

REVISION OF THE GENUS *RICANOIDES* (HEMIPTERA: FULGOROMORPHA: RICANIIDAE) WITH DESCRIPTIONS OF THREE NEW SPECIES AND ONE NEW COMBINATION

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ABSTRACT

The genus *Ricanoides* Zia, 1935 is revised. The genus includes 5 species as follows: *R. flabellum* Noulhier, 1896 (China: Guizhou, Guangdong, Taiwan; Burma; India), *R. liboensis* **sp. nov.** (China: Guizhou), *R. melanicus* **sp. nov.** (China: Guizhou), *R. pipera* (Distant, 1914), **comb. nov.** (China: Taiwan, Hainan; Japan; India) and *R. rotundatus* **sp. nov.** (China: Guizhou, Guangxi). All 5 species (including the above-mentioned 3 new species) are described or redescribed and illustrated. A new combination, *R. pipera* (Distant, 1914) **comb. nov.**, is proposed (previously placed in the genus *Pochazia*). A key to all species of this genus is given.

Key Words: Fulgoroidea, morphology, planthopper, ricaniid, taxonomy

RESUMEN

Se revisa el género *Ricanoides* Zia, 1935. El género incluye las 5 especies siguientes: *R. flabellum* Noulhier, 1896 (China: Guizhou, Guangdong, Taiwán, Birmania, India), *R. liboensis* **sp. nov.** (China: Guizhou), *R. melanicus* **sp. nov.** (China: Guizhou), *R. piperazina* (Distant, 1914), **comb. nov.** (China Taiwán, Hainan, Japón, India) y *R. rotundatus* **sp. nov.** (China: Guizhou, Guangxi). Se describen o describen e ilustran todas las 5 especies (incluyendo las 3 nuevas especies antes mencionadas). Se propone la nueva combinación, *R. piperazina* (Distant, 1914) **comb. nov.** (colocado previamente en el género *Pochazia*). Se provee una clave para todas las especies de este género.

Palabras Clave: Fulgoroidea, morfología, chicharrita, ricaniido, taxonomía

The ricaniid planthopper genus *Ricanoides* was established by Zia (1935) with *Ricania flabellum* Noulhier, 1896 from China as its type species. To date, only 1 species was reported in the world. The most recent taxonomic study of this genus was that of Fennah (1956).

In this paper, 5 species of the genus *Ricanoides* are recognized and illustrated (including 3 new species from China), and a key is given for their identification. In addition, a new combination, *Ricanoides pipera* (Distant, 1914) **comb. nov.** is proposed.

MATERIAL AND METHODS

The terminology for the wing venation and genitalia follows Fennah (1969) and Fletcher (2008), and the terminology used for the head,

pronotum and mesonotum follows Yang (1989). The color photos of examined specimens were taken by a Keyence VHX-1000C camera. External morphology was observed under an Olympus SZX7 stereoscopic microscope and characters were measured with an ocular micrometer. The genital segments of the examined specimens were macerated in 10% KOH and drawn from preparations in glycerin jelly using an Olympus CX41 stereomicroscope. Illustrations were scanned by Canon CanoScan LiDE100 and imported into Adobe Photoshop CS5 for labeling and plate composition. The type materials and examined materials are deposited in the Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China (IEGU). Figures in this report are reproduced in color in the on-

line supplementary material available in Florida Entomologist 97(2) (2014) at <http://purl.fcla.edu/fcla/entomologist/browse>.

DESCRIPTIVE TAXONOMY

Genus *Ricanoides* Zia, 1935

*Ricanoides* Zia, 1935:538; Fennah, 1956:211.

Type species: *Ricania flabellum* Noulhier, 1896, by original designation.

Diagnosis

Coloration. General color blackish yellow or greyish brown. Medium size, body length (including forewings) 9-11 mm. Vertex black or black brown with each black macula at both rear angles. Pronotum greyish brown or black with central carina and 2 black macula at both sides of central carina. Forewing with a black spot at apex angle.

Head and Thorax. Face with clypeus convex, separated from frons by transverse crevice along frontoclypeal suture; frons short, broad with well-defined median longitudinal carina and arcuate lateral carinae, which is shorter than the central carina. Clypeus triangular without central carina. Vertex with very weak central and lateral carina. Pronotum narrow with median carina.

Mesonotum large, fan-shaped, convex, with 3 carinae: central carina straight; lateral carinae inwardly and anteriorly curved and bell-like, each bifurcating outwardly near middle in a straight longitudinal carina. Forewing R<sub>1</sub> and R<sub>2</sub> with short common stem begin from basal cell, costal membrane with a very small pterostigma or not. Metathoracic tibiae with 2 lateral spines

and 7 apical black-tipped spines. Metathoracic tarsomere with 8-13 apical black-tipped spines.

Male genitalia. Aedeagus stout, nearly straight, aedeagus stem with pair of dorsal processes and pair of ventral processes. Pair of cephalad directed dorsal processes begin from the apex of aedeagus stem on dorsal view. Ventral view at the apex of aedeagus stem with a very distinct concave, pair of cephalad directed ventral processes begin from this concave.

Female genitalia. Female ventral view on body segments VI and VII with a black spot on each side or not. Gonoplac triangular with many teeth extending along ventral margin.

Remarks

Species of *Ricanoides* can be distinguished from other Ricaniidae by the combination of the following diagnostic characters: clypeus without central carina, mesonotum with lateral carinae inwardly and anteriorly curved and bell-like, forewing with a black spot at apex angle, costal membrane of forewing with a very small pterostigma or not, and ventral processes begin from the concavity of the aedeagus.

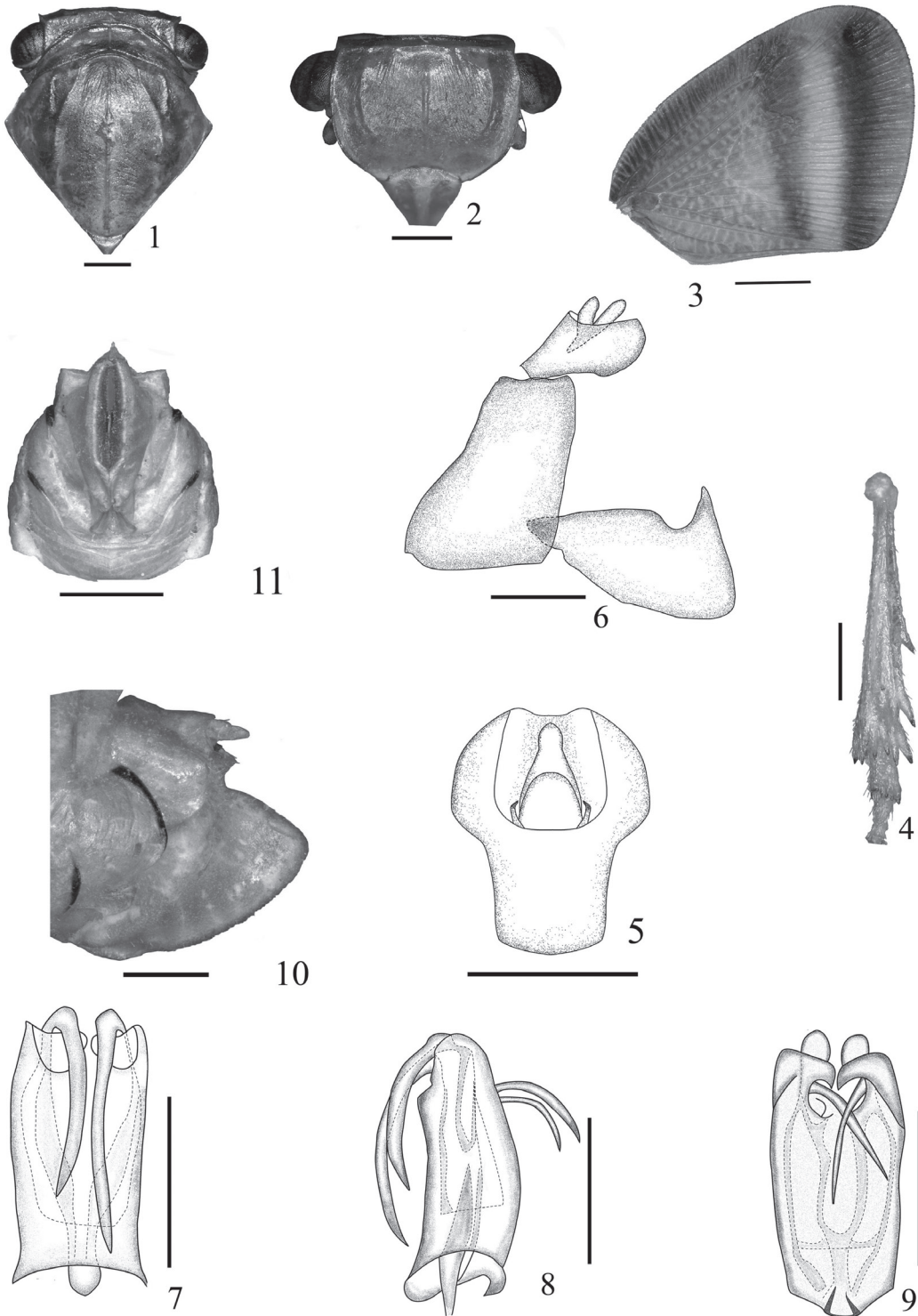
Besides the above diagnostic characters, species of *Ricanoides* are superficially similar to those of *Pochazia* Amyot & Serville, 1843 and *Ricania* Germar, 1818. *Ricanoides* differs 113 from these genera in having only 2 pairs of processes rather than 3. *Ricanoides* also be distinguished from *Pochazia* by the clypeus, which lacks a central carina.

Distribution

China, Java, Burma, India, Japan.

KEY TO SPECIES OF *RICANOIDES*

- 1. Forewing with 2 distinct transverse fasciae (Fig. 3) ..... *R. flabellum*
- Forewing without distinct transverse fasciae ..... 2
- 2. Ventral posterior margin of anal segment hook-shaped in the lateral view (Fig. 28); ventral processes of aedeagus subparallel in the ventral view (Fig. 32) ..... *R. melanicus* **sp. nov.**
- Ventral posterior margin of anal segment smooth in the lateral view; ventral processes crossed in the ventral view (Figs. 9, 21, 42, 51) ..... 3
- 3. Dorsal view aedeagus with pair of dorsal processes subequal (Figs. 40) and lateral view pygofer with a bulge at dorsal posterior margin (Figs. 39) ..... *R. pipera*
- Dorsal view pair of dorsal processes distinctly unequal ..... 4
- 4. Left dorsal processes twisted and shorter than right about 0.25:1 (Fig. 18). . *R. liboensis* **sp. nov.**
- Right dorsal processes twisted and shorter than left about 0.25:1 (Fig. 49) *R. rotundatus* **sp. nov.**



Figs. 1-11. *Ricanoides flabellum* Noualhier, 1986. 1. Head and thorax, dorsal view; 2. Frons; 3. Forewing; 4. Metathoracic tibia; 5. Anal segment, dorsal view; 6. Male genitalia, left side; 7. Aedeagus, dorsal view; 8. Aedeagus, left side; 9. Aedeagus, ventral view. 10. Female genitalia, left view; 11. Female genitalia, ventral view. Scale bars = 0.5 mm (Figs. 4-11), 1.0 mm (Figs. 1-2), 2.0 mm (Fig. 3). [See supplementary document with color graphics online at <http://purl.fcla.edu/fcla/entomologist/browse/>.]

*Ricanoides flabellum* Noualhier, 1896 (Figs. 1-11)

*Ricania flabellum* Noualhier, 1896: 256.

*Ricanoides flabellum*, Zia, 1935: 539; Fennah, 1956: 211.

#### Material Examined

1 ♂, Congjiang County (N 25° 45' E 108° 54"), Guizhou Province, China, 15-IX-1979, Z.-Z. Li; 1 ♂, Wangmo County (N 25° 10' E 106° 06"), Guizhou Province, China, 15-IX-1979, Y.-L. Mu. 3 ♀♀, Congjiang County (N 25° 45' E 108° 54"), Guizhou Province, China, 15-IX-1979, Z.-Z. Li.

#### Description

Measurement. Body length (from apex of vertex to tip of forewings in repose): ♂ 7.5-8.0 mm ( $n = 2$ ), ♀ 9.2-10.0 mm ( $n = 3$ ); forewing length: ♂ 7.2-7.7 mm ( $n = 4$ ), ♀ 7.5-7.7 mm ( $n = 2$ ).

Coloration. Body, forewing and vertex yellowish-brown. Eyes offwhite, ocellae red-brown, antennae brown. Forewing with 2 distinct black transverse fasciae (Fig. 3).

Head and Thorax. Vertex (Fig. 1) with distinct central carina and very weak lateral carina, wider at anterior margin than long in middle line (9.0:1). Frons (Fig. 2) rectangle similar, upper margin relatively flat, wider at widest part than length of middle line (1.5:1), with distinct central and lateral carinae. Pronotum wider at widest part than length of middle line (7.0:1), punctations beside central carina, central carina reaches front edge obviously. Mesonotum (Fig. 1) with sublateral carina and central carina subparallel, wider at widest part than length of mid line (1.1:1).

Male Genitalia. Lateral view pygofer (Fig. 6) almost quadrilateral, caudad front broad and posterior narrow. Aedeagus (Fig. 7-9) dorsal view cylindrical, pair of dorsal processes not equal, left dorsal processes longer than right about 1.25:1. Lateral view aedeagus stem curves slightly, the shorter dorsal processes equal to ventral processes. Ventral view aedeagus stem with 1 deep concavity at apex, pair of tenuous ventral processes shorter than half length of aedeagus, begin from the concavity then crossed.

#### Host Plants

Sugarcane (*Saccharum* sp.; Poales: Poaceae), corn (*Zea mays* L.; Poales: Poaceae)

#### Distribution

China (Guizhou, Guangdong, Taiwan); Burma; India; Japan.

#### Remarks

This species is similar to *R. rotundatus* **sp. nov.**, but can be separated from the latter by *R. rotundatus* **sp. nov.** having forewing with 2 black transverse fasciae, left dorsal processes of aedeagus not twisted and pair of ventral processes crossed.

*Ricanoides liboensis* **sp. nov.** (Figs. 12-22)

#### Material Examined

HOLOTYPE: ♂, Libo (N 25° 24' E 107° 52'), Guizhou Province, China, 18-VII-2011, W.-B. Zheng; PARATYPES: 1 ♀, same data as holotype; 1 ♂, 1 ♀, Liping (N 26° 13' E 109° 09'), Guizhou Province, 15-18-VII-2006, P. Zhang; 2 ♂♂, Maolan (N 25° 24' E 107° 52'), Libo County, Guizhou Province, 18-VII-2011, J.-K. Long and Z.-M. Chang.

#### Description

Measurement. Body length (from apex of vertex to tip of forewings in repose): ♂ 9.5-9.7 mm ( $n = 4$ ), ♀ 9.8-11.0 mm ( $n = 2$ ); forewing length: ♂ 8.1-8.5 mm ( $n = 4$ ), ♀ 9.4-10.0 mm ( $n = 2$ ).

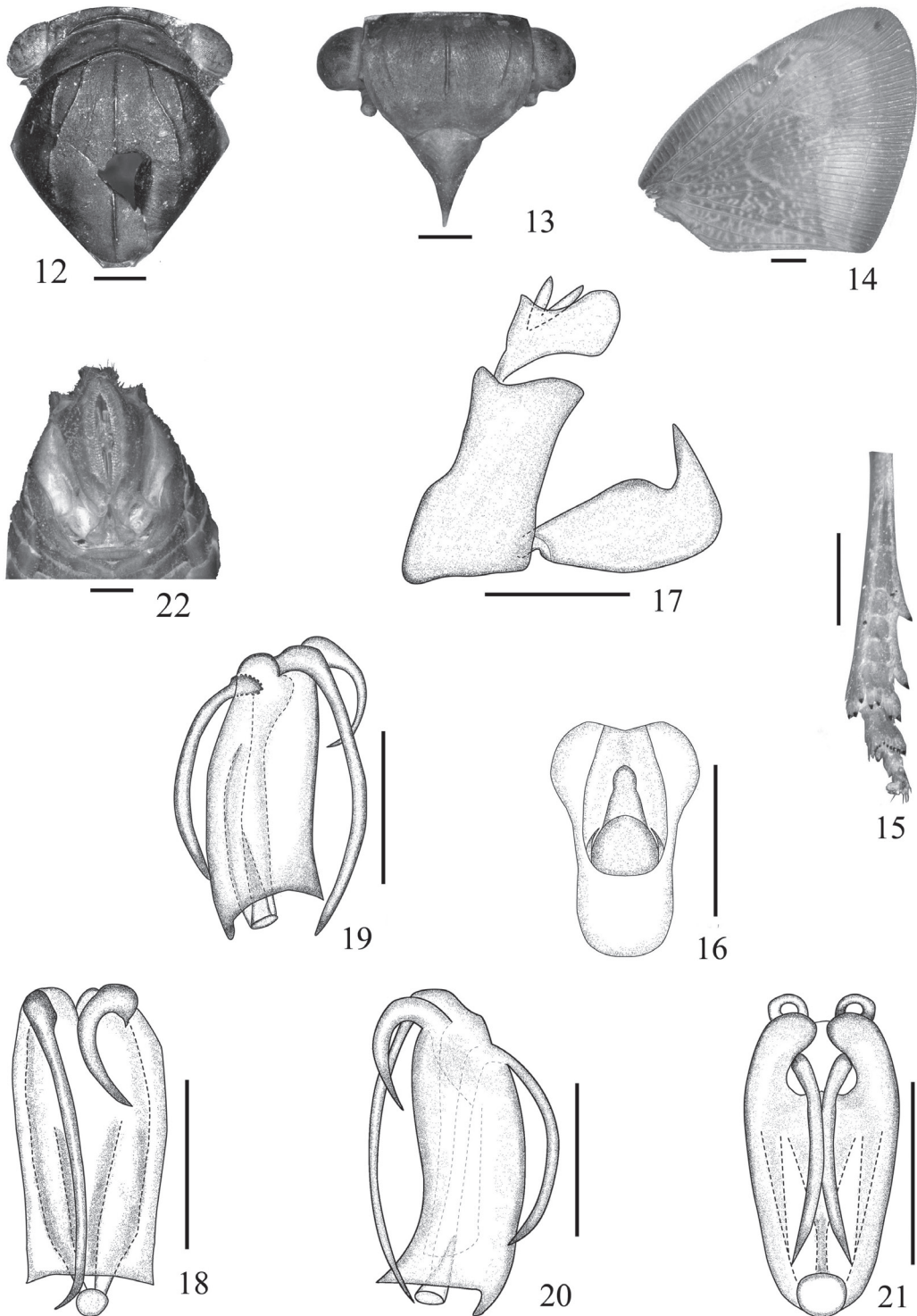
Coloration. Deep yellow or dark brown body. Forewing blackish. Forewing (Fig. 14) without black transverse fasciae, a black round spot at the apex angle outside of the second line compounded by cross veins.

Head and Thorax. Width of head (including eyes) equal to pronotum. Frons (Fig. 13) rectangle, upper margin relatively flat, wider at widest part than length of the middle line (1.5:1), with distinct central and lateral carina. Vertex (Fig. 12) with central and lateral carina, wider at anterior margin than length of the middle line (14.5:1). Pronotum wider at widest part than length of the middle line (7.5:1), punctuated beside central carina. Mesonotum (Fig. 12) with sublateral carina and central carina subparallel, wider at widest part than length of the middle line (1.1:1).

Male Genitalia. Pygofer and segment (Fig. 17) similar to that of *R. rotundatus* **sp. nov.** Aedeagus (Fig. 18-21) dorsal view cylindrical, left dorsal processes twisted and much shorter than the right about 0.25:1. Lateral view aedeagus curves slightly, ventral processes shorter than aedeagus 0.60:1, the longer dorsal processes little longer than aedeagus. Ventral view aedeagus with 1 deep concavity at apex, pair of sideways bending ventral processes set out from the concavity of the aedeagus.

#### Distribution

China (Guizhou).



Figs. 12-22. *Ricanoides liboensis* sp. nov. 12. Head and thorax, dorsal view; 13. Frons; 14. Forewing; 15. Meta-thoracic tibia; 16. Anal segment, dorsal view; 17. Male genitalia, left side; 18. Aedeagus, dorsal view; 19. Aedeagus, right side; 20. Aedeagus, left side; 21. Aedeagus, ventral view. 22. Female genitalia, ventral view. Scale bars = 0.5 mm (Figs. 15-21), 1.0 mm (Figs. 12, 13), 2.0 mm (Fig. 14). [See supplementary document with color graphics online at <http://purl.fcla.edu/fcla/entomologist/browse/>.]

## Etymology

The species name is derived from the type locality, Libo County, Guizhou Province.

## Remarks

This species can be separated from other species by: aedeagus with twisted left dorsal process, and sideways bending ventral processes.

*Ricanoides melanicus* **sp. nov.** (Figs. 23-33)

## Material Examined

HOLOTYPE: ♂, Wangmo County (N 25° 10' E 106° 06'), Guizhou Province, China, 20-VIII-2011, Z.-M. Chang; PARATYPES: 1 ♂, same data as holotype; 1 ♂, 2 ♀, Wangmo, Guizhou Province, 19-VIII-2011, S.-Y. Xu.

## Description

Measurement. Body length (from apex of vertex to tip of forewings): ♂ 9.5-9.7 mm ( $n = 2$ ), ♀ 9.8-11.0 mm ( $n = 2$ ); forewing length: ♂ 8.5-8.7 mm ( $n = 2$ ), ♀ 9.4-9.7 mm ( $n = 2$ ).

Coloration. Deep yellow or dark brown body. Frons yellow. Vertex blackish yellow. Mesonotum black. Forewing (Fig. 25) blackish with a black round spot at the apex angle.

Head and Thorax. Width of head (including eyes) equal to the pronotum. Frons (Fig. 24) width greater than length, wider at widest part than length of the middle line (1.6:1), central and lateral carina shorter than half the length of frons. Vertex (Fig. 23) wider at anterior margin than length of the middle line (17.0:1), with a black macula at both rear angles and without central and lateral carina. Pronotum (Fig. 23) wider at widest part than length of the middle line (6.9:1). Mesonotum (Fig. 23) with its branch of lateral carina shorter than lateral carina. Forewing (Fig. 25) without black transverse fasciae, 4 veins emanating from basal cell.

Male genitalia. Lateral view pygofer (Fig. 28) almost quadrilateral, upper rear margin slightly hollow. Lateral view ventral posterior margin of anal segment (Fig. 27) hooked very obviously. Aedeagus (Figs. 29-33) dorsal view cylindrical, pair of dorsal processes crossed, left dorsal processes shorter than the right about 0.5:1. Lateral view aedeagus stem curves slightly, right dorsal processes a little longer than aedeagus. Ventral view aedeagus stem with 1 deep concavity at apex, pair of tenuous and curving ventral processes set out from the concavity of the aedeagus almost parallel.

## Distribution

China (Guizhou).

## Etymology

The species name is derived from the Latin words "melanicus", referring to the black mesonotum.

## Remarks

This species can be separated from other species by: the anal segment hooked, pair of tenuous, curving and almost paralleling ventral processes.

*Ricanoides pipera* (Distant, 1914) **comb. nov.** (Figs. 34-42)

*Pochazia pipera* Distant, 1914: 420; Chou et al. 1985; Yang, 1989: 174.

*Pochazia formusona* Esaki, 1931: 268, synonymized by Zhou & Lu, 1977: 314.

## Material Examined

3 ♂♂, Jianfengling, Ledong County, Hainan Province, China, 26-IV-2013, J.-K. Long.

## Description

Measurement. Body length (from apex of vertex to tip of forewings): ♂ 11.0-12.0 mm ( $n = 3$ ); forewing length: ♂ 9.5-9.8 mm ( $n = 3$ ).

Coloration. Body and forewing blackish. Vertex yellowish-brown. Eyes offwhite, ocellasae reddish-brown, antennae brown. Forewing (Fig. 36) with a slight black transverse fasciae at middle of the forewing.

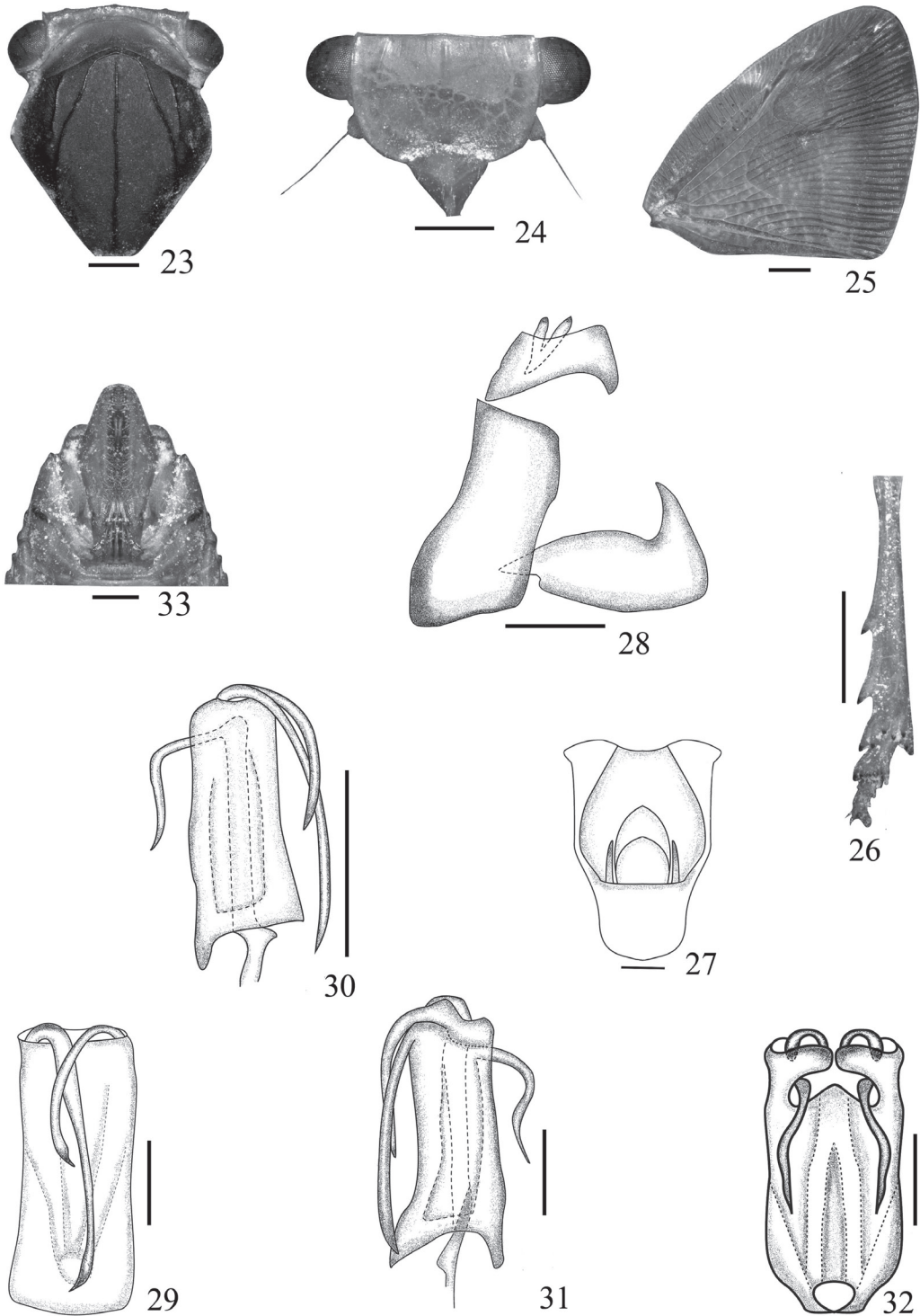
Head and Thorax. Frons (Fig. 35) rectangle similar, wider at widest part than long in middle line (1.4:1), with distinct central and lateral carina. Pronotum (Fig. 34) wider at widest part than long in middle line (6.8:1), with central carina reach front edge. Mesonotum (Fig. 34) with sublateral carina and central carina subparallel.

Male Genitalia. Lateral view pygofer (Fig. 39) with a bulge at dorsal posterior margin. Aedeagus (Figs. 40-42) dorsal view stem cylindrical, pair of equal dorsal processes. Lateral view aedeagus stem curves slightly, dorsal processes shorter than ventral processes about 0.5:1. Ventral view aedeagus stem with 1 deep concavity at apex, pair of tenuous ventral processes equal to length of aedeagus, set out from the concavity then crossed.

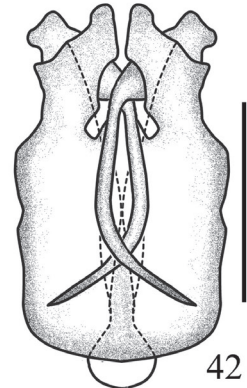
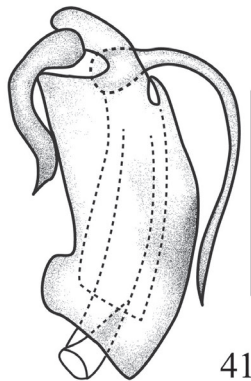
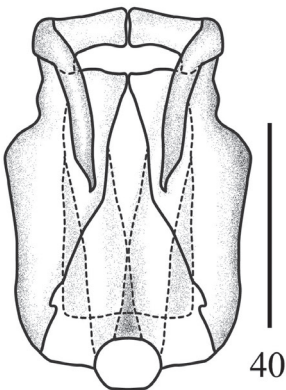
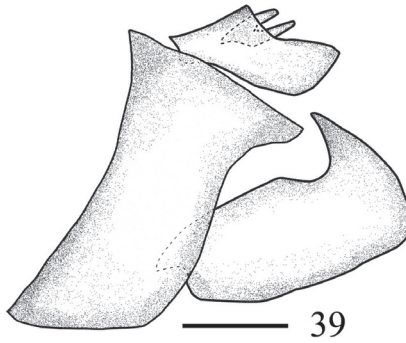
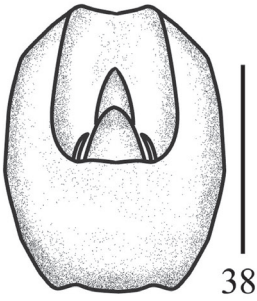
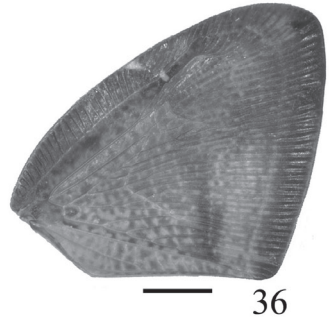
## Distribution

China (Taiwan, Hainan); Japan; India.

## Remarks



Figs. 23-33. *Ricanoides melanicus* **sp. nov.** 23. Head and thorax, dorsal view; 24. Frons; 25. Forewing; 26. Meta-thoracic tibia; 27. Anal segment, dorsal view; 28. Male genitalia, left side; 29. Aedeagus, dorsal view; 30. Aedeagus, right side; 31. Aedeagus, left side; 32. Aedeagus, ventral view; 33. Female genitalia, ventral view. Scale bars = 0.5 mm (Figs. 26-33), 1.0 mm (Figs. 23, 24), 2.0 mm (Fig. 25). [See supplementary document with color graphics online at <http://purl.fcla.edu/fcla/entomologist/browse>.]



Figs. 34-42. *Ricanoides pipera* (Distant, 1914), **comb. nov.** 34. Head and thorax, dorsal view; 35. Frons; 36. Forewing; 37. Anal segment, dorsal view; 38. Male genitalia, left side; 39. Metathoracic tibia; 40. Aedeagus, dorsal view; 41. Aedeagus, left side; 42. Aedeagus, ventral view. Scale bars = 0.5 mm (Figs. 37-42), 1.0 mm (Figs. 34, 35), 2.0 mm (Fig. 36). [See supplementary document with color graphics online at <http://purl.fcla.edu/fcla/entomologist/browse/>.]



This species was originally described by Distant (1914) and previously placed in *Pochazia*. Chou & Lu (1977) proposed that *Pochazia formosana* Esaki, 1931 is a junior synonym of *Pochazia pipera* Distant, 1914. Other species of *Pochazia* have 3 pairs of processes on the aedeagal stem and a central carina on the clypeus. But *R. pipera* has only 2 pairs of processes, a black point at the apex angle of forewing, no central carina on the clypeus, and an aedeagal stem with 1 deeply concave at apex at ventral view. These features agree with the features of *Ricanoides*, so here place this species in *Ricanoides*. The holotype of *Pochazia chienfengensis* Chou & Lu (1977) was also collected at Jianfengling, Ledong County, Hainan Province, China, and it is very similar to *R. pipera* in Chou's description. Although we doubt that it is a junior synonym of *R. pipera* Distant, 1914, we are uncertain because they did not illustrate it in their paper and it was not available for study.

*Ricanoides rotundatus* sp. nov. (Figs. 43-51)

#### Material Examined

HOLOTYPE: ♂, Congjiang County (N 25° 45' E 108° 53'), Guizhou Province, China, 28-VII-1978, coll. Z.-Z. Li; PARATYPES: 12 ♂♂, 15 ♀♀, same data as holotype; 4 ♂♂, 5 ♀♀, Congjiang County, Guizhou Province, 15-IX-1979; Z.-Z. Li; 2 ♂♂, 6 ♀♀, Daming Mountain (N 23° 27' E 108° 30, 400 m), Nanning City, Guangxi Autonomous Region, 22-VII-2007, Y.-B. Zhang; 2 ♂♂, 3 ♀♀, Daming Mountain, Nanning City, Guangxi Autonomous Region, 5-10-VIII-2011, Z.-H. Yang; 1 ♂, Leigong Mountain (N 26° 23' E 108° 13', 1,000-1,100 m), Guizhou Province, 13-14-IX-2005, Q.-R. Liao.

#### Description

Measurement. Body length (from apex of vertex to tip of forewings): ♂ 9.5-9.7 mm ( $n = 20$ ), ♀ 9.8-11.0 mm ( $n = 20$ ); forewing length: ♂ 8.8-9.0 mm ( $n = 20$ ), ♀ 9.4-9.7 mm ( $n = 20$ ).

Coloration. Body deep yellow or dark brown. Frons yellow. Vertex blackish yellow. Pronotum dark-brown, rear edge of pronotum dark-browns close to black. Mesonotum and forewing deep yellow or blackish brown. Forewing costal margin very shallowly convex with a very little Yellow-white pterostigma.

Head and Thorax. Width of head (include eyes) and pronotum equals. Frons (Fig. 44) wider at widest part than long in middle line (1.4:1), central carina longer than half length of frons. Vertex (Fig. 43) wider at anterior margin than the length of the middle line (13.0:1), with a black macula at both rear angles and very weak central and lateral carina. Pronotum (Fig. 43) wider at widest part

than the length of middle line (6.1:1), central carina of pronotum begins rear edge and not reach front edge. Mesonotum (Fig. 43) wider at widest part than the length of the middle line (0.86:1). Forewing (Fig. 45) with apical angle cambered, anal angle about right angle. Four veins emanating from basal cell,  $R_2$  running very close to  $M_1$ , but not merged with  $M_1$ . Forewing without black transverse fasciae.

Male Genitalia. Dorsal view anal segment (Fig. 47) middle part of lateral margin narrow, posterior part greatly convex on both sides. Aedeagus (Figs. 49-51) dorsal view cylindrical, right dorsal processes twisted and much shorter than left about 0.25:1. Lateral view aedeagus curved slightly, left dorsal processes longer than ventral processes, and also longer than aedeagus stem. Ventral view aedeagus stem with 1 deep concavity at apex, pair of tenuous ventral processes longer than half length of aedeagus, set out from the concave of the aedeagus then crossed.

#### Distribution

China (Guizhou, Guangxi).

#### Host Plant Species

Corn (*Zea mays* L.; Poales: Poaceae), pear (*Pyrus* spp.; Rosales: Rosaceae)

#### Etymology

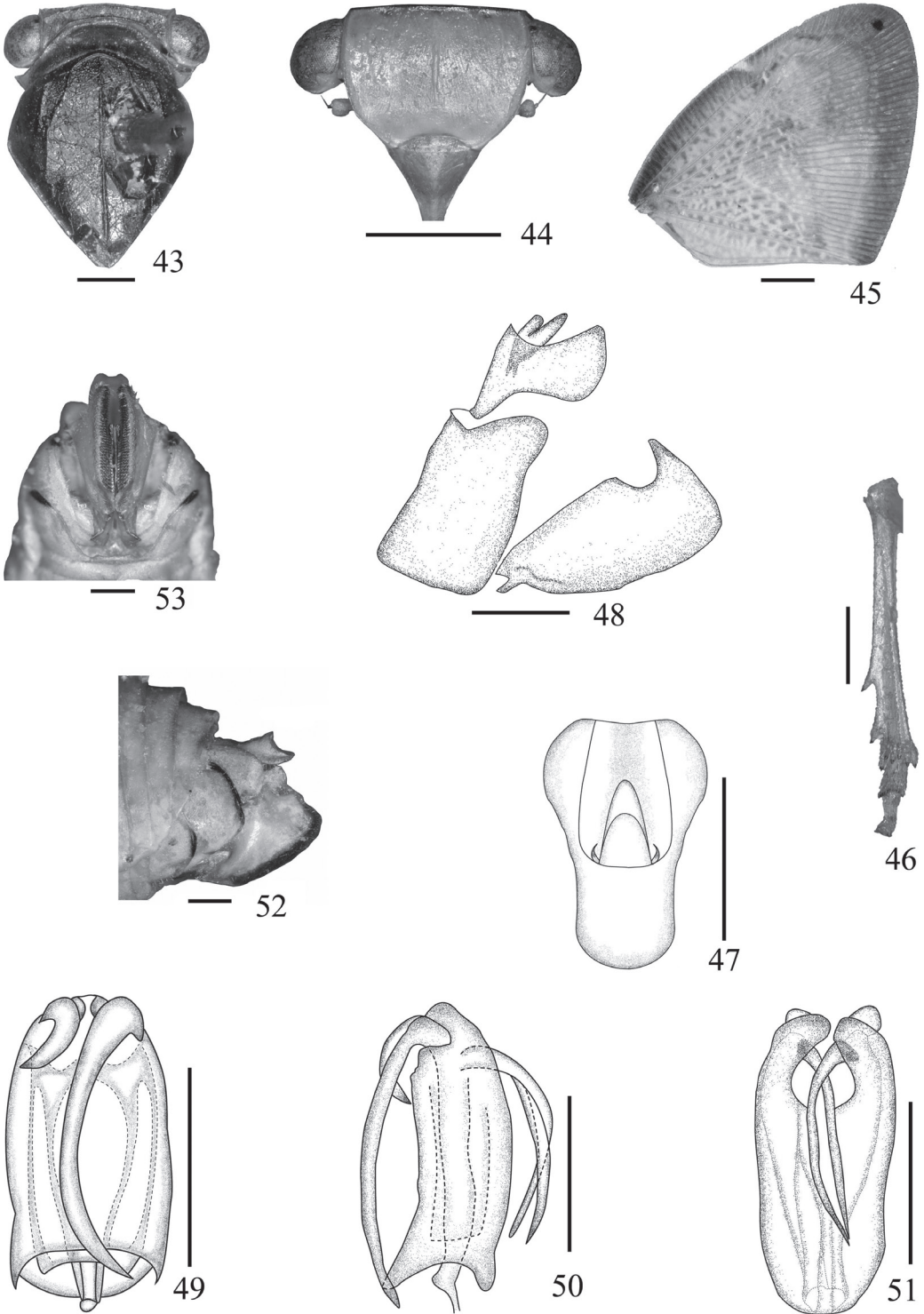
The species name is derived from the Latin words "*rotundatus*", referring to the forewing with a black round spot at the apical angle.

#### Remarks

This species is similar to *R. flabellum* Noulhier, 1896, but can be separated from the latter by having the forewing with a small black and obviously round spot at the apex angle, and without 2 black transverse fasciae and the twisted left dorsal processes of the aedeagus shorter obviously than the right.

#### ACKNOWLEDGMENTS

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Figs. 43-53. *Ricanoides rotundatus* sp. nov. 43. Head and thorax, dorsal view; 44. Frons; 45. Forewing; 46. Meta-thoracic tibia; 47. Anal segment, dorsal view; 48. Male genitalia, left side; 49. Aedeagus, dorsal view; 50. Aedeagus, left side; 51. Aedeagus, ventral view; 52. Female genitalia, left side; 53. Female genitalia, ventral view. Scale bars = 0.5 mm (Figs. 46-53), 1.0 mm (Figs. 43, 44), 2.0 mm (Fig. 45). [See supplementary document with color graphics online at <http://purl.fcla.edu/fcla/entomologist/browse/>.]

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