



Revision of the leafhopper genus *Reticulum* (Hemiptera: Cicadellidae: Deltocephalinae)

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Abstract

The leafhopper genus *Reticulum* from China is reviewed and refined. Two new species, *R. trispinosum* **sp. nov.** and *R. lanceolatum* **sp. nov.**, are described. A detailed morphological description and illustrations of the new species are provided. A key to species of *Reticulum* is also provided.

Key word: Homoptera, Auchenorrhyncha, Cicadina, morphology, China, key, identification

Introduction

Leafhoppers (Insecta: Hemiptera: Auchenorrhyncha) are some of the commonest insects in temperate and tropical ecosystems and their feeding habits (plant sap feeders) are an influential component in forests and agricultural areas. The largest and most economically important leafhopper subfamily is Deltocephalinae. This group, which is universally distributed with nearly 6000 species, is well represented in Southeast Asia and adjacent areas, particularly on grasses. One genus of this subfamily, *Reticulum* Dai *et al.* (Athysanini), forms the subject of the present work. This genus *Reticulum* was established by Dai *et al.* (2006) with *R. transvittatum* Dai, Li & Chen, as the type species from China.

During the course of study on the Chinese Deltocephalinae, we found two new species of *Reticulum*, in addition to the type species. Reference to the original description of the genus and examination of the additional material showed the following diagnostic features of the genus: 1) tegmina hyaline with variable brown irroration; 2) the male pygofer with a branched process on inner surface arising on dorsal margin; 3) male style apical process acute and curved laterally, and 4) aedeagal shaft with lateral processes at base. In this paper, we review the type species and describe two new species.

Materials and methods

In this study, species were collected from throughout China. Descriptions are based on specimens deposited in the Entomological Museum, Northwest A&F University, Yangling, Shaanxi, China (NWSUAF).

All specimens were examined with a Leica ZOOM2000 stereomicroscope, hand-drawing of male genitalia was carried out with OLYMPUS PM-10AD microscope with drawing, and external morphological characters figured out under Nikon AFX-II stereomicroscope fitted with drawing tube.

The morphological terminology used in the descriptions mainly followed Zhang (1990). Absolute measurements, in millimeters (mm), are used for body.

Reticulum Dai, Li & Chen

Reticulum Dai, Li & Chen, 2006:398. **Type species:** *Reticulum transvittatum* Dai, Li & Chen, 2006: 398.

Description. Head and thorax yellow, variably marked with brown; tegmen hyaline with variable brown irroration.

Head including eyes slightly wider than pronotum. Crown slightly longer medially than next to eyes, shorter than width between eyes; anterior margin roundly produced anteriorly in dorsal view; disc somewhat flat. Transition between vertex and frontoclypeus rounded. Eyes fairly large; ocellus situated on frontal margin of crown next to corresponding eye, separated from eye by distance equal to 1.5 times diameter of ocellus. Frontoclypeus narrow, longer than width between eyes. Clypellus slightly expanded apically. Pronotum with anterior margin roundly produced and posterior margin slightly concave. Mesonotum almost as long as pronotum, with transverse suture curved and depressed. Forewing appendix wide; inner subapical cell closed; 4 apical cells. Female with abdominal sternite VII 3–5 times as long as abdominal sternite VI, its caudal margin produced medially into a bilobed structure.

Male pygofer longer than broad in lateral view, with a branched process on inner surface arising near dorsal margin, with several macrosetae posteriorly. Valve narrowly triangular. Subgenital plate elongate, triangular, with a uniseriate row of macrosetae along ventrolateral margin. Connective Y-shaped, stem longer than arms. Style elongate, apophysis short, tapered to acute apex and curved laterally; lateral lobe weakly developed, with a few fine setae. Aedeagus with basal apodeme well developed, shaft tubular and elongate, flanked laterally by a pair of basal processes, shorter than shaft; phallosome apical.

Diagnosis. The genus *Reticulum* is similar to the genera *Phlepsius* Fieber and *Orientalis* DeLong in having hyaline tegmina with variable brown irroration, but can be distinguished from them by the branched process of the pygofer on the dorsal margin, and by the aedeagal shaft having a pair of basal processes. This genus also resembles *Allotapes* Emeljanov 1964, but the latter can be easily recognised by the basal ventral processes of the aedeagus and pygofer without a branched process on the dorsal margin. The genus *Reticulum* is also similar to North American genera *Parphlepsius* Baker, *Pendarus* Ball, and *Norvellina* Ball (Hamilton, 1975; Kramer & DeLong, 1969) in having hyaline tegmina with variable brown irroration, but can be distinguished from them by the branched process of the pygofer on the dorsal margin, and by the style with apophysis tapered to acute apex and curved laterally.

Distribution. China (Henan, Hubei, Shaanxi, Sichuan, Gansu, Guizhou, Yunnan).

Biology. Some specimens of *Reticulum transvittatum* Dai, Li & Chen were collected on *Malus pumila* Mill (Apple) and *Crataegus* (hawthorn).

Remarks. Dai, Li and Chen (2006) established the genus *Reticulum*, with *R. transvittatum* as the type species. It was diagnosed as having the pygofer side with a process on the ventral margin and the aedeagus with a paired projection basally. However, we found the pygofer process not on the ventral margin but on dorsal margin in *R. transvittatum*, while the pygofer process arising near the dorsal margin (see Fig. 2) is diagnostic for the genus.

Key to species of *Reticulum*

1. Aedeagal shaft straight with rounded apex, basal process lanceolate and straight, not overlapping aedeagal shaft in lateral view (Figs. 20, 21)..... *lanceolatum* **sp. nov.**
Aedeagal shaft curved caudally with truncated apex, basal process lamellate or lanceolate and curved caudally, overlapping aedeagal shaft in lateral view (Figs. 6, 13)2
2. Male pygofer side with bifurcated process on inner surface (Fig. 7); basal process of aedeagal shaft lamel-

late, about half as long as shaft (Fig. 6)..... *transvittatum* Dai, Li & Chen
Male pygofer side with a 4-branched process on inner surface (Fig 12), basal process of aedeagal shaft
lanceolate, almost as long as shaft (Fig. 13)..... *trispinosum* sp. nov.

***Reticulum transvittatum* Dai, Li & Chen**

(Figs. 1–8)

Reticulum transvittatum Dai, Li & Chen, 2006: 398, figs 1–6.

Material examined. 2♂, 21♀, China, Shaanxi Prov., Fengxian, Shuangxipu, 13-15 Aug. 1995, Zhang Wenzhu and Ren Liyun, HO066668-HO066686, HO052706-HO052709; 3♂, 12♀, China, Shaanxi Prov., Fengxian, Liufengguan, 17 Aug. 1995, Zhang Wenzhu and Ren Liyun, HO066687-HO066699, HO066666-HO066667; 1♂, 1♀, Shaanxi Prov., Fengxian, 6 May 1980, Xiang Longcheng and Ma Ning, HO066702-HO066703; 1♂, Shaanxi Prov., Fengxian, Aug. 1980, Apple, HO066644; 1♂, Shaanxi Prov., Fengxian, Longkouzhen, 11 Aug. 1995, Zhang Wenzhu and Ren Liyun, HO052705; 1♂, Shaanxi Prov., Ningshan, Xunyangba, 26 Aug. 1995, Zhang Wenzhu and Ren Liyun, HO052704; 1♂1♀, Shaanxi Prov., Taibaishan, 14 Aug. ?, at light, HO066650-HO066651; 1♀, Shaanxi Prov., Ningdong, Xunyangba, 6 June 1998, Yang Linghuan, HO066700; 3♀, Shaanxi Prov., Shiquan, 27 April 1980, Xiang Longcheng and Maning, HO066706, HO066707, HO066709; 2♂, Shaanxi Prov., Yangxian, 22 Aug. 2002, Weicong and Shang Suqin, at light, HO066717, HO066721; 1♂, Hubei Prov., 25 Aug. 1986, Chen Tong, HO066701; 1♂, Gansu Prov., Wenxian, 950m, 15-16 June 1998, Yang Linghuan, HO066647; 1♂, Gansu Prov., Kangxian, Yangba, 1 Aug. 2004, Lv Lin and Duan Yani, at light, HO066665; 1♂, Shaanxi Prov., Lueyang, Lianghekou, 19 Aug. 2002, Wei Cong and Shang Suqin, HO066720; 1♂, Gansu Prov., Wenxian, Bikou, 6 Aug. 2002, Shang Suqin and Wei Cong, at light, HO066719; 1♀, Gansu Prov., Kangxian, Baiyunshan, 29 July 2002, Wei Cong and Yang Zhaofu, HO066718; 2♂, 5♀, Gansu Prov., Kangxian, 25 July 2002, Shang Suqin and Wei Cong, at light, HO066711-HO066716, HO066653; 1♀, Guizhou, Leigongshan, 30 July 1997, Zhang Yazhou, HO066652; 1♂1♀, Henan Prov., Neixiang, Getiaopa, 14 July 1998, 600-700m, Hu Jian, HO066648-HO066649; 1♂1♀, Henan Prov., Xixia, Huangshian forestry, 17 July 1998, 800-1300m, Hu Jian, HO066645-HO066646.

Distribution. China (Henan, Hubei, Shaanxi, Gansu, Guizhou, Yunnan).

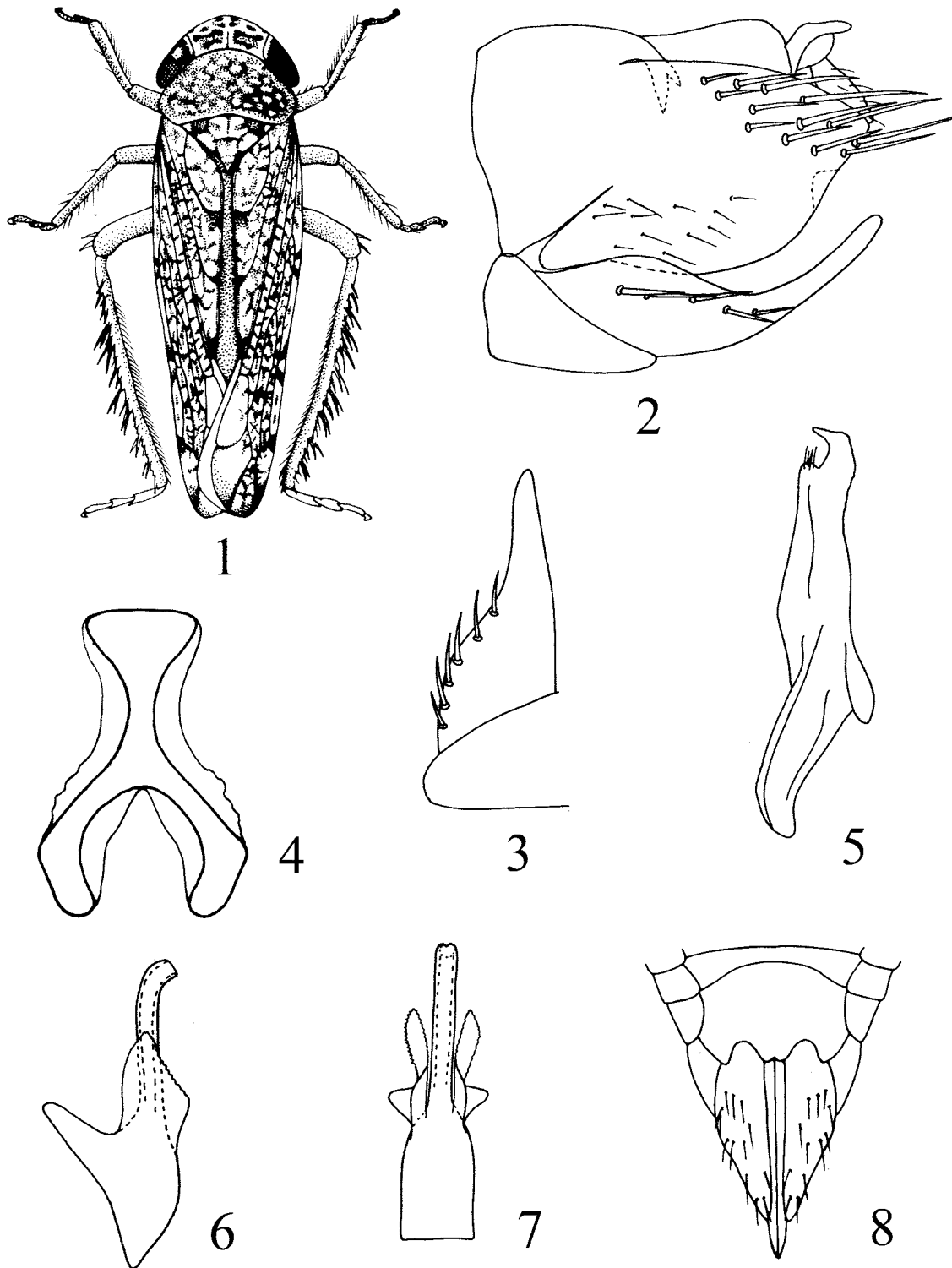
Diagnosis. This species resembles *Reticulum trispinosum* externally, but differs from this species in having a two branched pygofer processes and the basal processes of the aedeagal shaft extending to one-half length of the shaft.

***Reticulum trispinosum* sp. nov.**

(Figs. 9–17)

Size. Length of body to apex of forewings: Male 4.5–4.6 mm, female 4.5–4.7 mm.

Description. Yellow to fuscous with well expressed brown or black pattern. Vertex with six black spots on fore margin and a broad black transverse band between ocelli interrupted medially (Fig. 9). Face with frontoclypeus yellow, with well developed and often partly merged dark-brown arched lines; anteclypeus, genae and lorae mostly brown (Fig. 10). Pronotum yellow with some vermiculate brown flecks. Mesonotum pale yellow, with two triangular marginal spots and two pale brown dots anterior to scutellar suture, and two triangular marginal spots posterior to it, brown (Fig. 9). Forewings pale yellow hyaline with variable brown irroration; spot on apex of claval veins and on transverse costal veins, dark brown (Fig. 11). Female with abdominal sternite VII 3 times as long as abdominal sternite VI, caudal margin medially produced posteriorly with a median notch (Fig. 15).

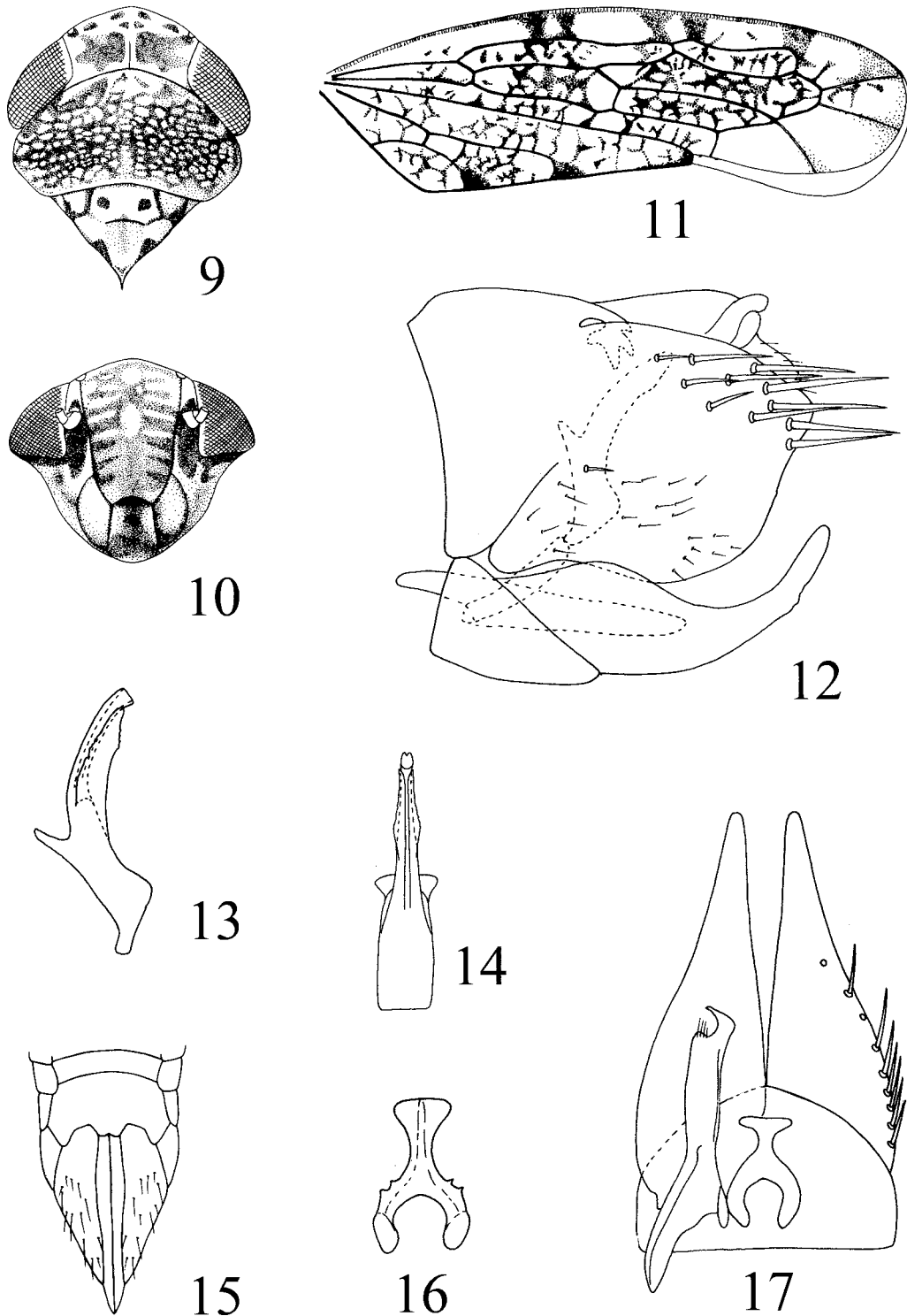


FIGURES 1–8. *Reticulum transvittatum* Dai, Li & Chen. 1. body, dorsal view; 2. genital capsule, lateral view; 3. genital valve and subgenital plate, ventral view; 4. connective; 5. style, dorsal view; 6. aedeagus, lateral view; 7. aedeagus, caudal view; 8. ♀ abdominal sternum VII, ventral view.

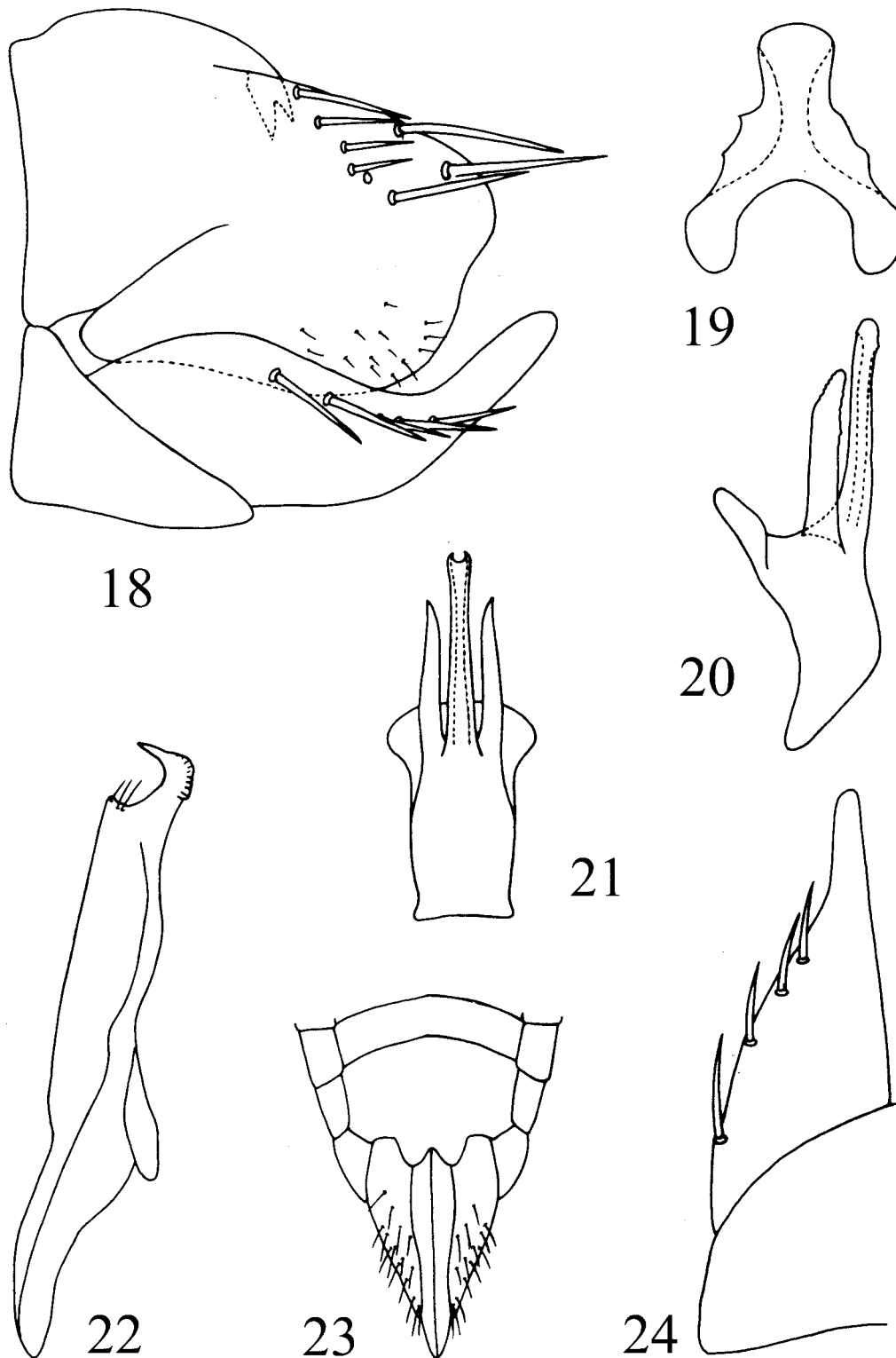
External features as in generic description.

Male pygofer longer than broad in lateral view, with 4-branched process on inner surface arising near dorsal margin (Fig. 12). Style elongate, apical process short, tapered to acute apex and curved laterally; lateral

lobe weakly developed, with a few fine setae (Figs. 17). Aedeagal shaft tubular and elongate, curved caudally, truncated at apex, an elongate, dorsally directed lateral lamellate processes arising basally extending dorsally near apex of shaft (Figs. 13, 14).



FIGURES 9–17. *Reticulum trispinosum* sp. nov. 9. head and thorax, dorsal view; 10. face; 11. tegmen; 12. genital capsule, lateral view; 13. aedeagus, lateral view; 14. aedeagus, caudal view; 15. ♀ abdominal sternum VII, ventral view; 16. connective; 17. genital valve, subgenital plate, style and connective: dorsal (left) and ventral (right) views.



FIGURES 18–24. *Reticulum lanceolatum* sp. nov. 18. genital capsule, lateral view; 19. connective; 20. aedeagus, lateral view; 21. aedeagus, caudal view; 22. style, dorsal view; 23. ♀ abdominal sternum VII, ventral view; 24. genital valve and subgenital plate, ventral view.

Type Material. Holotype ♂, China, Sichuan Prov., Batang, Zhubalong, 2450m, 11–10 July 2001, Sun Qiang, at light. Paratypes: China, 3 ♂, 2 ♀, data as for holotype.

Distribution. China (Sichuan).

Diagnosis. This species differs from other species of the genus in having the dorsal process of the pygofer 4-branched and the basal processes of the aedeagal shaft long, almost extending to shaft apex. It also differs from *Reticulum lanceolatum* **sp. nov.** in having the aedeagal shaft with a basal pair of processes curved caudally.

Etymology. The name of the new species refers to the 3-branched process on the inner surface of the pygofer side.

***Reticulum lanceolatum* sp. nov.**

(Figs. 18–24)

Size. Length of body to apex of forewings: Male 4.3–4.6 mm, female 4.5–4.8 mm.

Description. Color and external features as in *Reticulum trispinosum* **sp. nov.**

Male pygofer longer than broad in lateral view, with bifurcate process on inner surface arising near dorsal margin (Fig. 18). Subgenital plate elongate, triangular, longer than valve (Figs. 18, 22). Aedeagus with basal apodeme well developed, shaft elongate and straight, cylindrical, with a basal pair of elongate, lanceolate, lateral processes, reaching 0.75 length of shaft (Figs. 20, 21).

Type Material. Holotype ♂, China: Yunnan Prov., Zhongdian, 3150m, 15 July 2001, coll. Sunqiang; Paratypes, 8♂, 31♀, data as for holotype.

Distribution. China (Yunnan).

Diagnosis. This species externally resembles *Reticulum transvittatum* Dai, Li et Chen, but differs in having the aedeagal shaft straight with rounded apex and basal processes of the shaft straight, extending to 0.75 length of shaft. The new species also resembles *R. trispinosum* **sp. nov.** in the shape of the aedeagus, but differs from the latter in having the pygofer processes bifurcate and the basal processes of the aedeagal shaft straight.

Etymology. The name of the new species refers to the lanceolate processes at the base of the aedeagal shaft.

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