

## **A Checklist of the Genus *Malaxa* (Hemiptera: Fulgoromorpha: Delphacidae) with Descriptions and Illustrations of *Malaxa Bispinata* Newly Recorded in China and The Fifth Instar of *Malaxa delicata***

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A CHECKLIST OF THE GENUS *MALAXA* (HEMIPTERA: FULGOROMORPHA: DELPHACIDAE) WITH DESCRIPTIONS AND ILLUSTRATIONS OF *MALAXA BISPINATA* NEWLY RECORDED IN CHINA AND THE FIFTH INSTAR OF *MALAXA DELICATA*

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ABSTRACT

The Oriental and Neotropical delphacid genus *Malaxa* is reviewed and currently includes 11 species. *Malaxa fusca* Yang and Yang (1986) is removed from synonymy with *M. semifusca* Yang & Yang 1986, and is considered valid. *Malaxa bispinata* Muir, 1926, is re-described and re-illustrated as a new record in China. The fifth instar of *M. delicata* Ding & Yang 1986, is described and illustrated for the first time. A key to the species of this genus in China is provided.

Key Words: bamboo pests, immature stages, Oriental region, planthoppers, taxonomy

RESUMEN

Se revisa *Malaxa*, un género oriental y neotropical que actualmente incluye 11 especies. Se retira *Malaxa fusca* Yang y Yang de su sinonimia con *M. semifusca* Yang & Yang 1986, y es considerado como válido. Se describe e ilustra de nuevo *Malaxa bispinata* Muir, 1926 y se informa como un nuevo registro de distribución en China. Se describe e ilustra por primera vez el quinto estadio ninfal de *M. delicata* Ding & Yang 1986. Se provee una de las claves de las especies de este género en China.

Palabras Clave: plagas de bambú, estadios inmaduros, región oriental, salta-hojas, taxonomía

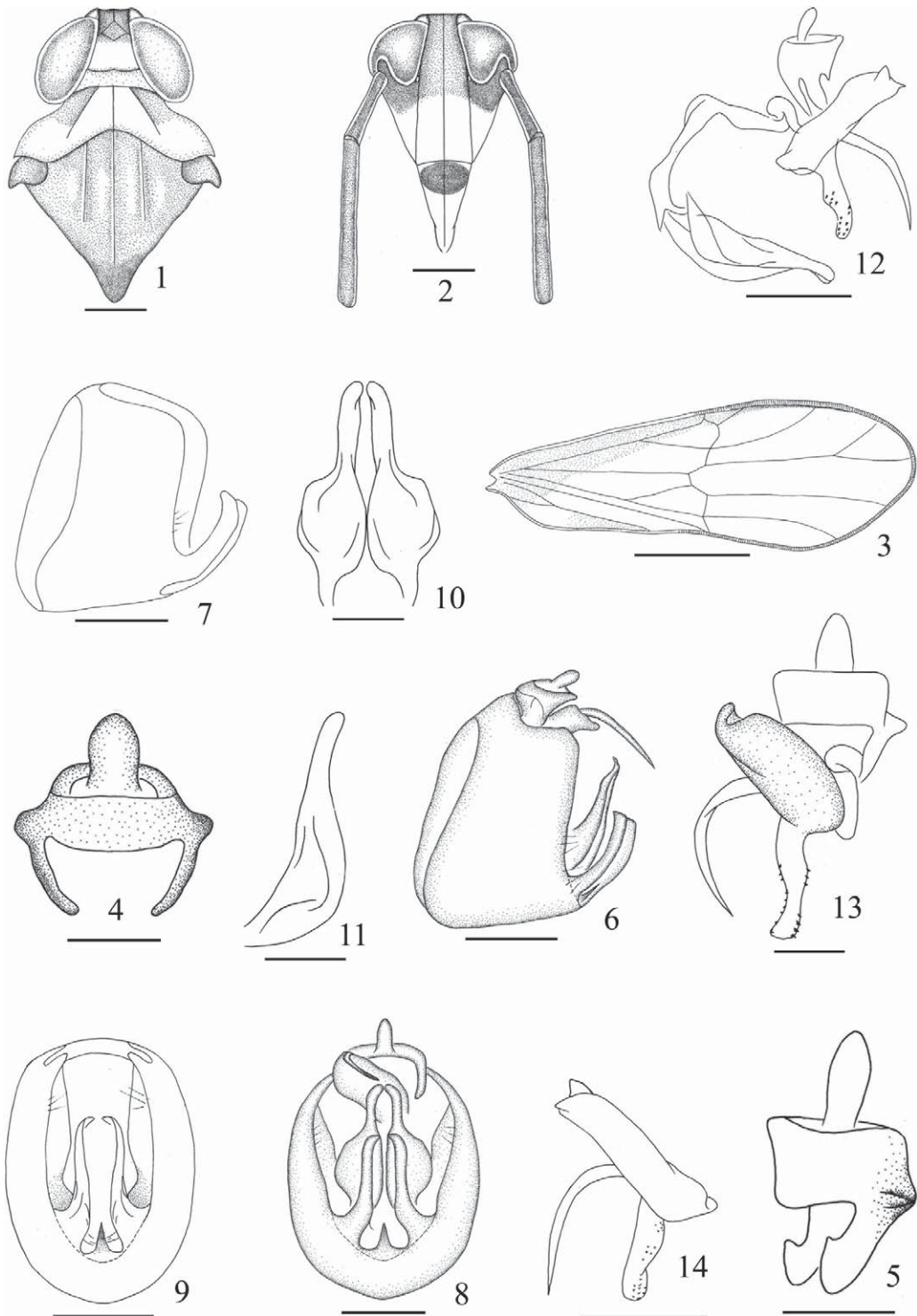
The delphacid genus *Malaxa* was established by Melichar (1914) with *Malaxa acutipennis* Melichar, 1914 (Philippines) as its type species. It belongs to the tribe Tropidocephalini within the subfamily Delphacinae (Hemiptera: Fulgoroidea: Delphacidae) (Melichar et al. 1914; Chen et al. 2006; Ding 2006) and is easily distinguished from other members in this tribe by its very long antennae (Figs. 2 and 17), by the slender, patterned body, and by the tegmina often with blackish brown markings (Chen et al. 2006). This genus is only known to occur in the Oriental and Neotropical regions. To date, 11 species have been described (Melichar 1914; Muir 1919, 1926a, 1926b, 1930; Ding et al. 1986; Yang & Yang 1986; Yang 1989; Chen et al. 2006).

In this paper the species of the genus *Malaxa* are reviewed, and *M. fusca* Yang et Yang is restored to a valid species. *Malaxa bispinata* Muir, 1926, collected from Hainan Province, a new record for China, is re-described and re-illustrated. The fifth instar of *M. delicata* Ding et al. 1986, is

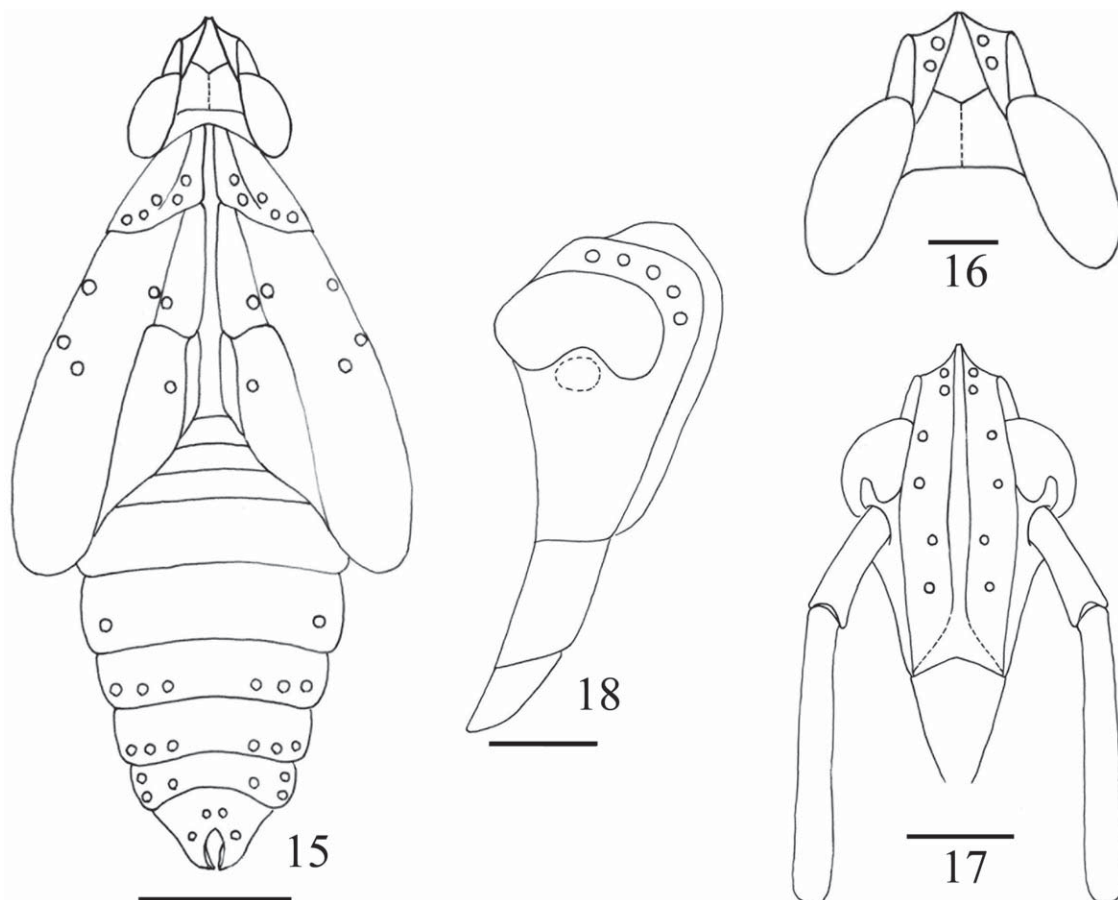
described and illustrated for the first time. A key for identifying the 5 Chinese species of this genus *Malaxa* is provided.

MATERIALS AND METHODS

Morphological terminology used in this work follows Chen et al. (2006). Dry specimens were used for the description and illustration. External morphology was observed under a stereoscopic microscope and characters were measured with an ocular micrometer. The genital segments of the examined specimens were macerated in 10% KOH and details of the genitalia were drawn from preparations in glycerin jelly with the aid of a light microscope. Illustrations were made with a Leica MZ 12.5 stereomicroscope. The formula of spines refers to the numbers of apical spines of the metathoracic tibiae and 1st and metathoracic tarsomeres. The type specimens and other examined specimens are deposited in the Insect Collection at the Institute of Entomology, Guizhou



Figs. 1-14. *Malaxa bispinata* Muir. 1. Head and thorax, dorsal view; 2. Frons and clypeus; 3. Forewing; 4. Anal segment, ventral view; 5. Anal segment, lateral view; 6. Male genitalia, lateral view; 7. Pygofer, lateral view; 8. Male genitalia, posterior view; 9. Pygofer, posterior view; 10. Genital styles, posterior view; 11. Genital style, lateral view; 12. Anal segment, aedeagus, connective and genital style, lateral view; 13. Anal segment and aedeagus, right side; 14. Aedeagus, lateral view. Scale bars = 0.2 mm (Figs. 1, 2, 6-10, 12-14); 0.1 mm (Figs. 4, 5, 11); 0.4 mm (Fig. 3).



Figs. 15-18. *Malaxa delicata* Ding and Yang fifth instar. 15. Body, dorsal view; 16. Head, dorsal view; 17. Head, ventral view; 18. Head, lateral view. Scale bars = 0.4 mm (Fig. 15); 0.1 mm (Fig. 16); 0.2 mm (Figs. 17-18).

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#### Descriptive Taxonomy

##### *Malaxa* Melichar

*Malaxa* Melichar, 1914: 275; Muir, 1926b: 7; Fennah, 1945: 429; Yang et Yang, 1986: 56; Ding, Huang and Zhou, 1999: 443; Chen et al., 2006: 160; Ding, 2006: 150.

Type species: *Malaxa acutipennis* Melichar, 1914, by original designation.

The description of the distinctive characters used by Chen et al. (2006) is modified as follows: Body slender and elongate, length (from apex of vertex to tip of tegmina): male 3.7-4.8mm, female 4.3-5.1mm, often with blackish brown markings.

Head with eyes narrower than pronotum. Vertex longer or slightly shorter in middle than

broad at base (0.95-1.24: 1), apex projected in front of eyes. Submedian carinae uniting before apex, greatest length of basal compartment shorter than wide at base of vertex (0.48-0.81: 1). Frons relatively long, longer in middle line than wide at widest part (about 2.73-3.00: 1), widest at middle or apex. Rostrum reaching mesothoracic trochanters. Antennae cylindrical, very long, surpassing apex of clypeus, basal segment longer in middle than wide at apex (3.67-5.22: 1), shorter than frons in middle line (0.49-0.74: 1), shorter than second segment (0.40-0.56: 1). Pronotum shorter than vertex in middle line (0.58-0.96: 1), lateral carinae attaining hind margin. Mesonotum longer in middle line than vertex and pronotum together (1.33-2.05: 1). Tegmina elongate, longer in middle line than wide at widest part (1.76-3.16: 1), much longer than abdomen, hyaline, cross vein deposited medially, apical margin acutely rounded. Spinal formula of hind tibia 5-6-4.

Post-tibial spur large and thick, concave on inner surface, without teeth along the hind margin, with an apical tooth.

Anal segment of male short, ring-like, left lateroapical angle produced into process. Pygofer with two broad lamellate medioventral processes, between of them with a V-like emargination. Genital styles broad in basal half, forked or with process at apex. Aedeagus with or without phallobase, phallus tubular, curved C-like and directed segmental venter.

#### Host Plants

Bamboo (Poaceae: Bambusoideae including *Fargesia*, *Bambusa*, *Indocalamus*, *Phyllostachys*).

#### Distribution

Oriental and Neotropical regions.

#### CHECKLIST, HOST PLANT AND DISTRIBUTION OF *MALAXA* MELICHAR

1. *Malaxa acutipennis* Melichar, 1914: 275.

#### Host Plant

Unknown.

#### Distribution

Philippines (Luzon).

2. *Malaxa bispinata* Muir, 1926a: 398. (New record for China)

#### Host Plant

Bamboo (Poaceae: Bambusoideae: *Bambusa*).

#### Distribution

Indonesia (Mentawai Islands), China (Hainan).

3. *Malaxa delicata* Ding & Yang 1986: 418

#### Host Plant

*Phyllostachys* sp. (Poales: Poaceae: Bambusoideae) (Chen et al. 2006).

#### Distribution

South China (Zhejiang, Guizhou, Fujian, Yunnan, Taiwan).

4. *Malaxa fusca* Yang et Yang, 1986: 61. (Status revised)

#### Host plant

*Bambusa multiplex* Raeuschel cv. "Femleaf" Young (Poales: Poaceae: Bambusoideae) (Yang & Yang 1986).

#### Distribution

China (Taiwan).

#### Remarks

*Malaxa fuscaw* was first described by Yang & Yang (1986) based on 1 female from Taiwan, China, and was synonymised with *M. semifusca* Yang & Yang 1986 by Ding (2006). However, those 2 species are distinctly different in the markings of their forewings and in the shape of male genitalia (Chen et al. 2006), so it should be restored to a valid species.

5. *Malaxa hunanensis* Chen, 2006: 163.

#### Host plant

*Indocalamus* sp. (Poales: Poaceae: Bambusoideae) (Chen et al. 2006).

#### Distribution

South China (Hunan).

6. *Malaxa javanensis* Muir, 1919: 524.

#### Host plant

Unknown.

#### Distribution

Indonesia (Java).

7. *Malaxa microstyla* Muir, 1930: 207.

#### Host plant

Unknown.

#### Distribution

South America (Bolivia).

8. *Malaxa nigra* Muir, 1919: 524.

#### Host plant

Unknown.

#### Distribution

Philippines (Luzon).	Unknown.
9. <i>Malaxa obtusipennis</i> Muir, 1919: 523.	Distribution
Host plant	South America (Ecuador) .
Unknown.	11. <i>Malaxa semifusca</i> Yang & Yang, 1986: 62
Distribution	Host plant
Borneo.	<i>Fargesia</i> sp. (Poales: Poaceae: Bambusoideae) (Chen et al. 2006).
10. <i>Malaxa occidentalis</i> Muir, 1926b: 7.	Distribution
Host plant	South China (Guizhou, Taiwan).

KEY TO THE SPECIES OF *MALAXA* MELICHAR FROM CHINA

- 1. Postclypeus yellow; tegmina with apical veins Cu<sub>1</sub> and M<sub>2</sub> diverging apically, posterior half of apical tegmina dark brown, tegulae yellow; anal segment of male without long process, just with a convex lobe at left-ventral margin; aedeagus with distinct phallobase . . . . . *M. semifusca*
- Postclypeus with basal half blackish brown; tegmina with apical veins Cu<sub>1</sub> and M<sub>2</sub> fused, first and second apical cells hyaline; tegulae with apical half dark brown or hyaline; anal segment of male with a stout process at lateroapical margin or no process; phallobase complex or absence . . . . . 2
- 2. Genae basal half dark brown; anal segment of male without process; phallobase complex, coverer on basal half of phallus; genital styles apical half narrowing abruptly, not forked and blunt at apex . . . . . *M. bispinata*
- Genae all or mostly dark brown; anal segment of male with process; genital styles with inner and outer apical angles . . . . . 3
- 3. Genae dark brown; in posterior view, process of anal segment of male relatively short and broad, lobe-like, situated in middle of ventral margin; outer apical angle of genital styles not forked . . . . . *M. hunanensis*
- Genae mostly dark brown but apical small part yellow; in posterior view, process of anal segment of male relatively long and stout, sinuous, situated on left side of ventral margin; outer apical angle of genital styles forked . . . . . 4
- 4. Area between lateral carinae of pronotum dark brown; two branches of outer apical angle of genital styles subequal; aedeagus with one small spine situated near basal third, directed caudally . . . . . *M. delicata*
- Area between lateral carinae of pronotum mostly yellow; two branches of outer apical angle of genital styles unequal; aedeagus with one small tooth situated near middle, directed right. . . . . *M. fusca*

*Malaxa bispinata* Muir, 1926a, new record to China (Figs. 1-14)

*Malaxa bispinata* Muir, 1926a: 398.

Description. Length of body 1.8mm (male), 2.5mm (female); including forewing 3.5mm (male), 4.4mm (female). General color pale brown with dark brown to blackish brown markings, shiny. Vertex apical half and lateral parts

of pronotum dark brown. Vertex basal half and pronotum mostly dirty yellowish brown. Mesonotum brown, scutellum blackish brown. Frons and basal half of genae dark brown to blackish brown, distal half of genae yellowish white. Clypeus yellowish white, except base of postclypeus with oval black marking. Eyes and ocelli reddish brown. Antennae with dorsal side dirty yellowish brown to brown, with ventral side brown to dark brown. Mesopleura dirty yellow, except the area of meso-



sternum, pro- and mesothoracic legs dark brown. Pro- and mesothoracic legs with tibiae and digitus mostly dark brown to blackish brown, with trochanter and femora yellowish white. Hind legs mostly yellowish white, except apex of femora and base of tibiae with dark brown stripes. Tegmina mostly hyaline, except triangle area at costal margin and base color light yellowish brown. Abdomen with dorsal side blackish brown, with ventral side yellowish white to light yellow. Genitalia brown to blackish brown.

Vertex longer than wide submedially at base about 1.1:1, submedian carinae uniting before apex. Frons relatively long, longer in middle line than wide at widest part (about 2.6:1), widest at apex. Antennae cylindrical, very long, surpassing apex of clypeus, scape longer in middle than wide at apex (4.6:1), shorter than pedicel (2:1). Rostrum reaching metatrochanters. Pronotum shorter than vertex in middle line (0.7:1), lateral carinae almost attaining hind margin. Mesonotum longer in middle line than vertex and pronotum together (1.7:1). Tegmina elongate, longer in middle line than wide at widest part (2.8:1).

Anal segment of male short, ring-like, with 2 small lobe-like processes at lateral apex in posterior view. Pygofer in profile tapering dorsally, in posterior view with opening longer than wide, ventral margin with 3 medioventral processes, intermediate process small and spine-like, bilateral processes very long and slender, obtuse at apex. Aedeagus with phallus tubular, tapering to apex, phallobase complex, incomplete, process long and cylindrical, with several small teeth along margin in distal half. Genital styles long, round at apex, with basal half broad and complanate, with distal half slender and tubulose, narrowing abruptly in middle.

#### Specimens Examined

1 male, 1 female, CHINA: Hainan, Bawangling National Natural Reserve (N 19° 05' E 109° 07'), 478-817 m asl, bamboo, 28-IV-2009 (X. H. Hou) (IEGU).

#### Host plant

Bamboo.

#### Distribution

Indonesia (Mentawai Islands), China (Hainan).

*Malaxa delicata* Ding et Yang, 1986 (fifth instar)(Figs. 15-18)

*Malaxa delicata* Ding et Yang, 1986: 418; Chen et al., 2006: 164; Ding, 2006: 150.

Description. Length of body 2.30 mm; width of head including eyes 0.46 mm; length of anterior wing pad 1.18 mm; length of antenna 0.75 mm. General color pale yellow to yellow. Eyes yellowish brown. Claw of legs, tibiae and digitus mostly at apex of hind legs, teeth of tibial spur black.

Head between eyes longer at middle line than wide at narrowest part about 1.6:1, vertex moderately protruding in front of eyes, anterior margin between submedian carinae straight, eyes slightly divergent posteriorly, width between highest points of eyes narrower than width between lowest points about 1:2.0, length of eye longer than length between level of eyes and lateral point of frons about 5.8:1; head including eyes wider than width between lateral point of frons about 2.7:1, wider than width of basal compartment at hind margin about 2.6:1; submedian carinae meeting lateral carinae of vertex base; basal compartment wider at hind margin than greatest length about 1.2:1, hind margin curved downward laterally. Frons longer in middle line than wide at widest part about 2.6:1, the widest part at level of ocelli, wider than apex of frons about 1.55:1, at level of widest part laterofrons wider than interfrons about 2.2:1, with two median carinae separated, nearly parallel. Number and arrangement of sensory pits is typical, each side with 3 extra pits basally, upper pits relatively centralized, median pits and lower pits are obviously separate; lower of lower pits lies far away from frontoclypeal suture, distance of former longer than between upper and lower of lower pits about 1.7:1; interval of upper and lower of median pits, nearly equal to between lower of median pits and upper of lower pits or between upper of median pits and lower of upper pits; distance of upper and lower of upper pits, about one diameter of pit. Area between eye and lateral carina with 5 sensory pits, with the ventral most pit at middle of eye. Frontoclypeal suture arched upward submedially. Antennae club-like, very long, surpassing apex of postclypeus, scape 2.5 × as long as wide, pedicel 8.7 × as long as wide, much longer than scape (ca. 3.2:1). Rostrum moderately long, reaching mesotrochanters.

Pronotum with lateral carinae curving outward and not reaching hind margin, with 5 sensory pits on each side: 2 medial, 3 lateral along posterior margin. Number and arrangement of pits on meso-, metanotum and wing pads typical, relative distances between W1-W2 and W2-W3 are ca. 1.8:1, all three aligned as a triangle. Mesothoracic wing pad extending to level of metathoracic wing pad and extending to abdominal segment IV. Spinal formula of hind tibia 5-6-4. Metatibial spur with 1 tiny tooth at apex, without teeth on lateral margin.

Abdominal tergites V-VIII each side with sensory pits in formula 0+1, 1+2, 1+2, 1+2; ninth abdominal segment bears 2 dorsal and 1 ventral

pit on each side, in dorsal aspect, with anal ridge shallowly incised medially, lateral lobes relative large.

#### Specimens Examined

Thirteen nymphs, 33 males, 24 females, CHINA: Guizhou, Qianling Park, (N 26° 35' E 106° 42'), 1100 m asl, 17-VII-1999 (X. S. Chen and L. Yang).

#### Host Plant

*Phyllostachys* spp. (Chen et al. 2006).

#### Distribution

China (Guizhou, Yunnan, Zhejiang, Fujian).

#### Remarks

*Malaxa delicata* is of economic significance because it can attain large populations in bamboo fields and damage bamboo (*Phyllostachys* spp.) by both feeding and oviposition at Qianling Park, Guiyang, Guizhou Province (Chen et al, 2006). This is the first detailed description of the fifth instar.

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