

http://doi.org/10.11164/zootaxa.4144.2.7
http://zoobank.org/urn:lsid:zoobank.org:pub:29EA4D6F-2040-4C59-A91B-5C007FABC558

A review of the Oriental leafhopper genera *Thampoa* Mahmood and *Guheswaria* Thapa (Hemiptera: Cicadellidae: Typhlocybinae)

XIAO-JIAO HOU, YA-LIN ZHANG & MIN HUANG¹

Key Laboratory of Plant Protection Resources and Pest Management of Ministry of Education, Entomological Museum, college of Plant Protection, Northwest A&F University, Yangling 712100, Shaanxi, China

¹Corresponding author. E-mail: huangmin@nwsuaf.edu.cn

Abstract

The genus *Guheswaria* Thapa is recorded for the first time from China; two new species, *Thampoa quinquemaculata* sp. nov. and *Guheswaria brevicula* sp. nov. are described; one species, *Guheswaria linguplata* rec. nov. is newly recorded from China; and one new combination, *Thampoa alata* (Dworakowska, 1994) comb. nov. (from *Guheswaria*) is proposed. A checklist and updated keys to species of *Thampoa* and *Guheswaria* are provided.

Key words: Auchenorrhyncha, morphology, new species, new combination, distribution, key

Introduction

The leafhopper genus *Thampoa* Mahmood (Typhlocybinae: Typhlocybini) was established by Mahmood (1967) for its type species *Thampoa dansaiensis* Mahmood.

Zhang & Chou (1988) described one new species *Typhlocyba arborella*, but later it was transferred to the genus *Thampoa* by Huang & Zhang (2002) who at the same time described nine new species and one new record of *Thampoa* from China and synonymized *Thampoa guttata* Hu & Kuoh (1991) with *Edwardsiana ishidai* (Matsumura, 1932). Hitherto, there are 11 known species in the genus *Thampoa*, all distributed in the Oriental region.

The leafhopper genus *Guheswaria* Thapa (Typhlocybinae: Typhlocybini) was established by Thapa (1983) for a single species, *Guheswaria linguplata* Thapa, from Nepal. Dworakowska (1994) reported three new species from Sikkim. To date, there are 4 known species in the genus *Guheswaria*, also restricted to the Oriental region (Dmitriev & Dietrich, 2003).

In this paper, we respectively add one new species to each of these genera, report one previously described species of *Guheswaria* for the first time from China and transfer *Guheswaria alata* Dworakowska, 1994 to the genus *Thampoa*. A checklist of species of the two genera and keys to species of *Thampoa* (updated from Huang & Zhang, 2002) and *Guheswaria* are provided.

Material and methods

The type specimens of the new species are deposited in the collections of the Entomological Museum, Northwest A&F University, Yangling, China. The entire male abdomens of the examined specimens were dissected out and dealt with 10% NaOH at approximately 80° C for several minutes, and then transferred to glycer for further perservation. Habitus photographs were taken with an automontage QIMAGING Retiga 4000R digital camera (CCD). Line diagrams of the male genitalia were drawn using an OLYMPUS PM-10AD microscope. All the figures were edited using Adobe Photoshop CS6.0 (Adobe Systems).

The morphological terminology in this paper follows Young (1952) and Zhang (1990) except for the venation of wing follows Dworakowska (1993).

***Thampoa* Mahmood , 1967**

Thampoa Mahmood, 1967: 33. Type species: *Thampoa dansaiensis* Mahmood, 1967

Description. Body slim. Vertex produced anteriorly, narrower than pronotum. Forewing with oblique streak at hind margin of brochosome field. Hindwing with two crossveins RM and MP which nearly lie on the same level. Abdominal apodemes well developed and extending to apex of 5th sternite at least; apex of 7th sternite bilaterally bearing clusters of long setae. Base of subgenital plate with one macroseta; apex bilobed with thin setae and small peg-like microsetae. Paramere slender and curved apically, and with several thin setae on outer margin and row of sensory pits on inner margin near middle. Connective T-shaped or Y-shaped. Aedeagus with preatrium undeveloped and dorsoatrium well developed; shaft with one or two pairs of processes and apex membranous.

Distribution. China (Yunnan, Hunan, Hainan), Thailand and adjoining areas.

Checklist of species of *Thampoa* Mahmood, 1967

Thampoa alata (Dworakowska, 1994), **comb. nov.**

Guheswaria alata Dworakowska, 1994: 140

Distribution. India (Sikkim).

Thampoa arborella (Zhang & Chou, 1988)

Typhlocyba arborella Zhang & Chou, 1988: 46; Zhang, 1990: 157

Thampoa arborella (Zhang & Chou), Huang & Zhang, 2002: 299

Distribution. China (Hainan).

Thampoa bannaensis Huang & Zhang, 2002

Thampoa bannaensis Huang & Zhang, 2002: 292

Distribution. China (Yunnan).

Thampoa dansaiensis Mahmood, 1967

Thampoa dansaiensis Mahmood, 1967: 35; Dworakowska, 1982: 148

Distribution. China (Yunnan), Thailand and adjoining areas.

Thampoa dissimilis Huang & Zhang, 2002

Thampoa dissimilis Huang & Zhang, 2002: 295

Distribution. China (Yunnan).

Thampoa foliacea Huang & Zhang, 2002

Thampoa foliacea Huang & Zhang, 2002: 293

Distribution. China (Yunnan).

Thampoa innotata Huang & Zhang, 2002

Thampoa innotata Huang & Zhang, 2002: 294

Distribution. China (Hunan).

Thampoa quinquemaculata sp. nov.

Distribution. China (Yunnan).

Thampoa rotara Huang & Zhang, 2002

Thampoa rotara Huang & Zhang, 2002: 294

Distribution. China (Yunnan).

Thampona serrata Huang & Zhang, 2002

Thampona serrata Huang & Zhang, 2002: 291

Distribution. China (Yunnan).

Thampona tiani Huang & Zhang, 2002

Thampona tiani Huang & Zhang, 2002: 291

Distribution. China (Yunnan).

Thampona triangularis Huang & Zhang, 2002

Thampona triangularis Huang & Zhang, 2002: 296

Distribution. China (Yunnan).

Thampona trifasciata Huang & Zhang, 2002

Thampona trifasciata Huang & Zhang, 2002: 298

Distribution. China (Yunnan).

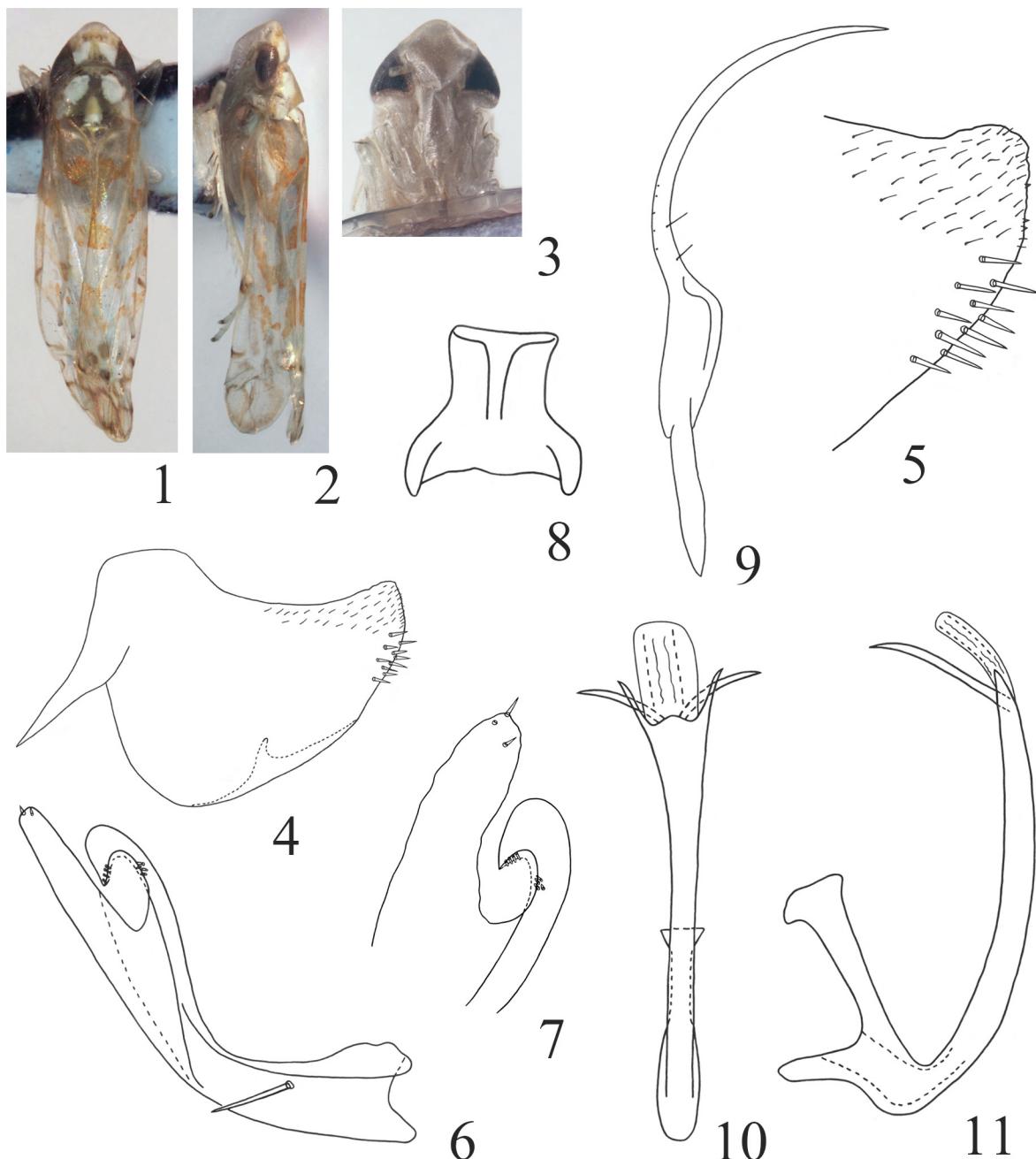
Key to species of *Thampona* Mahmood, 1967 (males, updated from Huang & Zhang, 2002)

- | | | |
|-----|--|--|
| 1. | Aedeagus with one or two pairs of apical processes..... | 2 |
| - | Aedeagus with two pairs of processes, one pair at apex, other at subapex near middle of shaft | 9 |
| 2. | Aedeagus with one pair of apical processes | 3 |
| - | Aedeagus with two pairs of apical processes | 5 |
| 3. | Apical processes of aedeagus short, with branch | 4 |
| - | Apical processes of aedeagus long, without branch | <i>T. innotata</i> |
| 4. | Branch of aedeagal processes twisted, pygofer with protrusion at caudo-ventral margin | <i>T. rotara</i> |
| - | Branch of aedeagal processes straight, pygofer without protrusion at caudo-ventral margin | <i>T. dansaiensis</i> |
| 5. | Apical processes of aedeagus foliaceous | <i>T. foliacea</i> |
| - | Apical processes of aedeagus not foliaceous, slender | 6 |
| 6. | Ventral processes of aedeagus crossed and directed basad | <i>T. arborella</i> |
| - | Ventral processes of aedeagus not crossed and directed caudad | 7 |
| 7. | Dorsal processes of aedeagus asymmetrical and crossed | <i>T. alata</i> (Dworakowska) comb. nov. |
| - | Dorsal processes of aedeagus symmetrical and not crossed | 8 |
| 8. | Pygofer side with one fingerlike appendage at ventral margin (Fig. 4) | <i>T. quinquemaculata</i> sp. nov. |
| - | Pygofer side without any appendage at ventral margin | <i>T. trifasciata</i> |
| 9. | Dorsal processes of aedeagus directed basad | 10 |
| - | Dorsal processes of aedeagus directed dorad | 11 |
| 10. | Ventral processes of aedeagus not crossed and with a branch, aedeagal shaft strongly curved dorsad | <i>T. dissimilis</i> |
| - | Ventral processes of aedeagus crossed and without any branch, aedeagal shaft slightly curved dorsad | <i>T. bannaensis</i> |
| 11. | Ventral processes of aedeagus crossed and with some small serrations at inner margin | <i>T. serrata</i> |
| - | Ventral processes of aedeagus not crossed and without any serration at inner margin | 12 |
| 12. | Dorsal processes of aedeagus almost straight, divergent dorsad; manubrium of connective shorter; crown and pronotum with orange archlike streaks along anterior and lateral margin | <i>T. tiani</i> |
| - | Dorsal processes of aedeagus curved laterally then dorsally; manubrium of connective longer; crown and pronotum with a long triangular patch medially, and without streaks along anterior and bilateral margin | <i>T. triangularis</i> |

Thampona quinquemaculata sp. nov.

(Figs 1–11)

Description. Body pale overall with symmetrical dorsal pattern diffusing yellow, orange, reddish-orange and brown markings. Vertex with one broad transverse light brown band between anterior eye margins and with two quadrangular ivory patches between coronal suture and eyes. Pronotum with two round ivory patches anteriorly and laterally. Adjoining area between posterior area of pronotum and anterior area of scutellum with one oval ivory patch medially; triangles brown; transverse depression yellow. Forewing semitransparent excepting oblique brown stripe in apical part of brochosome field and infumated patches in apical half, reddish-orange patches in remaining part. Hindwing transparent and white with veins brown (Figs 1–3).



FIGURES 1–11. *Thamposa quinquemaculata* sp. nov. 1, habitus, dorsal view; 2, habitus, lateral view; 3, face of male; 4, male pygofer, lateral view; 5, hind margin of male pygofer, lateral view; 6, subgenital plate, dorsal view; 7, apex of subgenital plate; 8, connective; 9, paramere; 10, aedeagus, posterior view; 11, aedeagus, lateral view.

Abdominal apodemes extending to 6th segment. Pygofer side gradually narrowed from base to apex with numerous microsetae on caudo-dorsal part, several rigid setae at caudal margin, and with finger-like process rolled towards inner side of ventral margin (Figs 4, 5). Subgenital plate with one macroseta basally; apical part bilobed, inner lobe with 2–3 setae apically; outer lobe cucullate basally with four peg-like setae on outer margin, apex sharply narrowed, hooked and curved to base with four peg-like setae (Figs 6, 7). Paramere slender and curved, row of sensory pits on inner margin and several setae on outer margin medially (Fig. 9). Aedeagus with two pairs of processes apically; ventral processes short, slender and directed caudally, dorsal processes slightly wider, longer and directed dorsad. Apical capsule long exceeding apex of ventral processes (Figs 10, 11).

Measurement. Male 2.56 mm (including wing).

Type material. Holotype, ♂, Yunnan Prov., Mengla Yaoqu, altitude 800m, 28.V.2009, coll. Cui Wei.

Paratypes, 1♂, same data as holotype; 4♂, Yunnan Prov., Mengla Longmen, altitude 930m, 17.V.2009, coll. Cui Wei; 2♂, Yunnan Prov., Mengla Longmen, altitude 930m, 20.V.2009, coll. Cui Wei.

Notes. The new species is similar to *T. trifasciata* Huang in the aedeagal structure, but the former has five ivory patches on the vertex, pronotum and adjoining area between pronotum and scutellum, and the subgenital plate has the inner lobe distinctly longer than the outer lobe which has four peg-like setae on the outer margin of the cucullate base and four peg-like setae on the hooked and pointed apex. In contrast, *T. trifasciata* has two conjoined longitudinal orange patches on the middle part of the vertex and pronotum, and the subgenital plate has the inner lobe slightly shorter than the outer lobe which has seven peg-like setae longitudinally arranged on the outer margin of the cucullate base and lacks peg-like setae on the curved and lamellate apex.

Etymology. The species name is derived from a combination of the Latin prefix “*quinque-*” (five) and the Latin word “*maculata*” (patch), which refers to five ivory patches on the crown, pronotum and scutellum.

***Thampona alata* (Dworakowska, 1994) comb. nov.**

(Figs 12–19)

Guheswaria alata Dworakowska, 1994: 140

Notes. We were unable to examine specimens of *Guheswaria alata* Dworakowska, 1994, but the original description and illustrations provided by Dworakowska (1994) show that the male genitalia of *Guheswaria alata* have the generic characteristics of *Thampona* Mahmood, especially the bilobed apex of the subgenital plate (Fig. 15) which distinguishes *Thampona* from *Guheswaria*. So here we transfer *Guheswaria alata* to *Thampona*.

***Guheswaria Thapa*, 1983, new record to China**

Guheswaria Thapa, 1983: 175. Type species: *Guheswaria linguplata* Thapa, 1983

Description. Body slim. Vertex conically produced, narrow than pronotum. Hindwing with two crossveins RM and MP which nearly lie on the same level. Abdominal apodemes well developed and extending to apex of 5th sternite at least; apex of 7th sternite bilaterally bearing clusters of long setae. Subgenital plate not bilobed with several small peg-like microsetae apically. Paramere with caudal part long and curved, cephalic part short. Connective T-shaped or Y-shaped. Aedeagus with preatrium undeveloped and dorsoatrium well developed, shaft with one or two pairs of processes, and apex membranous.

Distribution. China (Yunnan), Nepal (Kathmandu).

Checklist of species of *Guheswaria* Thapa, 1983

***Guheswaria brevicula* sp. nov.**

Distribution. China (Yunnan).

Guheswaria colorata Dworakowska, 1994

Guheswaria colorata Dworakowska, 1994: 141

Distribution. India (Sikkim).

Guheswaria kalyaniae Dworakowska, 1994

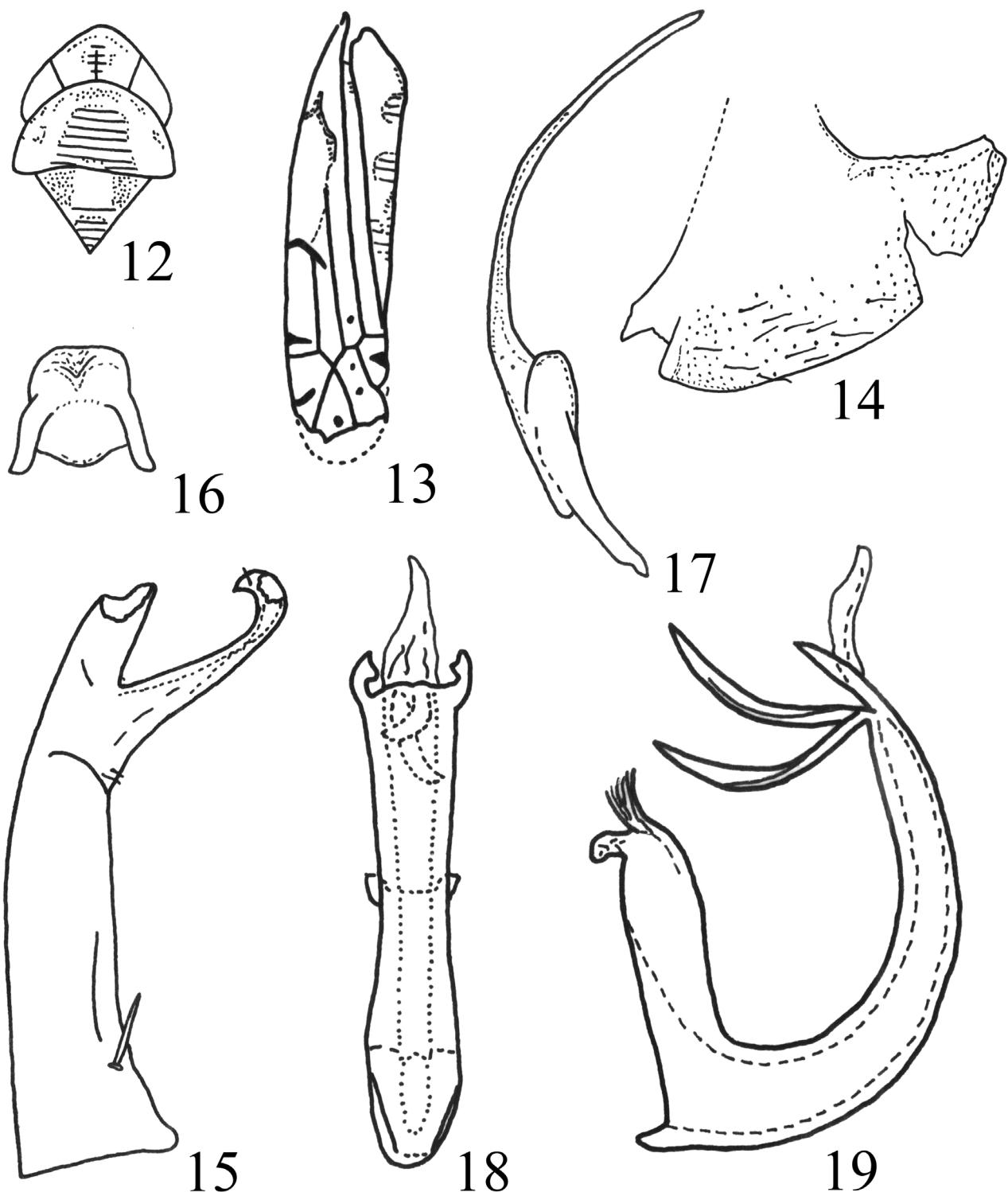
Guheswaria kalyaniae Dworakowska, 1994: 141

Distribution. India (Sikkim).

***Guheswaria linguplata* Thapa, 1983, rec. nov.**

Guheswaria linguplata Thapa, 1983: 175; Dworakowska, 1994: 141

Distribution. China (Yunnan), India (Sikkim).



FIGURES 12–19. *Thampona alata* (Dworakowska, 1994). 12–19 (after Dworakowska, 1994): 12, crown, pronotum and scutellum, dorsal view; 13, forewing; 14, male pygofer, lateral view; 15, subgenital plate, dorsal view; 16, connective; 17, paramere; 18, aedeagus, posterior view; 19, aedeagus, lateral view.

Key to species of *Guheswaria* Thapa (males)

- | | |
|---|------------------------------|
| 1. Aedeagal shaft with processes asymmetrical (Figs 29, 30, 31) | <i>G. brevicula</i> sp. nov. |
| - Aedeagal shaft with processes symmetrical | 2 |

2.	Dorsal processes of aedeagus directed dorad	<i>G. colorata</i>
-	Dorsal processes of aedeagus directed basad	3
3.	Ventral processes of aedeagus conspicuous and blade (Figs 39, 40)	<i>G. linguplata</i> . rec. nov.
-	Ventral processes of aedeagus inconspicuous and fused to the membranous terminal part	<i>G. kalyaniae</i>

***Guheswaria brevicula* sp. nov.**

(Figs 20–31)

Description. Body translucent whitish overall. Vertex with two round opaque white patches between coronal suture and eyes. Pronotum with two symmetrical L-shaped opaque white patches. Scutellum opaque whitish medially; triangles pale yellow, terminal part of scutellum yellow. Forewing with basal half mostly opaque ivory, with large transverse reddish-brown medial band, apical cells transparent and infumated lightly; 1st apical cell smallest, 2nd apical cell largest (Figs 20–22).

Abdominal apodemes nearly extending to apex of 7th segment. Pygofer side with several rigid setae at hind margin, and with large triangular lobe at ventro-caudal angle (Figs 23, 24). Subgenital plate with triangular lateral protrusion subapically, with 2 small rigid setae and 1 peg-like seta apically (Figs 25, 26). Paramere with lateral margin broadly rounded distad of connective, medial margin with several irregularly arranged sensory pits, apex curved slightly and abruptly tapered (Fig. 28). Aedeagal shaft bending gently and inflated near midlength in lateral view, with two pairs of processes; apical ventral processes long, slender and asymmetrical, one serrate apically and extended laterad, other curved to shaft; dorsal processes near midlength short and thin (Figs 29–31).

Measurement. Male 2.76 mm and female 2.95 mm (including wing).

Type material. Holotype, ♂, Hunan Prov., Chenzhou, Mangshan, 31.VII.1985, coll. Zhang Yalin & Chai Yonghui. Paratypes, 2♂♂22♀♀, same data as holotype; 1♂5♀♀, 30.VII.1985, same locality and collectors as holotype.

Notes. The reddish-brown pattern and genital characteristics of the new species are unique in the genus *Guheswaria* excepting that the crown with two large white patches and shape of connective are similar to *G. linguplata* Thapa.

Etymology. The species name is derived from a combination of the Latin prefix “*brevi-*” (short) and the Latin suffix “*-cula*” (small) which refers to caudal part of paramere short.

***Guheswaria linguplata* Thapa, 1983, new record to China.**

(Figs 32–40)

Guheswaria linguplata Thapa, 1983: 175; Dworakowska, 1994: 141

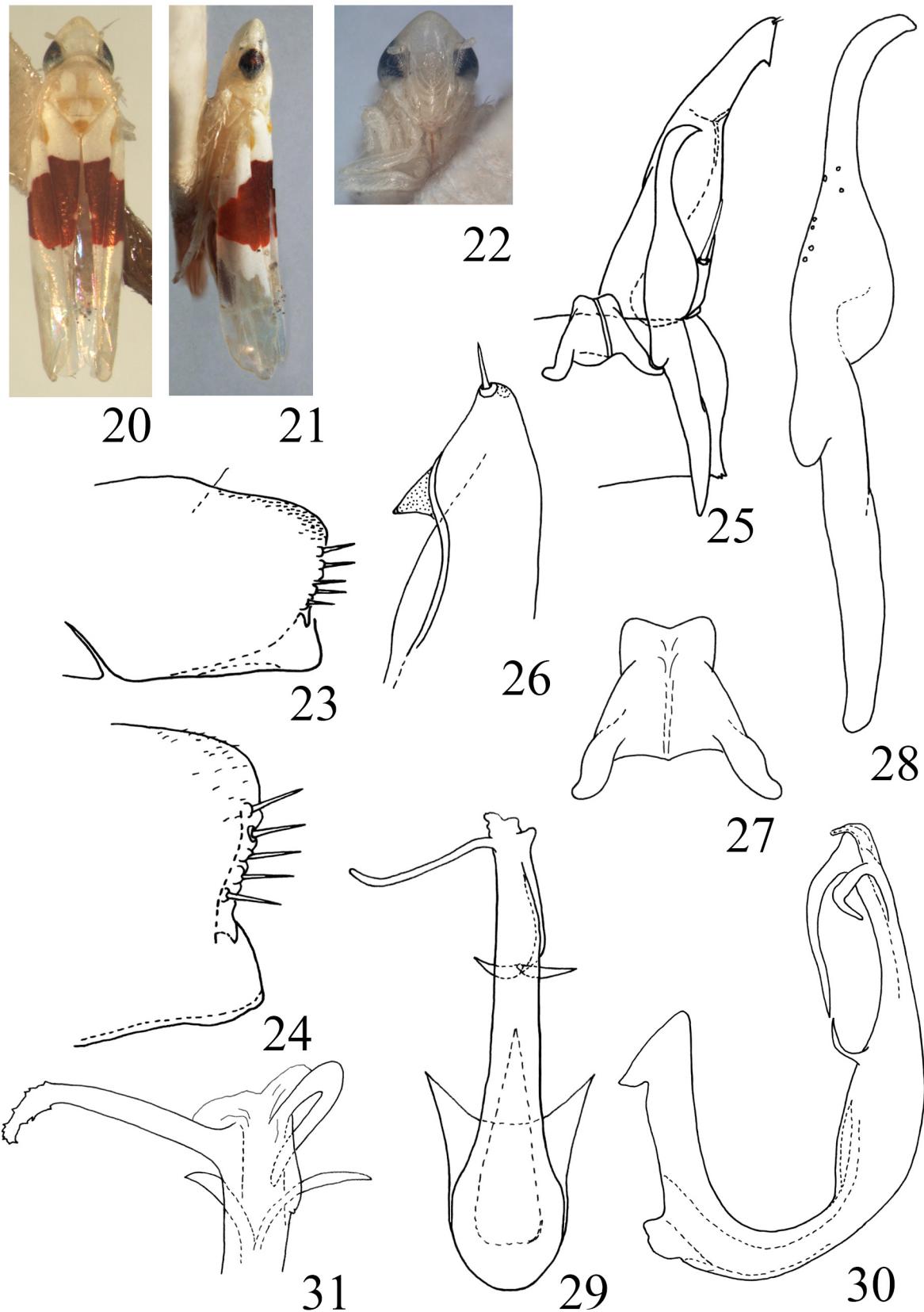
Material examined. 2♂♂, Yunnan Prov., Mengla Longmen, altitude 930m, 18.V.2009, coll. Cui Wei.

Notes. In the specimens collected from Yunnan Province, the pygofer side has a slender appendage at the caudo-dorsal angle directed ventrad (Fig. 35) and the apex of the subgenital plate is more slender which differ from the type of *G. linguplata* from Nepal (Kathmandu) as drawn by Thapa (1983), but other features of the genitalia are very similar so these two populations are considered conspecific.

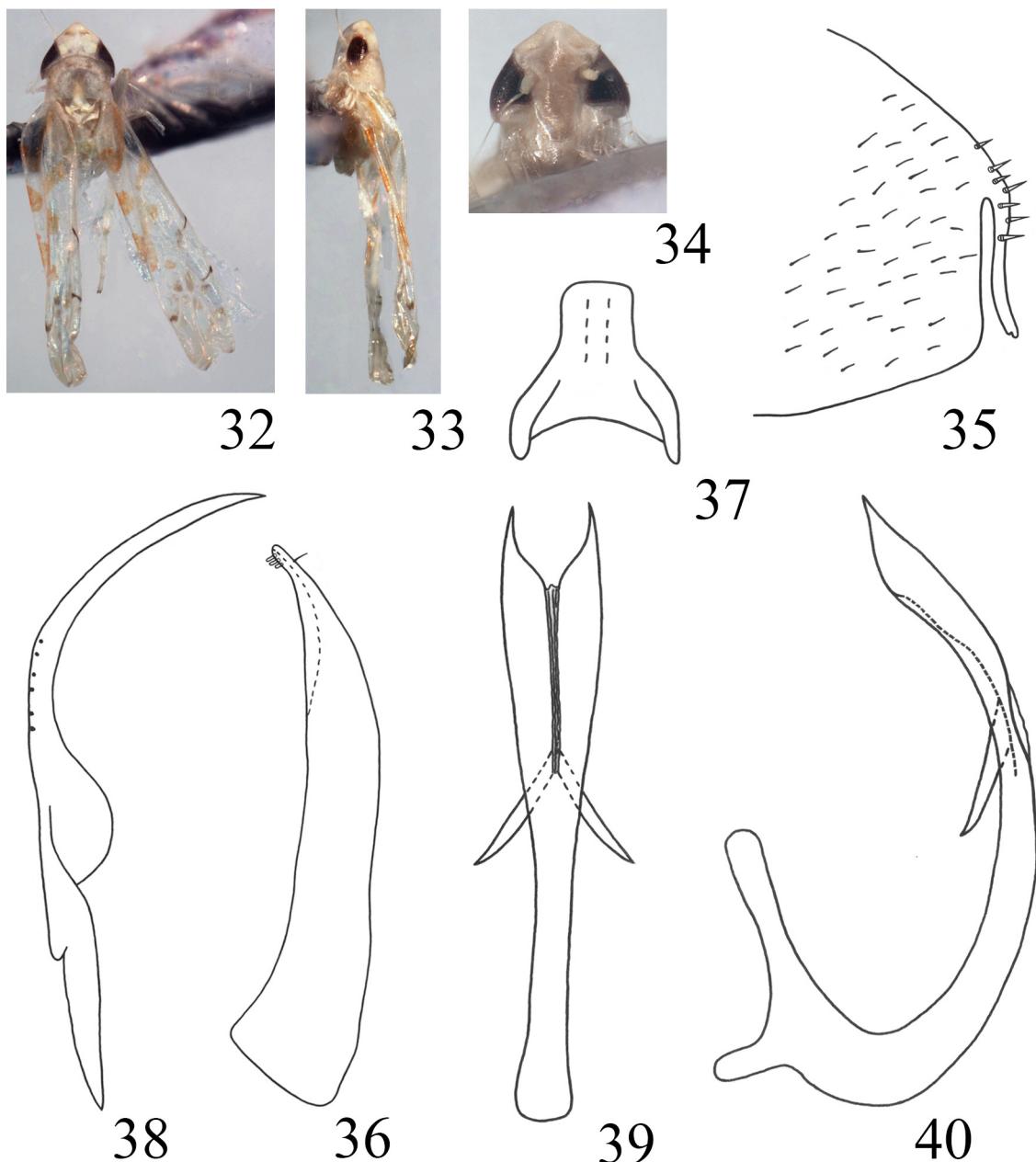
Discussion

The genera *Thamoa* and *Guheswaria* are very similar to each other and share unique characteristics that distinguish them from other genera of Typhlocybini, particularly the apex of male sternite VII laterally bearing clusters of long setae. Other characteristics shared by these two genera include: body slim; vertex well produced, shorter than pronotum; hindwing with two crossveins RM and MP which nearly lie on the same level; abdominal apodemes well developed, at least extending to apex of male sternite V; aedeagus with preatrium undeveloped and dorsoatrium well developed, shaft always with membranous capsule apically, with one or two pairs of processes.

The generic diagnostic characteristics of *Thamoa* and *Guheswaria* described respectively by Mahmood (1967) and Thapa (1983) are unstable within the two genera. For example, the shape of the connective and the presence of



FIGURES 20–31. *Guheswaria brevicula* sp. nov. 20, habitus, dorsal view; 21, habitus, lateral view; 22, face of male; 23, male pygofer, lateral view; 24, hind margin of male pygofer, lateral view; 25, paramere, connective, subgenital plate and sternite IX, dorsal view; 26, apex of subgenital plate; 27, connective; 28, paramere; 29, aedeagus, posterior view; 30, aedeagus, lateral view; 31, apical part of aedeagus, dorsal view.



FIGURES 32–40. *Guheswaria linguplata* Thapa, 1983 (from Yunnan). 32, habitus, dorsal view; 33, habitus, lateral view; 34, face of male; 35, hind margin of male pygofer, lateral view; 36, subgenital plate, dorsal view; 37, connective; 38, paramere; 39, aedeagus, posterior view; 40, aedeagus, lateral view.

the pygofer processes were described respectively in the two genera as connective T-shaped and pygofer processes absent in *Thampona* (Mahmood, 1967) and connective Y-shaped and pygofer processes present in *Guheswaria* (Thapa, 1983), but these features can occur in some species of both genera described by latter researchers, so more stable diagnostic characteristics are needed to distinguish them clearly.

Following discussions with Dr. Dworakowska (in litt.) and comparing the characteristics of original descriptions to the type species *Thampona dansaiensis* Mahmood and *Guheswaria linguplata* Thapa and other *Thampona* species described by Zhang & Chou (1988) and Huang & Zhang (2002) and *Guheswaria* species by Dworakowska (1994), we discover that the characteristics of the subgenital plate are consistently different between the two genera: in *Thampona* the subgenital plate is narrowed slightly from base to apex or broadened slightly from midlength to apex and the apex is distinctly bilobed; and in *Guheswaria* the subgenital plate is distinctly narrowed from base to apex and the apex is never bilobed. According to the above mentioned situation, we propose that the main diagnostic character separating these two genera is whether or not the apex of the subgenital plate is bilobed. Therefore, the transfer of *Guheswaria alata* Dworakowska to *Thampona* is well justified.

However, because the two genera *Thamoa* Mahmood and *Guheswaria* Thapa are closely similar to each other in the appearance and male genitalia, it is necessary to find more data, such as molecular, bionomical characters or ultrastructure and so on, to decide whether they are separated or should be combined as one genus.

Acknowledgements

We thank Dr Irena Dworakowska (Canada) for her contribution to the knowledge of Chinese Typhlocybinae and for her part of illustrations and invaluable suggestions to this manuscript. Sincere thanks also to Dr Chris Dietrich (Illinois Natural History Survey, USA) and anonymous reviewers for their revising the manuscript. This study is supported by the National Natural Science Foundation of China (31372233, 31420103911, 31493021) and The Ministry of Science and Technology of the People's Republic of China (2005DKA21402, 2015FY210300).

References

- Dmitriev, D.A. (2003) Dmitry A. Dmitriev—Home page. Available from: <http://ctap.inhs.uiuc.edu/dmitriev/> (accessed 19 April 2016)
- Dworakowska, I. (1982) Typhlocybini of Asia (Homoptera, Auchenorrhyncha, Cicadellidae). *Entomologische Abhandlungen und Berichte aus dem Staatlichen Museum für Tierkunde in Dresden*, 45 (6), 99–181.
- Dworakowska, I. (1993) Remarks on *Alebra* Fieb. and Eastern Hemisphere Alebrini (Auchenorrhyncha: Cicadellidae: Typhlocybinae). *Entomotaxonomia*, 15 (2), 91–121.
- Dworakowska, I. (1994) Typhlocybinae (Auchenorrhyncha: Cicadellidae) of Sikkim, a preliminary survey. *Folia Entomologica Hungarica*, 55, 93–215.
- Huang, M. & Zhang, Y.L. (2002) A taxonomic study of the genus *Thamoa* Mahmood from China (Homoptera: Cicadellidae: Typhlocybinae). *Entomotaxonomia*, 27 (2), 290–303.
- Mahmood, S.H. (1967) A study of the Typhlocybinae genera of the Oriental region (Thailand, the Philippines and adjoining areas). *Pacific Insects Monograph*, 12, 1–52.
- Thapa, V.K. (1983) Descriptions of two new genera and a few new records of leafhoppers (Typhlocybinae, Cicadellidae, Homoptera) from Nepal. In: Knight, W.J., Pant, N.C., Robertson, T.S. & Wilson, M.R., (Eds.), *Proceedings of the 1st International Workshop on Biota taxonomy, Classification and Biology of Leafhoppers and Planthoppers (Auchenorrhyncha) of Economic Importance*. pp. 173–177.
- Young, D.A. (1952) A reclassification of Western Hemisphere Typhlocybinae (Homoptera, Cicadellidae). *The University of Kansas Science Bulletin*, 35 (1), 3–217.
<http://dx.doi.org/10.5962/bhl.part.4327>
- Zhang, Y.L. & Chou, I. (1988) Some new species and new records of Typhlocybinae from Guangdong (Homoptera: Cicadellidae: Typhlocybinae). *Entomotaxonomia*, 10 (1–2), 43–48.
- Zhang, Y.L. (1990) *A Taxonomic Study of Chinese Cicadellidae (Homoptera)*. Tianze Eldonejo, Yangling, Shaanxi, 218 pp.