

# The planthopper genus *Perkinsiella* Kirkaldy (Hemiptera: Fulgoroidea: Delphacidae) from China

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**Abstract:** The planthopper genus *Perkinsiella* Kirkaldy from China is studied. *P. miriamae* Emeljanov is reported for the first time from China. A key to the species (males) of *Perkinsiella* from China is provided.

**Key words:** Auchenorrhyncha; Delphacinae; Delphacini; taxonomy; key

中国扁角飞虱属分类研究（半翅目：蜡蝉总科：飞虱科）

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**摘要:** 研究了扁角飞虱属 *Perkinsiella* Kirkaldy, 报道了来自中国云南的 1 个新纪录种: *Perkinsiella miriamae* Emeljanov, 1983, 提供了中国该属已知种的检索表。

**关键词:** 头喙亚目; 飞虱亚科; 飞虱族; 分类; 检索表

## Introduction

The genus *Perkinsiella* is a relatively large group in the Delphacini of the subfamily Delphacinae in Delphacidae. It was established by Kirkaldy (1903) based on specimens from Oahu, Honolulu, and is distinguished from other genera in the family by the form of the frons, and by the flattened apically dilated first segment of the antennae being distinctly shorter than the second (Kirkaldy 1903). 36 species are known in this genus so far (Bartlett 2014). Some species in this genus are of great economic importance. The type species, *Perkinsiella saccharicida* Kirkaldy, 1903, is a vector of Fiji disease, one of the most important diseases of sugarcane in Australia and several sugar-producing areas of Asia and the Pacific region (Smith & Candy 2004).

The Chinese *Perkinsiella* species have been studied by Ding, 1983 (in Kuoh *et al.* 1983), Yang (1989) and Ding (2006). 8 species (*P. saccharicida* Kirkaldy, *P. sinensis* Kirkaldy, *P. yuanjiangensis* Ding, *P. thompsoni* Muir, *P. yakushimensis* Ishihara, *P. bigemina* Ding, *P. vastatrix* (Breddin) and *P. bakeri* Muir) are known in the Chinese fauna. This paper adds a new record species, *Perkinsiella miriamae* Emeljanov, 1983 based on specimens collected from Yunnan (southwest China). Habitus photographs of male adult and reillustrations of male genitalia of this species are provided. A key to all of the *Perkinsiella* species (males) from China is also given.

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## Material and methods

All specimens examined in this study are deposited in the Entomological Museum, Northwest A&F University, Yangling, Shaanxi, China (NWAUFU). The genital segments of the examined specimens were macerated in 10% KOH and drawn from preparations in glycerin jelly with the aid of a light microscope. Illustrations of the specimens were made using a Leica MZ 12.5 stereomicroscope. Habitus photos were taken using a Scientific Digital micrography system equipped with an Auto-montage imaging system and a highly sensitive QIMAGING Retiga 4000R digital camera (CCD). Multiple photographs were compiled into final images. The terminology in this paper follows that of Ding (2006). Measurements of the body length were from the apex of the vertex to the posterior tip of the abdomen (macropterous). All measurements are in millimeters (mm).

## Taxonomy

### Genus *Perkinsiella* Kirkaldy

*Perkinsiella* Kirkaldy, 1903: 179; Kirkaldy, 1906: 404; Ishihara, 1949: 18; Yang, 1989: 75; Ding, 1983 (in Kuoh *et al.* 1983); Ding, 2006: 234.

Type species: *Perkinsiella saccharicida* Kirkaldy, 1903.

Large-sized delphacids. Head including eyes slightly wider or as wide as pronotum. Vertex quadrate, slightly shorter in midline than broad at base, anterior margin slightly projecting in front of eyes, in profile rounded into frons, lateral carinae nearly parallel except where expanded at base, submedian carinae not uniting at apex. Eyes large. Y-shaped carinae distinct. Frons longer in midline than wide at widest (about 1.5–2.0 : 1), widest near lower margin of eyes, median carina forked above the level of ocelli. Postclypeus at base about as wide as frons at apex. Rostrum surpassing meso-trochanters. Antennae large, almost reaching apex of postclypeus, segment I triangular, segment II somewhat flattened and narrower at apex than at base, longer than first by about 1.5 : 1. Pronotum shorter than vertex in midline, lateral carinae not attaining hind margin. Spination of apex of hind leg 5(3+2)-7(5+2)-4. Post-tibial spur large, densely arranged with more than 30 teeth.

Male anal segment with latero-distal angle produced into a process on each side. Pygofer in profile wider ventrally than dorsally, medioventral processes paired. Aedeagus tubular, long. Suspendorium Y-shaped.

### Key to the Chinese species of *Perkinsiella* Kirkaldy (males)

1. Genital styles broad, nearly rectangle in caudal view.....2
- Genital styles broad at base and narrowed at apex in caudal view.....3
2. Aedeagus bearing only one tooth on the left side; ventrally sinuate in basal half; medioventral processes closely placed, apices divergent laterally; genital styles in caudal aspect with apices broad and slightly emarginated medially, T-shaped .....*P. miriamae* Emeljanov n. rec.
- Aedeagus bearing only two teeth on the left side, ventrally slightly curved; medioventral processes separate, apices not divergent laterally; genital styles in caudal aspect with apices acuminate, not T-shaped .....*P. saccharicida* Kirkaldy
3. Genital styles with apices twisted.....4
- Genital styles with apices not twisted .....5

4. Aedeagus strongly reflected at apex, with 3 spinose processes in apical half ..... *P. thompsoni* Muir  
 - Aedeagus not reflected at apex, with 2 spinose processes in basal half ..... *P. sinensis* Kirkaldy  
 5. Anal segment with laterodistal processes bifurcated apically ..... *P. vastatrix* (Bredin)  
 - Anal segment with laterodistal processes not bifurcated apically ..... 6  
 6. Medioventral processes long, surpassing the dorsal margin of diaphragm in caudal aspect .....  
 ..... *P. yakushimensis* Ishihara  
 - Medioventral processes short, not surpassing the dorsal margin of diaphragm in caudal aspect ..... 7  
 7. Anal segment with laterodistal processes long, reaching to the base of genital styles; genital styles without a  
 tooth or spinose process subapically, apices strongly divergent and curved laterally ..... *P. bakeri* Muir  
 - Anal segment with laterodistal processes short, not reaching to the base of genital styles; genital styles with a  
 tooth or spinose process subapically, apices moderately divergent but not curved laterally ..... 8  
 8. Aedeagus reflected at apex in paired spinose, equal length processes on the dorsal side; common stem of  
 suspensorium distinctly shorter than arms ..... *P. yuanjiangensis* Ding  
 - Aedeagus reflected at apex in a long flagellum and a short, stout spine on the dorsal side; common stem of  
 suspensorium slightly shorter than arms ..... *P. bigemina* Ding

***Perkinsiella miriamae* Emeljanov, 1988** (Figs. 1–12), new record to China

*Perkinsiella miriamae* Emeljanov, 1988: 110.

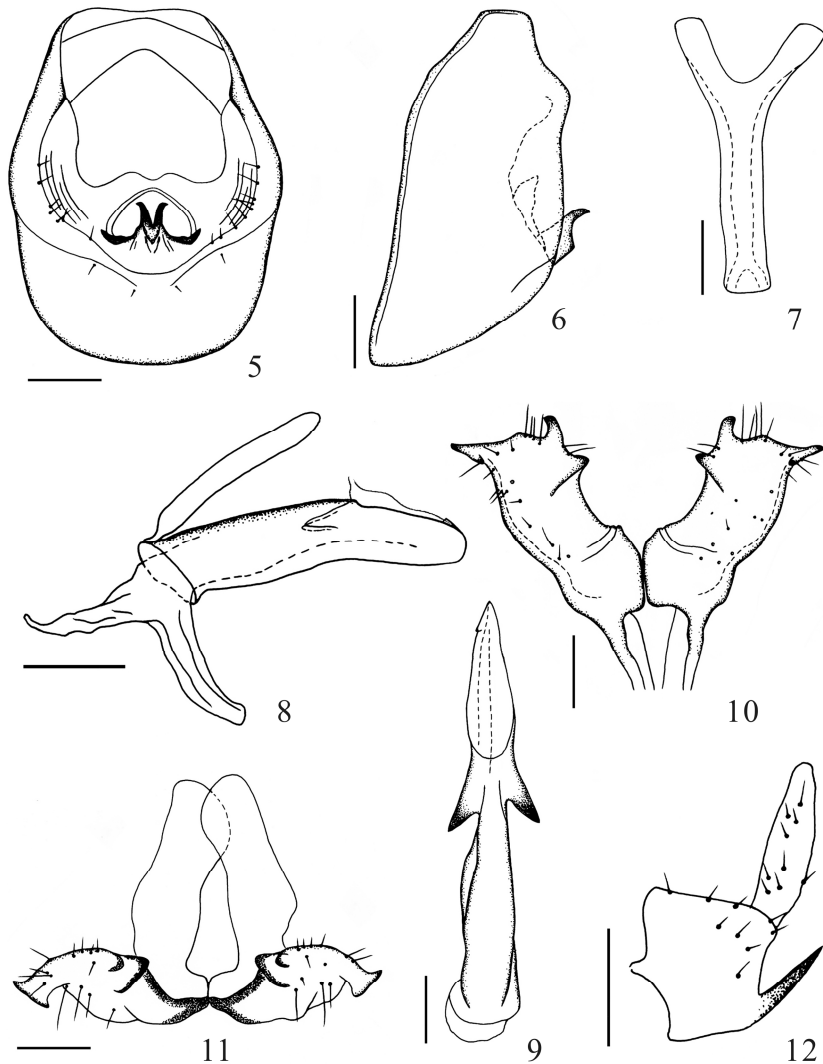
Macropterous male. Body length (from apex of vertex to the tip of forewing): male 5.32–5.54 mm ( $n = 2$ ); forewing length: male 4.72–4.82 mm ( $n = 2$ ).



Figures 1–4. *Perkinsiella miriamae* Emeljanov, 1988. 1. Male adult, dorsal view; 2. Male adult, left lateral view; 3. Head and thorax, dorsal view; 4. Frons and clypeus.

General colour brown (Figs. 1, 2). Vertex in basal half, pronotum and mesonotum between lateral carinae brownish yellow, rest area of vertex brownish (Figs. 1, 3). Frons brown

and interspersed with small yellowish spots in basal half, apical half and genae mostly beige (Fig. 4). Postclypeus fuscous (Fig. 4). Pronotum and mesonotum with outer areas of lateral carinae black (Figs. 1, 3). Eyes and ocelli black brown (Figs. 1–4). Abdomen blackish brown, each segment with narrow yellowish stripe along posterior margin and yellowish patch laterally. Legs with fore coxae near base and middle coxae basally with black patches, the large spot on each pleuron black, fore- to hind tibiae with brown longitudinal stripes. Tegmina subhyaline, with large black marking as in Fig. 2, longitudinal veins ornamented with blackish brown granules.



Figures 5–12. *Perkinsiella miriamae* Emeljanov, 1988. 5. Male pygofer, caudal view; 6. Male pygofer, left lateral view; 7. Suspensorium; 8. Suspensorium and aedeagus, left lateral view; 9. Aedeagus, dorsal view; 10. Genital styles, caudal view; 11. Genital styles, dorsal view; 12. Anal segment, left lateral view. Scale bars = 0.2 mm (Figs. 5, 6, 8, 12); 0.1 mm (Figs. 7, 9–11).

Head including eyes slightly broader than pronotum (about 1.06 : 1). Vertex shorter in midline than wide at base (about 0.78 : 1), narrower at apex than at base (about 0.69 : 1) (Figs. 1, 3). Submedian carinae originating from near base of lateral carinae, directed obliquely to arms of Y-shaped carina, then angled but not uniting at apex of vertex, areas of basal compartment concave (Figs. 1, 3). Frons longer in midline than maximum width about 1.67 : 1, widest at basal 2/5, carinae conspicuous (Fig. 4). Postclypeus and anteclypeus together approximately  $0.92 \times$  the length of the frons (Fig. 4).

Pronotum shorter than vertex in midline (about 0.79 : 1), lateral carinae straight for most part, apically slightly curved postlaterally, not reaching to posterior margin (Figs. 1, 3). Mesonotum medially ca. 1.57 times longer than vertex and pronotum together, lateral carinae slightly curved, reaching posterior margin, median carina obscure near apex (Figs. 1, 3). Macropterous forewings surpassing tip of abdomen approximately 2/5 of its total length (Fig. 1). Post-tibial spur shorter than metabasitarsus (about 0.73 : 1), with about 35 tiny teeth along posterior margin (Fig. 2).

Male genitalia. Male pygofer in posterior view with opening almost as wide as long, lateral margins well defined, two medioventral processes relatively long, closely placed, broad at bases and narrowed distad, apices divergent laterally (Fig. 5); in profile pygofer wider ventrally than dorsally, anterior margin convex near dorsal, medioventral processes stout, surpassing caudal margin of pygofer, very broad at base and attenuated in apical half with pointed apex (Fig. 6). Suspensorium Y-shaped, arms widely separated, shorter than half length of common stem (Fig. 7). Aedeagus tubular, in profile ventral margin sinuate, apical 2/5 slightly narrowed, apex rounded, with a stout spinose process on each lateral side, orifice large on dorsal side, dorsad of orifice has a membranous structure, in caudal aspect the aedeagus has a small tooth subapically on the left side (Figs. 8, 9). Diaphragm narrow, not sclerotized, narrower than opening for genital styles, emarginated medially on dorsal side (Fig. 5). Genital styles broad, in posterior view contiguous at base and divergent apicad, inner margin sinuate, produced near apex, inner apical angle has a short process, outer margin produced medially, outer apical angle with rather long process, in dorsal aspect the outer apical angle T-shaped, apices broad and slightly emarginated medially (Figs. 10, 11). Male anal segment relatively short, latero-ventrally has a stout spinose process on each side, directed dorsad (Fig. 12).

**Specimens examined.** 2♂, **China**, Yunnan, Mengla, Shimen, 15-V-2013, coll. Qingquan XUE, by light trap.

Distribution. China (Yunnan); Vietnam.

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## References

- Bartlett CR contributors. 2014. Delphacid planthoppers of North America. Available from: <http://ag.udel.edu/enwc/research/delphacid/index.html> (Accessed on 19 July 2015).
- Ding JH. 2006. *Fauna Sinica. Insecta Vol. 45. Homoptera Delphacidae*. Editorial Committee of Fauna Sinica, Chinese Academy of Science. Science Press, Beijing, 776 pp.
- Emeljanov AF. 1988. A new planthopper species of the genus *Perkinsiella* Kirkaldy (Homoptera, Delphacidae) from Vietnam. *Entomological Review*, 67(1): 108–111.
- Ishihara T. 1949. Revision of the Araeopidae of Japan. Ryukyu and Formosa (Hemiptera). *Science Report of Matsuyama Agricultural College*, 2: 102.
- Kirkaldy GW. 1903. Miscellanea Rhynchotalia. No. 7. *The Entomologist*, 36: 179–181.
- Kirkaldy GW. 1906. Leafhoppers and their natural enemies. (Pt. IX Leafhoppers. Hemiptera). *Bulletin. Hawaiian Sugar Planters' Association Experiment Station. Division of Entomology*, 1(9): 271–479.
- Kuoh CL, Ding JH, Tian LX & Huang CL. 1983. *Economic Insect Fauna of China, Fasc. 27, Homoptera, Delphacidae*. Fauna Editorial Committee, Academia Sinica, Science Press, Beijing, 166 pp.
- Smith GR & Candy JM. 2004. Improving Fiji disease resistance screening trials in sugarcane by considering virus transmission class and possible origin of Fiji disease virus. *Australian Journal of Agricultural Research*, 55: 665–672.
- Yang CT. 1989. Delphacidae of Taiwan (II) (Homoptera: Fulgoroidea). *National Science Council Special Publication*, 6: 1–334.