



## A key to the genera of Tropidocephalini (Hemiptera: Fulgoromorpha: Delphacidae) of China with description of *Mucillnata rava*, new genus and species

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### Abstract

A new planthopper genus, *Mucillnata*, is established with a new species, *Mucillnata rava* **sp. nov.** as the type species, in the tribe Tropidocephalini, subfamily Delphacinae from southern China. A key to the known genera of the tribe from China is also provided and the differences between the new genus and closely related genera are discussed.

**Key words:** Taxonomy, Homoptera, Auchenorrhyncha, new taxa, China

### Introduction

Tropidocephalini is the second largest tribe of the subfamily Delphacinae containing 33 genera, distributed in the Oriental, Palearctic, Afrotropical, Australian and the Pacific Regions of the world. However, the majority of the species are found in the Oriental Region (Donaldson 1991; Chen 2003, Chen & Tsai 2009). Most species of the tribe feed on bamboo (Bambusoideae) or grasses (Poaceae) (Chen 2003, Chen & Tsai 2009). Though the richest species diversity of the tribe Tropidocephalini in the world are found in China, comprising 20 genera (Chen 2003, Chen & Tsai 2009, Ding 2006), several genera and species remain still to be discovered. In this paper we describe a new genus and species and provide a key to all the known genera of the tribe from China.

### Material and methods

The specimens used in this study are deposited in the Entomological Museum, Northwest A & F University, Yangling, Shaanxi, China (NWAUFU). Habitus photos were taken by using a Scientific Digital micrography system equipped with an Auto-montage imaging system and a high sensitive QIMAGING Retiga 4000R digital camera (CCD). Multiple photographs were compressed into final images. The terminology in this paper follow those of Ding (2006). Measurements of body length equal the distance between the apex of vertex and tip of abdomen. All measurements are in millimeters (mm).

### Results

#### Key to genera of Tropidocephalini from China

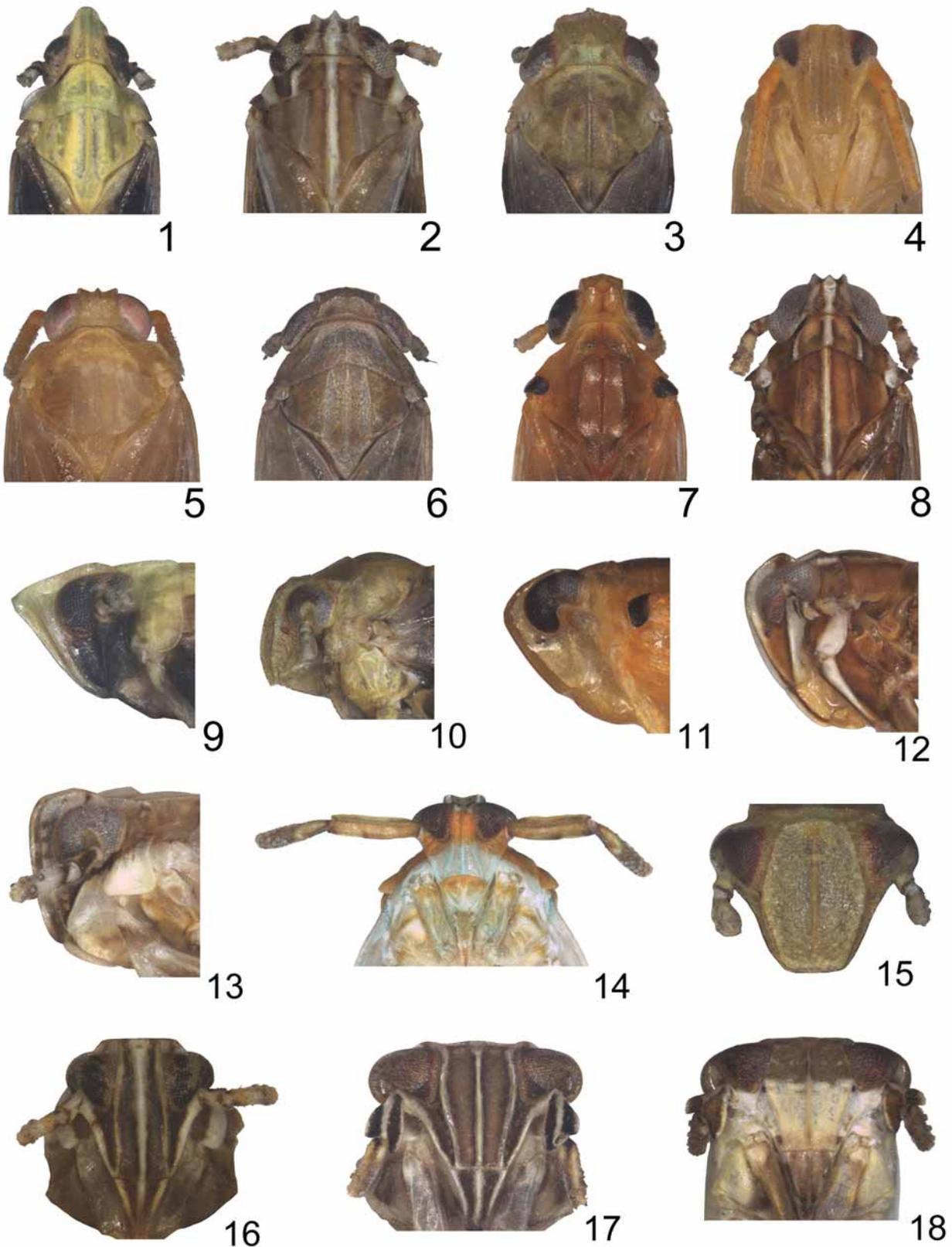
1. Vertex subtriangular (Fig. 1)..... 2
- Vertex quadrate or nearly so (Figs 2, 3, 5, 6, 7, 8, 20, 21, 24, 34, 37)..... 3
2. Vertex raised upwards at apex (Fig. 19); frons in midline more than 3.0 times wider than maximum width.....

.....	<i>Conocraera</i> Muir
- Vertex not raised upwards at apex (Fig. 9); frons in midline less than 3.0 times wider than maximum width .....	.....
.....	<i>Tropidocephala</i> Stål
3. Antennal segment I distinctly large and flattened, longer than segment II (Fig. 14) .....	<i>Purohita</i> Distant
- Antennal segment I not as above, if flattened, then shorter than segment II (Figs. 4, 15, 16, 17, 18, 36, 38) .....	4
4. Antennal segment I sagittate or strongly widening towards apex (Figs. 17, 18).....	5
- Antennal segment I not sagittate or strongly widening towards apex (Figs. 4, 15, 16, 36, 38) .....	6
5. Antennal segment I with median longitudinal carina (Fig. 17) .....	<i>Neobelocera</i> Ding & Yang
- Antennal segment I without median longitudinal carina (Fig. 18) .....	<i>Belocera</i> Muir
6. Frons in front of vertex acutely convex in dorsal aspect (Fig. 20), in profile apex of frons strongly bent caudad.....	.....
.....	<i>Arcifrons</i> Ding & Yang
- Frons not as above (Figs. 2, 3, 5, 6, 7, 8, 21, 24, 34, 37).....	7
7. Postclypeus in profile strongly bent at right angle to frons (Fig. 10).....	8
- Postclypeus in profile in the same plane as frons, or curved caudad but not at right angle to frons (Figs. 11, 12, 13, 35, 39) .....	9
8. Head and thorax with longitudinal whitish stripe along midline from apex of postclypeus to end of mesonotum bordered with blackish brown; frons in midline more than 2.0 times wider than maximum width (Figs. 2, 16) .....	.....
.....	<i>Arcofacies</i> Muir
- Head and thorax without longitudinal whitish stripe along midline; frons in midline about 1.4 times wider than maximum width (Figs. 3, 15).....	<i>Arcofaciella</i> Fennah
9. Scutellum with median carina strongly keeled .....	<i>Carinodelphax</i> Ding & Yang
- Scutellum with median carina not keeled .....	10
10. Vertex devoid of submedian carinae (Figs. 21, 34, 37) .....	11
- Vertex with submedian carinae (Figs. 5, 6, 7, 8, 24) .....	12
11. Lateral carinae of pronotum reaching posterior margin (Fig. 21); parameres divergent apically (Fig. 22) .....	.....
.....	<i>Gufacies</i> Ding
- Lateral carinae of pronotum not reaching posterior margin (Figs. 34, 37); parameres convergent apically (Figs. 41, 48) .....	<i>Mucillnata</i> <b>gen. n.</b>
12. Antennal segments fairly long, reaching or surpassing apex of clypeus (Fig. 4).....	13
- Antennal segments short, at most reaching anteclypeus .....	14
13. Submedian carinae of vertex percurrent and uniting at apex (Fig. 5); male anal segment with cluster of hair-like setae at base of the left laterodistal process (Fig. 23) .....	<i>Malaxella</i> Ding & Hu
- Submedian carinae of vertex uniting before apex of vertex (Fig. 24); male anal segment bare at base of left laterodistal process (Fig. 25).....	<i>Malaxa</i> Melichar
14. Post-tibial spur devoid of apical tooth.....	<i>Paranectopia</i> Ding & Tian
- Post-tibial spur with apical tooth .....	15
15. Lateral carinae of pronotum not reaching hind margins (Fig. 6).....	16
- Lateral carinae of pronotum reaching hind margins (Figs. 7, 8) .....	18
16. Vertex short and broad, distinctly longer at base than median length (about 1.6-3.2:1) (Fig. 6) <i>Epeuryssa</i> Matsumura	.....
- Vertex quadrate, at base equal to median length or nearly so (less than 1.1:1).....	17
17. Median carina of frons forked at basal third; parameres convergent apically (Fig. 26).....	<i>Carinofrons</i> Chen & Li
- Median carina of frons not forked; parameres divergent apically (Fig. 27).....	<i>Mirocauda</i> Chen
18. Anterior margin of vertex evenly rounded or truncated (Fig. 7) .....	19
- Anterior margin of vertex distinctly sinuate (Fig. 8).....	20
19. In profile, posterior margin of male pygofer strongly incised (Fig. 28).....	<i>Specinervures</i> Kuoh & Ding
- In profile, posterior margin of male pygofer not incised (Fig. 29) .....	<i>Bambusiphaga</i> Huang & Ding
20. Parameres convergent apically (Fig. 30); male pygofer with laterocaudal margin strongly produced in pillar-like projection at each side (Fig. 31) .....	<i>Neocarinodelphax</i> Chen & Tsai
- Parameres divergent apically (Fig. 32); male pygofer with laterocaudal margin sinuate but not produced (Fig. 33) ...	.....
.....	<i>Yuanchia</i> Chen & Tsai

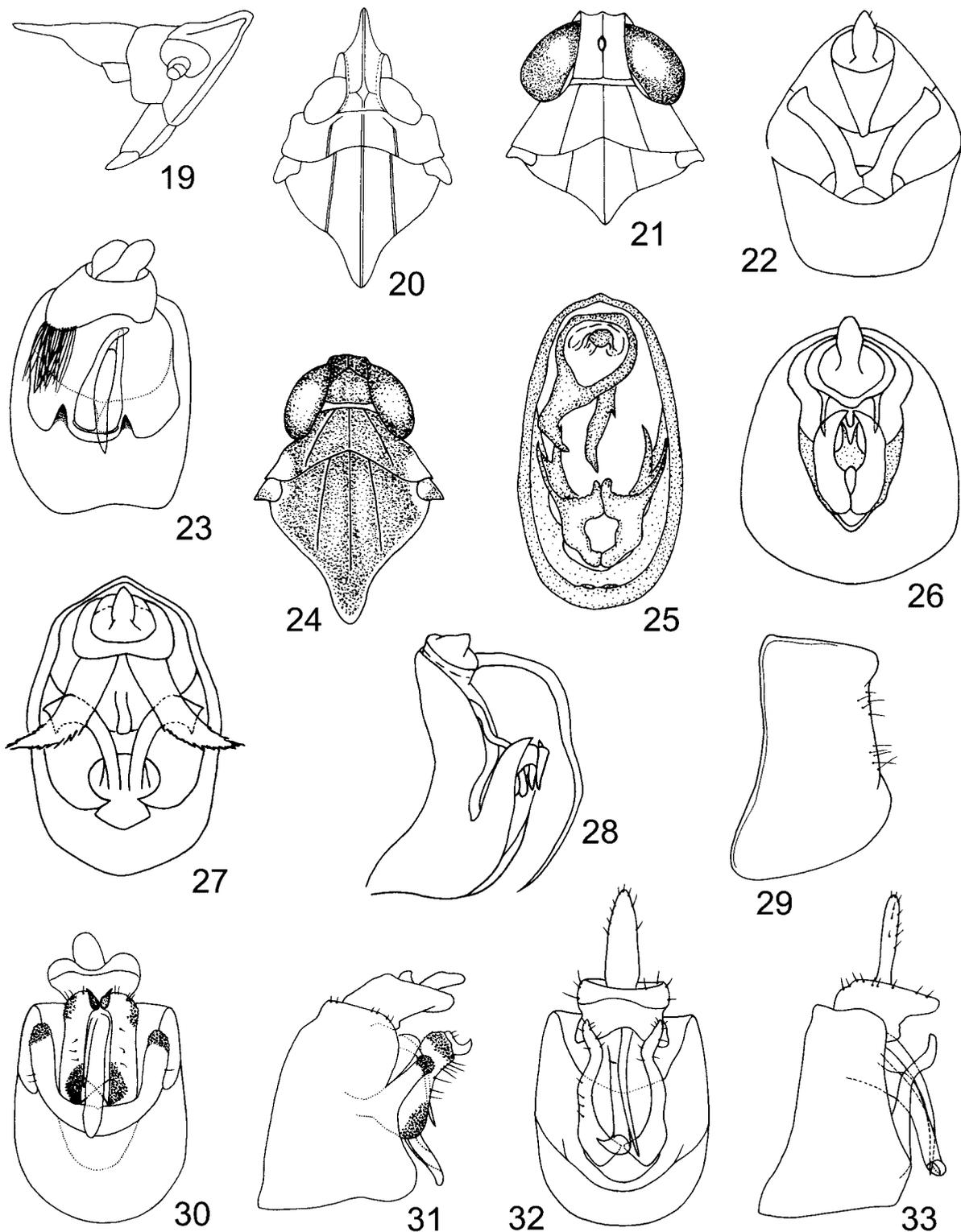
### ***Mucillnata* gen. n.**

**Type species.** *Mucillnata rava* sp. nov., here designated.

**Description.** Small, yellowish delphacids. Head including eyes narrower and shorter than pronotum (Figs. 34, 37). Vertex short, submedian carinae absent, Y-shaped carina distinct (Figs. 34, 37). Frons with median carina



**FIGURES 1–18.** 1, 9, *Tropidocephala brunnipennis* Signoret; 2, 16, *Arcofacies strigatipennis* Ding; 3, 10, 15, *Arcofaciella verrucosa* Fennah; 4, 5, *Malaxella tetracantha* Qin & Zhang; 6, *Epeuryrsa infumata* Huang & Ding; 7, 11, *Bambusiphaga luodianensis* Ding; 8, 12, *Neocarinodephax hainanensis* (Qin & Zhang); 13, *Yuanchia maculata* Chen & Tsai; 14, *Purohita theognis* Fennah; 17, *Neobelocera hanyinensis* Qin & Yuan; 18, *Belocera sinensis* Muir. 1, 2, 3, 5, 6, 7, 8, head and thorax, dorsal view; 4, 14, 15, 16, 17, 18, head, ventral view; 9, 10, 11, 12, 13, head and thorax, left lateral view.



**FIGURES 19–33.** 19, *Conocraera hainana* Huang & Ding (after Huang & Ding, 1980); 20, *Arcifrons arcifrontalis* Ding & Yang (after Ding & Yang, 1986); 21, 22, *Gufacies hyalimaculata* Ding (after Ding, 2006); 23, *Malaxella flava* Ding & Hu; 24, 25, *Malaxa delicata* Ding & Yang (after Chen et al. 2006); 26, *Carinofrons maculatipennis* Chen & Li (after Chen & Li, 2000); 27, *Mirocauda albilineana* Chen (after Chen, 2003); 28, *Specinervures basifusca* Chen & Li (after Chen & Li, 2000); 29, *Bambusiphaga nigropunctata* Huang & Ding; 30, 31, *Neocarinodelphax hainanensis* (Qin & Zhang); 32, 33, *Yuanchia maculata* Chen & Tsai. 19, head and thorax, right lateral view; 20, 21, 24, head and thorax, dorsal view; 22, 23, 25, 26, 27, 30, 32, male genitalia, caudal view; 28, 31, 33, same, left lateral view; 29, male pygofer, left lateral view, anal segment, aedeagus and parameres removed.

simple (Figs. 36, 38). Antennal segments cylindrical, short (Figs. 36, 38). Post-tibial spur thick, with an apical tooth, without teeth on lateral margin. Male pygofer with medioventral process present (Figs. 41, 43). Parameres moderate, convergent apically (Figs. 41, 48). Diaphragm of pygofer open medially (Fig. 43). Aedeagus tubular, broad, basal process arising basally (Figs. 45, 46, 47). Male anal segment ring-like, caudoventral margin produced, with single process on right side (Figs. 41, 49).

**Etymology.** The generic name is an arbitrary combination of letters, and is regarded as feminine.

**Remarks.** The new genus is similar to *Arcofaciella* Fennah and *Arcifrons* Ding in having the vertex short and about three times as broad as median length, submedian carinae absent, transition from vertex to frons with distinct transverse carina. However, *Mucillnata* differs from both the genera in having the frons not distinctly inclined anteriorly in lateral view; the lateral carinae of the pronotum diverging and not attaining the hind margin; the male pygofer with a medioventral process; the male anal segment with single process on the caudoventral margin on right side. From *Arcofaciella* the new genus differs in having the postclypeus nearly in the same plane as the frons at base rather than at right angle to the frons; in the spinal formula of hind leg 5-6-4; and in the presence of median carina on the clypeus.

The new genus is also similar to the genus *Epeuryssa* Matsumura in the external appearance and in the configuration of the male genitalia. However, it differs from *Epeuryssa* by: the lateral carinae of the vertex strongly converging towards apex, distinctly narrower at apex than at base (in *Epeuryssa* lateral carinae of the vertex slightly concave medially, apically nearly as wide as basally); the male pygofer with single median process on the ventrocaudal margin (in *Epeuryssa* with 3 medioventral processes); the parameres with the basal angles not produced (in *Epeuryssa* the basal angles distinctly produced); the male anal segment with caudoventral margin produced in to a single process on right side (in *Epeuryssa* the laterodistal angles produced in two separated processes).

#### ***Mucillnata rava* sp. nov.**

(Figs. 34–49)

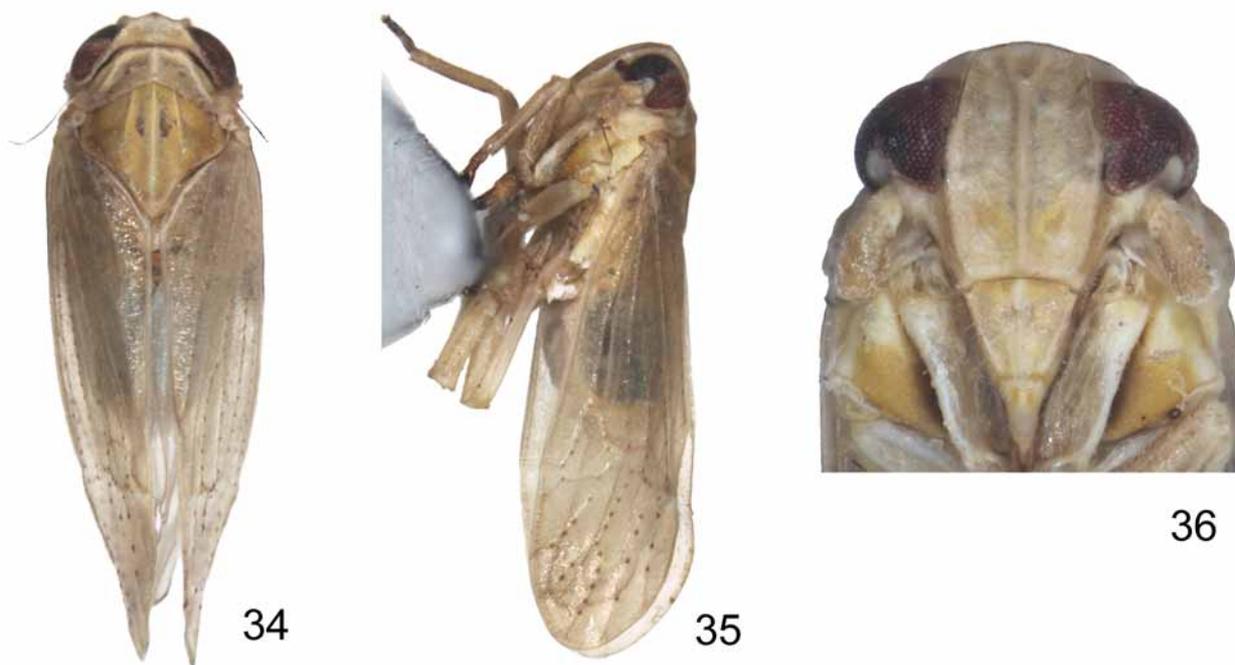
**Type material.** **Holotype** male (macropterous), **China:** Hainan Province, Qixianling, 30 April 2008, coll. Qiulei Men (NWAUFU). **Paratypes.** 5 males, 1 female (macropterous), same data as holotype (NWAUFU).

**Description.** Body length: male (macropterous, n=6) 1.74-1.77 mm; female 2.01mm (macropterous, n=1), Total length (including tegmen): male (macropterous) 2.73-2.86 mm, female (macropterous) 3.21 mm.

**Color.** General color yellowish. Eyes reddish brown. Ocelli reddish black. Pronotum ochreous to brownish. Tegmina translucent with pale yellowish veins, speckled with yellowish to brownish flecks, wings greyish, subhyaline. Dorsum of male abdomen blackish except laterally yellowish white, venter of abdomen yellow, ornamented with tiny brownish spots sublaterally on each tergite. Rostrum brownish, apex black. Legs yellow to brownish yellow, protarsi brownish, tips of apical teeth on hind tibiae and tarsi black. Male pygofer yellow. Parameres brownish. Female with the same color as male. Ovipositor brownish.

**Head.** Including eyes slightly narrower than pronotum (about 0.96: 1) (Figs. 34, 37). Vertex trapeziform, short, at base about 3.20 times as broad as long in midline; distinctly narrower at apex than at base (about 0.66: 1), anterior margin transverse, somewhat incised caudad in middle, slightly projecting in front of eyes, lateral carinae ridged, slightly convex, distinctly converging anteriorly and diverging apically to lateral carinae of frons; posterior margin ridged, slightly concave and incised medially, vertex truncated in lateral view (Figs. 34, 35, 37, 39); Y-shaped carina with common stem prominent (Figs. 34, 37), areas of basal compartments shallowly concave. Frons ca. 1.52 times higher than its maximum width, widest at middle level of frons, lateral margins convex and ridged, median carina distinctly convex, very shortly forked at base, area within fork apparently depressed, frontal areas between carinae shallowly concave, at apex slightly shorter than at base (about 0.92: 1), apical frontal margin slightly curved medially (Figs. 36, 38). Rostrum with apex reaching mesotrochanters. Postclypeus at base apparently wider than frons at frontoclypeal suture, less than half the length of frons (about 0.41: 1) and ca. 1.27 times longer than anteclypeus, post- and anteclypeus together approximately 0.76x length of frons, postclypeus with median carina apparently convex, lateral carinae developed, in profile nearly in the same plane as frons at base (Figs. 36, 38, 39), Antennal segments

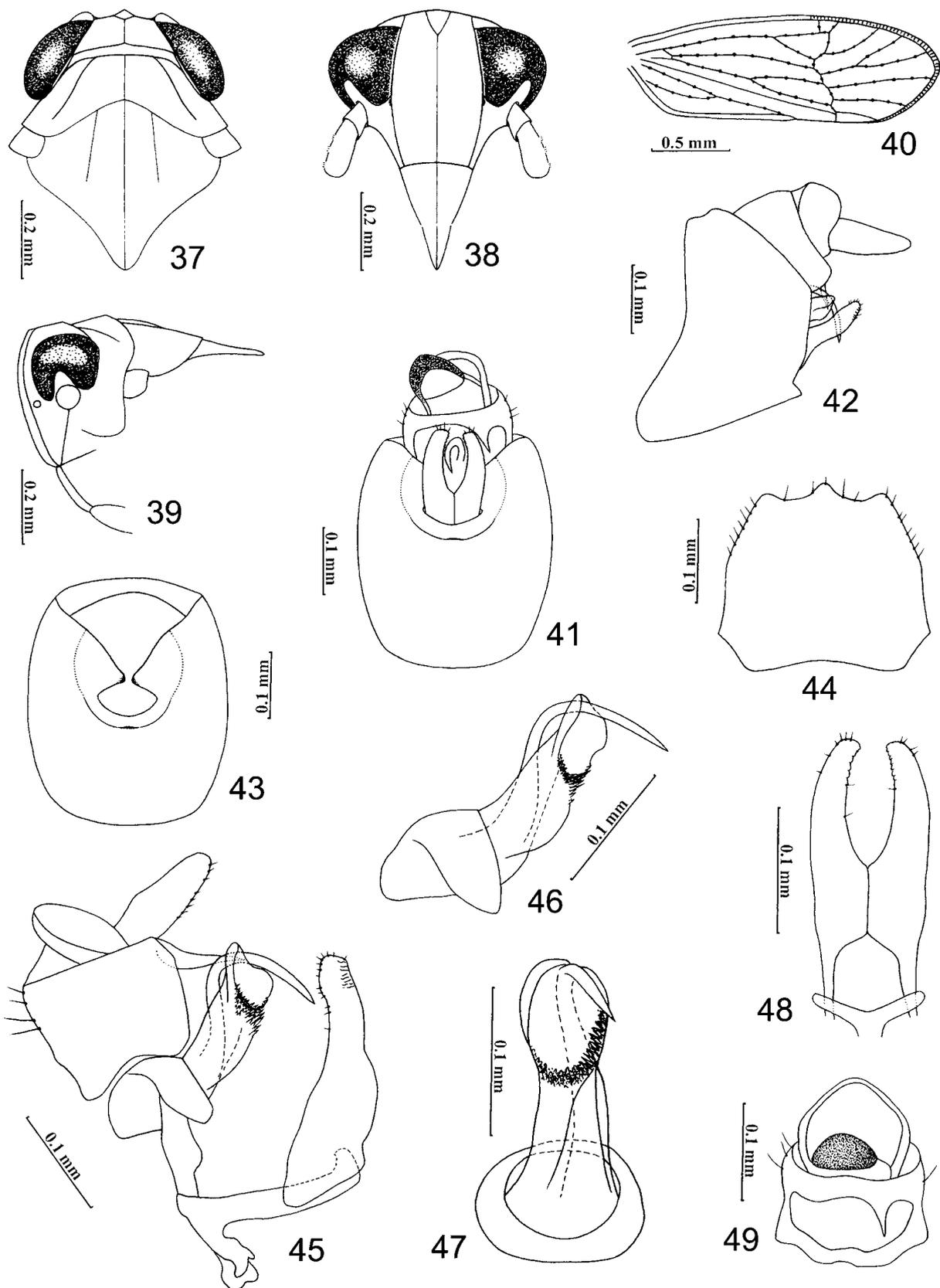
short, cylindrical, slightly surpassing frontoclypeal suture, segment I slightly widening distad, almost as long as apical width, segment II about 2.5 times longer than I (Figs. 36, 38).



**FIGURES 34–36.** *Mucillnata rava* sp. nov., 34, male adult, dorsal view; 35, same, left lateral view; 36, head, ventral view.

**Thorax.** Pronotum in midline longer than vertex (about 1.30: 1), anterior margin transverse, anterior lateral areas strongly sloping laterad, posterior margin concave inwardly, lateral carinae developed, slightly sinuate and diverging posterolaterally, not attaining hind margin, pronotum width 0.70-0.79, length 0.13-0.15 (Figs. 34, 37). Mesonotum gently vaulted, medially ca. 2.10 times longer than vertex and pronotum together, lateral carinae straight, slightly diverging posterolaterad but not reaching hind margin, median carina reaching end of scutellum except where obscure subapically (Figs. 34, 37). Tegmina 2.28-2.68 mm long, surpassing tip of abdomen more than one third of total length, apical margin acutely rounded, row of crossveins almost in apical third (Figs. 35, 40). Legs relatively short and stout, hind tibiae 0.66-0.71 mm long, bearing 2 lateral teeth on outer edge and 5 teeth at apex (grouped 2 at inner side and 3 at outer side), metabasitarsus (0.23-0.25) slightly shorter than tarsomere II (0.10-0.13) + III (0.18-0.22) combined, metabasitarsus joint distally with 6 black teeth in a transverse row, tarsomere II with 4 teeth. Post-tibial spur (0.20-0.22) nearly the same length as metabasitarsus, solid, thick, without teeth along lateral margin but with a rigid apical tooth.

**Male genitalia.** Male pygofer rounded in caudal aspect, ventrocaudal margin smooth, with single median process on the midventral margin (Figs. 41, 43), in lateral view posterior margin concave medially, much longer than the anterior margin, ventral margin slightly wider than dorsal margin, laterodorsal angle angulate but not produced caudad, caudoventral angle triangularly produced (Fig. 42); in ventral view ventrocaudal margin shallowly concave, apically with a rather developed projection in middle (Fig. 44). Diaphragm narrow, centrally open and connecting with the opening for parameres (Fig. 43). Parameres moderate, directed dorsocaudad in lateral view, in caudal aspect with bases broad and contiguous, then slightly narrowing towards apex, distally slightly converging and with small teeth along inner margins, apices rounded (Figs. 41, 42, 48). Aedeagus tubular, broad, thick at base, in middle slightly broadened, gonopore apical on left side, subapically surround gonopore with notches and membranous teeth ventrally to laterally; basal aedeagal process slender, apparently longer than aedeagus, arising basally, apical third strongly curved caudoventrad (Figs. 45, 46, 47). Opening for parameres relatively small, ventral margin evenly concave (Fig. 43). Male anal segment ring-like, caudoventral margin produced caudoventrad into single and spinose process on right side (Figs. 41, 49).



**FIGURES 37–49.** *Mucillnata rava* sp. nov., 37, head and thorax, dorsal view; 38, head, ventral view; 39, head and thorax, left lateral view; 40, right forewing, macropterous male; 41, male genitalia, caudal view; 42, same, left lateral view; 43, pygofer, caudal view, anal segment, aedeagus and parameres removed; 44, same, ventral view; 45, anal segment, aedeagal complex and parameres, left lateral view; 46, aedeagus, left lateral view; 47, same, caudoventral view; 48, parameres, caudal view; 49, male anal segment, caudal view.

**Etymology.** The name of the species alludes to the yellowish brown body color of the species.

**Distribution.** Known only from the type locality in southern China (Hainan Province).

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### References

- Chen X.S. (2003) Key to genera of the tribe Tropidocephalini (Hemiptera: Fulgoroidea: Delphacidae) from the People's Republic of China, with description of a new genus. *The Canadian Entomologist*, 135 (6): 811–821.
- Chen, X.S. & Tsai, J.H. (2009) Two new genera of Tropidocephalini (Hemiptera: Fulgoroidea: Delphacidae) from Hainan Province, China. *Florida Entomologist*, 92 (2): 261–268.
- Ding, J.H. (2006) Fauna Sinica. Insecta Vol. 45. Homoptera Delphacidae. Editorial Committee of Fauna Sinica, Chinese Academy of Science. Beijing, China. Science Press. 776 pp.
- Donaldson, J.F. (1991) Revision of the Australian Tropidocephalini (Hemiptera: Delphacidae: Delphacinae). *Journal of the Australian Entomological Society*, 30: 325–332.