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Euterpnosia ampla, a New Species of Cicada from Taiwan (Hemiptera: Cicadidae)

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ABSTRACT

A new species of cicada, *Euterpnosia ampla* **sp. nov.**, belonging to the *varicolor* group, was described from Northern Taiwan. This species is distinct from other allied species in its large body size and wider male abdomen shape. The species is similar to *E. alpina* in its dark coloration but the morphology of aedeagus shows that *E. ampla* should be more closely related to *E. madawdawensis* from Eastern Taiwan.

Key words: *Euterpnosia*, *varicolor* group, Dundubiini, taxonomy, male genitalia

Introduction

Euterpnosia is a cicadid genus belonging to the tribe Dundubiini (Duffels and van der Laan, 1985; Moulds, 2005). Thirteen *Euterpnosia* species have been recorded from Taiwan and all of them are endemic (Lee and Hayashi, 2003; Chen, 2005). *Euterpnosia varicolor* Kato, 1926, *E. alpina* Chen, 2005, and *E. madawdawensis* Chen, 2005 are recognized as a species group (Chen, 2005), sharing the following characters: forewing spotted with infuscations on cross veins R_3-R_{4+5}, R_{4+5}-M_1, M_2-M_3, and M_4-CuA_1, and on apical part of veins R_{4+5}, M_1, M_2, M_3, M_4, CuA_1, and CuA_2 (Fig. 1A); projection on each lateral side of male 4th abdominal tergum is large and distinct (Fig. 1A-C); ventral lobe of male pygofer without subapical projection on inner side (Fig. 1E). Herein I described a new species belonging to this species group, i.e., the *varicolor* group, from Northern Taiwan.

Materials and Methods

Two males and one female of the new *Euterpnosia* species were collected from the Tsuifeng Forest Road near the Taipingshan Forest Recreation Area in Northern Taiwan by Dr. Wen-I Chou and Mr. Shu-Ping Wu. These three specimens were preserved with sorbic acid and frozen for a long time, leading to fading in coloration, especially in green color. As a result, the coloration of this new species was not emphasized in the description. The type specimens of this new species are deposited in the National Museum of Natural Science (NMNS), Taichung, Taiwan. All high quality images of the type specimens can be requested from me.

The method of measurements on specimens follow Chen (2005). Male genitalia were examined and photographed by a dissecting microscope (Leica MZ16). The aedeagus of the male paratype (NMNS 4929-59) was mounted on a slide with Entellan (Merck, Germany), then examined and photographed by a light microscopy (Olympus BX1). Images of male genitalia (Fig. 1E, F) were processed by the software Auto-Montage (Syncroscopy Co., Cambridge, UK) to increase the depth of field.

Taxonomy

Key to males of the *varicolor* group of *Euterpnosia* from Taiwan

1. Aedeagus without apical and subapical projection ..... *E. alpina* Chen
- Aedeagus bearing apical and subapical projection (Fig. 1F)..... 2
2. Vesica of aedeagus small, without proximal extension..... *E. varicolor* Kato
- Vesica of aedeagus large, bearing proximal

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extension (Fig. 1F)..... 3
3.Thorax wider than 6th abdominal tergum width (Fig. 1C, G); mesonotum green with black fascia (Fig. 1C)..... *E. madawdawensis* Chen
- Thorax narrower than 6th abdominal tergum width (Fig. 1A); mesonotum black (Fig. 1A)..... ……..... *E. ampla* **sp. nov.**

Euterpnosia ampla Chen, **sp. nov.**
(Table 1-2; Fig. 1A, D-F)

Diagnosis: *E. ampla* (Fig. 1A) is similar to *E. alpina* (Fig. 1B) in coloration but can be distinguished from *E. alpina* by following characters: body size larger (Fig. 1A-B); 6th abdominal tergum wider than thorax (Fig. 1A); male pygofer (3.4 mm in length) smaller than that of *E. alpina* (4.0 mm in length); apical and subapical projections present on the apical part of aedeagus (Fig. 1F). Moreover, *E. ampla* is similar to *E. madawdawensis* in the morphology of male genitalia, including the shape of uncus lobe (Fig. 1E) and the apical part of aedeagus (Fig. 1F). However, these two species are quite different in three aspects. First, the body length of male *E. ampla* (29.2-31.0 mm) is distinctly longer than that of male *E. madawdawensis* (24.9-26.2 mm). Second, the male abdomen of *E. ampla* is wider in shape. Male 6th abdominal tergum is wider than thorax in *E. ampla* (Fig. 1A), but narrower than thorax in *E. madawdawensis* (Fig. 1C). Third, the coloration of male *E. ampla* is more darkened (Fig. 1A, C). It is easy to distinguish *E. ampla* from *E. madawdawensis* by the black mesonotum and darker wing veins. See Table 1 for more comparison.

Description: Male. Head width same to mesonotum width; vertex black, with some irregular brown marks between lateral ocelli and eyes; postclypeus slightly protruding anteriorly, with a tawny triangular spot in front of central ocellus in dorsal view and a wide longitudinal black fascia situated centrally in ventral view; anteclypeus almost entirely black; rostrum extending to coxa of hind leg.

Pronotum entirely black in inner area except central fascia; pronotum collar tawny, bearing two black spots on each posterolateral lobe. Mesonotum black except a pair of paramedian patches in the holotype; cruciform elevation bearing a median black fascia and a black base. Lateral edge of operculum rounded; operculum pale brownish with black edge in the holotype, much darkened in the male paratype. Wings hyaline; wing veins black or fuscus; forewing slightly tinged and spotted with infuscations on 1st, 2nd, 3rd, and 4th cross veins, on apical part of veins R_3, R_{4+5}, M_1, M_2, M_3, M_4, CuA_1, and CuA_2, and on distal end of clavus.

Abdomen brownish, clothed with sparse silver

Table 1. Morphological differences of males among *Euterpnosia ampla* **sp. nov.** and the congeners of the *varicolor* species group.

Characters	*E. ampla* **sp. nov.**	*E. alpina* Chen, 2005	*E. madawdawensis* Chen, 2005	*E. varicolor* Kato, 1926
Body length* (mm)	29.2-31.0	25.6-28.3	24.9-26.2	25.3-28.0
Wing-spread width (mm)	71.7-75.9	65.4-69.9	65.5-68.7	66.8-72.2
Coloration of mesonotum	Black	Usually black	Green with black fascia	Variable
6th abdominal tergum width	Wider than thorax width	Narrower than thorax width	Narrower than thorax width	Narrower than thorax width
Uncus lobe of pygofer	Narrowed or not narrowed at base	Narrowed at base	Not narrowed at base	Narrowed at base
Apical projection of aedeagus	Present	Absent	Present	Present
Subapical projection of aedeagus	Present	Absent	Present	Present
Vesica of aedeagus	Large	Small	Large	Small
Proximal extension of vesica	Present	Absent	Present	Absent

* Pygofer and hypandrium are excluded

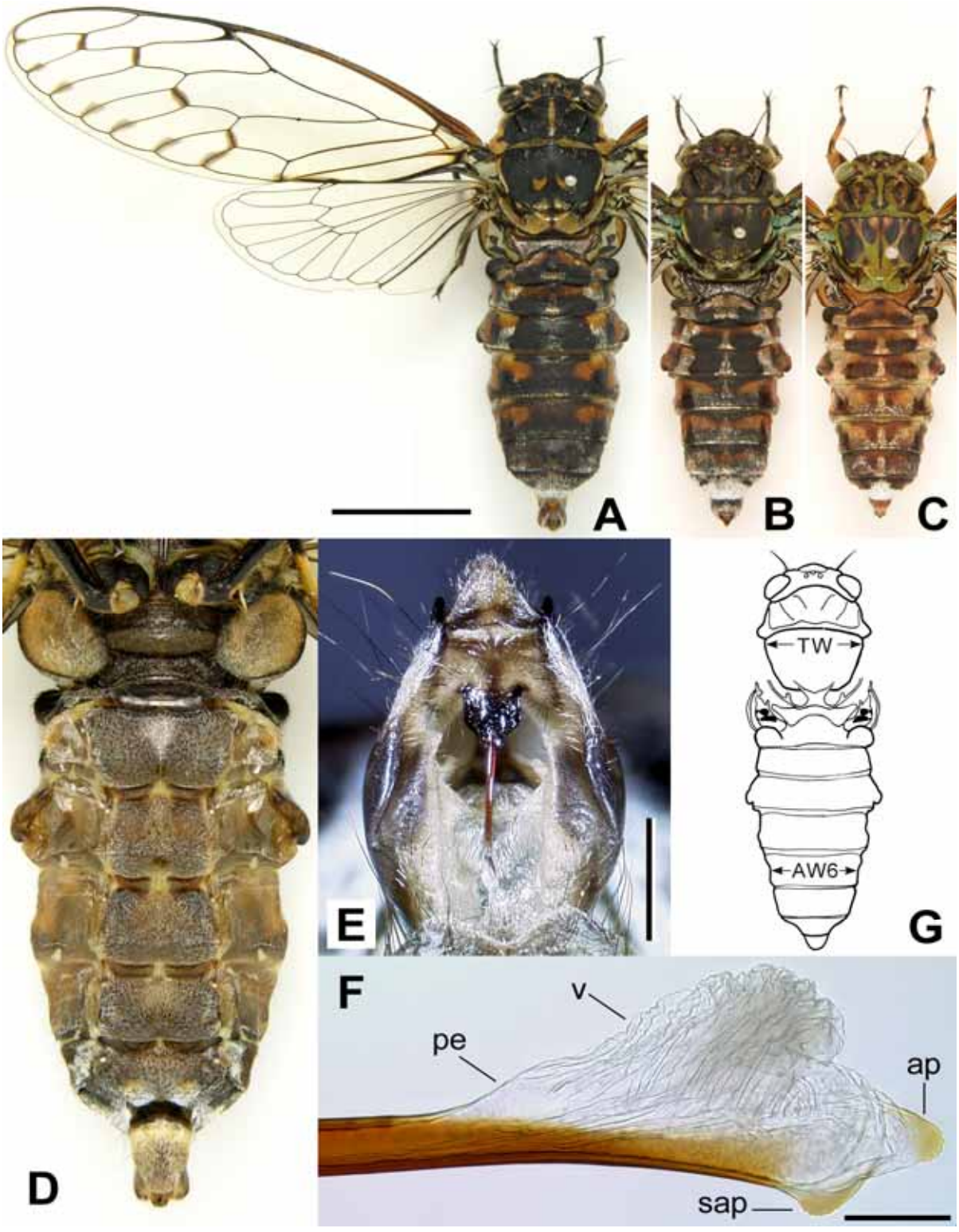

Figure 1. (A) Holotype of *Euterpnosia ampla* **sp. nov.**, NMNS 4929-58; (B) holotype of *E. alpina*, NMNS 4929-4; (C) holotype of *E. madawdawensis*, NMNS 4929-1; (D) male abdomen of *E. ampla* in ventral view, holotype; (E) male genitalia of *E. ampla* in ventral view, holotype; (F) apical part of aedeagus of *E. ampla* in lateral view, paratype, NMNS 4929-59; (G) measurements applied in the key to species. (ap) apical projection; (AW6) 6th abdominal tergum width; (pe) proximal extension of vesica; (sap) subapical projection; (TW) thorax width; (v) vesica. Scale bars represent 10 mm for (A-C), 1 mm for (E), and 100 μm for (F), respectively.

Table 2. Measurements of male *Euterpnosia ampla* **sp. nov.**

Variables (mm)	Holotype NMNS 4929-58	Paratype NMNS 4929-59
Body length*	31.0	29.2
Head and thorax length	11.8	11.1
Abdomen length	19.2	18.1
Head width	7.6	7.1
Thorax width	7.7	7.1
3rd abdominal tergum width	8.6	8.5
Abdominal projection width	10.8	10.7
5th abdominal tergum width	8.9	8.9
6th abdominal tergum width	8.0	7.9
Forewing length	35.3	33.6
Wing-spread width	75.9	71.7

* Pygofer and hypandrium are excluded

pile in dorsum; black, wide transverse fasciae present on 2nd, 3rd, and 4th terga centrally; black, narrow transverse fasciae present on anterior and posterior edges of 5th and 6th terga; a black spot present on each sublateral area of 3rd, 4th, 5th, and 6th terga; tymbal cover slightly everted, pilose, entirely black; projection on each lateral side of 4th tergum large, with black tip and a distinct notch; posterior half of 5th tergum projecting laterally; 7th tergum black; 8th tergum covered with white wax. Venter of abdomen brownish, slightly translucent; sterna covered with erect hairs and sparse white wax.

Male genitalia. Pygofer oval; uncus lobe not narrowed at base and entirely black in the holotype (NMNS 4929-58), but narrowed at base and bearing a longitudinal obscure fascia situated centrally in the paratype (NMNS 4929-59); inner edge of ventral lobe smooth without subapical projections; apical part of aedeagus bearing one apical and one subapical sclerotized projections; both projections flat, with slightly indented edge; membranous vesica hyaline, large, and bearing obvious folds and a proximal extension.

Measurements: 2 ♂, 1 ♀. Body length: ♂, 29.2-31.0 mm (pygofer and hypandrium excluded); ♀, 25.6 mm (ovipositor included). See Table 2 for details.

Type series: Holotype: 1 ♂, Taiwan, Ilan Hsien (county), Nanao Hsiang (township), Tsuifeng Forest Road, alt. 1900 m, 1 V 2004, WI Chou leg., NMNS 4929-58 (ex JHCC 1003). Paratypes: 1 ♂, same data as for holotype, NMNS 4929-59 (ex JHCC 1004); 1 ♀, Tsuifeng Forest Road, start of hiking trail to Mt. Sanhsingshan, by light trap, at 19:00, 10 V 2002, SP Wu leg., NMNS 4929-54 (ex JHCC 0460).

Distribution: Only known from the Tsuifeng Forest Road near the Taipingshan Forest Recreation Area, Ilan County, Taiwan.

Etymology: The Latin *ampla* refers the large size of this species (Lat. *amplus, ~a, ~um,* large, big, impressive in size and splendour).

Biology: The dominant vegetation along the Tsuifeng Forest Road is coniferous plantation, but the preferred habitats and host plants of *E. ampla* remain unknown. According to the collectors, two males were collected from broad-leaved trees by netting, and the female was attracted to mercury-vapor light traps at night.

Discussion

Although only two male specimens are available, the large body size, which is the largest among Taiwanese *Euterpnosia* species, and the wider male abdomen shape make *E. ampla* distinct from other species of the *varicolor* group. However, more specimens should be obtained to confirm stable characters in this species, especially those characters used in the key.

E. ampla is very similar to *E. alpina* in its darker coloration, but the morphology of aedeagus shows that *E. ampla* should be more closely related to *E. madawdawensis*. These two species share following genital characters: proximal extension of vesica present, vesica large and bearing many folds, apical and subapical projections present on the apical part of aedeagus. The darker coloration of *E. ampla* and *E. alpina* may be adaptive for cool alpine habitats (e.g. Ellers and Boggs, 2004). Both species inhabit high mountain regions and adults of both species occur in early May. Males of *E. alpina* usually call on high twigs in the sunshine, but they are often quiet when it is cloudy and cold (pers. obs.). Such melanization may help these alpine cicadas to raise body temperature more efficiently for diurnal activities when basking. In contrast to males, females of *E. alpina* and *E. ampla* do not have entirely melanized mesonotum.

It is still impracticable to make an unambiguous key to identify species of the *varicolor* group without using microscopic characters of male genitalia, making species

identification inconvenient for ecologists. Male calling songs are species-specific in *E. varicolor*, *E. alpina*, and *E. madawdawensis* (Chen, 2005). It is likely that the calling song of *E. ampla* is distinct as well and can be useful for species identification.

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台灣的新蟬種－翠峰姬春蟬（半翅目：蟬科）

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摘　要

本文描述一種產於台灣北部山區，屬於姬春蟬屬 *varicolor* 種群的新蟬種－翠峰姬春蟬（*Euterpnosia ampla* **sp. nov.**）。相較於其他近緣種，本種體形明顯較大且雄性腹部形狀較寬。在 *varicolor* 種群中本種偏暗的體色與高山姬春蟬（*E. alpina*）的體色十分近似，但陽莖形態顯示本種可能與台灣東部所產的新港山姬春蟬（*E. madawdawensis*）較為近緣。

關鍵詞：*Euterpnosia*、*varicolor* 種群、Dundubiini、分類學、雄性生殖器

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