Bambusimukaria, a new bamboo-feeding leafhopper genus from China, with description of one new species (Hemiptera, Cicadellidae, Deltocephalinae, Mukariini)

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Abstract
A new genus and species, Bambusimukaria quinquepunctata gen. & sp. n., feeding on bamboo in Guizhou and Fujian, China, are described and illustrated. The characters of crown, frontoclypeus, forewing venations and male genitalia place the new genus in the tribe Mukariini.

Keywords
Cicadomorpha, Oriental region, species diversity, taxonomy
Introduction

The bamboo feeding leafhoppers from China were reviewed by Chen et al. (2012). Four of the new species described in this work, i.e., Abrus xishuiensis Yang & Chen, Bambusimukaria quinquepunctatus Yang, Chen & Li, Bundera bambusana Yang & Chen and Paraonukia wangmoensis Yang & Chen, were stated as species in press. Although, for all intents and purposes, these species were well described in this work, they do not fit the criteria of the Code (Art. 16.1) in one respect: it was not the authors’ intention to formally describe them as new in that publication. Subsequently, the first of these species was named by Yang and Chen (2013) and the last two by Yang et al. (2013). It is the purpose of this paper to formally describe the fourth species Bambusimukaria quinquepunctatus and to also assign it to a new genus.

The tribe Mukariini was erected by Distant (1908), placed in the subfamily Nirvaninae (Evans 1947; Li and Chen 1999), and then raised to Mukariinae (Linnavuori 1979; Oman et al. 1990; Hayashi 1996). Recently, it was transferred to the subfamily Deltocephalinae based on molecular and morphological data (Zahniser and Dietrich 2010, 2013). The tribe contains the following genera: Agrica Strand, 1942 (three species); Bengalbra Mahmood & Ahmad, 1969 (two species, reviewed by Khatri and Webb 2011); Buloria Distant, 1908 (one species); Flatfronta Chen & Li, 1997 (two species); Mohunia Distant, 1908 (six species, reviewed by Chen et al. 2007); Mukaria Distant, 1908 (13 species, reviewed by Yang and Chen 2011); Neobassareus Koçak, 1981 (nine species); Neomohunia Chen & Li, 2007 (one species); Paramohunia Chen & Li, 2007 (one species); Pseudobalbillus Jacobi, 1912 (18 species); Pseudomohunia Li, Chen & Zhang, 2007 (one species); Scaphotettix Matsumura, 1914 (four species, reviewed by Dai et al. 2009); Tiaobeinia Chen & Li, 2008 (three species).

The following characters place the new genus in Mukariini: crown strongly sloping, frontoclypeus mostly flat, forewing venation obscure except near apex, with four apical cells and appendix well developed and aedeagus with paired shafts and two gonopores.

Materials and methods

The study on bamboo leafhoppers in China was carried out from 2001 to 2011 for a minimum of ten weeks each year (June to October). All specimens were collected by sweep net in southern provinces of China and were counted and identified in the laboratory using a binocular microscope. A total of 8,000 leafhopper specimens from bamboo were examined and a total of 58 different genera and at least 123 species were identified, belonging to eight subfamilies (Chen et al. 2012).

In the present paper, terminology follows Li et al. (2011) except leg chaetotaxy, which follows Rakitov (1997). Dry specimens were used for the descriptions and illustrations. External morphology was observed under a stereoscopic microscope and characters were measured with an ocular micrometer. Measurements are given in mil-
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limeters; body length is measured from the apex of the head to the apex of the forewing in repose. The genital segments of the examined specimens were macerated in 10% KOH, washed in water and transferred to glycerin. Illustrations of the specimens were made with a Leica MZ 12.5 stereomicroscope. Photographs were taken with a Leica D-lux 3 digital camera. The digital images were then imported into Adobe Photoshop 8.0 for labeling and plate composition.

Type specimens of the new species here described are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (IEGU).

**Taxonomy**

**Key to genera of Mukariini**

1. Apex of head in profile thin and acuminate, ventral part of face flat and lying nearly horizontally (Figs 6, 8) ................................................................. 2
   – Apex of head in profile thick and truncate, ventral part of face tumid distally... 5
2. Aedeagus with single shaft and 1 gonopore .................................................... 3
   – Aedeagus with 2 shafts and 2 gonopores (Figs 21, 23) .............................. 4
3. Forewing with vein M$_{3+4}$ originating from the central anteapical cell; male pygofer with one process at inside of posterior margin; subgenital plate with a single row of macrosetae; connective V-shaped ................. **Flatfronta**
   – Forewing with vein M$_{3+4}$ originating from inner anteapical cell; male pygofer with two processes at posterior margin; subgenital plate with several rows of macrosetae; connective Y-shaped ...................................... **Tiaobeinia**
4. Hindwing with veins R$_{4+5}$ and M$_{1+2}$ confluent basally (Fig. 9); male anal segment with large process ventrally (Figs 16–18) .............. **Bambusimukaria**
   – Hindwing with veins R$_{4+5}$ and M$_{1+2}$ confluent basally; male anal segment without process ventrally .............................................. **Pseudobalbillus**
5. Crown in dorsal view rather short, anterior margin broadly rounded .... **Buloria**
   – Crown in dorsal view relatively long, anterior margin acutely rounded ...... 6
6. Aedeagus with 2 shafts and 2 gonopores ..................................................... 7
   – Aedeagus with single shaft and 1 gonopore ............................................. 9
7. Male pygofer side with process ................................................................. 8
   – Male pygofer side without process ....................................................... **Neobassareus**
8. Body broad and dorsoventrally depressed, black, without longitudinal stripe dorsally; anterior margin of head with several carinae; male pygofer with process at posterior or ventral margin........................................ **Mukaria**
   – Body normal, yellowish white, with dark longitudinal stripe dorsally; anterior margin of head without carina; male pygofer with process at inside of dorsal margin .......................................................... **Pseudomohunia**
9. Valve and subgenital plates fused .............................................................. **Agrica**
   – Valve and subgenital plates not fused .................................................. 10
10 Forewing with vein $M_{3+4}$ originating from central anteapical cell ..........11
– Forewing with vein $M_{3+4}$ originating from inner anteapical cell ..........13
11 Male pygofer with process at posterior margin .....................................Mobunia
– Male pygofer with process at ventral margin .......................................12
12 Male pygofer with a single process at inside of ventral margin ......Benglebra
– Male pygofer with paired processes at ventral margin ........Scaphotettix
13 Hindwing with veins $R_{4+5}$ and $M_{1+2}$ confluent basally; connective Y-shaped ....
....................................................................................................Neomohunia
– Hindwing with veins $R_{4+5}$ and $M_{1+2}$ separated basally; connective slender square...........................................Paramohunia

Bambusimukaria gen. n.
http://zoobank.org/F6030468-65D6-48A2-A5B7-3B36477D9DB9
Figs 1–23, 26, 27

Type species. Bambusimukaria quinquepunctata sp. n., here designated.

Diagnosis. Crown with anterior and submarginal carinae; entire second segment of antenna visible from above. Frontoctypleus transversely impressed across base beneath prominent overhanging anterior edge of head. Forewing with four apical cells, venation obscure except near apex, vein $M_{3+4}$ originating from junction of inner and central anteapical cell. Hind wing with four closed apical cells. Ventral margin of male pygofer without process. Style with short articulating arm and broad outer basal arm. Connective Y-shaped, fused with aedeagus. Aedeagus with paired stout shafts diverging from base, gonopores subapical, large; basal apodeme short.

Description. Head and thorax. Crown (Figs 4, 7) shorter than pronotum, subconically anteriorly rounded, more than half as long as breadth between eyes, with anterior and submarginal carinae, posterior end of anterior carina strongly incurved before eyes; disk strongly sloping posteriorly, texture smooth; ocelli on crown, distant from eyes and close to anterior margin; entire second segment of antenna visible from above; eyes long, oblique, extending backward over anterior angles of pronotum; face (Fig. 5) including eyes as long as broad, frontoclypeus transversely impressed across base beneath prominent overhanging anterior edge of head, narrowed towards clypeus; clypellus narrowing apically; lorum broad. Pronotum (Figs 4, 7) elevated centrally, arched, anterior margin convexly rounded between eyes, posterior margin slightly concave, lateral margin short. Scutellum (Figs 4, 7) large, broad, basal margin longer than lateral margin, transverse depression slightly curving. Forewing (Figs 1–3, 9) elongate, considerably longer than abdomen, slightly widened posteriorly, with four apical cells, venation obscure except near apex, vein $M_{3+4}$ originating from junction of inner and central anteapical cell; appendix well developed. Hind wing (Fig. 10) with four closed apical cells. Profemur (Fig. 11) with 2 dorsoapical setae, row AM with 1 stout seta, and row AV with several fine
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Male genitalia. Male pygofer (Figs 15, 16) rather dorso-ventrally depressed, with macrosetae caudally; ventral margin without process. Valve (Fig. 19) broad, subtriangular. Subgenital plate (Fig. 19) very short, broad basally, with group of moderately long fine setae laterobasally and few short fine setae apically. Style (Fig. 20) with short articulating arm and broad outer basal arm. Connective (Fig. 21) Y-shaped, fused with aedeagus. Aedeagus (Figs 21–23) with paired stout shafts diverging from base, gonopores subapical, large; basal apodeme short, thumb-like in lateral view.

Female genitalia. Sternite VII (Fig. 12) with hind margin broadly concave. Pygofer with numerous macrosetae. Ovipositor protruding slightly beyond pygofer apex. First valvula (Fig. 13a, b) weakly curved; dorsal sculpturing pattern strigate, reaching dorsal margin; without distinctly delimited ventroapical sculpturing. Second valvula (Fig. 14a, b) broad, widest near mid-length, thereafter gradually tapered to acute apex; with broad dorsal sclerotized area, thereafter dorsal margin with numerous fine regular teeth after dorsal prominences.

Host plant. Bamboo (Figs 24–27).

Distribution. Southwest and south China.

Etymology. The genus name, which is feminine, is a combination of “bambus” (bamboo) and “Mukaria” (name of the type genus of Mukariini), meaning that members of this genus feeding exclusively on bamboo (Bambusoideae).

Remarks. The new genus can be distinguished from other genera of Mukariini by the very large anal tube process (see also above key to genera of Mukariini). Among other Chinese mukariin genera, the new genus is somewhat similar to Flatfronta Chen & Li, 1997 and Tiaobeinia Chen & Li, 2008 in the shape of head, and also similar to Mukaria Distant, 1908 in the shape of male genitalia. See also Table 1 for further comparisons.

**Bambusimukaria quinquepunctata** sp. n.

http://zoobank.org/A5330454-C791-40F9-8BAC-9FCEFD88EFEF
Figs 1–23, 26, 27

_Bambusimukaria quinquepunctatus_, in press, Chen et al. (2012).

Type material. Holotype: ♂, China: Forest Park (26°35’N, 106°42’) (1100 m), Guiyang, Guizhou, on bamboo (_P. bambusoides_), 11 Aug. 2006, X.-S. Chen and L. Yang;
paratypes: 4♂♂, 7♀♀, data same as holotype; 1♀, Dongtang (25°24’N, 107°52’), Maolan, Libo, Guizhou, on bamboo, 24 May 1998, X.-S. Chen; 10♀♀, Dayi (25°21’N, 106°06’), Wangmo, Guizhou, on bamboo (*P. bambusoides*), 28 July 1998, X.-S. Chen; 25♂♂, 6♀♀, Forest Park, Guiyang, Guizhou, on bamboo, 11 July 2006, Q.-Z. Song; 1♀, Weiyuan (26°01’N, 106°31’), Changshun, Guizhou, on bamboo, 11 July 2007, X.-S. Chen; 6♀♀, Daxianfeng (26°55’N, 116°59’), Datian, Sanming, Fujian, on bamboo, 14 May 2011, Z.-M. Chang and J.-K. Long; 5♀♀, Tianyanbao (26°39’N, 118°53’), Yongan, Fujian, on bamboo, 17 May 2011, Z.-M. Chang and W.-C. Yang. All types are deposited in IEGU except two males and two females deposited in BMNH where indicated.

**Diagnosis.** General color yellowish white to yellowish orange. Head and thorax with five black markings. Female sternite VII with two blackish brown markings. Anal (Xth) segment with a very large process at apical-ventral margin. Aedeagus with shafts diverging from base, each shaft narrower at base, broad to near apex, outer margin extended apically into a stout acute process inner margin with a stout subapical tooth-like process directed medially, dentate on dorsal suface, gonopores subapical on ventral surface.

**Description.** **Measurements.** Body length including forewing: male 5.30–5.40 mm (n = 30), female 5.50–5.60 mm (n = 36).  

**Coloration.** General color yellowish white to yellowish orange (Figs 1–6, 26, 27). Eyes yellowish brown. Head and thorax (Figs 4, 7) with five black markings, one at apex of crown, two on anterior margin of pronotum and two on anterior margin of mesonotum. Fore tibia with one dark brown mark subapically. Female sternite VII with two blackish brown markings (Fig. 12).

**Head and thorax.** Crown (Figs 4, 7) with median length shorter than width between eyes (0.62:1). Face including eyes (Fig. 5) slightly shorter in middle line than broad at widest part (0.81:1). Pronotum (Figs 4, 7) wider than head including eyes (1.17:1), longer than vertex in middle line (1.48:1). Scutellum (Figs 4, 7) as long as pronotum in middle. Forewing (Fig. 9) 3.4 times longer in middle line than widest part. Hindwing (Fig. 10) 2.13 times longer in middle than widest part.

**Male genitalia.** Anal (Xth) segment (Figs 15–18) with a very large process at apical-ventral margin, directed cephalad, tapering distally to acute apex. Pygofer (Figs 15, 16) broad and rounded in lateral view, with many macrosetae. Valve (Fig. 19) with basal width 2 times longer than median length, posterior margin rounded. Subgenital plate (Fig. 19) very short, broad at base, tapering to acutely rounded apex. Style apophysis (Fig. 20) thumb-like, slightly sinuate, apex rounded. Connective stem (Figs 21, 22) slightly shorter than arms, fused with base of aedeagus. Aedeagus (Figs 21–23) in ventral view with shafts diverging from base, each shaft narrower at base, broad to near apex, outer margin extended apically into a stout acute process inner margin with a stout subapical tooth-like process directed medially, dentate on dorsal surface, gonopores subapical on ventral surface.

**Female genitalia.** Sternite VII (Fig. 12) with anterior margin angularly produced laterally, posterior margin strongly and broadly concaved. First and second valvulae
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(Fig. 13a, b) as in generic description; second valvulae (Fig. 14a, b) bearing approximately 36 fine teeth on apical half behind dorsal prominence and basal curvature.

**Host plant.** Bamboo (*Phyllostachys bambusoides f. lacrimadeae* Keng et Wen) (Figs 24–27).

**Distribution.** Southwest and south China (Guizhou, Fujian).

**Etymology.** The name is a combination of the Latin words “quinque” (five) and “punctata” (spots), which refers to the dorsum of head and thorax with five small dark spots.

**Remarks.** The new species can be distinguished from other species of Mukariini by the very large anal tube process.

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**Figures 1–6.** *Bambusimukaria quinquepunctata* sp. n. 1 Male habitus, dorsal view 2 Male habitus, dorsal and lateral view 3 Male habitus, lateral view 4 Head and thorax, dorsal view 5 Face 6 Head and thorax, lateral view.
Figures 7–14. *Bambusimukaria quinquepunctata* sp. n. 7 Head and thorax, dorsal view 8 Head and thorax, lateral view 9 Forewing 10 Hindwing 11 Fore femur and tibia, anterior surface 12 Female sternite VII, ventral view 13a First valvula and valvifer, lateral view 13b Apex of first valvula, lateral view 14a Second valvula, lateral view 14b Apex of second valvula, lateral view. Scale bars: 1.0 mm (7–12); 0.5 mm (13–14).
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Figures 15–23. Bambusimukaria quinquepunctata sp. n. 15 Pygofer and anal tube, dorsal view 16 Pygofer and anal tube, lateral view 17 Anal tube, lateral view 18 Anal tube, postero-ventral view 19 Valve and right subgenital plate, ventral view 20 Style, dorsal view 21 Aedeagus and connective, ventral view 22 Aedeagus and connective, lateral view 23 Aedeagus, caudal view. Scale bars: 1.0 mm (15–20); 0.5 mm (21–23).
Figures 24–27. Host plant of *Bambusimukaria quinquepunctata* sp. n. 24 View of the area where the types of *B. quinquepunctata* were captured, inGuiyang Forest Park (Guizhou, China) with *Phyllostachys bambusoides* f. *lacrimadeae* Keng & Wen 25 View of the plant 26 *B. quinquepunctata* resting on a leaf of *P. bambusoides* f. *lacrimadeae*, dorsal view (Guiyang Forest Park, Guizhou) 27 same, lateral view. (11 Aug 2006, photography by X.-S. Chen)

Table 1. Morphological comparison of *Bambusimukaria* to similar genera, *Flatfronta*, *Tiaobeinia* and *Mukaria*.

|                         | Bambusimukaria | Flatfronta | Tiaobeinia | Mukaria       |
|-------------------------|----------------|------------|------------|---------------|
| Body form               | Depressed      | Depressed  | Depressed  | Weakly depressed |
| No. of carinae on crown | Two            | One        | One        | Two or three   |
| Anterior margin of crown in dorsal view | Strongly incurved before eyes | Smoothly curved | Smoothly curved | Smoothly curved |
| Disk of crown           | Strongly elevated posteriorly | Weakly elevated posteriorly | Weakly elevated posteriorly | Strongly elevated posteriorly |
| Frontoclypeus form      | Mainly flat    | Mainly flat | Mainly flat | Tumid anteriorly and depressed posteriorly |
| Forewing vein $M_{1+4}$ originating from | Inner anteapical cell | Central anteapical cell | Inner anteapical cell | Inner anteapical cell |
| Hindwing veins $R_{1+3}$ and $M_{1+2}$ | Separated basally | Confluent basally | Separated basally | Separated basally |
| Hind femur macrosetae   | $2+2+1$        | $2+2+1$    | $2+2+1+1$  | $2+2+1$      |
| Pygofer process         | Absent         | Present    | Present    | Present or absent |
| Subgenital plate macrosetae | Absent     | One row   | Several rows | Absent |
| Connective form         | Y-shaped       | V-shaped   | Y-shaped   | U-shaped     |
| Ventral process of anal segment | Present | Absent    | Absent    | Absent     |
| Number of gonopores     | Two            | One        | One        | Two          |
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