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Review of the oriental Issid genus *Tetricodes* Fennah (Hemiptera: Fulgoroidea: Issidae) with the description of one new species

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Abstract

Species in the genus *Tetricodes* Fennah, 1956 (Hemiptera: Fulgoroidea: Issidae: Parahiraciini) are reviewed. The genus consists of two species: *T. polyphemus* Fennah, 1956 and *T. songae* Zhang & Chen, **sp. nov.**. The male of *T. polyphemus* Fennah, collected from Leigongshan National Natural Reserve, Leishan, Guizhou Province, and Pianma, Lushui, Yunnan Province, is reported and described for the first time. The generic characteristics are redefined. The main morphological characters and male genitalia of the two species are described, or redescribed, and illustrated. A key to species in the genus is provided.

Key words: Parahiraciini, *Tetricodes songae*, *Tetricodes polyphemus*, China, Oriental Region, Taxonomy

Introduction

The issid genus *Tetricodes* was established by Fennah (1956) based upon a single female specimen from Suisapa, Lichuan District, Hubei, China (type species: *Tetricodes polyphemus* Fennah, 1956). We propose that it is transferred from the tribe Thioniini Melichar, 1906 to the tribe Parahiraciini Cheng & Yang, 1991 (Hemiptera: Fulgoroidea: Issidae: Issinae) according to the diagnosis of the tribe by Cheng and Yang (1991a, b) and Gnezdilov and Wilson (2005, 2007).

The tribe Parahiraciini was erected by Cheng and Yang (1991b) for the genus *Parahiracia* Ouchi, 1940 on the basis of the elongate ovate body and the number of median sensory pits of the meso- and metanotum (10 and 8 each side, respectively) in the 5th instar larva (Cheng and Yang, 1991a, b). The genera of Parahiraciini are characterized by two adult apomorphies, beetle-like, convex, elongate, and apically narrowed forewings with a net of cross veins and long fore and middle legs. The tribe is also characterized by having well-developed three- or two-lobed (anal lobe more or less reduced) hindwing, with a deep notch between the remigium and the vannus, and a net of cross veins in the distal part (Gnezdilov and Wilson, 2005, 2007). The tribe comprises nine genera including the genus *Tetricodes* Fennah redescribed below (*Flavina* Stål, 1861, *Mincopius* Distant, 1909, *Fortunia* Distant, 1909, *Narinosus* Gnezdilov & Wilson, 2005, *Bardunia* Stål, 1863, *Scantinius* Stål, 1866, *Pinocchias* Gnezdilov & Wilson, 2005, *Neodurium* Fennah, 1956 and *Tetricodes* Fennah, 1956) with 25 species distributed in eastern and southeastern Asia (Ran *et al.*, 2005; Gnezdilov and Wilson, 2007; Zhang and Chen 2008).

The genus *Tetricodes* is only known to occur in southern China. To date, only one species has been described: *T. polyphemus* Fennah, 1956 (Hubei: Lichuan; Guizhou: Leishan).

In this paper, the species of the genus *Tetricodes* are reviewed. *Tetricodes songae* Zhang & Chen, collected from Leigongshan National Natural Reserve, Leishan, Guizhou Province, is described as new to

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science. The male of *T. polyphemus* Fennah, is reported and described for the first time. The generic characteristics are redefined. The main morphological characters and male genitalia of the two species are described and illustrated. A key to both species in the genus is provided.

Material and methods

The morphological nomenclature follows Chan & Yang (1994) and Gnezdilov & Wilson (2005, 2007). The genital segments of the examined specimens were macerated in 10% NaOH and drawn from preparations in glycerin using a light microscope. Figures of the specimens were made using Leica MZ125. Spinal formula of hind leg means the numbers of spines of the tibia, plus the 1st and 2nd tarsomeres.

Specimens examined are deposited in the Institute of Entomology, Guizhou University, Guiyang, Guizhou Province, China (IEGU).

Taxonomy

Tetricodes Fennah, 1956

Tetricodes Fennah, 1956: 513.

Type species. *Tetricodes polyphemus* Fennah, 1956: 513, fig. 23, A–D, by original designation.
Description. Body length (from apex of coryphe to tip of forewings): ♂ 5.0–7.0 mm, ♀ 6.0–7.0 mm.

Coloration. Body brown, with greenish patches. Coryphe jade-green. Eyes brown. Metope dark brown with black protuberance near base. The circumambience of protuberance light brown. Lateral margins of metope with light brown verrucas. Clypeus and rostrum brown with light brown marks. Antenna pale brown. Pronotum jade-green and mesonotum pale brown. Forewings yellowish brown with greenish spots, hindwings dark brown. Legs brown with dark brown spots or stripes. Abdomen ventrally pale brown with pale greenish.

Head. Coryphe (Figs 1, 11) sagittate, disc sloping down to middle line, wider than long (1.7–1.9 :1), without median keel, anterior margin angulately convex, posterior margin angulately concave. Metope (Figs 2, 12) longer than wide (1.3–1.4 :1) with a hemispheroidal protuberance near base, basal margin slightly concave, lateral margins raised. Median keel only present at base. Rostrum slightly surpassing mesotrochanters.

Thorax. Pronotum (Figs 1, 11) short, extremely narrow behind eyes, in midline slightly longer than vertex (1.5–1.7:1). Anterior margin of pronotum strongly protruding, acutely angulated, posterior margin almost straight. Scutellum (Figs 1, 11) triangular, with median groove and very weak lateral keels. Forewing (Figs 4, 13) 2.4–2.6 times longer than widest part, acutely rounded at apex. Costal margin of forewing concave near the base of abdomen. Sc and R convergent near base, M bifurcate in basal part, Cu simple reaching to apex. Hindwing (Figs 5, 14) well developed, same length as forewing, bilobed, without anal lobe. Hindwing with distal margins overlapping, with a network of veins. Between remigium and vannus a deep notch present. Hind tibia with 2–3 lateral teeth. Spinal formula of hind leg 8-8-2.

Genitalia. Pygofer (Figs 6, 15) narrow, hind margin convex. Anal segment (Figs 7, 16) short, approximately oval or triangular, lateral margins turned down. Anal foramen near middle. Aedeagus (Figs 9, 10, 17) laterally with foliaceous processes near apex, without ventral hooks, laterally with finger-like processes. Genital styles (Figs 8, 18) in lateral view oval, with hook-shaped process in middle of dorsal margin.

Host plant. Unknown.

Distribution. Oriental region (China: Hubei, Guizhou, Yunnan).

Remarks. The structure of the forewings (beetle-like, convex, elongate, and apically narrowed, with a

network of crossveins) and hindwings (well-developed two-lobed hindwings, with a deep notch between remigium and vannus) place this genus in the tribe Parahiraciini. This genus is related to *Neodurium* Fennah, which was transferred to Parahiraciini from Thioniini by Zhang and Chen (2008), and *Flavina* Stål, but differs in the metope, with a hemispheroidal protuberance near base, without median carina, and the aedeagus without any hooks ventrally. This genus is distinguished from other genera of Parahiraciini by the lack of a well-developed metopial proboscis.

Key to species of *Tetricodes* Fennah

1 Body length of males more than 6.0 mm. Anal segment (Fig. 16) in dorsal view triangular, anterior margin weakly convex laterally, apex with two finger-shaped lobes. Aedeagus (Fig. 17) laterally with an oval flake 1/3 near apex; apical margin of dorsal lobe straight, apically with a short ventral hook, lateral lobes apically with an acute hook directed cephalad. Hind tibiae with two teeth near apex... ..... *T. songae* Zhang & Chen, **sp. nov.**

- Body length of males not more than 6.0 mm. Anal segment (Fig. 7) in dorsal view oval; Aedeagus (Fig. 9) laterally with a quadrangular flake near apex. Hind tibiae with a small tooth near base and two large teeth near apex .... *T. polyphemus* Fennah

Tetricodes polyphemus Fennah, 1956
(Figs 1–10, 20–22)

Tetricodes polyphemus Fennah, 1956: 514; Fig. 23, A–D.

Description. Body length (from apex of coryphe to tip of forewings): ♂ 5.8 mm; forewing length: ♂ 4.7 mm

Coloration. Body brown. Coryphe (Fig. 20) brown with dark brown marks. Eyes dark brown. Metope (Fig. 21) dark brown, basic hemispheroidal protuberance black. Clypeus brown with light brown marks near base. Rostrum brown. Antenna dark brown. Pro- and mesonotum (Fig. 20) brown, with scattered dark brown spots. Forewings yellowish brown, lateral margins with dark brown marks, hindwings dark brown. Legs brown with dark brown annular stripes. Abdomen ventrally dark brown.

Head and thorax. Coryphe (Fig. 1) wider than long (1.7:1). Metope (Fig. 2) longer than wide (1.3:1). Pronotum (Fig. 1) without median keel, in middle line slightly longer than vertex (1.5:1). Scutellum (Fig. 1) longer than pronotum (1.9:1). Forewing (Fig. 4) 2.4 times longer than widest part, Sc and R convergent 1/4 near base, each reaching to margin. M bifurcate 1/3 near base, MA simple reaching to margin, MP bifurcate near middle, MP2 reaching to margin, MP1 and MP2 joining at distal. Hindwing (Fig. 5) with length of incision about 0.2 times of hindwings. Hind tibiae with a small tooth near base and two large teeth near apex.

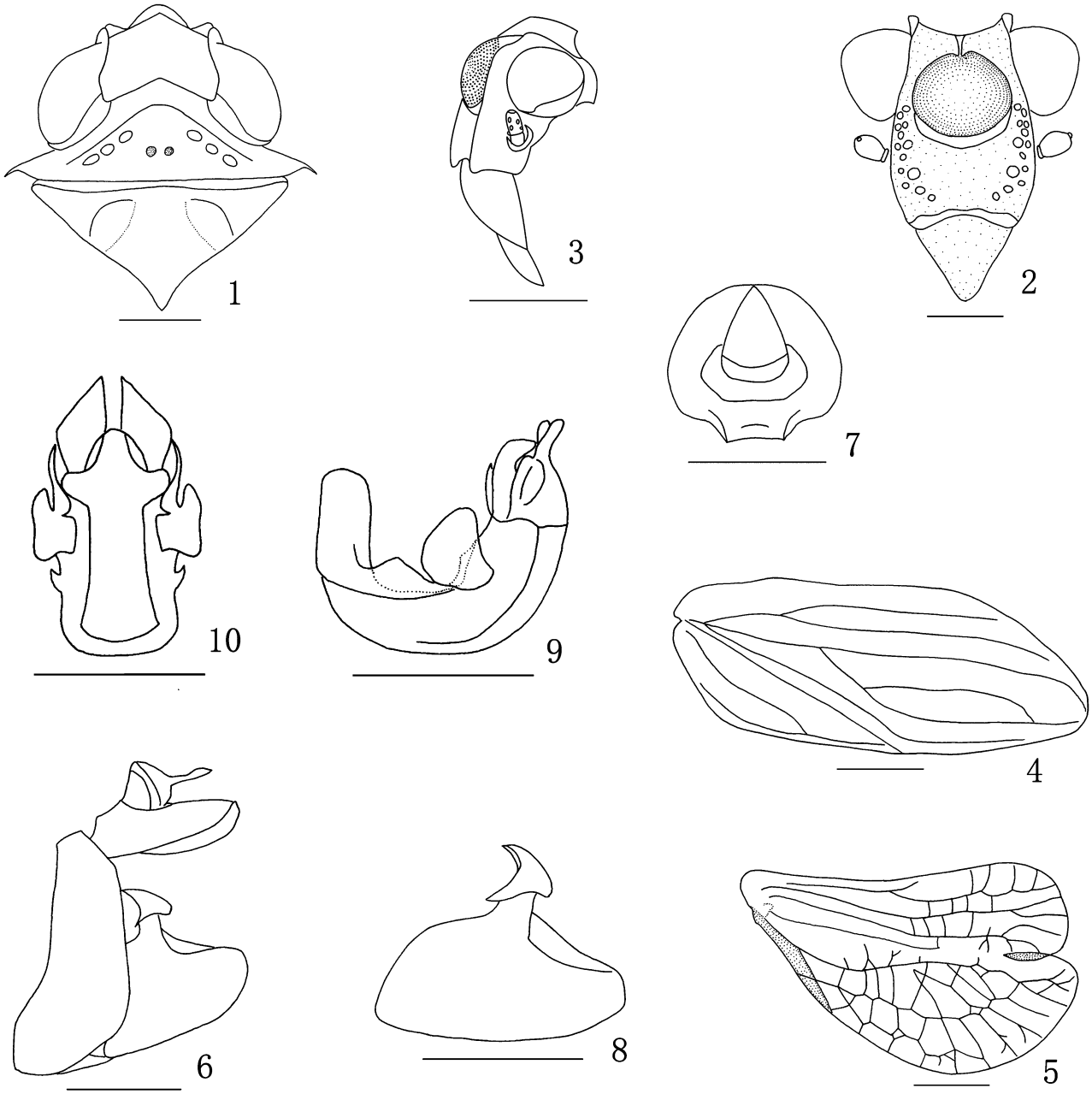
Male genitalia. Anal segment (Fig. 7) in dorsal view oval, anal column near middle. Pygofer (Fig. 6) narrow, hind margin slightly convex. Aedeagus (Figs 9, 10) laterally with a quadrangular flake near apical and a finger-like process near base. Aedeagus with lateral, ventral and dorsal lobes. Apical margin of dorsal lobe convex in middle. Lateral lobes apical margin truncate not hooked. Genital styles (Fig. 8) in lateral view oval, with a hook-shaped process in middle of dorsal margin.

Material examined. 1 ♂, Leigongshan National Natural Reserve (26°28´N, 108°17´E), Leishan, Guizhou Province, China, 2 Aug. 2004, F. L. Xu (IEGU).

Host plant. Unknown.

Distribution. South China (Hubei, Guizhou).

Discussion. *Tetricodes polyphemus* was described from a female only. Based on the following reasons we consider the male specimen described here as *Tetricodes polyphemus*: *i*) body length not surpassing 6.0 mm; *ii*) hind tibiae with a small tooth near base and two big teeth near apex; and *iii*) the male genitalia of the species here is related to the material described in Ran's dissertation (not published), which was collected from Hupeh (1♂, Suisapa, 1000m, Lichuan Distr. W. Hupeh, 28 Aug. 1948).



FIGURES 1–10. *Tetricodes polyphemus* Fennah. (1) Head and thorax, dorsal view; (2) Frons; (3) Head, lateral view; (4) Forewing; (5) Hindwing; (6) Male genitalia, lateral view; (7) Anal segment, dorsal view; (8) Genital style, lateral view; (9) Aedeagus, lateral view; (10) Aedeagus, ventral view. Scale bars = 0.5 mm (Figs 1, 2, 6–10), 1.0 mm (Figs 3–5)

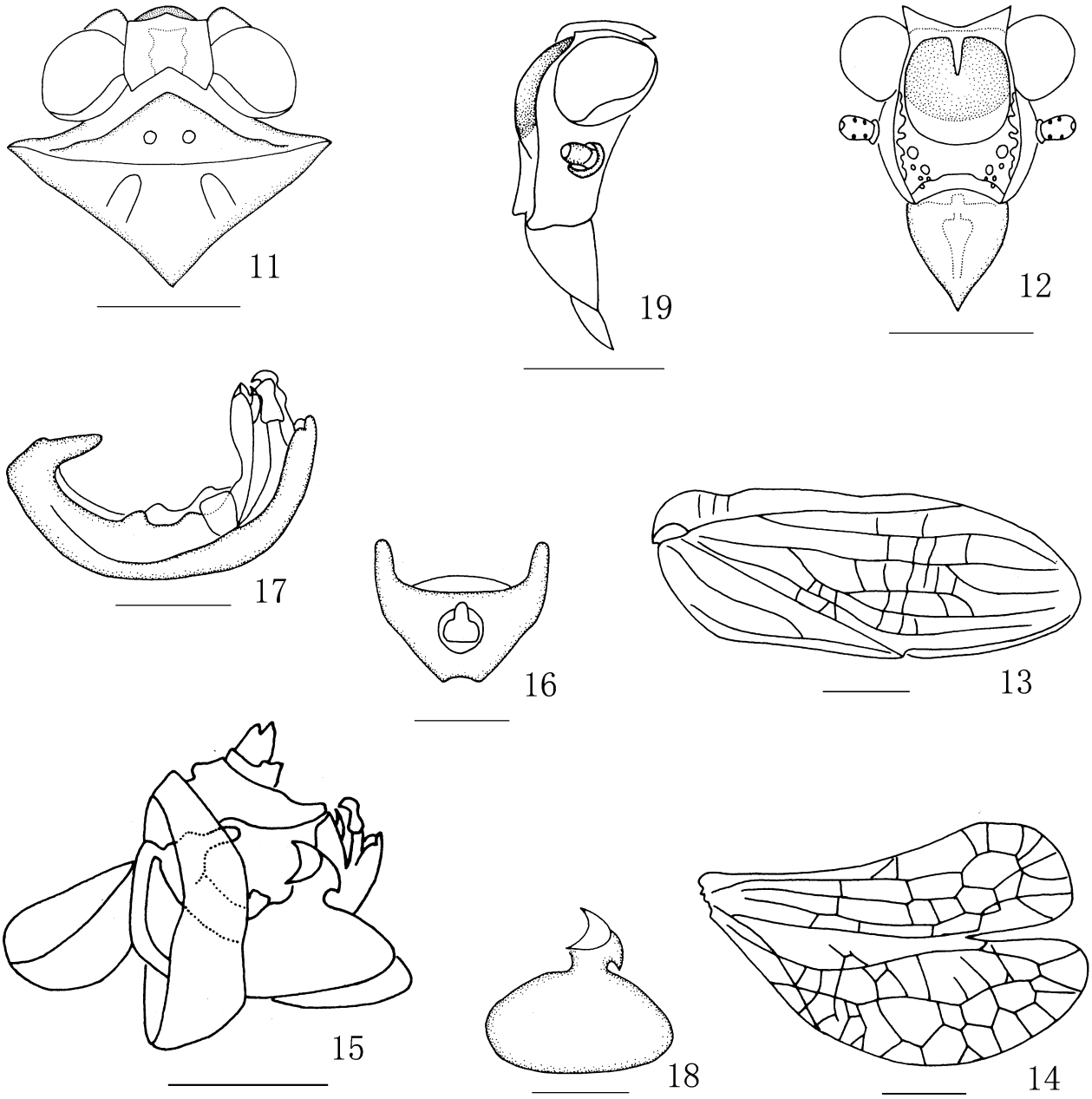
***Tetricodes songae* Zhang & Chen, sp. nov.**
(Figs 11–19, 23–27)

Description. Body length (from apex of coryphe to tip of forewings): ♂ 6.7 mm ♀ 6.8 mm; forewing length: ♂ 5.5 mm ♀ 5.6 mm.

Coloration. Body (Figs 23, 24, 27) brown with greenish spots. Coryphe (Figs 23, 24) light green. Eyes brown. Metope (Fig. 26) dark brown,basal protuberance black. Clypeus and rostrum dark brown with light brown marks. Antenna light green. Pronotum light green, mesonotum pale brown. Forewings (Figs 23, 24) yellowish brown, lateral margins with dark brown marks, veins light green; hindwings dark brown. Legs light

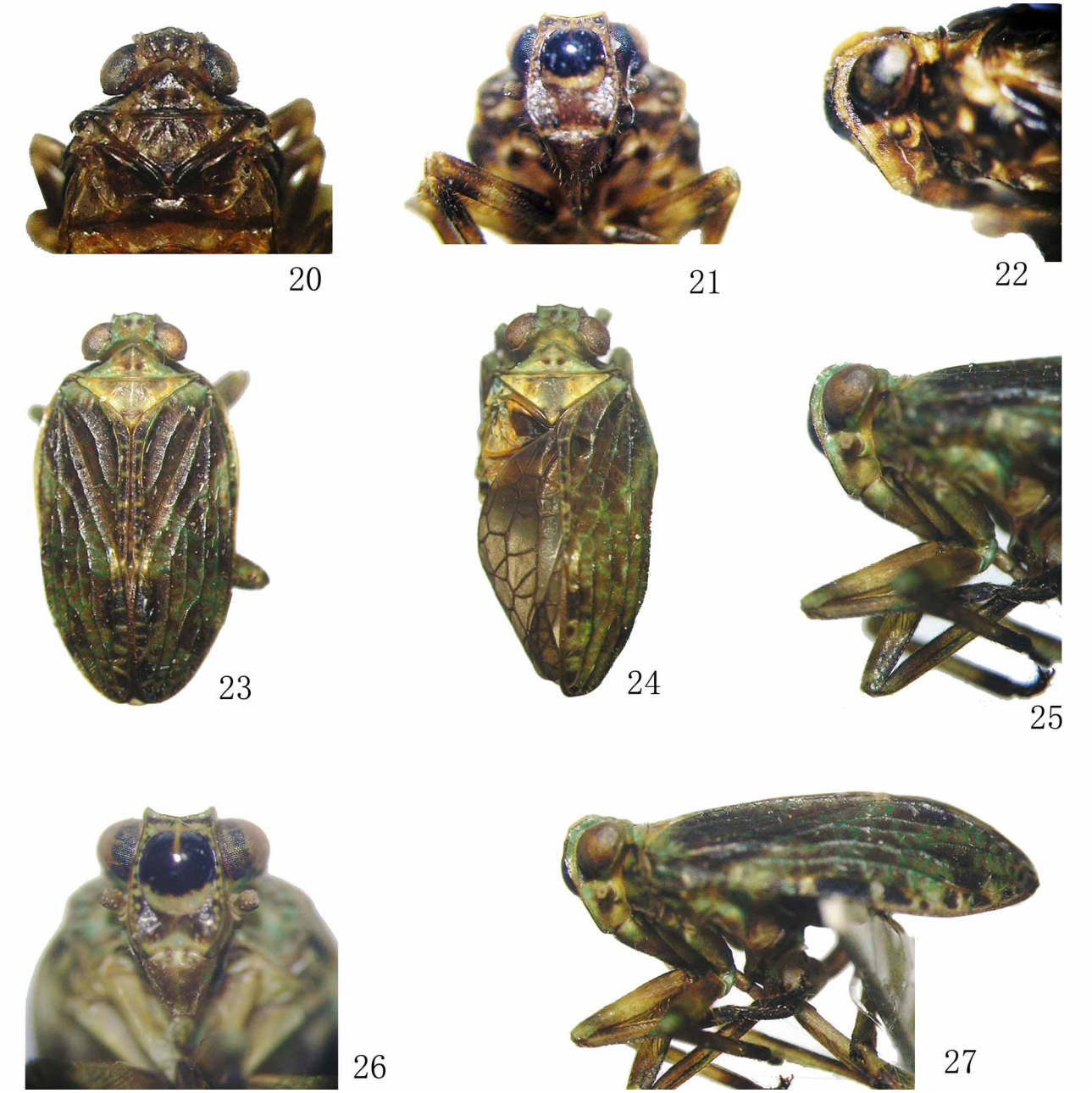
brown with dark brown or light green spots or stripes. Abdomen ventrally pale brown with pale greenish areas.

Head and thorax. Coryphe (Fig. 11) wider than long (1.9:1). Metope (Fig. 12) longer than wide (1.4:1). Pronotum (Fig. 11) without median keel, each side convex, in midline slightly longer than vertex (1.7:1). Scutellum (Fig. 11) longer than pronotum (1.6:1) in midline. Forewing (Fig. 13) 2.6 times longer than widest part, Sc and R convergent 1/4 near base, each reaching to margin of wing. M bifurcate 1/3 near base. MA bifurcate 2/3 near base. MA1 and MA2 reaching to margin of wing, MP bifurcate near middle, MP1 only reaching to the union of MA1 and MA2. MP2 reaching to margin. Hind wings (Fig. 14) with length of incision about 0.3 times of hindwings. Hind tibiae with 2 teeth near apex.



FIGURES 11–19. *Tetricodes songae* Zhang & Chen, **sp. nov.** (11) Head and thorax, dorsal view; (12) Frons; (13) Forewing; (14) Hindwing; (15) Male genitalia, lateral view; (16) Anal segment, dorsal view; (17) Aedeagus, lateral view; (18) Genital style, lateral view; (19) Head, lateral view. Scale bars = 0.5 mm (Figs 16–18), 1.0 mm (Figs 11–15, 19)

Male genitalia. Anal segment (Fig. 16) in dorsal view triangular, anterior margin weakly convex, apex with two finger-shaped lobes. Anal column near middle. Pygofer (Fig. 15) narrow, hind margin convex in middle. Aedeagus (Fig. 17) laterally each with a finger-like process near base and a oval flake 1/3 near apex. Aedeagus with ventral, lateral and dorsal lobes, apical margin of dorsal lobe straight, apically with a short ventral hook, lateral lobes apically with acute hook directed cephalad. Genital styles (Fig. 18) in lateral view oval, with a hook-shaped process in middle of dorsal margin.



FIGURES 20–27. *Tetricodes polyphemus* Fennah and *Tetricodes songae* Zhang & Chen, **sp. nov.** 20–22. *T. polyphemus*: (20) Head and thorax, dorsal view; (21) Frons; (22) Head and thorax, lateral view. 23–27. *T. songae*: (23) Body, dorsal view (paratype ♂); (24) Body, dorsal view (holotype ♂); (25) Head and thorax, lateral view (paratype ♂); (26) Frons (paratype ♂); (27) Body, lateral view (paratype ♂).

Type material. Holotype: ♂, Leigongshan National Natural Reserve (26°28´N, 108°17´E), Leishan, Guizhou Province, China, 1620–2178 m, 1 Aug. 2004, Q. Z. Song; Paratypes: 2♂♂, 1♀, same data as holotype (IEGU); 1♂, Leigongshan National Natural Reserve, Leishan, Guizhou Province, 17 Sep. 2005, Z.

G. Zhang (IEGU); 1♀, Pianma (26°01´N, 98°37´E), Lushui, Yunnan Province China, 2600–2900 m, 17 Aug. 2000, X. S. Chen (IEGU).

Etymology. The species name is derived from the last name of the first collector of the species, Q. Z. Song.

Host plant. Unknown.

Distribution. South China (Guizhou, Yunnan).

Remarks. This new species is similar to *T. polyphemus* Fennah, 1956, but differs from the latter in: (*i*) larger body length including forewing ♂ 6.7 mm, ♀ 6.8 mm (♂ 5.8 mm, in *T. polyphemus* Fennah) (*ii*) M bifurcate 1/3 near base, MA bifurcate 2/3 near base, MA1 and MA2 reaching to margin of wing, MP bifurcate near middle, MP1 only reaching to the union of MA1 and MA2, MP2 reaching to margin; (*iii*) anal segment in dorsal view triangular, anterior margin weakly convex, apex with two finger-shaped lobes (anal segment oval laterally without finger-shaped processes at apex in *T. polyphemus* Fennah); (*iv*) aedeagus laterally with an oval flake 1/3 near apex, apical margin of dorsal lobe straight, apically with a short ventral hook, lateral lobes apically with an acute hook directed cephalad (aedeagus laterally with a square flake 1/3 near apex, apical margin of dorsal lobe convex in middle, apically without any ventral hooks, lateral lobes apically truncate but not hooked in the *T. polyphemus* Fennah).

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