with irregularly fuscous posterior margins at each of 2nd–6th terga; anterior margin of tymbal covering narrowly black; each of 3rd–5th terga with a pair of roundish fuscous spots laterally; male 7th and 8th terga entirely fuscous and densely covered with short silvery hairs (without white pollinosity). Ventral part of body yellowish dull olivaceous; frontoclypeus with a pair of longitudinal black stripes centrally, which usually are fused each other posteriorly and reaches clypeus; lorum posteriorly black; legs with no fuscous markings except for a few small markings at apical parts of claws and fore and mid tarsi and tibiae; male operculum very narrowly margined with black; male abdomen very sparsely covered with tiny white hairs and white pollinosity; 2nd sternum fuscous posteriorly. Areas along 1st and 2nd cross veins of forewing infuscated. Head distinctly wider than base of mesonotum; frontoclypeus hardly prominent anteriorly; molar-like projection on each lateral part of male 4th abdominal segment small, but distinct and triangular-shaped in dorsal view; male operculum oblique; posterior margin of 7th abdominal sternum slightly incised at middle. See also the description by Kato (1932).

Male genitalia (Fig. 15). Pygofer oval in ventral view; a pair of ventral lobes well developed with indistinctly prominent subapical projection on each inner side; uncus lobe apically slender with wide base and triangular apex which is incised in ventral view; aedeagus very slender and much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 24–25.5 mm, ♀ 21–21.5 mm. Total length: ♂ 31–33 mm.

Material examined. [TT] 1♂, Botel Tobago, date uncertain (KUF); 2♀, Lanyu Island, 15 II 1987, HY Wang (NTM); 1♂, same locality, 15 IV 1988, HY Wang (NTM); 1♂, same locality, 28 III 2000, HY Wang (NTM); 2♂, same locality, 29 III 2000, HY Wang (NTM).

Locality. [TT] Lanyu Island (Kato, 1925a).

Distribution. Taiwan (Lanyu Island).

Chinese name. 臺灣真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia olivacea* Kato, 1927**

(Figs. 17, 18)

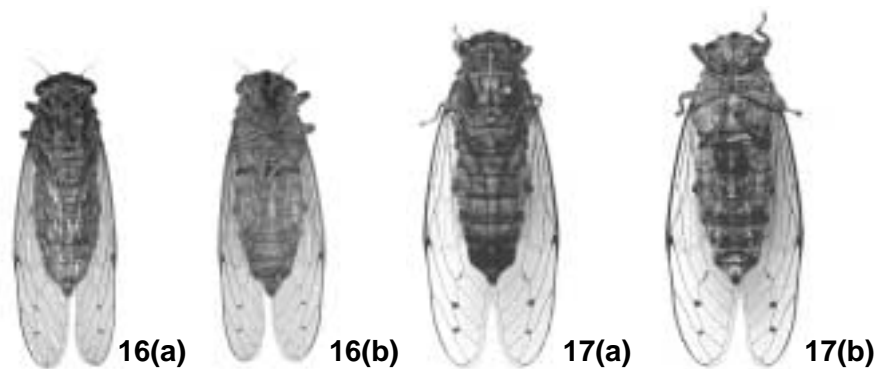
Euterpnosia olivacea Kato, 1927b: 278 [TL: Kusukusu near Koshun, Formosa]; Kato, 1930: 53, 67; Kato,

1932: 284; Kato, 1933, pl. 31; Kato, 1938a: 12; Kato, 1956: 116, 134, 271; Duffels and van der Laan, 1985: 104; Chou *et al.*, 1997: 202.

Diagnosis. This species also has subapical projection on each inner side of ventral lobes of male genitalia, although it is only slightly prominent, but its male abdomen excluding molar-like projections is nearly parallel-sided unlike *E. hoppo*, *suishana*, and *kotoshoensis*. This species can be also distinguished from other Taiwanese congeners by the following peculiar characteristics: Frontoclypeus usually with a pair of longitudinal black stripes centrally, separate from each other and interrupted before clypeus and each with branches along anterior transverse striations of which anterior two are long and rest of them very short; pronotum with very much reduced anterolateral part and very much developed posterolateral part of outer dilatation.

Description. Male. Body sparsely covered with short silvery hairs; head and thorax greenish or olivaceous; head with a large irregular marking at ocellar area and several large and small irregular spots between eyes, black; coloration and marking-pattern on pronotum similar to those of *E. kotoshoensis*, but with narrower black markings; coloration and marking-pattern on mesonotum similar to those of *E. viridifrons*; cruciform elevation mostly greenish; abdomen greenish olivaceous with irregularly blackish posterior margins at each of 2nd–6th terga; anterior margin of tymbal covering narrowly black; each of 3rd–5th terga with a pair of rather obscure roundish fuscous spots laterally; 7th tergum mostly blackish; 8th tergum entirely black and covered with short silvery hairs (without white pollinosity). Ventral parts of head and thorax light green and covered with tiny white hairs and some white pollinosity; lorum mostly black but densely covered with short white hairs; legs with some fuscous markings; operculum very narrowly margined with black; abdomen olivaceous, sparsely covered with tiny white hairs and some white pollinosity; 2nd sternum fuscous at posterior marginal area. Areas along 1st, 2nd, and 3rd (obscurely) cross veins of forewing infuscated. Head slightly wider than base of mesonotum; frontoclypeus moderately prominent anteriorly; molar-like projection on each lateral part of male 4th abdominal segment small, but distinct and triangular-shaped in dorsal view; operculum oblique, very small, which makes posterolateral part of tymbal well revealed in ventral view; posterior margin of 7th abdominal sternum distinctly incised at middle. See also the description by Kato (1932).

Male genitalia (Fig. 18). Pygofer oval in ventral view; a pair of ventral lobes well developed with slightly prominent subapical projection on each inner side; uncus lobe apically slender with wide base and triangular apex which is much incised in ventral view; aedeagus very



Figs. 16–17. 16. A male *Euterpnosia kotoshoensis* in dorsal (a) and ventral (b) views (National Taiwan Museum); 17. A male *Euterpnosia olivacea* in dorsal (a) and ventral (b) views.

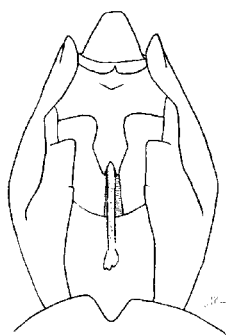


Fig. 18. Male pygofer of *Euterpnosia olivacea* in ventral view.

slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 26.2 mm. Total length: ♂ 34.5 mm.

Material examined. [HL] 1 ♂, Hualien, 15 V 2002, YJ Lee (YJL).

Biology. This species seems to be distributed in lowlands of eastern and southern Taiwan. Adults appear from May to August. Males like to sing inside the forest on sunny days. Adults are not so wary.

Male chirping. The burst that sounds like “chakachakachakachaka...” or “shikushikushikushiku...” is repeated regularly on the basis of “jee—” sound that is like a basso continuo. Thus the chirping sounds like “chakachakachaka... jee— chakachakachaka... jee— chakachakachaka... jee— ...”. The burst of “chakachakachaka...” normally continues for 1–3 sec. (sometimes elongated to 7–8 sec.) before suddenly stops and the next burst starts normally after an interval of 2–4 sec. A complete call normally lasts for up to several minutes when uninterrupted. See also the note given by Kato (1927b).

Localities. [HL] Hualien (new); [KH] Shanping (♫) (new); [PT] Mudan (牡丹) (Kato, 1932), Hengchuen (Kato, 1927b).

Distribution. Taiwan.

Chinese name. 橄欖真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia gina* Kato, 1930**

(Figs. 19, 20)

Euterpnosia gina Kato, 1930: 53, 67, 72 [TL: Horisha and Rengechi near Gyochi, Formosa]; Kato, 1932: 285; Kato, 1933, pls. 26–27; Kato, 1938a: 12; Kato, 1956: 116, 133, 271; Duffels and van der Laan, 1985: 103; Chou *et al.*, 1997: 202.

Diagnosis. This species is similar to *E. olivacea* and also has male abdomen excluding molar-like projections nearly parallel-sided, but can be distinguished from *olivacea* by the following characteristics: Male abdomen greenish ochreous with (sometimes without) irregular blackish posterior margins at each of 2nd–7th terga; each of 3rd–5th terga with a pair of distinct roundish fuscous spots laterally; 7th tergum sometimes fuscous, and 8th tergum sometimes covered with white pollinosity at posterior margin; frontoclypeus usually with only one longitudinal black stripe comprising a narrower longitudinal ochreous stripe inside; ventral part of male abdomen ochreous; 2nd sternum entirely fuscous; areas along 1st and 2nd cross veins of forewing infuscated; body slenderer; frontoclypeus more prominent anteriorly; pronotum with not so reduced anterolateral part and less developed posterolateral part of outer dilatation; subapical projection on each inner side of ventral lobes of male

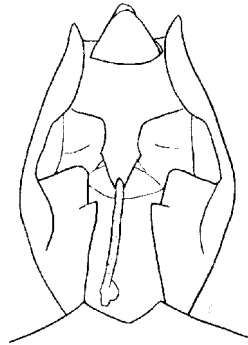


Fig. 19. Male pygofer of *Euterpnosia gina* in ventral view.

genitalia substantially prominent. This species can be also distinguished from other Taiwanese congeners by the existence of a semicircular protrusion on mid-posterior part of the male 6th abdominal sternum. See also the description by Kato (1932).

Male genitalia (Fig. 19). Pygofer oval in ventral view; a pair of ventral lobes well developed with a substantially prominent subapical projection on each inner side; uncus lobe apically slender with wide base and triangular apex which is incised in ventral view; aedeagus very slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 24.5–26 mm, ♀ approximately 21 mm. Total length: ♂ 34–37.5 mm, ♀ approximately 32 mm.

Material examined. [NT] 1 ♀, Lienhuachi (= Lienhuachr), 9–19 IV–V 1998, Malaise trap, CS Lin and WT Yang (NMNS); [KH] 1 ♂, 1 ♀, Baushan, Taoyuan, V 2002, WL Chen (YJL); 1 ♂, 1 ♀, same locality, date uncertain, WL Chen (YJL); 1 ♂, Shanpin (= Shanping) (750 m alt.), 5–10 IV 1988, light-trap, KW Huang (NMNS); 1 ♂, 1 ♀, same locality, 18–23 IV 1988, light-trap, Lin and Huang (NMNS); 1 ♀, Shanping, 3 V 1989, HY Wang (NTM); 4 ♂, 2 ♀, Shanpen (= Shanping) For. Stn., 750 m alt., Liakuei (= Liouguei), 10 km SE, 5–6 VII 1996, KT Park and HK Lee (or JS Lee) (CIS).

Biology. This species is locally distributed in low mountainous areas of central and southern Taiwan. Adults appear from April to July. Both sexes are attracted to electric light at night.

Localities. [NT] Puli (Kato, 1930), Lienhuachr (Kato, 1930); [KH] Baushan, Taoyuan (new), Shanping (new).

Distribution. Taiwan.

Chinese name. 金真寧蟬 (Chou *et al.*, 1997).

***Euterpnosia laii* Lee, sp. nov.**

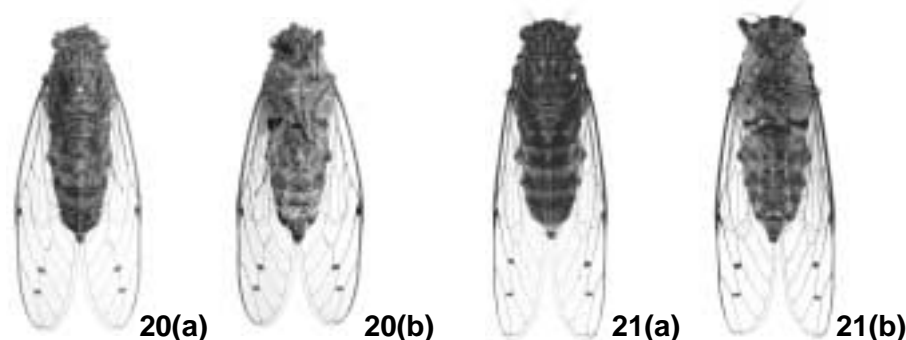
(Figs. 21, 22, 23, 24)

Diagnosis. This species is most closely allied to *E. gina* but can be distinguished by the following characteristics: Dorsal part of body with somewhat larger and broader blackish markings; frontoclypeus less prominent anteriorly (but more than in *olivacea*); molar-like projection on each lateral part of male 4th abdominal segment more distinct; male operculum bigger and rather longitudinal, which makes posterolateral part of tymbal mostly screened in ventral view; male 6th abdominal sternum flat without the semicircular protrusion. Unlike *E. varicolor*, *elongata*, and *viridifrons*, this species has an indistinct subapical projection on each inner side of ventral lobes of male genitalia. The male abdomen of this species is shorter than

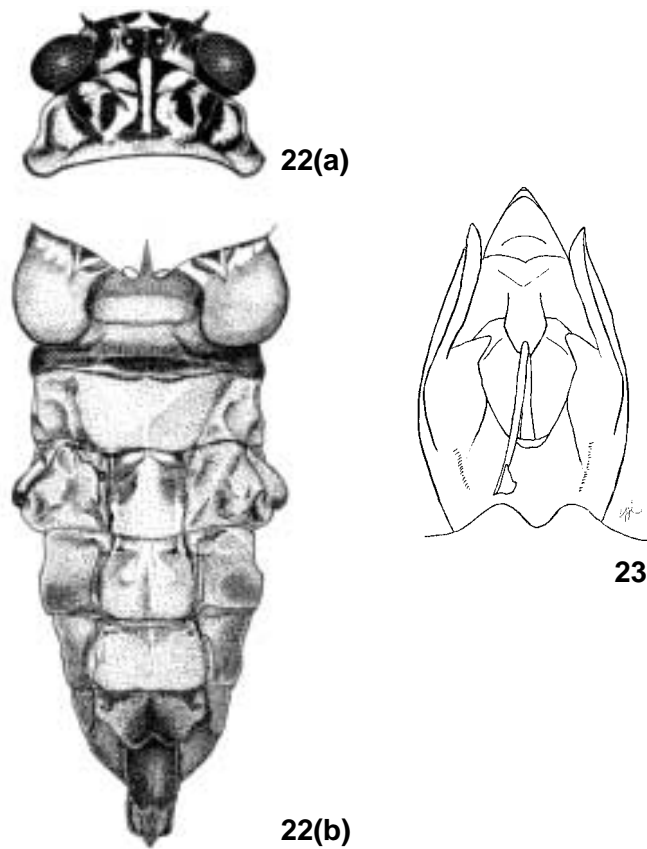
E. varicolor or *elongata* (longer than $1.7 \times$ of distance from head to cruciform elevation in *E. varicolor* and *elongata*, but shorter than $1.6 \times$ in this species). Unlike *E. hoppo*, *suishana*, and *kotoshoensis*, the male abdomen excluding molar-like projections of this species is nearly parallel-sided. This species can be distinguished from *E. olivacea* by the following characteristics: Dorsal part of body with somewhat larger and broader blackish markings; frontoclypeus usually with only one longitudinal black stripe comprising a narrower longitudinal yellowish stripe inside; pronotum with not so reduced anterolateral part and not so developed posterolateral part of outer dilatation; body slenderer. This species can be also distinguished from other Taiwanese congeners by the shape of the inner side of the ventral lobe of male genitalia, which is zigzag or waved.

Description. Body sparsely covered with short silvery hairs; head and thorax greenish or olivaceous; head with a large irregular marking at ocellar area and several large and small irregular spots between eyes, black; pronotum with a pair of central longitudinal stripes, broadened both anteriorly and posteriorly, markings along furrows of inner area, and two spots at each posterolateral part of outer dilatation, black; mesonotum with a central longitudinal stripe, of which posterior 1/2 somewhat (sometimes very much) broadened and reaching to cruciform elevation, a small roundish spot at each side of posterior end of central stripe, often fused with the central stripe, a pair of shorter and inwardly curved stripes at outer sides of anterior 1/2 of central one, a pair of outwardly curved and broad stripes next to inwardly curved stripes, and a pair of small but clear longitudinal, triangular markings between anterior ends of inwardly curved and outwardly curved stripes, black; cruciform elevation mostly greenish; male abdomen greenish or olivaceous with irregularly blackish posterior margins, and often forming a pair of rectangular markings at each of 2nd–6th terga; anterior margin of male tymbal covering narrowly black; each of 3rd and 4th, and sometimes 5th, terga with a pair of longitudinal blackish markings laterally; male 7th tergum often entirely blackish; male 8th tergum entirely blackish and covered with white pollinosity at posterior margin. Ventral part of body light greenish ochreous and covered with short white hairs and some white pollinosity; frontoclypeus with some stripes along anterior transverse striations, black; lorum mostly black; legs with some blackish markings; male operculum sometimes very narrowly margined with black; 2nd sternum entirely blackish. Areas along 1st and 2nd cross veins of forewing infuscated. Head about as wide as base of mesonotum; posterior margin of 7th abdominal sternum distinctly incised at middle.

Male genitalia (Fig. 23). Pygofer oval in ventral view; a pair of ventral lobes well developed with zigzag or waved inner sides and with an indistinct subapical projection on each inner



Figs. 20-21. 20. A male *Euterpnosia gina* in dorsal (a) and ventral (b) views; 21. A male *Euterpnosia laii* in dorsal (a) and ventral (b) views.



Figs. 22-23. 22. Head and pronotum in dorsal view (a) and male abdomen in ventral view (b) of *Euterpnosia laii*; 23. Male pygofer of *Euterpnosia laii* in ventral view.

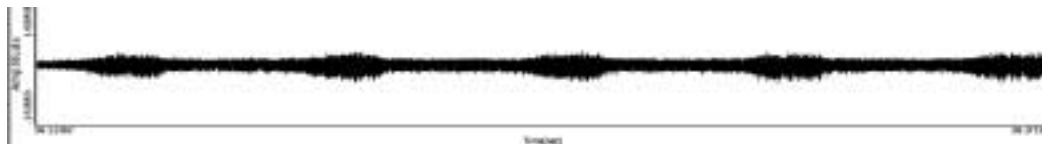


Fig. 24. Partial oscillogram of the male chirping of *Euterpnosia laii* for 5 sec.

side; uncus lobe apically slender with wide base and triangular apex which is much incised in ventral view; aedeagus very slender and very much protruding out of apex of uncus lobe.

Measurements. Body length: ♂ 23.5–26 mm, ♀ 18–22 mm. Total length: ♂ 32.5–36.5 mm, ♀ 29–35 mm.

Etymology. The specific name is derived from the name of Mr. Chien Hung Lai who collected the first specimen of this species from Chingching Grassland and helped the first author to collect many specimens.

Types. Holotype: ♂, [NT] Chingching Grassland, 27 VI 2000, YJ Lee. Paratypes: [TY] 2♂, Paleng, 12 VI 1991, HC Hsu; [NT] 1♂, 5♀, Songgang (松崗), 21 VI 2002, CH Lai; 3♂,

Chingching Grassland, 26 VI 2000, light trap, CH Lai; 1♂, 2♀, same locality, 27 VI 2000, YJ Lee; 1♀, same locality, 12 VII 2000, CH Lai; 3♂, 5♀, same locality, VII 2000, CH Lai; 2♂, same locality, 9 VI 2001, CH Lai; 2♂, 4♀, same locality, 13 VI 2001, CH Lai; 1♂, 1♀, same locality, 23 VI 2001, CH Lai; 3♀, same locality, 27–29 VI 2001, CH Lai; 2♀, same locality, 9 VII 2001, YJ Lee; 1♂, Mt. Hewangshan, 1 VI 2000, C Lo. The holotype and paratypes are deposited in the Insect Museum, Seoul National University, Suwon, Korea.

Biology. This species seems to be locally distributed in high mountainous areas (1,000–2,200 m) of northern and central Taiwan. Adults appear in June and July, and males intermittently sing all day long and often until about 1915h. (Complete darkness comes at about 1900h in late June). Both sexes are attracted to electric light at night, especially 1.5–3.5 hours after the complete darkness begins.

Male chirping (Fig. 24). The chirping sounds like “waeg! waeg! waeg! waeg!...” or “zaek! zaek! zaek! zaek!...”. The short burst of “waeg!” (or “zaek!”) is repeated at a rate of about 8–12 bursts per 10 sec. on the basis of “ssss—” sound that is like a basso continuo. A call normally lasts for up to several tens of minutes when uninterrupted.

Localities. [TY] Paleng; [NT] Songgang, Chingching Grassland, Mt. Hewangshan.

Distribution. Taiwan.

Taiwanese name. 賴建宏真寧蟬 (新稱).

Genus *Semia* Matsumura, 1917

Semia Matsumura, 1917: 195. Type species: *Leptopsaltria watanabei* Matsumura, 1907 (Formosa).

Diagnosis. Unlike *Leptosemia*, *Terpnosia*, and *Euterpnosia*, this genus has the dentate lateral margin of pronotum and transverse male opercula that are nearly contiguous to each other. This genus does not have a molar-like projection on each lateral part of male 4th abdominal segment.

Head nearly as wide as or slightly narrower than base of mesonotum; frontoclypeus moderately prominent anteriorly; inner area of pronotum generally concolorous to outer dilatation; male abdomen cylindrical, much longer than distance from head to cruciform elevation, and slightly widest across 4th abdominal segment and wider than base of mesonotum; male tymbal covering very small and semicircular, mostly exposing tymbal in dorsal view; male 8th abdominal tergum mostly covered with white pollinosity; ovipositor not protruding beyond pygofer; male operculum scale-like, roundish, and not extending beyond 2nd abdominal sternum; wings hyaline; 6th apical cell of forewing about as long as or longer than twice of 5th apical cell in median length.

Semia watanabei (Matsumura, 1907)

(Figs. 25, 26)

Leptopsaltria watanabei Matsumura, 1907: 96 [TL: Hoppo, Formosa]; Schmidt, 1932: 123.

Pomponia watanabei: Matsumura, 1913: 78.

Semia watanabei: Matsumura, 1917: 196; Kato, 1925a: 32; Kato, 1926b: 175; Kato, 1927a: 33; Kato, 1930: 53, 67; Kato, 1931: 221; Kato, 1932: 295; Schmidt, 1932: 125; Kato, 1933, pls. 28–29; Hirayama, 1937: 184; Kato, 1938a: 13; Kato, 1956: 116, 133, 187; Hayashi, 1979: 260; Duffels and van der Laan, 1985: 112.

Diagnosis. Body sparsely covered with short silvery hairs; head and thorax light green, sometimes tinged with blue, with blackish markings; head with a large irregular marking at ocellar area, a pair of large but rather indistinct markings between eyes, and a pair of markings next to frontoclypeus, blackish; pronotum with a pair of central longitudinal stripes, of which both anterior and posterior parts a little broadened, markings along and near

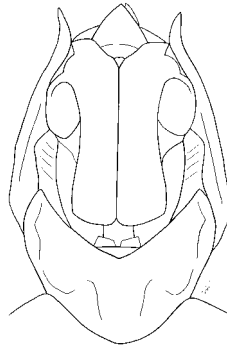


Fig. 25. Male pygofer of *Semia watanabei* in ventral view.

diagonal grooves, and often a pair of oblique markings at posterior part of outer dilatation, blackish; mesonotum with a large square marking mid-anteriorly, which bears a central slender branch toward cruciform elevation and comprises each one pair of triangular olivaceous spots and laterally oblique olivaceous stripes inside, and other irregular spots surrounding the square marking, blackish; cruciform elevation light green; abdomen brownish ochreous with few markings; male 6th and 7th abdominal segments darker than other segments; male 8th tergum covered with thick white pollinosity. Ventral parts of head, thorax, legs, and opercula paler light green with a few blackish markings and sparsely covered with tiny hairs and white pollinosity; frontoclypeus with some transverse stripes along anterior transverse striations and a large spot at posterior part, blackish; lorum mostly blackish except for anterior part; clypeus with a wide transverse stripe in middle; each femur, tibia, tarsus, and claw with a or a few blackish markings; male operculum with a triangular blackish marking at anterolateral part; male abdomen pale greenish ochreous, covered with tiny white hairs and white pollinosity; female abdomen mostly fuscous and covered with silvery hairs. Wings slightly tinged with pale brown; areas along 1st, 2nd, and 3rd cross veins, base of vein R₃, rarely base of R₄₊₅, faintly area along 4th cross vein and bases of M₁, M₂, M₃, and M₄, base of CuA₁, CuA₂, and vein parts around nodal line, infuscated; a roundish infuscation appearing on each apical portion of veins R₃, R₄₊₅, M₁, M₂, M₃, M₄, and CuA₁, forming a series of spots on subapical margin of forewing. See also the description by Kato (1932).

Male genitalia (Fig. 25). Pygofer oval in ventral view, with an acute triangular caudal beak; uncus with a pair of long lobes, which are substantially, roundly curved inward; aedeagus very slender, often concealed under uncus lobes.

Measurements. Body length: ♂ approximately 38 mm, ♀ approximately 29.5 mm. Total length: ♂ approximately 52 mm, ♀ approximately 53 mm.

Material examined. [TY] 2 ♀, Paleng, 7 VII 2000, HY Wang (NTM); [IL] 1 ♂, Fushan, 29 V 1995, JJ Hsiao (TFRI); 1 ♀, same locality, 26 VII 1995, WT Jou (TFRI); 1 ♀, same locality, 27 VII 1995, YJ Chen (TFRI); [NT] 2 ♀, Mt. Hewangshan, 18 V 2000, C Lo (YJL); 1 ♀, same locality, 27 V 2000, C Lo (YJL); 1 ♂, Shrtzutou, 6 VIII 1996, C Lo (YJL); 1 ♀, same locality, 19 VI 1999, C Lo (YJL); 2 ♂, same locality, 22 V 2000, C Lo (YJL); 1 ♀, Lienhuachih, 20 V 1972, K Kojima (SUU); 18 ♂, 3 ♀, same locality, 30 VI 1973, M Hayashi (SUU); 6 ♂, 5 ♀, same data except 1 VII 1973 (SUU); 1 ♂, same locality, 23 V 1990, YB Fan (TFRI); 1 ♂, Shanlinhsi, 1994, YJ Chen (TFRI); [KH] 1 ♂, Baushan, Taoyuan, date uncertain, WL Chen (YJL); 2 ♂, Mt. Sen Pei, near Liu Kuei, 24 VII 1987, K Baba (SUU); [TT] 1 ♂, Lichia For. Rd. (利嘉林道), 21 VI 2002, M Hayashi (SUU); 1 ♀, Kueitien, 18 VI 1976, H

Makihara (SUU); 2♂, Gueitian, 14 VIII 2002, YJ Lee (YJL); [PT] 1♂, 1♀, Souka, Shihtyu, 20 VI 2002, M Hayashi (SUU).

Biology. This species is widely distributed in Taiwan from lowlands to mountainous areas of not-so-high altitude. Adults appear from May to September. Males sometimes sing in the daytime, preferably on cloudy days, but are most active early in the morning and at dusk. They continue their chirping until the complete darkness comes at about 1900h. They often sing at high places of tall trees, but in the habitats where the population density is very high, they often sing at low places. According to the observation by the second author, the copulation was recognized only in the morning (0730–0830h). Both sexes are attracted to electric light at night. See also the information given by Kato (1933, 1956).

Male chirping. The chirping is metallic and at a very high pitch. It sounds like “ghee—” that suddenly rise in pitch right after the chirping starts and continues without interruption for 16–22 sec. See also the descriptions given by Kato (1932, 1956).

Localities. [TP] Wulai (Kato, 1931); [TY] Paleng (new); [HC] Beipu (Matsumura, 1907); [IL] Ilan (宜蘭) (Kato, 1926b), Fushan (new), Mt. Taipingshan (Kato, 1926b); [TC] Guguan (鼓官) (new); [NT] Mt. Hewangshan (new), Shrtzutou (new), Puli (Matsumura, 1917), Lienhuachr (Hayashi, 1979), Shueishe (Kato, 1932), Shanlinhsi (new); [KH] Baushan, Taoyuan (new), Mt. Sen Pei near Liouguei (new); [TN] Guantzling (Kato, 1925a); [TT] Lichia For. Rd. (new), Gueitian (new); [PT] Shouka (new), Hengchuen (Kato, 1925a).

Distribution. Taiwan.

Genus *Pomponia* Stål, 1866

Pomponia Stål, 1866: 6. Type species: *Cicada fusca* Olivier, 1790 (Westküste von Sumatra).

Diagnosis. Similar to *Semia*, but differing by the following characteristics: Head distinctly narrower than base of mesonotum; frontoclypeus much prominent anteriorly; inner area of pronotum generally different-colored from outer dilatation; male abdomen gradually tapering to apex; male tymbal covering small, but larger than in *Semia*, exposing only smaller part of tymbal in dorsal view; male 8th abdominal tergum with little white pollinosity; male operculum extending slightly beyond 2nd abdominal sternum; 6th apical cell of forewing shorter than twice of 5th apical cell in median length.

Pomponia linearis (Walker, 1850)

(Figs. 27, 28)

Dundubia linearis Walker, 1850: 48 [TL: unknown].

Pomponia linearis: Hayashi, 1979: 260; Duffels and van der Laan, 1985: 176; Chou *et al.*, 1997: 188.

Cicada fusca Olivier, 1790: 749. [TL: Westküste von Sumatra].

Pomponia fusca: Matsumura, 1907: 99; Matsumura, 1913: 83; Schumacher, 1915: 111; Matsumura, 1917: 200; Kato, 1925a: 26; Kato, 1927a: 31; Kato, 1930: 52, 66; Kato, 1931: 220; Kato, 1932: 314; Kato, 1933, pl. 24; Chen, 1933: 360; Hirayama, 1937: 184; Kato, 1938a: 16; Kato, 1938b: 8; Kato, 1940: 3.

Pomponia fusca fusca: Kato, 1956: 111, 116, 130, 188.

Diagnosis. Body covered with short golden hairs; head and thorax fuscous with irregular greenish and brownish markings; abdomen castaneous or dark ochreous, with caudal margins of each segment narrowly black. Ventral part of head yellow with a transverse stripe connecting both eyes through anterior frontoclypeus, and a marking on posterior frontoclypeus, fuscous or black; thorax and operculum greenish olivaceous with various fuscous markings and sparsely covered with white pollinosity; outer margin of male operculum very narrowly margined with black; male abdomen mostly ochreous, sparsely covered with white pollinosity. Wings slightly tinged with pale brown; areas along 1st, 2nd,

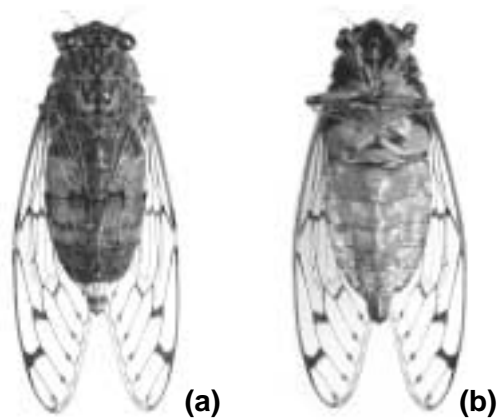


Fig. 26. A male *Semia watanabei* in dorsal (a) and ventral (b) views.

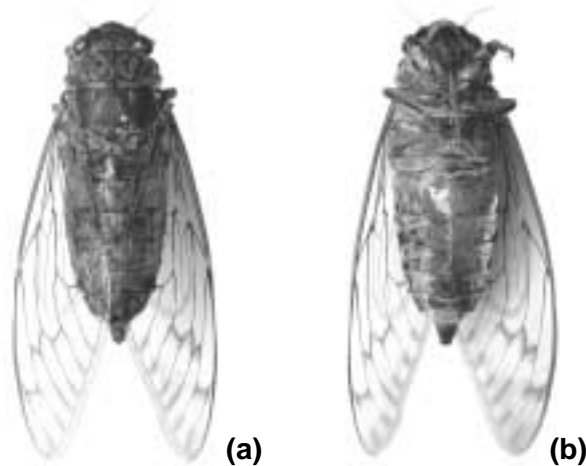


Fig. 27. A male *Pomponia linearis* in dorsal (a) and ventral (b) views.

and 3rd cross veins and bases of veins M_1 and R_{4+5} , infuscated; a widely spread or a roundish infuscation appearing on each apical portion of veins R_3 , R_{4+5} , M_1 , M_2 , M_3 , M_4 , and CuA_1 , forming a series of markings on subapical margin of forewing. See also the descriptions by Kato (1932) (as *P. fusca*) and Chou *et al.* (1997).

Male genitalia. See the description and figures by Chou *et al.* (1997).

Measurements. Body length: ♂ 39.5–48 mm, ♀ 31–35 mm. Total length: ♂ 53–61 mm, ♀ 54–60 mm.

Material examined. [TP] 16♂, 2♀, Mt. Yangmingshan, 23 VI 1973, M Hayashi (SUU); 5♂, 4♀, same data except 17 VII 1973 (SUU); 1♀, same locality, 14 VII 2001, YJ Lee (YJL); 2♂, Wulai, 22 VI 1999, YJ Lee (YJL); [TY] 1♂, Pa Lon, 3 VIII 1988, K Baba (SUU); [TC] 1♂, Kukuan, 10 VI 1976, H Makihara (SUU); [HL] 2♂, Hungyeh (= Hungye 紅葉), 13 VII 1973, M Hayashi (SUU); [NT] 1♀, Mt. Hewangshan, 27 IV 2000, C Lo (YJL); 2♂, Nanshanchi, 29 VI 1978 (SUU); 1♂, Jenai Nanshanchi, 7–9 VI 1999, Mercury light, CS Lin and WT Yang,

NMNS ENT 3235–1334 (NMNS); 1♂, Shrtzutou, 12 VII 1996, C Lo (YJL); 1♂, same locality, 12 VIII 1996, C Lo (YJL); 1♂, same locality, 22 V 2000, C Lo (YJL); 7♂, 8♀, Lienhuachih, 30 VI 1973, M Hayashi (SUU); 1♀, same data except 1 VII 1973 (SUU); 1♂, same locality, 12 VI 2001, UV light, CS Lin and WT Yang, NMNS ENT 3672–608 (NMNS); 1♂, Lienhuachr, 12 V 2002, YJ Lee (YJL); 1♀, Sun Moon Lake, 12 VI 1988, K Baba (SUU); 1♂, same locality, 19 VI 1999, YJ Lee (YJL); 1♂, 2♀, same locality, 26 VI 2000, YJ Lee (YJL); 4♂, 1♀, Shuishe (= Shueishe), 29 VI 1973, M Hayashi (SUU); 1♂, Chushan Shiaping Botanical Garden, 3 VII 2001, by hand, ML Chan, NMNS ENT 3653–88 (NMNS); [KH] 1♂, Shi Nan Shan (= Mt. Shinanshan 溪南山), near Liu Kui, 16 V 1986, K Baba (SUU); 3♂, 3♀, Liukuei, 6 VII 1973, M Hayashi (SUU); 1♂, Liu Kui, 29 VI 1986, K Baba (SUU); 3♂, 1♀, Mt. Sen Pei, near Liu Kuei, 24 VII 1987, R Sato (SUU); 1♂, Tsai Tien Ku, near Liu Kui, 2 V 1986, K Baba (SUU); 2♂, same data except 2 VI 1986 (SUU); 1♂, Shanpen For. Stn., 750 m alt., Liakuei, 10 km SE, 5–6 VII 1996, KT Park and HK Lee (CIS); 1♂, Shanping, 13 VIII 2002, YJ Lee (YJL); [TT] 1♂, Yenping For. Rd. (延平林道), 22 VI 2002, M Hayashi (SUU); 3♂, Lichia For. Rd., 21 VI 2002, M Hayashi (SUU); 1♂, same locality, 22 VI 2002 (light trap), M Hayashi (SUU); 1♀, Kueitien, 10 VI 1976, H Makihara (SUU); [PT] 1♀, Souka, 20 VI 2002, M Hayashi (SUU); 3♀, Kenting Park, 8 VII 1973, M

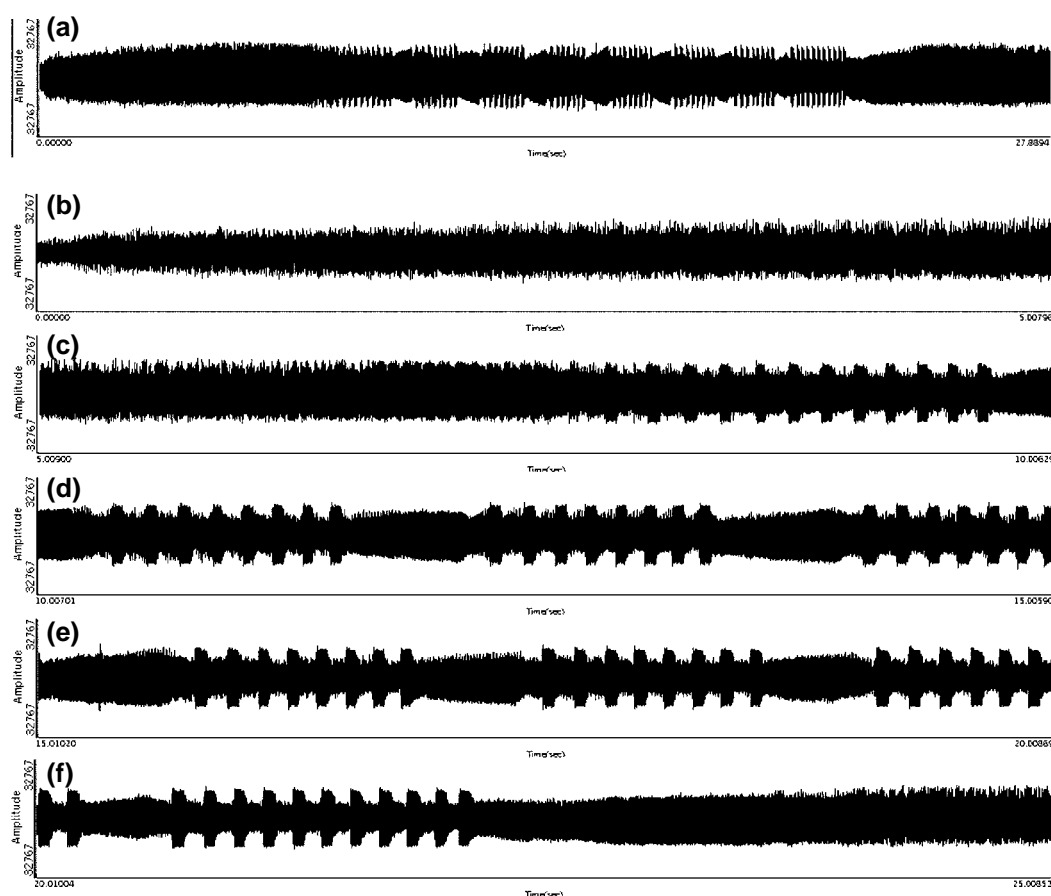


Fig. 28. Oscillogram of the male chirping of *Pomponia linearis* for 27.9 sec. (a) and its expansion for successive 5 sec. each (b–f).

Hayashi (SUU); 1♂, 3♀, same data except 9 VII 1973 (SUU); 1♂, 1♀, same data except 10 VII 1973 (SUU); 8♂, 1♀, same locality, 23 V 1985, T Endo (SUU).

Biology. This species is one of the most abundant species in Taiwan and widely distributed in the whole Taiwan from lowlands to mountainous areas up to about 1,000 m in altitude. Adults appear from late April to October. They often perch on low trunks or branches of various species of trees. Males sometimes sing in the morning and daytime, preferably on cloudy days, but are most active at dawn and dusk. They start to sing usually between 1500 and 1530h in the sunny evening and stop singing at about 1840–1900h. They do not readily stop singing in a heavy rain. Adults are not wary and have no capacity for evasive flight. Both sexes are attracted to electric light at night. See also the information for the Taiwanese population given by Kato (1933, 1956).

Male chirping (Fig. 28). The chirping sound is very loud and noisy. It sounds like “ghee— (or shau shau shau shau...) gghing! gghing! gghing! gghing! jee—ng gghing! gghing! gghing! gghing! jee—ng gghing! gghing! gghing! gghing! jee—ng...”. The burst of “gghing!” is repeated at a rate of about 5–6 bursts per second. See also the descriptions given by Kato (1932, 1956).

Localities. [TP] Mt. Mientienshan (Hayashi, 1979), Mt. Yangmingshan (Kato, 1931), Taipei (Kato, 1931), Wulai (Kato, 1931); [TY] Pa Lon (new); [HC] Daping near Beipu (♂) (new); [IL] Jentze Hot Springs (♂) (new); [TC] Guguan (new); [HL] Hualien (♂) (new), Hungye (new); [NT] Mt. Hewangshan (new), Nanshanchi (new), Shrtzutou (new), Jiantai (尖台) (Schumacher, 1915), Lienhuachr (Hayashi, 1979), Wucheng (Schumacher, 1915), Sun Moon Lake (Hayashi, 1979), Shueishe (Schumacher, 1915), Chushan Shiaping Botanical Garden (new); [CI] Chiai (Schumacher, 1915), Shanmei (山美) (♂) (new), Shinmei (新美) (♂) (new); [KH] Mt. Shinanshan near Liouguei (new), Jiashian (Schumacher, 1915), Liouguei (Hayashi, 1979), Mt. Sen Pei near Liouguei (new), Tsai Tien Ku near Liouguei (new), Shanping (new); [TN] Guantzling (Schumacher, 1915); [TT] Yenping For. Rd. (new), Lichia For. Rd. (new), Dapan (Schumacher, 1915), Gueitian (new); [PT] Shouka (new), Ligang (Schumacher, 1915), Kenting Park (new), Kenting (Hayashi, 1979); [UN] Hoozan (Schumacher, 1915).

Distribution. Taiwan, Japan (Ryukyus), China, Vietnam, Laos, Cambodia, Thailand, Malaysia, Singapore, Indonesia, Myanmar, Bangladesh, Nepal, and India.

Taiwanese name. 臺灣騷蟬; *Chinese name.* 螂蟬 (Chou *et al.*, 1997).

Genus *Purana* Distant, 1905

Purana Distant, 1905: 60. Type species: *Dundubia tigrina* Walker, 1850 (Malabar).

Formosemia Matsumura, 1917: 193. Type species: *Leptosaltria apicalis* Matsumura, 1907 (Formosa).

Diagnosis. Differently from the previous genera, this genus has a tubercle-like projection, nearly longitudinally or obliquely protruding posteriorly, on each lateral surface of male 3rd and 4th abdominal sternum; vertex very long, with anterior end situated far beyond level of anterior margin of eyes.

Body comparatively short (ratio of male body length to width of head about 2.9 in *P. apicalis*); head slightly wider than base of mesonotum; frontoclypeus much swollen anteriorly; inner area of pronotum generally concolorous to outer dilatation; lateral margin of pronotum sinuate and anteriorly dentate; male abdomen obconical, about as long as distance from head to cruciform elevation; tymbal mostly concealed with tymbal covering in dorsal view, but exposed laterally; ovipositor hardly protruding beyond pygofer; male operculum small, scale-like, apart from each other, and extending scarcely or substantially beyond 2nd abdominal sternum; wings hyaline; 6th apical cell of forewing shorter than twice of 5th apical cell in median length.

***Purana apicalis* (Matsumura, 1907)**

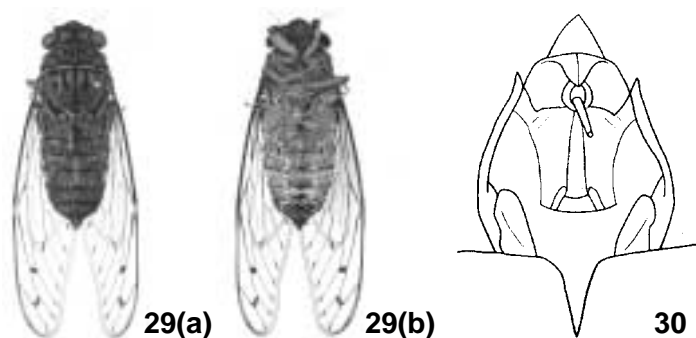
(Figs. 29, 30, 31)

Leptopsaltria apicalis Matsumura, 1907: 95 [TL: Koshun and Hoppo, Formosa]; Matsumura, 1913: 78; Schmidt, 1932: 123.*Purana apicalis*: Schumacher, 1915: 110; Kato, 1956: 117, 131, 189; Duffels and van der Laan, 1985: 106.*Formosemia apicalis*: Matsumura, 1917: 193; Kato, 1925a: 16; Kato, 1926a: 31; Kato, 1927a: 25; Kato, 1930: 52, 63; Kato, 1931: 220; Kato, 1932: 299; Schmidt, 1932: 123; Kato, 1933, pl. 13; Kato, 1938a: 14.

Diagnosis. Body sparsely covered with short silvery hairs; head and thorax greenish ochreous with blackish markings; pronotum with a pair of central longitudinal stripes, broadened and fused each other both anteriorly and posteriorly, markings along furrows of inner area, and two spots at each posterolateral part of outer dilatation, blackish; mesonotum with a central longitudinal stripe, of which posterior 1/2 a little broadened and reaching to cruciform elevation, a small roundish spot at each side of posterior end of central stripe, a pair of shorter and inwardly curved stripes at outer sides of anterior 1/2 of central one, two pairs of longitudinally arranged roundish spots next to inwardly curved stripes, and sometimes a pair of indistinct smaller spots outside of posterior small roundish spots, blackish; cruciform elevation greenish ochreous with blackish markings posteriorly and sub-laterally; abdomen greenish ochreous, but 7th and 8th segments often castaneous, with caudal margins of each segment narrowly black; each of 2nd and 3rd terga with a central fuscous marking. Ventral part of body greenish olivaceous with several blackish markings and sparsely covered with white pollinosity; male operculum narrowly margined with black; 6th, 7th, and 8th sterna of male abdomen mostly fuscous or black. Areas along 1st and 2nd, and mostly 3rd, cross veins infuscated; a roundish infuscation appearing on each apical portion of veins R₃, R₄₊₅, M₁, M₂, M₃, M₄, and CuA₁, forming a series of spots on subapical margin of forewing. Male operculum extending not or scarcely beyond 2nd abdominal sternum; tubercle-like projection on each lateral surface of male 3rd and 4th abdominal sterna very slender and nearly longitudinally protruding posteriorly. See also the description by Kato (1932) (as *Formosemia apicalis*).

Male genitalia (Fig. 30). Pygofer oval in ventral view; a pair of ventral lobes small; both uncus lobes fused to a single lobe, which is triangular and straightly prominent ventrally but a little curved inward in lateral view; aedeagus very slender and somewhat protruding out of uncus lobe.

Measurements. Body length: ♂ 23–26.5 mm, ♀ 20–24.5 mm. Total length: ♂ 37–40 mm, ♀ 36–41 mm.



Figs. 29–30. 29. A male *Purana apicalis* in dorsal (a) and ventral (b) views; 30. Male pygofer of *Purana apicalis* in ventral view.

Material examined. [TP] 7♂, 1♀, Wulai, 22 VI 1999, YJ Lee (YJL); 1♀, same locality, 25 VI 2000, YJ Lee (YJL); [IL] 1♂, 1♀, Fushan, 26 VII 1995, YJ Chen (TFRI); 1♀, same locality, 29 VIII 1995, WT Jou (TFRI); 1♀, same locality, 30 VIII 1995, JJ Hsiao (TFRI); [ML] 4♂, 1♀, Mt. Shihtoushan, 17 VII 1968, H Makihara (SUU); 1♂, Penglai, 18 VII 1968, H Fukuda (SUU); [NT] 1♂, Shrtzutou, 12 VIII 1996, C Lo (YJL); 2♂, 13♀, Lienhuachih, 30 VI 1973, M Hayashi (SUU); 1♀, same data except 1 VII 1973 (SUU); 1♀, Sun Moon Lake, VII 2000, CH Lai (YJL); 2♂, Shuishe, 29 VI 1973, M Hayashi (SUU); 2♂, 1♀, Shueishe, 10 VII 2001, YJ Lee (YJL); [KH] 2♂, 3♀, Shanping, 13 VIII 2002, YJ Lee (YJL); [TT] 1♂, Chihpen, 1 VIII 1968, H Makihara (SUU); 1♂, Kueitien, 17 VI 1976, H Makihara (SUU); [PT] 1♂, Souka, 20 VI 2002, M Hayashi (SUU); 1♀, Kenting Park, 7 VII 1973, M Hayashi (SUU); 4♂, 4♀, same data except 8 VII 1973 (SUU); 3♂, same locality, 23 V 1985, T Endo (SUU); 2♂, 1♀, Kenting, 14 VIII 2002, YJ Lee (YJL).

Biology. This species is widely distributed in Taiwan from lowlands to low mountainous areas up to about 900 m in altitude. Adults appear from May to September. Males usually sing only in the morning, at about 0530–0800h. After a complete call is finished, males often fly to a neighboring tree to begin another call. Adults perch on the low or high trunks and branches of various trees including maple trees such as *Acer serrulatum* Hay in Wulai [TP]. Adults are very wary, and it is difficult to get close to them before they fly away. See also the notes given by Matsumura (1907) and Kato (1933, 1956).

Male chirping (Fig. 31). The chirping sounds like “meem meem meem meem ... mee—”. A call has 13–20 bursts of “meem”, and the burst of “meem” is repeated at a rate of about two bursts per second. As soon as a call is finished, it is often followed by another call with no pause. It is often observed that males occasionally produce noises like “bbeek!” when they do not sing. See also the descriptions given by Kato (1932, 1956).

Localities. [TP] Mt. Yangmingshan (Kato, 1926a), Wulai (Kato, 1926a); [HC] Beipu (Matsumura, 1907); [IL] Ilan (Kato, 1926a), Fushan (new); [ML] Mt. Shrtoushan (new), Penglai (new); [NT] Shrtzutou (new), Lienhuachr (new), Sun Moon Lake (new), Shueishe (new), Shueilikeng (Kato, 1927a), Neimaopu (Kato, 1927a); [KH] Shanping (new); [TT] Jrben (new), Gueitian (new); [PT] Shouka (new), Hengchuen (Matsumura, 1907), Kenting Park (new), Kenting (new).

Distribution. Taiwan.

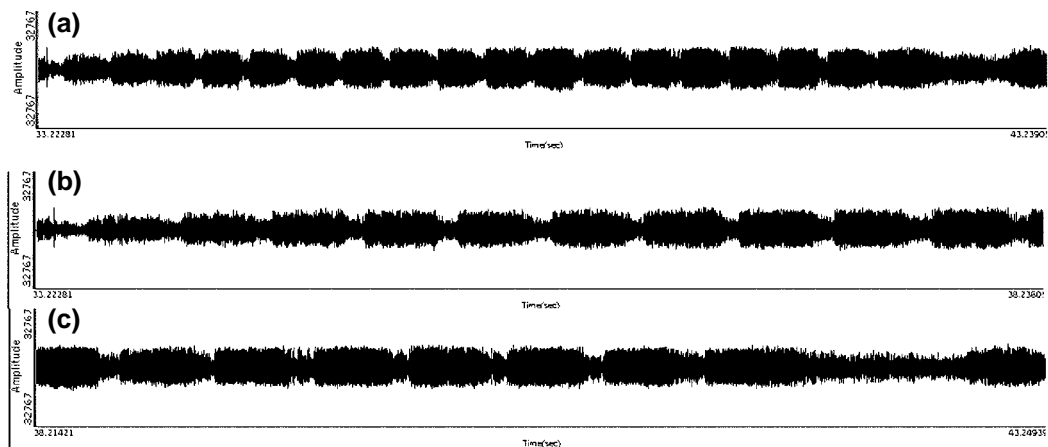


Fig. 31. Partial oscillogram of the male chirping of *Purana apicalis* for 10 sec. (a) and its expansion for successive 5 sec. each (b, c).

Genus *Taiwanosemia* Matsumura, 1917

Taiwanosemia Matsumura, 1917: 194. Type species: *Leptopsaltria hoppoensis* Matsumura, 1907 (Formosa).
Higurasia Kato, 1925b: 58. Type species: *Terpnosia? bicolor* Kato, 1925 (Kagi, Takesaki, Toroku, and Tsuusho, Formosa).

Diagnosis. This genus is different from *Purana* by the following characteristics: Vertex normal, its anterior end situated at similar level of anterior margin of eyes; lateral margin of pronotum not dentate; male abdomen much longer than *Purana* (normally ca $1.8 \times$ of distance from head to cruciform elevation and ratio of male body length to head width about 4.2 in *T. hoppoensis*); each lateral surface of male 3rd and 4th abdominal sterna with an oval protuberance instead of a longitudinal tubercle-like projection in *Purana*.

Head nearly as wide as base of mesonotum; frontoclypeus moderately prominent anteriorly; inner area of pronotum generally concolorous to outer dilatation; male abdomen cylindrical, slightly widest across 4th abdominal segment, and somewhat wider than base of mesonotum; tymbal partly exposed in dorsal view, and exposed laterally; male 8th abdominal tergum covered with white pollinosity; ovipositor hardly protruding beyond pygofer; male operculum scale-like, apart from each other, and not extending beyond 2nd abdominal sternum; wings hyaline; 6th apical cell of forewing shorter than twice of 5th apical cell in median length.

Taiwanosemia hoppoensis (Matsumura, 1907)

(Figs. 32, 33, 34)

Leptopsaltria hoppoensis Matsumura, 1907: 96 [TL: Hoppo, Formosa]; Schmidt, 1932: 123.

Taiwanosemia hoppoensis: Matsumura, 1917: 194; Kato, 1926a: 30; Kato, 1927a: 26; Kato, 1928: 187; Kato, 1932: 312; Schmidt, 1932: 123; Kato, 1933, pl. 25; Hirayama, 1937: 184; Kato, 1938a: 16; Kato, 1956: 116, 133, 187; Duffels and van der Laan, 1985: 114.

Purana hoppoensis: Kato, 1925a: 16.

Terpnosia hoppoensis: Kato, 1930: 52, 66.

Terpnosia? bicolor Kato, 1925a: 30 [TL: Kagi, Takesaki, Toroku, and Tsuusho, Formosa]; Kato, 1925b: 59, 72 (*Higurasia*); Kato, 1926a: 30, 31 (*Higurasia*); Kato, 1927a: 33 (*Higurasia*).

Diagnosis. Head and thorax a little greenish dull ochreous with blackish markings and covered with tiny golden hairs; head with an irregular marking at ocellar area and several large and small irregular spots between eyes, blackish; pronotum with a pair of central longitudinal stripes, broadened both anteriorly and posteriorly, a large spot at each posterolateral corner of outer dilatation, and indistinct (sometimes distinct) markings near diagonal grooves, fuscous; mesonotum with a central longitudinal stripe, of which posterior 1/2 a little broadened and reaching to cruciform elevation, a roundish spot at each side of posterior end of central stripe, which bearing a branch anteriorly, a pair of shorter and inwardly curved stripes at outer sides of anterior 1/2 of central stripe, a pair of wider stripes next to curved stripes, lateral margins, which are present or absent depending on individuals, and a pair of small longitudinal, triangular markings between anterior parts of curved stripes and wider stripes, fuscous; cruciform elevation mostly dull ochreous; abdomen a little brownish ochreous with few markings; male 1st–7th and female 1st–8th terga covered with tiny golden hairs; male 8th tergum covered with white pollinosity. Ventral parts of head, thorax, legs, and opercula a little greenish pale ochreous with a few fuscous markings and sparsely covered with tiny hairs and white pollinosity; frontoclypeus with a central longitudinal stripes and transverse markings along anterior transverse striations, blackish; lorum mostly blackish; underside of fore femur and claws apically, blackish; male abdomen pale ochreous, covered with tiny white hairs and white pollinosity; female abdomen pale ochreous and covered with tiny white hairs and white pollinosity. Wings slightly tinged with

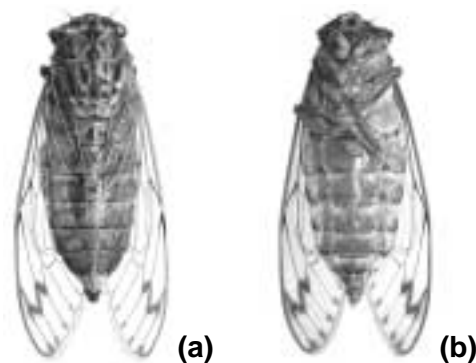
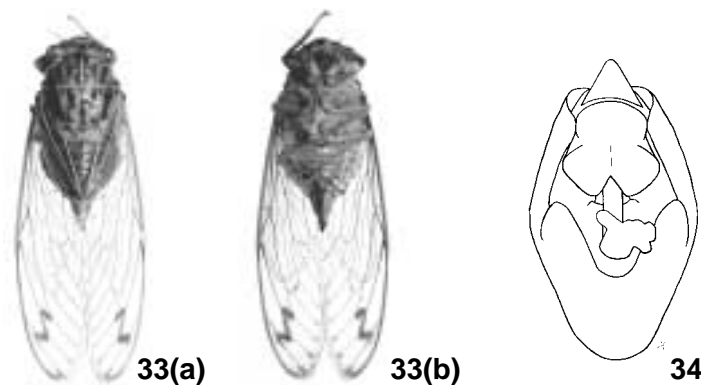


Fig. 32. A male *Taiwanosemia hoppoensis* in dorsal (a) and ventral (b) views.



Figs. 33-34. 33. A female *Taiwanosemia hoppoensis* in dorsal (a) and ventral (b) views; 34. Male pygofer of *Taiwanosemia hoppoensis* in ventral view.

pale brown; areas along 1st and 2nd cross veins and base of vein R_{4+5} thickly infuscated, and sometimes base of R_3 obscurely infuscated; a small round infuscation appearing on 3rd cross vein and on each apical portion of veins R_3 , R_{4+5} , M_1 , M_2 , M_3 , M_4 , and CuA_1 , forming a series of spots on subapical margin of forewing. See also the description by Kato (1932).

Male genitalia (Fig. 34). Pygofer oval in ventral view, with a small but acute triangular caudal beak; uncus lobe big, wide with apex incised in ventral view, and a little curved at apex in lateral view; aedeagus thick, protruding out of apex of uncus lobe.

Measurements. Body length: ♂ approximately 33.5 mm, ♀ approximately 24 mm. Total length: ♂ approximately 40.5 mm, ♀ approximately 41.5 mm.

Material examined. [HC] 1 ♀, Hsinchu, date uncertain, HY Wang (NTM); [TN] 1 ♂, Chengshili (城西里), Tainan City, 14 VI 2001, JH Chen (SUU); 1 ♂, same data except 18 VI 2001 (SUU); 3 ♂, 4 ♀, same data except 21 VI 2001 (SUU); 30 ♂, 13 ♀, same locality, 18 VI 2002, M Hayashi *et al.* (SUU); 2 ♀, same locality, 6 VII 2002, JH Chen (YJL); 1 ♂, same locality, 9 VIII 2002, JH Chen (YJL); 1 ♂, same locality, 12 VIII 2002, JH Chen (YJL).

Biology. This endemic species is locally distributed in lowlands of Taiwan. Adults appear from May to August. According to Kato (1925a, 1933, 1956), adults inhabit shrubs inside the forest, and males sing at dawn and in the evening.

Male chirping. A call consists of several tens of repetitions of the burst of “ddraeg!” at a high pitch, which is repeated at a rate of about 2–2.5 bursts per second. See also the descriptions given by Kato (1925a, 1932, 1933, 1956).

Localities. [HC] Hsinchu (Kato, 1927a), Beipu (Matsumura, 1907), Shuangchi (雙溪) (Kato, 1926a); [IL] Ilan (Kato, 1925a); [ML] Tungshiau (通霄) (Kato, 1925a); [YL] Douliou (Kato, 1925a); [CI] Juchi (Kato, 1925a), Chiai (Kato, 1925a); [TN] Tainan (Kato, 1927a), Chengshili, Tainan City (new).

Distribution. Taiwan.

Taiwanese name. 暗蟬 (Kato, 1956).

REFERENCES

- Chen, K.-F. 1933. [Common cicadas to China and Japanese Empire.] Ent. World 1: 358–361. (In Chinese)
- Chou, I., Z. Lei, L. Li, X. Lu, and W. Yao. 1997. The Cicadidae of China (Homoptera: Cicadoidea). *Illustrataj Insect-faunoj*: 2. 10+380+5 pp., 4+16 pls. Tianze Eldoneio, Hong Kong. (In Chinese with English summary)
- Duffels, J.P. and P.A. van der Laan. 1985. Catalogue of the Cicadoidea (Homoptera, Auchenorrhyncha) 1956–1980. *Series Entomologica*, 34, xiv+414 pp. Dr. W. Junk Publishers.
- Hayashi, M. 1979. A list of Taiwanese Cicadidae collected by Prof. K. Kojima and Mr. S. Nakamura (Homoptera). *Rostria* 30: 259–262. (In Japanese with English summary)
- Hirayama, S. 1937. [Colored iconography of thousand insects of Japan, 2nd series.] 194 pp., 88 pls. Sanseido, Tokyo. (In Japanese)
- Kato, M. 1925a. Japanese Cicadidae, with descriptions of new species. *Trans. Nat. Hist. Soc. Formosa* 15: 1–47, 1 pl. (In Japanese)
- Kato, M. 1925b. The Japanese Cicadidae, with descriptions of some new species and genera. *Trans. Nat. Hist. Soc. Formosa* 15: 55–76, 2 pls. (In Japanese with English descriptions)
- Kato, M. 1925c. Japanese Cicadidae, with descriptions of two new species, one new subspecies and an aberrant form. *Trans. Nat. Hist. Soc. Formosa* 15: 92–101. (In Japanese with English descriptions)
- Kato, M. 1926a. The Japanese Cicadidae, with descriptions of 4 new species, one new subspecies and two new aberrant forms. *Trans. Nat. Hist. Soc. Formosa* 16: 23–31. (In Japanese with English descriptions)
- Kato, M. 1926b. Japanese Cicadidae, with descriptions of four new species. *Trans. Nat. Hist. Soc. Formosa* 16: 171–176, 1 pl. (In Japanese with English descriptions)
- Kato, M. 1927a. A catalogue of Japanese Cicadidae, with descriptions of new genus, species and others. *Trans. Nat. Hist. Soc. Formosa* 17: 19–41. (In Japanese with English descriptions)
- Kato, M. 1927b. Descriptions of some new Japanese and exotic Cicadidae. *Trans. Nat. Hist. Soc. Formosa* 17: 274–283, 1 pl. (In Japanese with English descriptions)
- Kato, M. 1928. Descriptions of two new genera of Japanese Cicadidae and corrections of some species. *Ins. World* 32: 182–188. (In Japanese)
- Kato, M. 1930. Notes on the distribution of Cicadidae in Japanese Empire. *Bull. Biogeogr. Soc. Japan* 2: 36–76. (In Japanese with English descriptions)
- Kato, M. 1931. Semi, part 3. *Trans. Nat. Hist. Soc. Formosa* 21: 217–221. (In Japanese)
- Kato, M. 1932. Monograph of Cicadidae. 450 pp., 32 pls. Sanseido, Tokyo. (In Japanese)
- Kato, M. 1933. Three colour illustrated insects of Japan. Fasc. 3 (Homoptera). 9 (+50)+11 pp., 50 pls. Kōseikaku, Tokyo. (In Japanese)
- Kato, M. 1938a. A revised catalogue of Japanese Cicadidae. *Bull. Cicad. Mus.* 1: 1–50. (In Japanese)
- Kato, M. 1938b. Studies on Chinese Cicadidae in Musée Heude collection. *Bull. Cicad. Mus.* 2: 1–28. (In Japanese with English resume)
- Kato, M. 1939. On two Formosan Cicadidae recorded by Mr. F. Schumacher. *Bull. Cicad. Mus.* 7: 1–2. (In Japanese)
- Kato, M. 1940. On some cicadas from Tai (Siam). *Bull. Cicad. Mus.* 11: 1–3. (In Japanese with an English description)
- Kato, M. 1956. The biology of the cicadas. 319 pp., 46 pls. Iwasakishoten Co., Tokyo. (In Japanese)

- Lee, Y.J. and M. Hayashi. 2003. Taxonomic review of Cicadidae (Hemiptera, Auchenorrhyncha) from Taiwan, part 1. Platyleurini, Tibicenini, Polyneurini, and Dundubiini (Dundubiina). *Ins. Koreana* 20: 149–185.
- Matsumura, S. 1907. Die Cicadinen Japans. *Annot. Zool. Japon.* 6: 83–116.
- Matsumura, S. 1913. Thousand insects of Japan, additamenta 1: 1–184, pls. i–xv. (In Japanese)
- Matsumura, S. 1917. A list of the Japanese and Formosan Cicadidae, with description of new species and genera. *Trans. Sapporo Nat. Hist. Soc.* 6: 186–212.
- Metcalf, Z.P. 1963. General catalogue of the Homoptera, Fasc. VIII (Cicadoidea). Pt. 1. Cicadidae, 919 pp.; Pt. 2. Tibicinidae, 492 pp. North Carolina State Univ., Raleigh.
- Schmidt, E. 1932. Verzeichnis der Cicaden des chinesischen Reiches. *Bull. Peking Nat. Hist.* 7: 117–133.
- Schumacher, F. 1915. H. Sauter's Formosa-Ausbeute. *Homoptera. Suppl. Ent.* 4: 108–142.
- Walker, F. 1850. List of the specimens of homopterous insects in the collection of the British Museum, part 1: 1–260, pls. 1–2.

(Received: October 25, 2003, Accepted: December 3, 2003)