



Taxonomic study of the genus *Zema* Fennah (Hemiptera: Fulgoromorpha: Tropiduchidae) from China

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Abstract

Zema montana sp. nov. (Hemiptera: Fulgoroidea: Tropiduchidae) is described and illustrated from Yunnan, southwestern China. This represents the second known species of *Zema*. The type species, *Z. gressitti* Fennah, unrecorded since its 1956 description, is redescribed and illustrated and a revised generic description provided. New distributional records for *Z. gressitti* are given for Nepal and China (Yunnan, Xizang).

Key words: *Zema*, Tropiduchidae, new species, new distribution records

Introduction

The tropiduchid planthopper genus *Zema* was established by Fennah (1956) for *Z. gressitti* Fennah from central China. Fennah (1956) believed that *Zema* is related to a group of genera including *Cixiopsis* Matsumura, *Duriopsis* Melichar, *Olontheus* Jacobi, *Ommatissus* Fieber and *Padanda* Distant. Fennah (1982) revised the higher classification of the Tropiduchidae and recognized 15 tribes in the family. *Zema* is placed in the tribe Cixiopsini, together with *Cixiopsis*, *Duriopsis*, *Padanda* and *Olontheus*. Huang & Bourgoin (1993) transferred *Caffrommatissus* Fennah to Cixiopsini from Trypetimorphini.

While sorting and identifying Tropiduchidae from material in the Insect Collection of the Institute of Zoology, Chinese Academy of Sciences, Beijing (IZCAS) and elsewhere, we found one new species of *Zema* collected from Mt. Meili, Yunnan in southwestern China. It is the second species of the genus. In this paper, we redescribe the genus *Zema*, describe and illustrate the new species, *Z. montana* sp. nov., and present the new distributional records of *Z. gressitti*.

Materials and Methods

The specimens studied in the course of this work are deposited in the following institutions whose names are abbreviated in the text as follows: California Academy of Sciences, San Francisco, USA (CAS); Insect Collection of China Agricultural University, Beijing, China (CAU); Institute of Zoology, Chinese Academy of Sciences, Beijing, China (IZCAS); Department of Biology Insect Collection, Nankai University, Tianjin, China (NU); Tianjin Museum of Natural History, Tianjin, China (TMNH), and National Museum of Natural History, Smithsonian Institution, Washington, DC, USA (USNM).

Morphological terminology follows that of Liang (2003) and Wang & Liang (2006).

Taxonomy

Genus *Zema* Fennah, 1956

Zema Fennah, 1956: 500. Type species: *Zema gressitti* Fennah, 1956, by original designation.

Redescription

Small-sized tropiduchids (Figs. 1, 2), length (from apex of vertex to tip of fore wings) 5.0–7.5 mm; fore wings length: 4.8–6.5 mm.

General color testaceous to brown, vertex and pronotum usually with blackish markings, gena with a blackish patch below eye; fore wings and hind wings transparent, veins brown.

Head with eyes narrower than pronotum. Vertex (Fig. 12) distinctly shorter in midline than breadth at base, anterior margin somewhat convex; lateral margins elevated and converged anteriorly; median carina percurrent or distinct only in basal two-thirds, disc of vertex depressed, posterior margin distinctly obtuse-angled concave. Frons (Fig. 13) tricarinate, longer in middle than the widest breadth, anterior margin straight, lateral margins carinate, slightly converging below level of antennae. Clypeus (Figs. 13, 14) about two-thirds as long as frons, with sparse microsetulae; median carina distinct or indistinct but with raised median area; lateral carinae slightly surpassing distad of middle. Rostrum long, reaching between hind coxae, apical segment distinctly longer than broad. Eyes oval. Ocelli small, close to eye and away from base of antennae. Antennae (Figs. 13, 14) with scape short and small, ring-like; pedicel subglobose, covered with fine setulae and more than 40 disclike sensory plaque organs, both setulae and sensory plaque organs extending to base of pedicel.

Pronotum (Figs. 12, 14) longer than vertex in middle line, distinctly shorter than mesonotum in midline; disc with anterior margin slightly arched, narrower than width of vertex at base, lateral carinae converging anteriorly; median carina distinct, reaching posterior margin; inter-carinal areas distinctly depressed with a circular depression medially beyond median carina; lateral portion anterior of tegulae with a subsinuately longitudinal carina on each side; posterior margin subangulately concave with a distinct notch at middle. Mesonotum (Fig. 12) tricarinate, without a distinct transverse suture separating mesoscutellum; median carina straight, reaching to mesoscutellum; lateral carinae curving anteriorly towards median carina. Fore wings (Fig. 15) hyaline, about three times as long as broad, widest at level of nodal line; costal margin and sutural margin subparallel, the former only slightly incurved at base; corium smooth, without granulation; costal marginal area without transverse veinlets; Sc + R, M, and Cu united to level of nodal line; nodal line straight and distinct, with one row of transverse veins distad of it; with 9 apical cells and 4 subapical cells; claval suture present, claval veins united at middle of clavus. Hind wings (Fig. 16) hyaline, Sc + R, M, and Cu₁ each forked once. Legs elongate, hind tibiae with 4 distinct lateral spines, abnormally with 5 (often on one leg only), distally with 8 small spines, basal metatarsal segment with 8–9 teeth at apex, metatarsal segment pad-like, with a spine at each apical angle.

Male genitalia with pygofer (Figs. 3–5, 17–19) narrow in upper 2/5 and broad in lower 3/5 in lateral view, anterior margin distinctly obtuse-angled concave submesially, posterior margin oblique and relatively straight in lateral view, dorsal margin deeply excavated to accommodate anal tube. Anal tube very short and small; anal styles relatively large, surpassing ventral margin of anal tube in dorsal view. Parameres (Figs. 3–5, 17–19, 21) very short and broad, directed anterodorsally, with a laminate, posteroventrally directed lobe arising from inner margin subapically in lateral view, apical margin ledged. Aedeagus (Figs. 3–6, 17–20) elongate, tubular, sinuate in lateral view; corpus connective (Figs. 20, 21) slender and elongate, with apex forked; phallosotreme exposed in the middle; periandrium (Figs. 3, 4, 6, 17, 18, 20) elongate, symmetrical or asymmetrical, with its basal half surrounding basal 1/2 of penis; penis elongate, sinuate, apical half directed posteroventrally in lateral view, apex or middle part distinctly forked.

Gonopophyses VIII (first valvulae) (Figs. 9, 10) sawlike, strongly sclerotized with about 2–4 blunt teeth on dorsal margin, with several indistinct, minute teeth arranged in 3 oblique short rows, a single relatively

large tooth at apex, ventral margin denticulate with several teeth, two apical teeth blunt, laterally at base with an oblique row of many minute teeth. Gonopophyses IX (second valvular) (Fig. 8) triangular, fused together on inner-lateral margin and strongly reduced but well sclerotized, apical ends not meeting together, blunt at apex, gonospiculum longer than median length of triangular part 1.35:1, flattened laterally. Gonoplac (third valvular) (Figs. 7, 10) with 2–5 teeth on dorsal margin and about five teeth on apical margin.

Biology

No biological data are currently available for species of *Zema*.

Distribution

China (Sichuan, Hubei, Yunnan, Xizang).

Remarks

Species of *Zema* can be distinguished from other genera in Cixiopsini by the following characters: frons (Fig. 13) tricarinate, longer in middle than the widest breadth (1.30–1.44:1), anterior margin straight, lateral margins slightly converging below level of antennae, with a broad callus at anterior margin; fore wings (Fig. 15) hyaline, Sc + R, M, and Cu united to level of nodal line; nodal line straight and distinct, with one row of transverse veins distad of it; with 9 apical cells and 4 subapical cells; claval veins united at middle of clavus; and hind wings (Fig. 16) with Sc + R, M, and Cu₁ each forked once.

***Zema gressitti* Fennah, 1956**

(Figs. 1, 3–11)

Redescription

♂, length (from apex of vertex to tip of fore wings) 5.0–6.5 mm; fore wings length: 4.9–5.6 mm. ♀, length (from apex of vertex to tip of fore wings) 5.0–7.5 mm; fore wings length: 4.9–6.5 mm.

For detailed descriptions and figures of the pregenital characters, see Fennah (1956). Male genitalia (Figs. 3–6) relatively small. Periandrium (Figs. 4–6) elongate and denticulate on apical margin, asymmetrical, with its basal half surrounding basal 1/2 of penis; penis slender and elongate, appreciably sinuate, apical half directed posteroventrally in lateral view, forming a distinctly fork from middle part.

Female genitalia (Figs. 7–11).

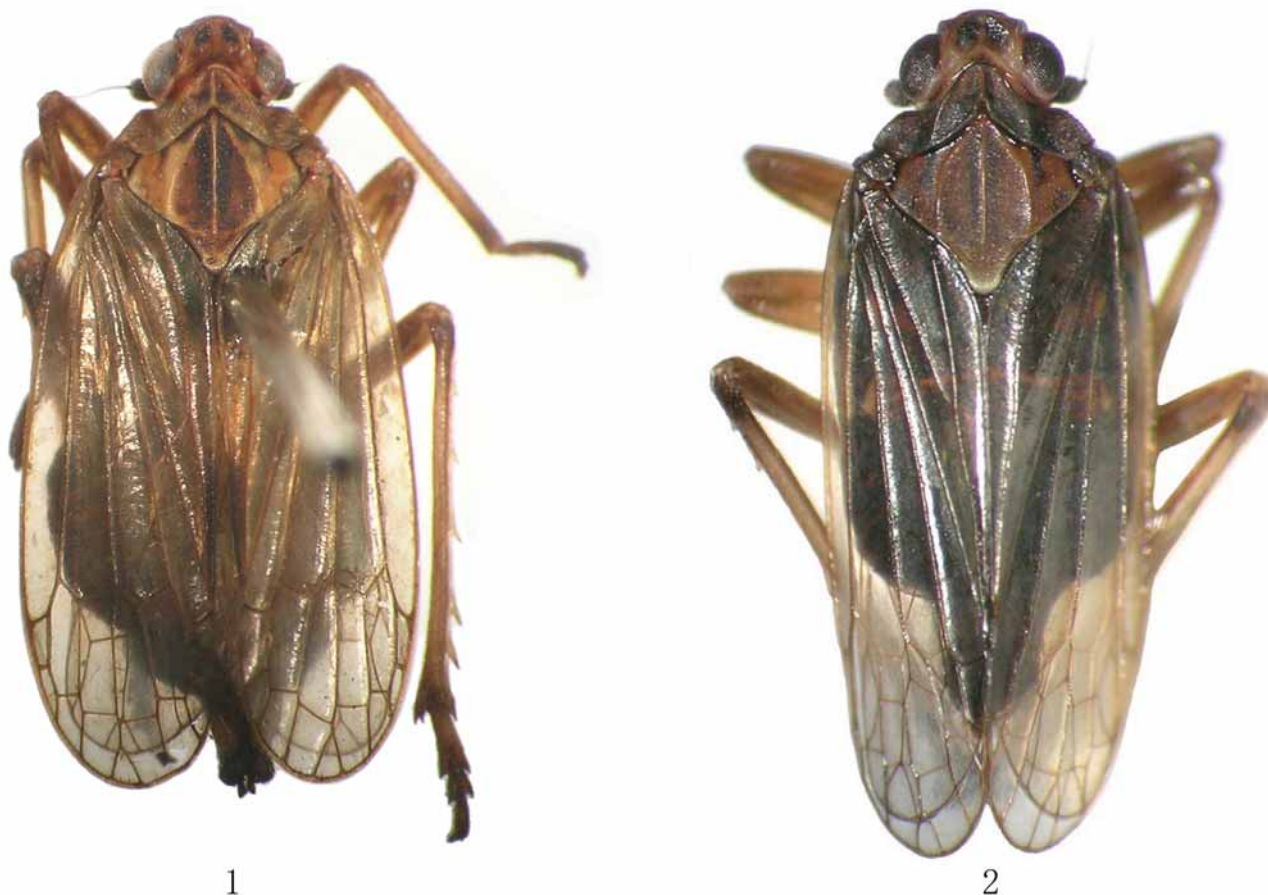
Type material examined

Holotype ♀, CHINA: Lung-chi-pa, Sichuan-Hubei border, 19-VII-1948 (L. Gressitt) (CAS).

Other material examined

CHINA: 1♂, Hubei, Xingshan, longmenhe, 1400m, 16-VI-1993 (R. Z. Huang) (IZCAS); 2♂♂, Hubei, Shennongjia, Songban, 900m, 7-VI-1981 (Y. H. Han) (IZCAS); 1♂, Hubei, Shennongjia, Songluo, 900m, Trap, 12-VI-1981 (Y. H. Han) (IZCAS); 1♀, Hubei, Shennongjia, Songban, 900m, 7-VI-1981 (Y. H. Han) (IZCAS); 2♀♀, Hubei, Shennongjia, Songluo, 900m, Trap, 12-VI-1981 (Y. H. Han) (IZCAS); 2♂♂, Sichuan, Wushan, Liziping, 1850m, 18-V-1994 (X. K. Yang) (IZCAS); 1♂, Sichuan, Mt. Emei, Baoguosi, 600m, 5-V-1957 (L. Y. Zheng, H. H. Cheng) (NU); 1♂, Sichuan, Mt. Emei, Baoguosi, 550–750m, 4-VI-1957 (F. X. Zhu) (IZCAS); 1♂, Sichuan, Mt. Emei, Baoguosi, 550–750m, 15-VI-1957 (Z. Y. Wang) (IZCAS); 1♀, Sichuan, Wushan, Liziping, 1850m, 18-V-1994 (W. Z. Li) (IZCAS); 1♀, Sichuan, Mt. Emei, Baoguosi, 550–750m, 22-VII-1957 (Y. C. Lu) (IZCAS); 1♀, Sichuan, Wushan, Liziping, 1850m, 18-V-1994 (X. K. Yang) (IZCAS); 1♀, Sichuan, Mt. Emei, Baoguosi, 550–750m, 3-VI-1957 (Z. Y. Wang) (IZCAS); 1♀, Sichuan, Mt. Emei, Baogu-

osi, 550–750m, 24-VI-1957 (F. X. Zhu) (IZCAS); 2♀♀, Sichuan, Xichang, 19-V-1974 (Y. H. Han) (IZCAS); 1♀, Sichuan, Mt. Emei, Baoguosi, 550–750m, 10-VI-1957 (F. X. Zhu) (IZCAS).



FIGURES 1, 2. Dorsal habitus of *Zema* species. 1. *Z. gressitti* Fennah (♀, China: Yunnan, NU). 2. *Z. montana* Wang & Liang, sp. nov. (♂, CHINA: Yunnan, IZCAS).

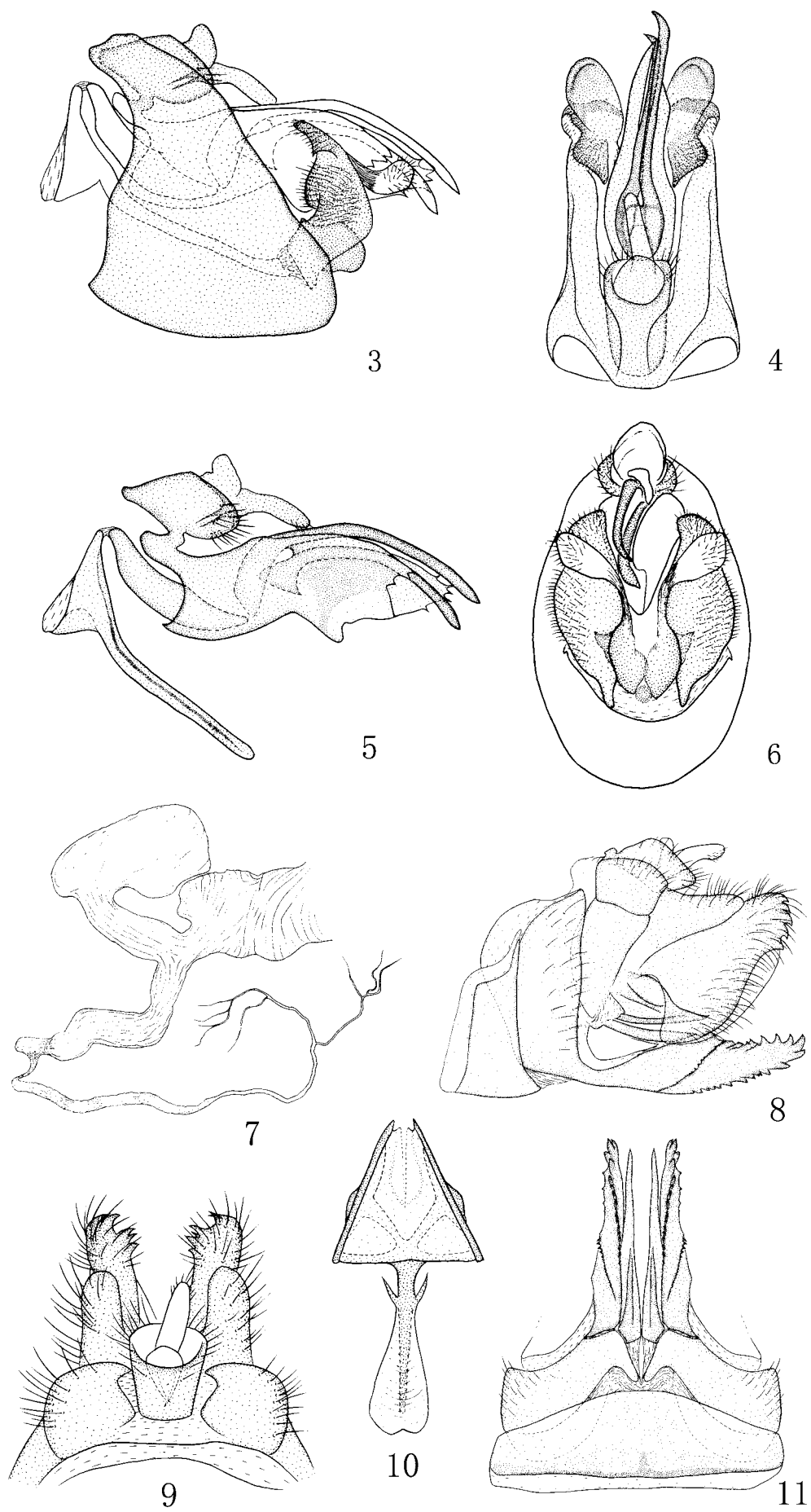
New records

NEPAL: 2♀♀, 9 km S of Kodari, 28-X-1977 (Gary F. Hevel) (USNM). CHINA: 1♂, Yunnan, Mt. Meili, 3200 m, 6-VII-2006 (M. F. Wang) (IZCAS); 1♀, Yunnan, Lijiang, Mt. Yulong, 2800m, 11-VIII-1979 (L. Y. Zheng) (NU); 1♂, Yunnan, Kunming, 16-XI-1978 (NU); 2♂♂, Yunnan, Kunming, Xishan, 23-XI-1978 (TMNH); 1♂, Yunnan, Xiaguan to Yongping, 1800m, 4-V-1955(Kryzhanovskiy) (IZCAS); 1♂, Yunnan, Xiaguan to Yongping, 1900m, 20-IIV-1955 (Kryzhanovskiy) (IZCAS); 1♀, Yunnan, Baoshan to Yongping, 1900m, 28-V-1955 (Bushik) (IZCAS); 1♂, Xizang, Chayu, Ciba, 1720m, 10-VII-1973 (F. S. Huang) (IZCAS); 1♂, Xizang, Chayu, Dongqiong, 1570m, 23-VI-1978 (F. S. Li) (CAU).

Distribution

China (Sichuan, Hubei, Yunnan, Xizang), Nepal.

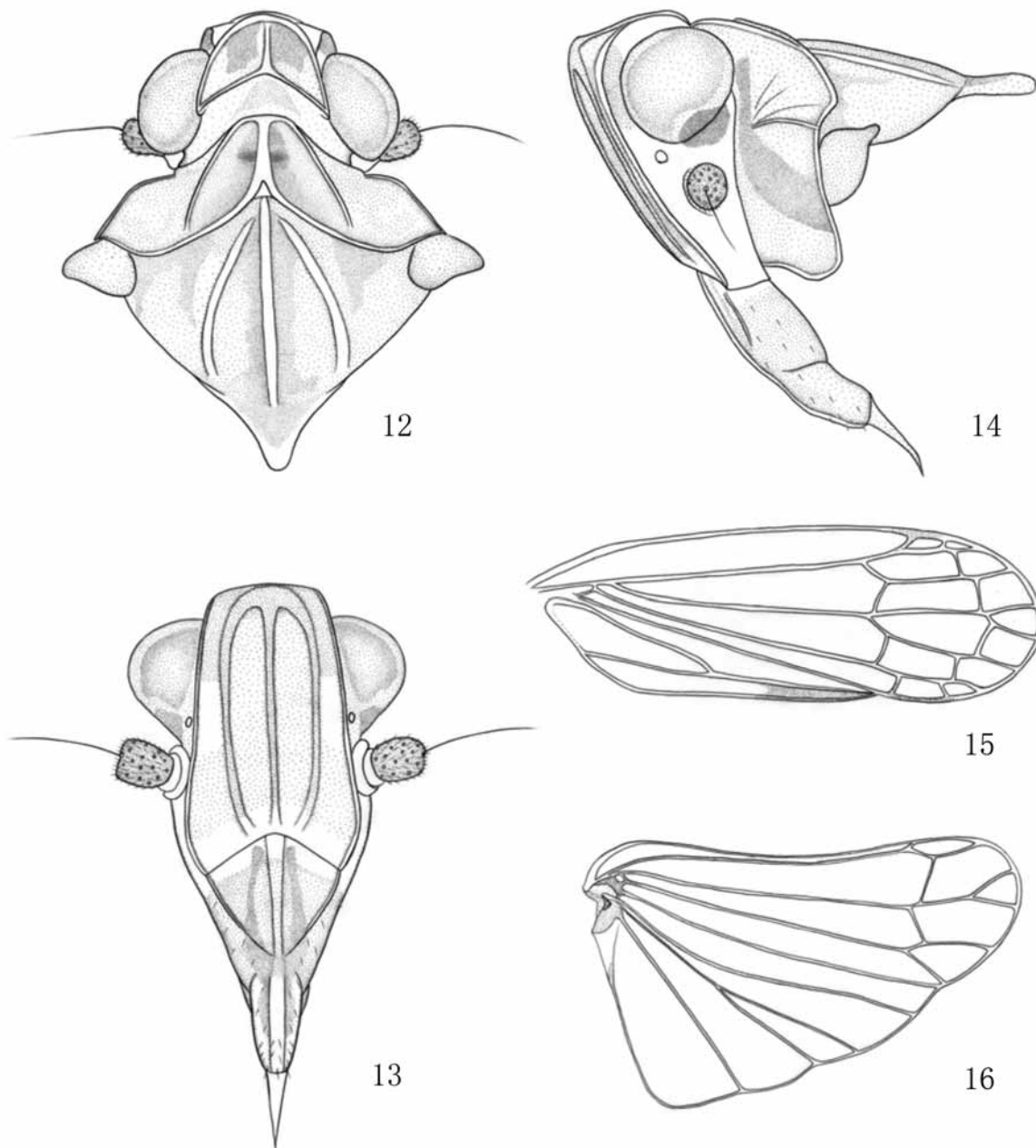
FIGURES 3–11. *Z. gressitti* Fennah. 3. male genitalia, lateral view; 4. male genitalia, dorsal view; 5. anal segment and aedeagus, lateral view; 6. male genitalia, caudal view; 7. inner components of female genitalia, lateral view; 8. female genitalia, lateral view; 9. female genitalia, dorsal view; 10. Gonopophyses IX, ventral view; 11. female genitalia, ventral view.



***Zema montana* Wang & Liang, sp. nov.**
(Figs. 2, 12–21)

Description

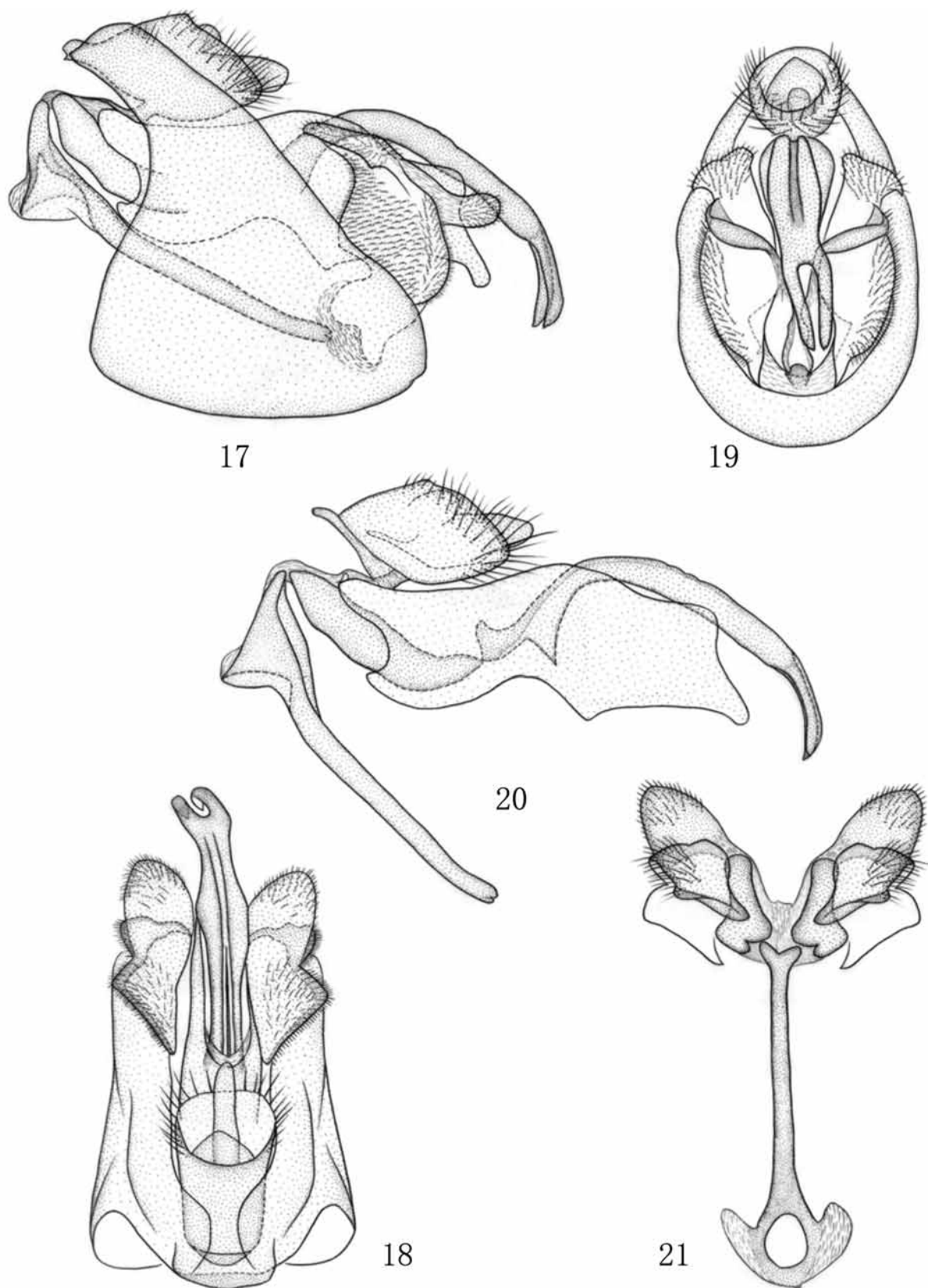
♂, length (from apex of vertex to tip of fore wings) 5.9–7.2 mm; fore wings length: 4.8–5.6 mm.



FIGURES 12–16. *Zema montana* sp. nov. 12. head, pronotum and mesonotum, dorsal view; 13. head, ventral view; 14. head, pronotum and mesonotum, lateral view; 15. right fore wing; 16. right hind wing.

General color brown; two patches on disc of vertex and a narrow, longitudinal stripe beyond median carina on pronotum blackish; frontal disc and clypeus largely fuscous; a broad band overlying fronto-clypeal suture ivory-white; clypeus with two, longitudinal piceous stripes beyond median carina; tip of rostrum fuscous; eyes reddish; most of gena ivory-white, with a blackish patch between eye and lateral margin of vertex and a large circular, black patch below eye; antennae with pedicel black, sensory plaque organs white; pronotum with ventral portion of lateral lobes covered with an oblique, blackish stripe, and the marginal portion

ivory-white; mesonotum with irregular, blackish stripes, base of mesoscutellum with fuscous suffusion; legs covered with longitudinal, fuscous stripes on femora, tibiae, pro- and mesotarsi; abdominal sclerites blackish; fore wings transparent, veins brown, apex of clavus with blackish suffusion.



FIGURES 17–21. *Zema montana* sp. nov. 17. male genitalia, lateral view; 18. male genitalia, dorsal view; 19. male genitalia, caudal view; 20. anal segment and aedeagus, lateral view; 21. corpus connective and parameres, ventral view.

Vertex (Fig. 12) distinctly shorter in midline line than breadth at base (2.14:1). Frons (Fig. 13) longer in middle than the widest breadth (1.44:1), with a broad callus at anterior margin, longitudinal carina, which between middle line and lateral carina, nearly parallel, uniting with median carina in the broad callus. Clypeus (Figs. 13, 14) with thicken median carina.

Male genitalia (Figs. 17–21) relatively large, Periandrium (Figs. 17, 18, 20) large and elongate, symmetrical, with its basal half surrounding basal 1/2 of penis; penis slender and elongate, distinctly sinuate, apical half directed posteroventrally in lateral view, apex distinctly forked.

Material examined

Holotype ♂, CHINA: Yunnan, Mt. Meili, 3200 m, 6-VII-2006 (M. F. Wang) (IZCAS). Paratype. 1 ♂, same data as holotype (IZCAS).

Etymology

The specific epithet is derived from the Latin '*montanus*', mountain, referring to the specimens of the species collected at a high altitude of 3200 m.

Distribution

Southwestern China (Yunnan).

Remarks

This species can be distinguished from *Z. gressitti* Fennah by the median carina of vertex percurrent (median carina only present in basal two-thirds in *Z. gressitti*), periandrium symmetrical (periandrium asymmetrical, denticulate on apical margin in *Z. gressitti*), and penis distinctly sinuate, much longer than that of *Z. gressitti* (about 4:3), apex distinctly forked (penis appreciably sinuate, forming a distinctly fork from middle part in *Z. gressitti*).

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