



***Macrotrichia*, a new genus of Ledorinae (Hemiptera: Cicadellidae) from China**

YALIN ZHANG¹, JING SUN² & WU DAI^{3,4}

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

E-mail: ¹yalinzh@nwsuaf.edu.cn; ²sjingsun@163.com; ³daiwu@nwsuaf.edu.cn

⁴Corresponding author

Abstract

Macrotrichia **gen. n.**, a new leafhopper genus of the tribe Ledorini (Hemiptera: Cicadellidae: Ledorinae), and three species, *M. deltata* **sp. n.**, *M. hamata* **sp. n.** and *M. flavomarginata* (Kuoh & Cai) **n. comb.**, from southern China are described and illustrated. A key to all species is provided, and the differences between the new genus and a closely related genus *Tituria* Stål are discussed.

Key words: Homoptera; Auchenorrhyncha; leafhopper; morphology; *Tituria*; new species

Introduction

The subfamily Ledorinae is a fairly large group of the 50 major subfamilies of leafhoppers and comprises 4 tribes (Dietrich, 2005) with over 450 species in 73 genera worldwide (Oman *et al.*, 1990). It is widely distributed and well represented in South East Asia and adjacent areas, usually on trees and shrubs. The ledorine fauna of China remains inadequately studied with about 130 species in 23 genera recorded (Li & Li, 2008). While sorting and identifying the ledorine material in China, we found two new species that resemble the species of the genus *Tituria* Stål, whose characteristics of external morphology and male genitalia were described by Linnavuori (1972) and Cai (1993) respectively, but had several peculiar features worthy of considering to establish a new genus for them. These taxa, *M. deltata* **sp. n.**, *M. hamata* **sp. n.** and *M. flavomarginata* (Kuoh & Cai, 1992) **n. comb.**, are described and illustrated in this paper.

Materials and methods

External morphology was observed and illustrated under a Nikon SMZ1500 Microscope. The male and female terminalia were dissected out and treated with 10% NaOH solution at approximately 80° C for several minutes, and then observed in a droplet of glycerol under the compound light microscope. The terminology of setal rows on legs follows Rakitov (1998).

The type specimens are deposited in the Entomological Museum of Northwest A&F University, Yangling, China.

***Macrotrichia* gen. n.**

Type species: *Macrotrichia deltata* **sp. n.**

Etymology. The name of the new genus refers to many long fine setae on inner margin of the style.

Description. Body large, generally virescent in living and freshly pinned specimens (Fig. 1), ochraceous in faded specimens (Fig. 2). Head and pronotum dark brown along lateral margin (Figs. 1, 2). Scutellum with basal angles testaceous (Figs. 1, 2). Pronotum and scutellum thickly punctated; vertex and tegmina sparsely punctated.

Head distinctly narrower than pronotum, slightly wider than anterior margin of scutellum. Vertex flat, shorter than half width between eyes; anterior margin obtusely angulate; coronal suture distinct, complete from anterior to posterior margin (Figs. 1, 2). Ocelli proximate to posterior margin of vertex, nearer to each other than to corresponding eye (Figs. 1, 2). Face slightly shorter than wide, broadly and distinctly concave between eyes in lateral view (Figs. 3, 4). Clypeal suture distinct; frontoclypeus reduced apically; anteclypeus broadened medially, then tapered apically; genae flat, with mesal margin deeply depressed; lora broad (Figs. 3, 4). Antennae short; antennal ledges distinct, extending nearly to margin of crown (Figs. 3, 4). Pronotum hexangular; anterior margin straight, lateral margins broadly angularly produced, posterior margin moderately concave; disc with long transverse sculpturing (Figs. 1, 2). Scutellum triangular, longer than pronotum; scutoscutellar depression curved cephalad (Figs. 1, 2). Tegmina extending beyond apex of abdomen, with veins reticulate apically, clavus densely punctate (Figs. 5, 6). Hind wings hyaline. Legs short. Fore femur with numerous irregularly arranged short setae. Hind femur with three stout macrosetae at apex. Hind tibiae flattened with five stout anterodorsal (AD) setae; posterodorsal (PD) setae fine; anteroventral (AV) and posteroventral (PV) setae shorter and finer.

Male 8th sternite twice longer than 7th sternite, posterior margin strongly concave medially (Figs. 13, 20).

Male pygofer tapering posteriorly and subtriangular in lateral view, with a well developed hook-like process apically (Figs. 11, 18). Subgenital plates broad, slight fused at base, tapered to rounded apex, with numerous short setae on ventral surface and row of slightly stouter setae near apical margin (Figs. 12, 19). Aedeagus well developed, with single process or a pair of processes at base anteriorly; aedeagal shaft simple and stout, curved dorsally and cephalad in lateral view (Figs. 16, 22). Style with apical half elongate and curved inwardly at apex, with a subapical process and many long fine setae on inner margin; outer basal arm strong and straight; inner basal arm very small or indistinct (Figs. 15, 21). Connective slightly elongated (Figs. 15, 21).

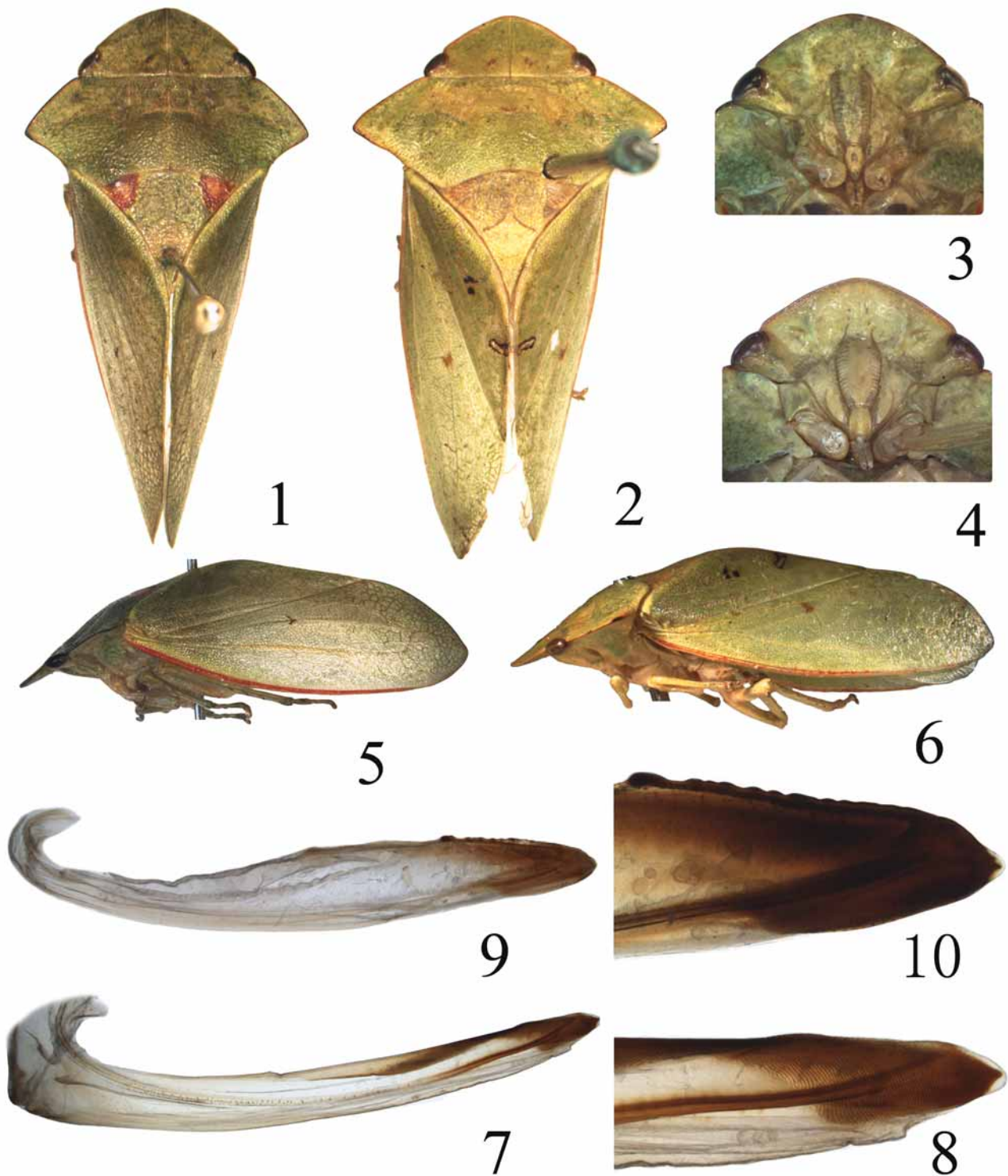
Female 7th sternite with posterior margin concave, V-shaped (Fig. 14); first valvulae sword-like, with submarginal striation sculpture dorsally; second valvulae blade-like, with several apical teeth dorsally (Figs. 7–10).

Distribution. China (Yunnan, Hainan and Xizang).

Remarks. The new genus is very similar to the genus *Tituria* externally, but it can be distinguished from the latter by: 1) body large, length longer than 19mm (Figs. 1, 2); 2) pygofer side without appendage at ventral margin (Figs. 11, 18); 3) aedeagus very short, with one or paired developed sclerotized processes at base anteriorly (Figs. 16, 22), but aedeagal shaft without apical process or lamellae; 4) style with long fine setae on inner edge (Figs. 15, 21).

Key to species of *Macrotrichia* gen. n. (males)

1. Aedeagus with single process arising from dorsal apodeme; a bifurcate subapical process of style along inner margin *M. flavomarginata* (Kuoh & Cai) **n. comb.**
- Aedeagus with paired processes arising from dorsal apodeme; an unforked subapical process of style along inner margin 2
2. Subapical process of style triangular, directed somewhat posteriorly; aedeagal shaft long and curved dorsally, tapering gradually in lateral view (Figs. 15, 16) *M. deltata* **sp. n.**
- Subapical process of style hook-like, directed anteriorly; aedeagal shaft short and straight, apex abruptly sharp in lateral view (Figs. 21, 22) *M. hamata* **sp. n.**



FIGURES 1–10. Figs. 1, 3, 5, 7–10. *Macrotrichia deltata* sp. n.; Figs. 2, 4, 6, *Macrotrichia hamata* sp. n.; 1–2, Habitus, dorsal view; 3–4, face; 5–6, Habitus, lateral view; 7, Female first valvulae; 8, Magnified view of apex of first valvulae; 9, female second valvulae; 10, Magnified view of apex of female second valvulae.

***Macrotrichia flavomarginata* (Kuoh & Cai) n. comb.**

Epiclinata flavomarginata Kuoh & Cai, 1992: 136–138, Figs. 1–8.

Remarks. This species was described from Xizang, China, based on one male specimen that is deposited in the Institute of Zoology, Chinese Academy of Sciences. From the original description and figures of Kuoh & Cai (1992), it is clear that this species belongs to *Macrotrichia* **gen. n.**, for its similarity to the other two species described below, e.g. subgenital plates slightly fused at base; aedeagus with well developed single basal process arising from dorsal margin; style with long fine setae and a large subapical process on inner margin. This species can be easily distinguished from the other two species of this genus by its single process on the apodeme of the aedeagus.

***Macrotrichia deltata* sp. n.**

(Figs. 1, 3, 5, 7–17)

Description. Male. Body length (incl. forewing) 19–20 mm, head width (incl. eyes) 6–6.2 mm, pronotum width 9–10 mm. Body virescent, lateral margins of vertex and pronotum dark brown (Fig. 1). Eyes dark brown; ocelli red (Fig. 1). Tegmina with costal margin red; an infusate spot on disc (Fig. 5).

Male 8th sternite with posterior margin concaved (Fig. 13). Pygofer side in lateral aspect tapering posteriorly, with a process blunt, curved ventrally (Fig. 11). Style with a triangular subapical process directed somewhat posteriorly, apex acuminate (Fig. 15). Aedeagus with a pair of elongate dorsal apodeme processes, curved dorsally; shaft slightly longer than apodeme process, tapering apically, slight curved dorsally in lateral view (Figs. 15–17); gonopore apical ventrally (Fig. 17).

Female. Body length (incl. forewing) 28 mm, head width (incl. eyes) 8 mm, pronotum width 14 mm. Other characteristics of female same as male.

Type material. Holotype: male, CHINA, **Hainan Prov.**, Mt. Wuzhishan, 640m, 17 May 2007, Yani Duan; Paratypes: 3 males, same data as holotype; 1 male, CHINA, **Hainan Prov.**, Mt. Jianfengling, 5 June 2007, Yani Duan, light trapped; 1 female, CHINA, **Hainan Prov.**: Mt. Diaoluoshan, 28 May 2008, Qiulei Men.

Etymology. The species name refers to the shape of the subapical process of style.

Remarks. This new species is superficially similar to *M. hamata* **sp. n.**, but can be distinguished from the latter by: (1) pygofer caudal process blunt; (2) subapical process of style directed posteriorly; (3) aedeagal shaft long and curved dorsally, narrowing to sharp apex. The new species is also similar to *M. flavomarginata* (Kuoh & Cai) **n. comb.**, but can be distinguished from the latter by: (1) aedeagus with paired processes arising dorsally; (2) subapical process of style along inner margin unforked.

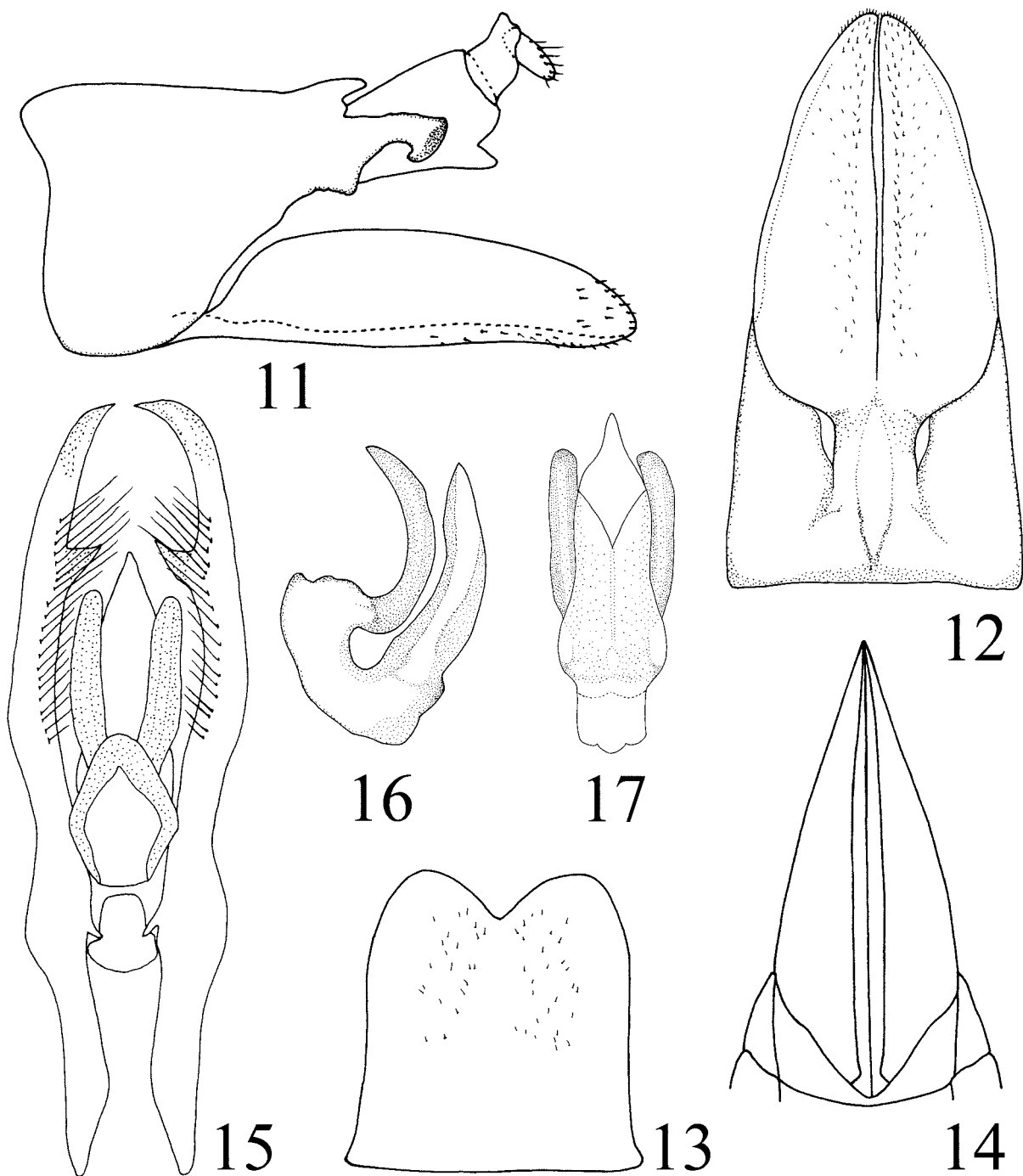
***Macrotrichia hamata* sp. n.**

(Figs. 2, 4, 6, 18–23)

Description. Male. Body length (incl. forewing) 20 mm, head width 6–6.4 mm (incl. eyes), pronotum width 11.5–12 mm. Body ochraceous, lateral margins of vertex and pronotum umber (Fig. 2). Eyes umber; ocelli red (Fig. 2). Tegmina with costal margin sanguineous; an infusate spot on disc (Fig. 6).

Male 8th sternite slightly broad, with caudal margin concaved (Fig. 20). Pygofer side tapering posteriorly in lateral aspect, apex with a slender process, curved ventrally (Fig. 18). Style with a small subapical process directed anteriorly, apex acuminate (Fig. 21). Aedeagus with a pair of dorsal basal processes strong and slightly short, apex curved dorsally; shaft straight, slightly shorter than apodeme process, base protruding ventrally, apex abruptly tapering dorsally in lateral view and rounded in ventral view (Figs. 21–23); gonopore ventroapical (Fig. 23).

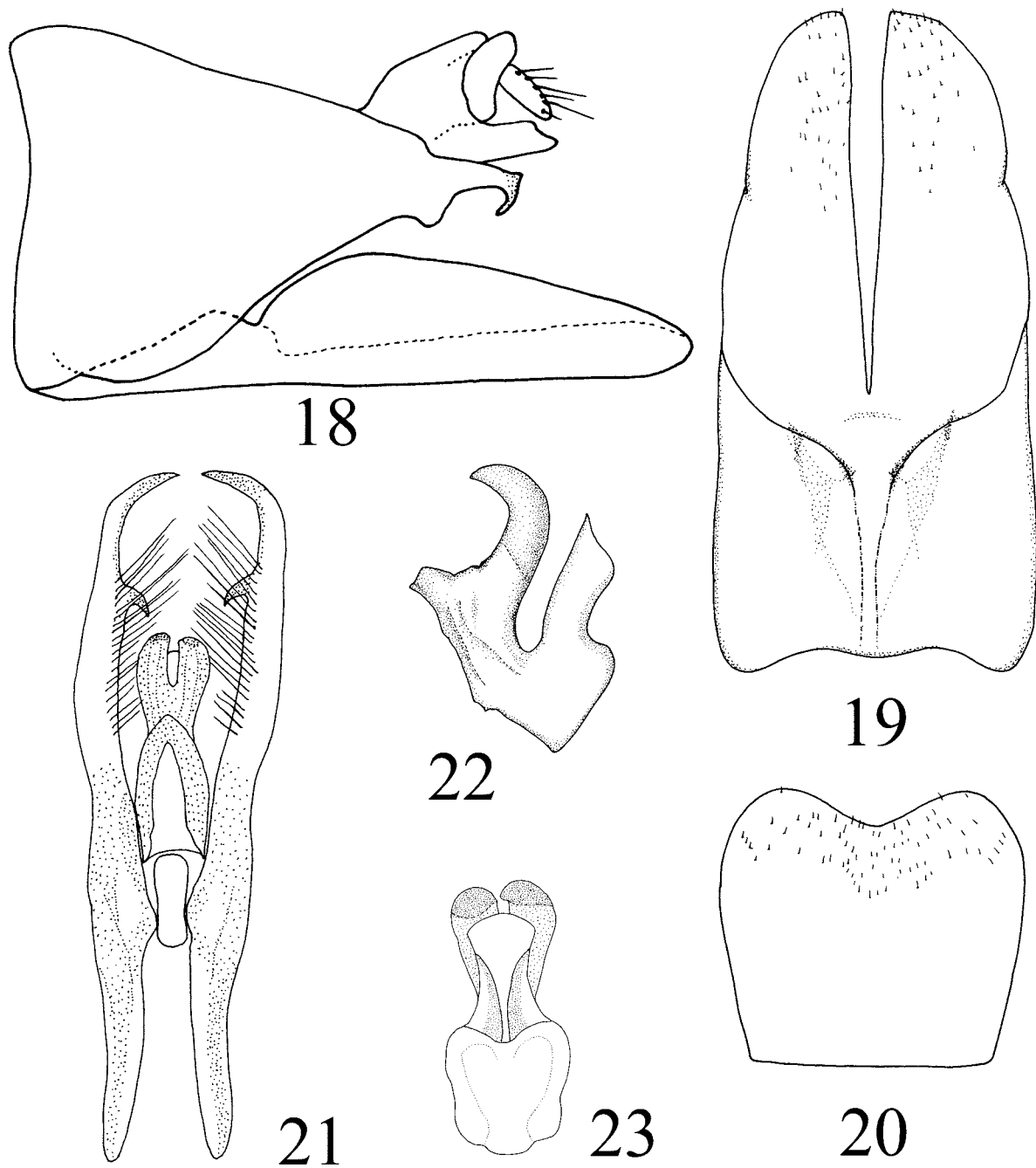
Type material. Holotype: male, CHINA, **Yunnan Prov.**, Yunxian, 1100m, 12 July 1980, Ming Zhang. Paratype: 1 male, CHINA, **Yunnan Prov.**: Cangyuan, 675m, 8 June 1980, Yaoyun Yin.



FIGURES 11–17. *Macrotrichia deltata* sp. n. 11, pygofer, subgenital plate and anal tube, lateral view; 12, subgenital plate, ventral view; 13, male 8th sternite, ventral view; 14, apex of female abdomen, ventral view; 15, aedeagus, styles and connective, dorsal view; 16, aedeagus, lateral view; 17, aedeagus, ventral view.

Etymology. The species name refers to the shape of the subapical process of style.

Remarks. This new species can be easily distinguished from *M. flavomarginata* (Kuoh & Cai) n. comb. by its paired processes of aedeagus arising from dorsal apodeme and an unforked subapical process of style along inner margin, and from *M. deltata* sp. n. by its shorter and stouter aedeagus as well as a hook-like process of style.



FIGURES 18–23. *Macrotrichia hamata* sp. n. 18, pygofer, subgenital plate and anal tube, lateral view; 19, subgenital plate, ventral view; 20, male 8th sternite, ventral view; 21, aedeagus, styles and connective, dorsal view; 22, aedeagus, lateral view; 23, aedeagus, ventral view.

Acknowledgements

We would like to thank Dr. Cong Wei for his comments on an earlier version of the manuscript. The project is supported by “the Pilot Project of Standardized Curation, Data Integration and Resource Sharing of Zoological Collections” (2005DKA21402), the Insect Expedition of Hainan and Xisha Islands (2006FY110500) and “Northwest A&F University Grant for Outstanding Faculty Members”.

References

- Cai, P. (1993) Five new species of the genus *Tituria* from China (Homoptera: Cicadelloidea: Ledridae). *Acta Zoologica Sinica*, 39, 41–47.
- Dietrich, C. H. (2005) Keys to the families of Cicadomorpha and Subfamilies and Tribes of Cicadellidae (Hemiptera: Auchenorrhyncha). *Florida Entomologist*, 88, 10–15.
- Kuoh, C. L. & Cai, P. (1992) A new species of the genus *Epiclinata* from China (Homoptera: Cicadelloidea: Ledridae) *Acta Zoologica Sinica*, 38, 136–138.
- Li, Y. J. & Li, Z. Z. (2008) Research Progress in Ledrinae Taxonomy. *Guizhou Agricultural Sciences*, 36, 110–112.
- Linnavuori, R. (1972) Revisional studies on African leafhoppers (Homoptera Cicadelloidea). *Revue de Zoologie et de Botanique Africaines*, 86, 196–252.
- Oman, P. W., Knight, W. J., and Nielson, M.W. (1990) *Leafhoppers (Cicadellidae): A bibliography, generic check-list and index to the word literature 1956–1985*. C. A. B. International Institute of Entomology, Wallingford, Oxon, United Kingdom, iii + 368 pp.
- Rakitov, R. A. (1998) On differentiation of cicadellid leg chaetotaxy (Homoptera: Auchenorrhyncha: Membracoidea). *Russian Entomological Journal*, 6, 7–27.
- Stål, C. (1865) Homoptera nova vel minus cognita. *Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar*, 22, 145–165.