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ORIGINAL ARTICLE

Two new species of grasshopper from China (Orthoptera: Pyrgomorphidae)

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Abstract The genus *Chlorizeina* Brunner von Wattenwyl, 1893 is firstly recorded for China. Two new species, *Chlorizeina yunnana* **sp. nov.** and *Tagasta nigritibia* **sp. nov.** are reported from China. All specimens are deposited in the Biological Science Museum, Dali University (BMDU).

Key words New record genus, new species, *Chlorizeina*, *Tagasta*, Pyrgomorphidae, China.

1 Introduction

The genus *Chlorizeina* Brunner von Wattenwyl, 1893 was proposed with the type species *C. unicolor* Brunner von Wattenwyl, 1893. Since then, four species have been added to the genus: *C. elegans* Ramme, 1941; *C. togulata* Rehn, 1951; *C. malabarensis* Kevan, 1953 and *C. roonwali* Bhowmik, 1964. Kevan (1969) reviewed the genus *Chlorizeina*: reported a new species *C. feae* Kevan, 1969 from Southern Thailand, removed *C. malabarensis* Kevan, 1953 to the new genus *Feacris* Kevan, 1969, regarded *C. roonwali* as the subspecies of *C. unicolor* and synonymized *C. elegans* as *C. unicolor unicolor*. The genus included 4 species (subspecies), distributing in Oriental Region, but was not previously reported in China.

The genus *Tagasta* Bolivar, 1905 was established with *Tagasta hoplosterna* (Stål, 1877) (= *Mestra hoplosterna* Stål, 1877) as type species. Until now, 14 species distributing in Oriental Region were reported (Yin, Ye & Yin, 2009; Eades *et al.*, 2014), of which 7 species were recorded in China, namely *T. brachyptera* Liang, 1988, *T. gui* Yin, Ye & Yin, 2009, *T. indica* Bolivar, 1905, *T. marginella* (Thunberg, 1815), *T. rufomaculata* Bi, 1983, *T. tonkinensis* Bolivar, 1905 and *T. yunnana* Bi, 1983.

2 Materials and methods

The materials studied in this study are deposited in the Biological Science Museum, Dali University (BMDU). In this paper, we adopt the Vickery's classification system (1997), follow the methods of Ingrisch (1989). The main terminology follows Dirsh (1975). The color Figs 1–4 are photographed by a digital camera (Canon EOS 60D). The line drawings, Figs 5–17, are made with a stereomicroscope (Olympus SZX7) equipped with drawing apparatus, and post-corrected with Adobe Photoshop® CS2 software.

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3 Taxonomy

3.1 *Chlorizeina* Brunner von Wattenwyl, 1893 New record to China

Chlorizeina Brunner von Wattenwyl, 1893: 130, 131; Kirby, 1910: 319; Kirby, 1914: 174; Rehn, 1951: 1–7; Kevan, 1969: 355–366; Otte, 1994: 41; Yin, Shi & Yin, 1996: 151.

Type species: *Chlorizeina unicolor* Brunner von Wattenwyl, 1893.

Generic diagnosis. Body medium-sized, slender, subfusiform, surface smooth. Head nearly conical; fastigium of vertex about as long as vertical diameter of eyes, longitudinally sulcated in middle; front oblique and somewhat sinuated in lateral view; frontal ridge with low longitudinal sulcus; antennae filiform, inserted below lateral ocelli, extending beyond hind margin of pronotum; eyes oval, observably prominent. Pronotum cylindrical, finely punctured, three transverse sulci present, prozona longer than metazona, hind margin roundly prominent, inferior margin of lateral lobe somewhat sinuous, infero-posterior angle faintly larger than a right-angle. Tegmina and hind wings reduced, but dorsad touching each other, extending beyond base of hind femora; hind wings shorter than tegmina, uncolored. Metasternal lobes contiguous in male or separate in female. Hind femora with upper basal lobe as long as lower one, lower knee lobe slightly pointed; hind tibiae cylindrical, with 6–7 outer spines on dorsal margin, besides apical spine. In male, 10th abdominal tergum broad, hind margin partly triangularly excised in middle, triangularly marginated in lateral sides; supra-anal plate liguliform, hind margin rounded or subacute; cerci conical, compressed, somewhat curved inwards, apex obtuse or slightly expanded; subgenital plate a little laterally compressed, cucullate. Female supra-anal plate triangular; dorsal and ventral valves toothed on outer edges; subgenital plate with posterior margin nearly straight.

Distribution. China (Yunnan), Indian, Burma, Thailand, Laos.

***Chlorizeina yunnana* sp. nov.** (Figs 1–2, 5–12)

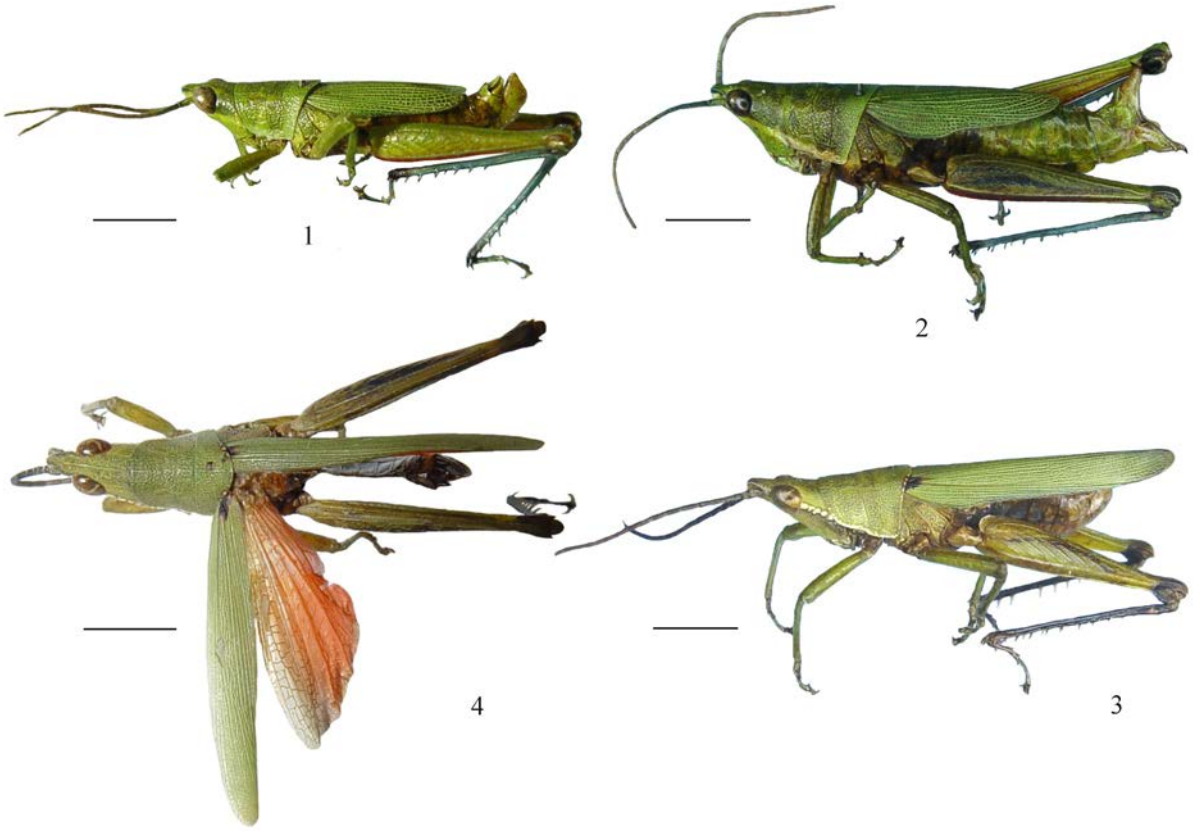
Diagnosis. This new species is similar to *C. feae* Kevan, 1969 and *C. unicolor* Brunner von Wattenwyl, 1893, but differs from the latter two by the characters listed in Table 1.

Table 1. Comparison among *Chlorizeina feae*, *C. yunnana* sp. nov. and *C. unicolor*.

Characters	*C. feae*	*C. yunnana* **sp. nov.**	*C. unicolor*
Size	Larger. Body, ♂ 30.0–32.0 mm, ♀ 36.0– 38.0 mm. Hind femur, ♂ 16.0–18.0 mm,♀ 17.0–21.0 mm	Smaller. Body, ♂ 21.7–23.0 mm, ♀ 30.0 mm. Hind femur, ♂ 12.2–13.1 mm, ♀ 15.1 mm	Larger. Body, ♂ 24.0–28.5 mm, ♀ 31.0– 35.0 mm. Hind femur, ♂ 14.0–15.5 mm, ♀ 15.0–17.5 mm
Tegmina	Longer, reaching 8th abdominal tergum or half of hind femur	Longer, reaching to 6th–8th abdominal tergum or near half of hind femur	Shorter, extending beyond 4th abdominal tergum
Male	The 10th abdominal tergite with posterior margin deeply and roundly excised in middle, dorsolateral lobes large, apically acute	The 10th abdominal tergite with posterior margin deeply and triangularly excised in middle, dorsolateral lobes large, apically subacute	The 10th abdominal tergite with posterior margin shallowly and triangularly excised in middle, dorsolateral lobes smaller, apically subacute
Epiphallus	Lophi rather small, and hind margin of bridge V-shaped	Lophi somewhat large, and hind margin of bridge U-shaped	Lophi somewhat large, and hind margin of bridge U-shaped
Hind femora	Lower sides and lower parts of inner sides unicolor	Lower sides and lower parts of inner sides red	Lower sides and lower parts of inner sides red

Description. Body medium-sized. Head 0.8 (♂) or 0.7 (♀) times as long as pronotum; vertex with longitudinal carina in middle, length of fastigium before anterior margin of eyes 0.6–0.7 (♂) or 0.8 (♀) times as long as longitudinal diameter of eyes; front acutely oblique in lateral view; frontal ridge slightly projecting between antennae, shallowly sulcated above transverse facial sulcus and a little widened near median ocellus. Antennae extended to base of hind femur (♂) or beyond hind margin of pronotum (♀), hind margin of antennal fovea being on same vertical line with lateral ocelli. Eyes longitudinal

diameter 1.2 (♂) or 1.3 (♀) times as long as horizontal one. Pronotum with anterior margin broadly arcuate; prozona with thin dots and rugulae, metazona with dense dots and rugulae, prozona 1.8 (♂) or 1.9 (♀) times as long as metazona; median and lateral carinae indistinct; anterior transverse sulcus only seen in lateral lobes, median transverse sulcus sinuated in middle. Prosternal spine conical, apex acute. Tegmina narrow, anterior margin near base faintly (♂) or observably (♀) expanded, apex reaching to 7th–8th abdominal tergite (or from two-fifths to half of hind femur) in male, or to middle of 6th abdominal tergite (or two-fifths of hind femur) in female. Mesosternal interspace reversedly trapeziform.



Figs 1–4. Adults. 1–2. *Chlorizeina yunnana* **sp. nov.**, habitus, lateral view, ♂, ♀. 3–4. *Tagasta nigritibia* **sp. nov.**, habitus, lateral and dorsal views, ♂. Scale bars = 5 mm.

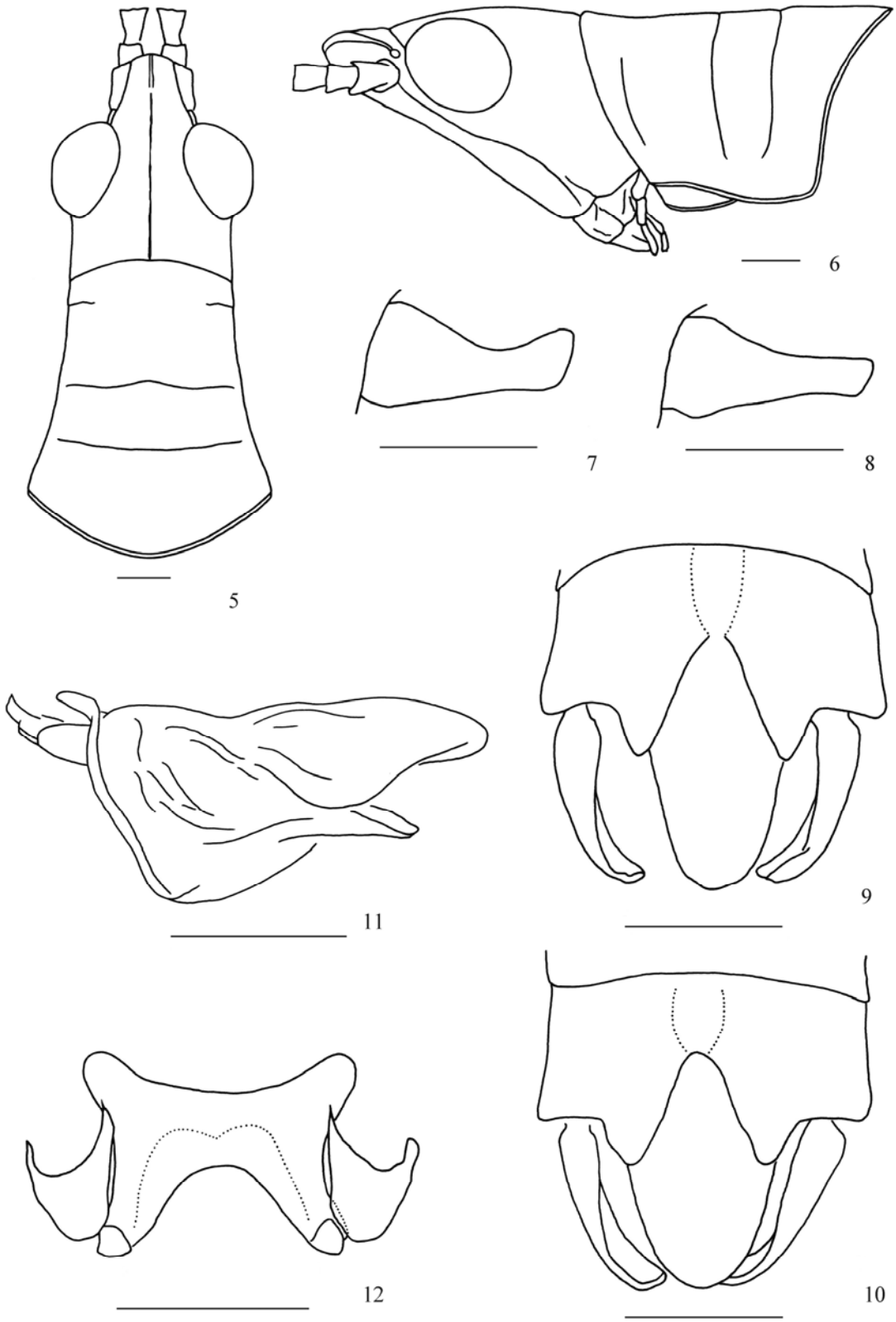
In male, 10th abdominal tergite with posterior margin deeply and triangularly excised in middle, dorsolateral lobes large, triangular, apex subacute; supra-anal plate long liguliform, apically rounded; cerci less strongly incurved, contracted near extremity, apically expanded, apices truncated in lateral view, reaching to or beyond hind margin of supra-anal plate.

In female, dorsal and ventral valves apically hooked, former obtusely serrate along outer margins when latter subsmooth; ventral basis valvular plate on ventral surface with many conical tubercles; subgenital plate in apical half with lateral longitudinal ridges, on which having 4–5 spines, a shallow concavity between lateral longitudinal ridges, posterior margin nearly straight.

Body green. Antennae apically greenish brown. Eyes brown. Gena with a yellowish white stripe extending afterwards inferior margin of lateral lobe of pronotum. Hind femora with lower sides and lower parts of inner sides suffused with red, genicular lobes partly black; hind tibiae blue, tipped with black.

Measurements. Length between fastigium and hind femur extremity, ♂ 24.4–26.3 mm, ♀ 30.0 mm. Length between fastigium and abdominal extremity, ♂ 21.7–23.0 mm, ♀ 30.0 mm. Pronotum, ♂ 5.2–5.5 mm, ♀ 6.7 mm. Tegmen, ♂ 9.6–10.5 mm, ♀ 12.5 mm. Hind femur, ♂ 12.2–13.1 mm, ♀ 15.1 mm.

Material examined. Holotype ♂, China, Yunnan Province, Yingjiang, Nabang (24°45'N, 97°34'E; elev. 278 m), 31 July 2009, coll. Ben-Yong Mao and Ming Qiu. Paratypes: 2 ♂, 2 ♀ (including one nymph), ibid. All type specimens deposited in BMDU.

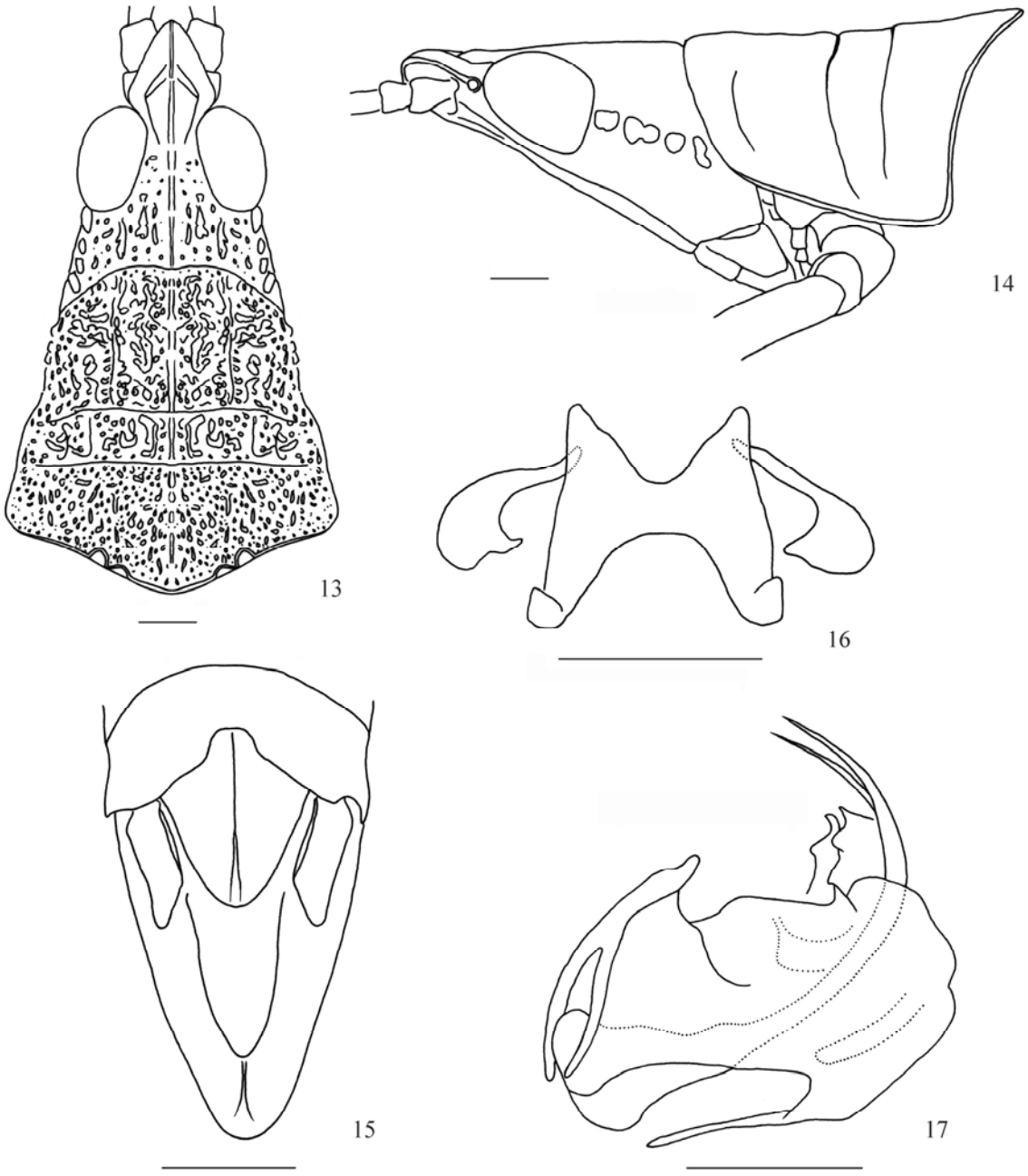


Figs 5–12. *Chlorizeina yunnana* **sp. nov.** 5–6. Head and pronotum, dorsal and lateral views, ♂. 7–8. Cerci, lateral views, ♂. 9–10. Terminalia, dorsal view, ♂. 11. Phallic complex, lateral view. 12. Epiphallus, dorsal view. Scale bars = 1 mm.

Etymology. The species name refers to the type locality, Yunnan Province, China.

Distribution. China (Yunnan).

Biology. The *Chlorizeina* spp. have been recorded feeding castor, cucumber, rice, sorghum, soybean, bamboo, *Brachiaria* sp., *Eupatorium odoratum*, *Imperata cylindrical*, *Pennisetum pedicellatum* and *Saccharum spontaneum*. The specimens of *C. yunnana* **sp. nov.** were captured from some tropical vine plant and broad-leaf shrub, which grows in low elevation zone (278–505 m) from Yingjiang County in the southwest of Yunnan, where several large rivers, deeply-incised valleys, and inter-mountain lowlands ecologically isolate mountain habitats. However, its food plants are unknown.



Figs 13–17. *Tagasta nigritibia* **sp. nov.** 13–14. Head and pronotum, dorsal and lateral views, ♂. 15. Terminalia, dorsal view, ♂. 16. Epiphallus, dorsal view. 17. Phallic complex, lateral view. Scale bars = 1 mm.

3.2 *Tagasta* Bolívar, 1905

Tagasta Bolívar, 1905: 111; Willemse, 1930: 87; Bi, 1983: 177, 178; Otte, 1994: 133; Xia *et al.*, 1994: 267; Yin, Ye & Yin, 2009: 1 244.
Type species: *Mestra hoplosterna* Stål, 1877.

***Tagasta nigritibia* sp. nov.** (Figs 3–4, 13–17)

Diagnosis. The new species is similar to *T. indica* Bolivar, 1905 by the similar general appearance, especially similar length of tegmina, and wings with a incision at the end of dividing vein, but differs with the latter by somewhat longer fastigium of vertex, black inner-lower knee lobes of hind femora and black hind tibiae, yellow tubercles on hind margin of pronotum and a V-shaped concave between anterior processes on epiphallic bridge. It is also differs from other species in *Tagasta*, by its black hind tibiae.

Description. Male. Body medium-sized. Head shorter than pronotum; vertex longitudinally carinate in middle; fastigium triangular, longitudinally and medially sulcated in apical half, length before anterior margin of eyes 1.0–1.1 times longer than maximum width; gena behind eyes with a series of 4–5 tubercles. Antennae filiform, extended to or beyond hind margin of pronotum. Eyes oval, longitudinal diameter 1.2–1.3 times as long as horizontal one. Pronotum with anterior margin arced, faintly concaved in middle; posterior margin obtusely angled, with 2–3 tubercles in lateral side; median and lateral carinae indistinct; prozona 1.6 times as long as metazona; infero-posterior angle of lateral lobe nearly right-angled. Prosternal process tuberculate, apex blunt as a round tubercle. Mesosternal lobes quadrate; mesosternal interspace reversedly trapeziform, 1.0–1.1 times as long as minimum width. Metasternal lobes contiguous. Tegmina reaching or approaching extremity of hind femora, apically rounded. Wings as long as tegmina, angularly excised at extremity of dividing vein. Hind femora with upper basal lobe as long as lower basal lobe, outer side irregularly carinated. Hind tibiae with 7–8 inner and 8–10 outer spines, inner and outer apical spines distinct. Tenth abdominal tergite broad, hind margin roundly concaved in middle; supra-anal plate triangular, median area longitudinally raised, apical half shallowly sulcated. Cerci short conical, distinctly extending beyond hind margin of supra-anal plate. Subgenital plate conical, apically rounded. Epiphallic bridge with anterior margin deeply concaved as V-shaped between anterior processes; phallic complex with apical penis valves very slender, pointed dorsad and ahead.

Body green. Antennae black. Eyes brown. Tubercles behind eyes yellowish white. Pronotum with inferior margin of lateral lobe yellowish white; yellow tubercles on hind margin with black-marginated. Tegmina green except a black spots at base; wings orange but faintly suffused with fumeus along anterior margin. Hind femora green, knee dark, inner-lower knee lobes dark; hind tibiae black.

Female. Unknown.

Measurements (♂). Length between fastigium and hind femur extremity 27.0–29.0 mm, length between fastigium and abdominal extremity 23.0–24.8 mm, pronotum 5.3–5.8 mm, tegmen 16.6–18.0 mm, hind femur 13.4–14.2 mm.

Material examined. Holotype ♂, China, Yunnan Province, Yingjiang, Nabang (24°42'N, 97°35'E; elev. 505 m), 1 August 2009, coll. Ben-Yong Mao and Ming Qiu. Paratypes 5 ♂, ibid. All type specimens deposited in BMDU.

Etymology. The specific name is derived from the Latin "*nigri-*" and "*tibia*", referring to hind tibiae being black.

Distribution. China (Yunnan).

Biology. The habitat of the species is similar to *C. yunnana* **sp. nov.,** besides of slightly higher altitude. Its food plants are unknown.

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