

ORIGINAL ARTICLE

Two new species of *Ortalotrypeta* Hendel (Diptera: Tephritidae: Ortalotrypetini) from China, with biological observation of the genus

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Abstract Two new species of *Ortalotrypeta* Hendel, *O. costamacula* Chen & Wang, **sp. nov.** and *O. straighta* Chen & Wang, **sp. nov.** from Shannxi, China are described and illustrated, together with their adult habits and behaviors. The biological observation of another three species, *O. gansuica*, *O. trypetoides*, and *O. ziae*, are also reported here. The biological reports are the first time for the tribe Ortalotrypetini, subfamily Tachiniscinae. An updated key to the genus *Ortalotrypeta* is provided.

Key words Tephritidae, *Ortalotrypeta*, new species, adult habitat and behavior.

1 Introduction

The genus *Ortalotrypeta* was established by Hendel (1927), with two species, *O. gigas* Hendel and *O. idana* Hendel. Several years later, *Hexachaeta issikii* Matsumura was transferred to the genus by Shiraki (1933). Subsequently, five additional species were added to the genus by Zia & Chen (1938), Chen (1948), Zia (1963), and Wang (1988, 1989). Norrbom (1994) described another new species, briefly reviewed the genus, and provided a key to all the valid species.

To date, nine species of this genus are known to occur in the Eastern Palearctic and Oriental Regions. These species are all distributed in China, with only *O. issikii* extended its distribution to Japan. The biology of this genus was completely unknown previously.

The tribe Ortalotrypetini was proposed by Ito (1983) in a key, with *Ortalotrypeta* as monotypy. It was expanded to include four genera, *Ortalotrypeta* Hendel, *Cyaforma* Wang, *Neortalotrypeta* Norrbom, and *Protortalotrypeta* Norrbom, based on their phylogenetic relationships (Norrbom, 1994). Subsequently, Ortalotrypetini, together with Tachiniscini, was placed in the tephritid subfamily Tachiniscinae by Korneyev (1999), and Korneyev & Norrbom (2006). The subfamily Tachiniscinae is considered to be a unique group in Tephritidae (Han & Ro, 2016) and possibly the sister group of all other subfamilies of Tephritidae. This is because, unlike all other Tephritidae, the members of the subfamily Tachiniscinae are believed to be parasitoids of other insects based on their particular female terminalia characters: ovicape with dorsoapical rather than posteroapical opening and everted ovipositor with characteristic “scorpion-tail” appearance; eversible membrane without taeniae, but with strong scales on ventral side; and aculeus lance-like, with cercal unit completely integrated into it (Korneyev & Norrbom, 2006). However, the only host data recorded for the subfamily Tachiniscinae is the mention of

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“*Anthophasia robertsi* Cogan” (nomen nudum; listed by Cogan (1980) as an undescribed species of *Bibundia*) reared from pupae of *Bunaea alcinoe* Stoll and *Imbrasia obscura* Butler (Lepidoptera: Saturniidae) by Roberts (1969). Therefore, any additional biological data on this subfamily would be valuable, interesting, and significant for understanding the phylogeny and evolution of Tephritidae.

This study reports two more new species of *Ortalotrypeta* from Shannxi, China, and records adult habitats and behaviors for five species of *Ortalotrypeta* for the first time, which is also completely new for the tribe Ortalotrypetini, subfamily Tachiniscinae.

2 Materials and methods

Morphological terminology generally follows White *et al.* (1999) and McAlpine (1981). The abbreviations for specimen depositories used in this paper are as follows:

IZCAS—Institute of Zoology, Chinese Academy of Sciences, Beijing, China;

HU—Hebei University, Baoding, China;

YU—Yangtze University, Jingzhou, China.

3 Results and discussions

Genus *Ortalotrypeta* Hendel, 1927

Ortalotrypeta Hendel, 1927: 55; Shiraki, 1933: 314; Zia & Chen, 1938: 13; Chen, 1948: 77, 84, 119; Zia, 1955: 66, 68; 1963: 631, 633, 637; Hardy, 1977: 66; Foote, 1984: 108; Ito, 1984: 51; Wang, 1989: 358; 1996: 115; Norrbom, 1994: 10; Korneyev, 1994: 16; 1999b: 93; Norrbom *et al.*, 1999: 129. Type species: *Ortalotrypeta idana* Hendel, 1927, by original designation.

Diagnosis. General characters similar to *Cyaforma* Wang. Medium-sized to large flies (body length 5.5–10.5 mm; wing length 6.5–9.8 mm) with yellow to orange body. Median carina of face well developed; antenna about 1/2 as long as face or shorter, arista short pubescent; typically with 2–3 postpronotal (except in *singula* Wang), 0–1 intrapostalar and 6 strong scutellar setae; ocellar and paraverticular setae very strong. Scutum and scutellum entirely yellow, lacking dark markings; wing mixed yellow and hyaline in ground color, typically with a crooked brown to dark brown band running along vein CuA₁, crossvein DM-Cu, 4th section of vein M, apices of cells r₂₊₃ and r₄₊₅ (except in *trypetoides* Chen); cell sc about 1/2 equal in length to cell c, lobe of cell bcu shortly produced, vein R₄₊₅ densely setose up to nearly length of vein; R-M crossvein situated beyond middle of cell dm; mid tibia with 2 strong apical spurs.

Female terminalia. Oviscape nearly triangular in shape, less than or equal in length to tergites 5–6, with large dorsoapical opening; eversible membrane with a large ventral area of dark brown to black scales but without basal taenia; aculeus greatly expanded at base, strongly dorsally curved, apically tapered to a point and lacking preapical serrations; 3 pale, subspherical spermathecae present.

Male genitalia. Inner surstylus well developed, outer surstylus nearly rounded at apex in profile.

An updated key to known species of *Ortalotrypeta* Hendel.

1. Thorax with 2–3 postpronotal setae; wing with apical portion of cell r₁ beyond end of vein R₁ at least partly hyaline.....2
Thorax with only 1 postpronotal seta; wing with apical 2/3 of cell r₁ entirely brown..... *O. singula* Wang
2. Wing hyaline in ground color, with 5 isolated brown spots *O. trypetoides* Chen
Wing markings not as above3
3. Wing with one isolated dark brown marking covering crossvein R-M *O. isshikii* (Matsumura)
Wing without dark brown markings covering crossvein R-M or not as above.....4
4. Wing without dark brown markings covering crossvein R-M.....5
Wing with one dark brown marking covering crossvein R-M and which connect with other markings or bands.....7
5. Wing with one clear brown marking near stigma and one clear large brown marking at its apex in cell r₁..... *O. idanina* Zia
Wing markings not as above6
6. Wing with one vague hyaline spot near stigma and one vague yellow-brown mark at its apex in cell r₁; scutum with 2 postpronotal setae *O. costamacula* Chen & Wang, sp.nov.
Wing with no vague hyaline spot near stigma and vague yellow-brown mark at its apex in cell r₁; scutum with 3 postpronotal setae .
..... *O. straighta* Chen & Wang, sp.nov.

7. Wing with one isolated hyaline spot in cell r_{2+3} or cell r_{4+5} 8
 Wing without isolated hyaline spot in cell r_{2+3} or cell r_{4+5} 9
8. Wing with one isolated hyaline spot in cell r_{2+3} ; apical brown marking in cell r_1 extending over cell r_{2+3} and connected with brown marking in cell r_{4+5} *O. gigas* Hendel
 Wing with one isolated hyaline spot in cell r_{4+5} ; apical brown marking in cell r_1 not connected with brown marking in cell r_{4+5} *O. tibeta* Wang
9. Wing without brown markings near stigma or at its apex in cell r_1 ; dark brown marking covering crossvein R-M not extend across cell dm *O. ziae* Norrbom
 Wing with one clear brown marking near stigma and one clear large brown marking at its apex in cell r_1 ; dark brown marking covering crossvein R-M extend across cell dm 10
10. Wing with cell bcu largely brownish; scutum with 3 postpronotal setae *O. gansuica* Zia
 Wing with cell bcu largely hyaline; scutum with 2 postpronotal setae *O. idana* Hendel

3.1 Two new species with adult habitat and behavior observations

3.1.1 *Ortalotrypeta costamacula* Chen & Wang, sp. nov. (Figs 1–13, 27–28)

Diagnosis. Medium sized. Body length 5.5–8.0 mm; wing length 6.8–9.8 mm. Head usually with 2 pairs frontal seta (sometimes 3 on one side). Scutum with 2 postpronotal setae. Wing with stigma predominantly dark brown; cell r_1 with one vague hyaline spot near stigma and one vague yellow-brown markings at apex; lacking dark brown markings or band on crossvein R-M. Basal half of female syntergosternite 7 yellowish and apical half dark brown to black (its color seems not very different from other tergites); 3 similar subspherical spermathecae. Male medial surstylus with 2 different-sized black prensisetae.

Description. A medium predominantly yellow species (Figs 1–2, 27–28). Body length 5.5–8.0 mm; wing length 6.8–9.8 mm.

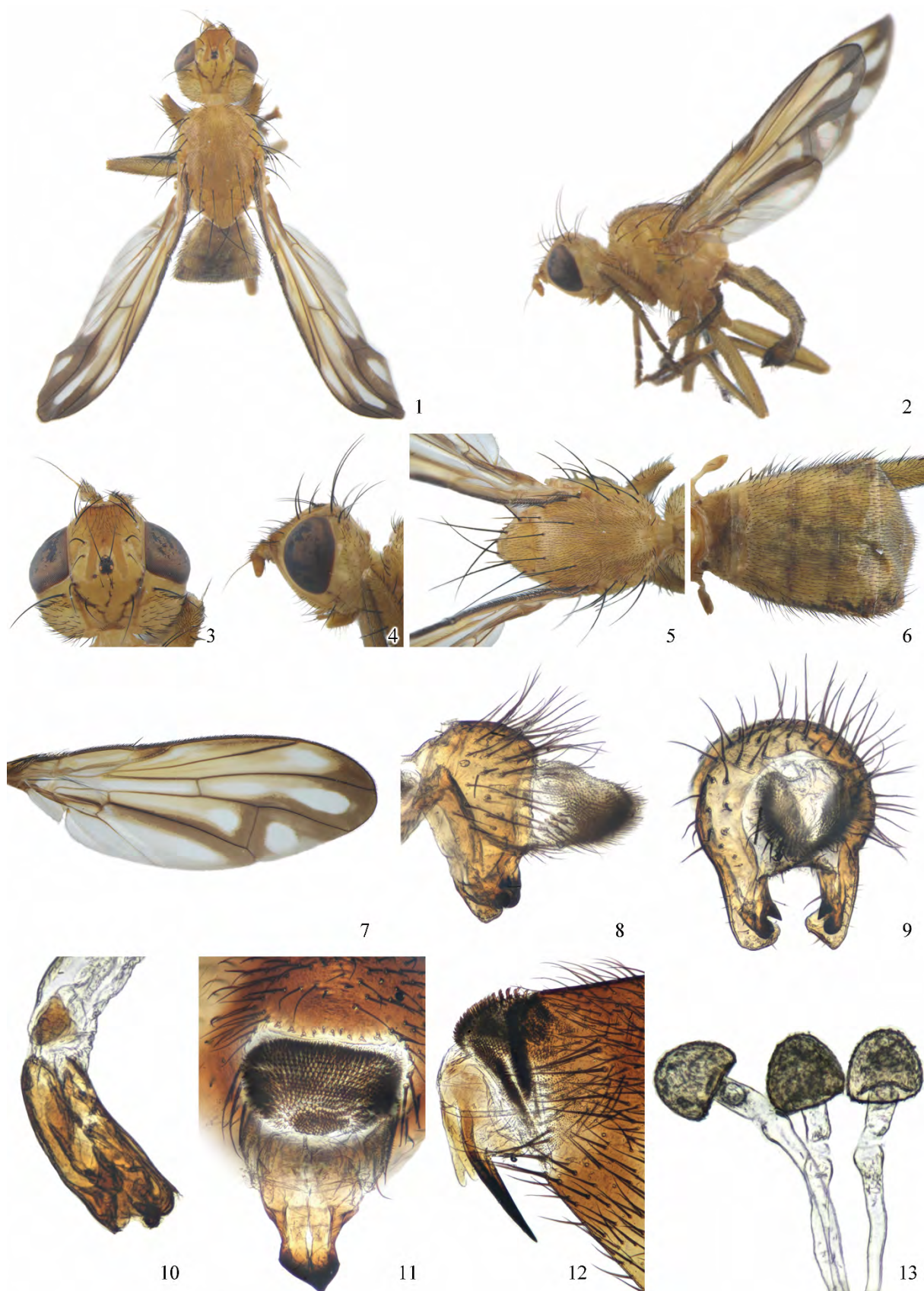
Head (Figs 3–4). Completely yellow except for ocellar triangle black. Head with distinct receding face and strongly swollen postgena. Head almost same width with thorax in dorsal view and slightly higher than wide in lateral view. Frons about 1.5 times as long as wide, wider than eye width in dorsal view. Antenna short, less than 1/2 as long as face; 1st flagellomere about 1.2–2.0 times as long as pedicel, 1.5–2.0 times as long as wide, apex rounded; arista short pubescent. Occiput convex, distinctly swollen ventrally. Head setae black: 2 inclinate frontals, 2 reclinate orbitals, 1 medial vertical and 1 lateral vertical setae. Postocellar and genal setae present. Paraverticular seta much larger than postocellar seta. Postocular setae poorly differentiated from postgenal setulae.

Thorax (Fig. 5). Completely yellow to yellow-brown. Scutum about 1.5 times as long as wide, with transverse suture shallow and not complete. Thoracic chaetotaxy: 1–2 pairs scapular, 2 postpronotal, 1 dorsocentral, 1 acrostichal, 3 scutellar (similar size, apical scutellar setae usually crossed), 2 notopleural, 2 anepisternal, 1 anepimeral, 1 katepisternal, 1 presutural and 2 postsutural supra-alar, 1 postalar, 1 intra-alar present; 1 intrapostalar setae usually present (occasionally absent). Dorsocentral seta aligned close to more anterior postsutural supra-alar seta. Wing (Fig. 7). Cells bc and c yellowish, stigma predominantly dark brown; cell r_1 yellowish and with 1 vague hyaline spot near stigma; cell r_{2+3} yellowish but apex dark brown, with 1 vague hyaline spot close to dark brown apex; cell br hyaline; cell r_{4+5} mostly hyaline, but apex and along vein M dark brown; cell dm and m with hyaline spots at middle, and having yellowish to dark brown bands along borders; cell cu_2 mostly hyaline, but with dark brown band along vein cu_1 . Anal cell hyaline. All yellow to dark brown bands and markings in cells r_1 , r_{2+3} , r_{4+5} , dm, m and cu_2 are connected together. Crossvein R-M situated beyond middle of cell dm; cell bcu with posterodistal lobe short. Legs completely yellow; mid tibia with 2 large black apicoventral spurs.

Abdomen (Fig. 6). Yellow to yellow-brown, sometimes with irregular dark-brown markings. Female abdomen. Syntergosternite 7 short, with large dorsoapical opening; basal half yellowish and apical half dark brown to black (its color seems not very different from other tergites), distinctly shorter than length of tergites 5+6; aculeus (Figs 11–12) strongly dorsally curved; tip completely fused to main part of aculeus; eversible membrane with large ventral area of dark scales; 3 similar subspherical spermathecae, with elongate and slender base (Fig. 13). Male abdomen. Epandrium rounded in posterior view (Fig. 9), surstylus with apex rounded in lateral view (Fig. 8), medial surstylus having 2 black and different-sized prensisetae (Fig. 9); distiphallus (Fig. 10) membranous basally, well sclerotized apically.

Distribution. China (Shaanxi, Hubei).

Material examined. Holotype ♀ (IZCAS), China, Shaanxi, Ankang, Ningshan, Huoditang, 24 July 2016, 1552 m, leg. Yong Wang. Paratypes. 2♂1♀ (IZCAS), China, Shaanxi, Ankang, Ningshan, Huoditang, 7–9 July 2016, 1552 m, leg. Yong Wang.



Figures 1–13. *Ortalotrypeta costamacula* Chen & Wang, **sp. nov.** 1. Habitus, dorsal view; 2. Habitus, lateral view; 3. Head, dorsal view; 4. Head, lateral view; 5. Scutum, dorsal view; 6. Abdomen, dorsal view; 7. Wing. 8. Epandrium and surstyli, lateral; 9. Epandrium and surstyli, posterior; 10. Aedeagus; 11. Aculeus and eversible membrane, ventral view; 12. Aculeus and eversible membrane, lateral view; 13. Spermathecae.

Etymology. The name of this species is a noun combining ‘*costa*’ and ‘*macula*’ referring to the brown macula in cell r_1 at costal area of wing.

Biology. The flies (Figs 27–28) and their collection sites were observed and photographed in Huoditang, Shannxi Province, China by Xiaolin Chen and Yong Wang in the summer, 2016. The collection site had high humidity and dense vegetation, located at an elevation of 1552 m. The habitat was underneath a broad-leaved forest along a small walking path. It mainly contains two types of grass: one belongs to *Pilea* Lindl., while another to gramineous plants. The flies were often observed to walk on the leaves of the plants or under them or fly around the leaves and stems. There were also some sawfly larvae in the habitat. Several flies and sawfly larvae were collected and raised together in a cage. Finally one female fly was observed to prick the body of a sawfly larva using its abdomen. This probably is an evidence of its parasitic habits.

Remarks. This species is similar to *O. ziae* Norrbom and *O. straighta* Chen & Wang, **sp. nov.** in the general wing pattern, but differs from them by the stigma predominantly dark brown, cell r_1 having one vague hyaline spot near stigma and one vague yellow-brown markings at apex, scutum with 2 postpronotal setae, female syntergosternite 7 yellowish and the apical half dark brown to black.

3.1.2 *Ortalotrypeta straighta* Chen & Wang, **sp. nov.** (Figs 14–26)

Diagnosis. Large sized, body length 9.0–12.0 mm, wing length 10.5–11.8 mm. Head usually with 3 pairs frontal seta. Scutum with 3 postpronotal setae. Wing with stigma yellowish and a narrow dark brown border along costa; lacking dark brown markings or band covering on crossvein R-M. Female syntergosternite 7 completely black or almost so (color seems very different from other yellowish tergites); 3 similar hemispherical spermathecae. Male medial surstylus with 2 black same-sized prensisetae.

Description. A large predominantly yellow species (Figs 14–15). Body length 9.0–12.0 mm; wing length 10.5–11.8 mm.

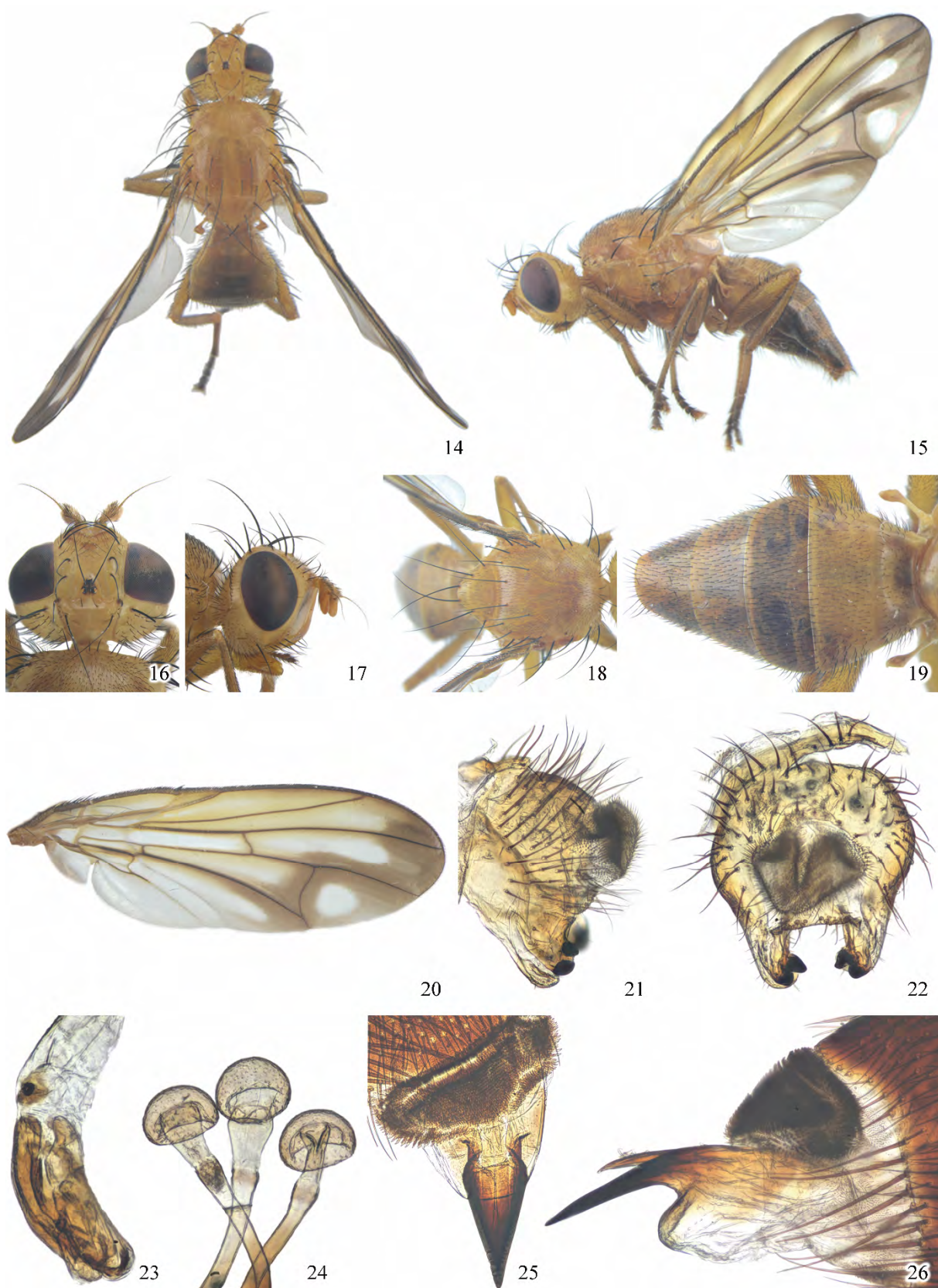
Head (Figs 16–17). Completely yellow except for ocellar triangle black. Head with receding face and swollen postgena. Head almost same width as thorax in dorsal view and higher than wide in lateral view. Frons about 1.3 times as long as wide, and wider than eye width in dorsal view. Antenna short, about 1/2 as long as face; 1st flagellomere about 1.0–1.2 times as long as pedicel, 1.5–2.0 times as long as wide, apex rounded; arista short pubescent. Occiput convex, swollen ventrally. Head setae black: 3 inclinate frontal, 2 reclinate orbital, 1 medial vertical and 1 lateral vertical setae. Postocellar and genal setae present. Paraverticlar seta much larger than postocellar seta. Postocular setae poorly differentiated from postgenal setulae.

Thorax (Fig. 18). Completely yellow to yellow-brown. Scutum about 1.5 times as long as wide, with transverse suture shallow and not complete. Thoracic chaetotaxy: 3–4 pairs scapular, 3 postpronotal, 1 dorsocentral, 1 acrostichal, 3 scutellar (similar size, the apical scutellar setae usually crossed), 3 notopleural, 3 anepisternal, 1 anepimeral, 1 katepisternal, 1 presutural and 2 postsutural supra-alar, 1 postalar, 1 intra-alar, 1 intrapostalar setae present. Dorsocentral seta aligned close to the more posterior postsutural supra-alar seta. Wing (Fig. 20). Cells bc, c and stigma yellowish; cell r_1 yellowish and with 1 narrow black-brown band along costa; cell r_{2+3} yellowish but apex black-brown, and with black-brown bands along both vein R_{2+3} and vein R_{4+5} ; cell br hyaline; cell r_{4+5} mostly hyaline, but apex and along vein M black-brown; cell dm and m with hyaline spots in the middle, and having dark brown bands along the borders; cell cu_2 mostly hyaline, but with dark brown band along vein cu_1 . Anal cell hyaline. All dark brown bands and marks in cells r_1 , r_{2+3} , r_{4+5} , dm, m and cu_2 are connected. Crossvein R-M situated beyond middle of cell dm; cell bcu with posterodistal lobe short. Legs completely yellow; mid tibia with 2 large black apicoventral spurs.

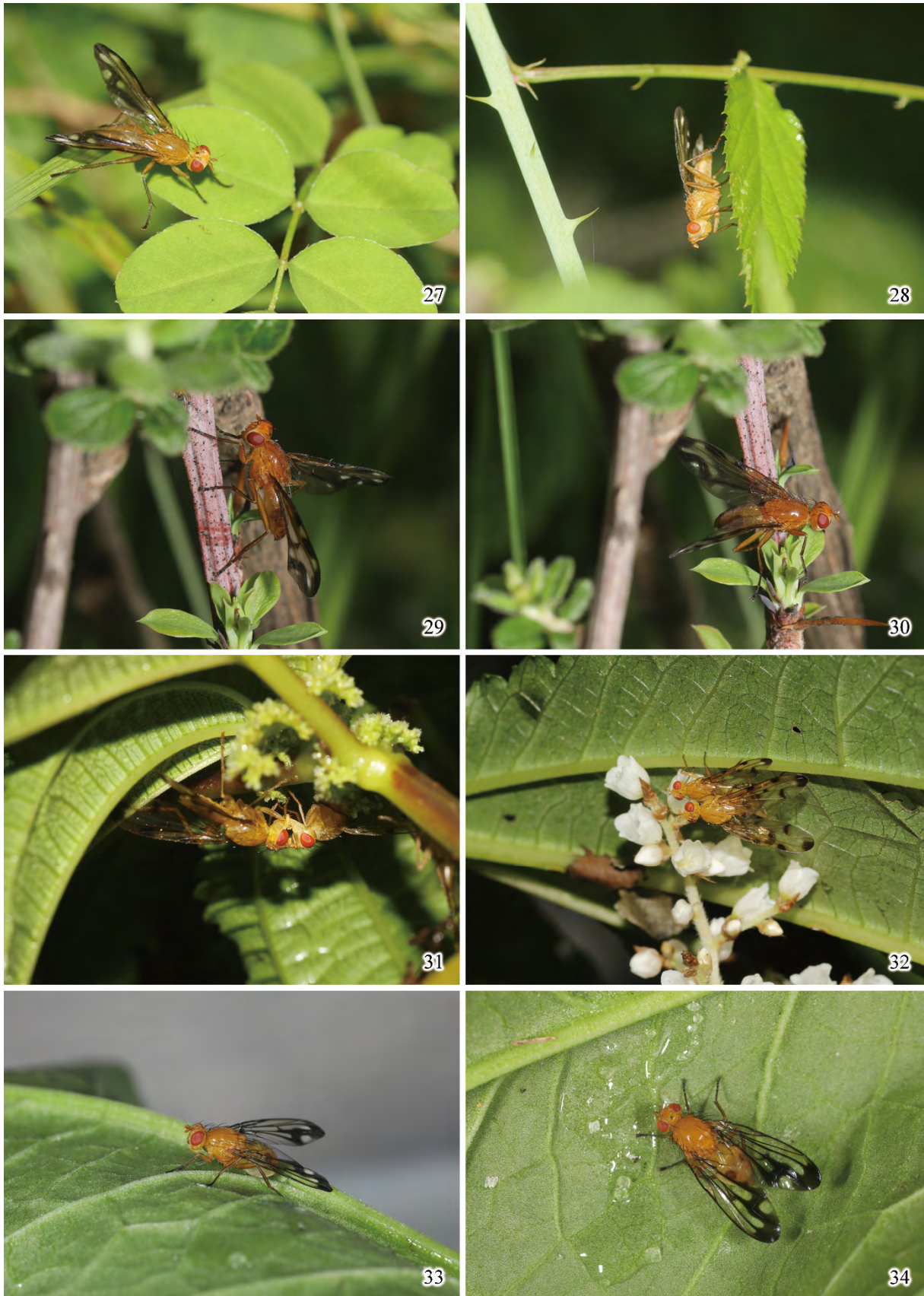
Abdomen (Fig. 19). Yellow to yellow-brown, sometimes with irregular dark-brown marks. Female abdomen. Syntergosternite 7 short or medium, with large dorsoapical opening; completely black or almost so (seem very different from other yellowish tergites), slightly shorter than the length of tergites 5+6 or almost so; aculeus (Figs 25–26) strongly dorsally curved; tip completely fused to main part of aculeus. Eversible membrane with large ventral area of dark scales. Three similar hemispherical spermathecae, with elongate and slender base (Fig. 24). Male abdomen. Epandrium rounded in posterior view (Fig. 22), surstylus with apex rounded in lateral view (Fig. 21); medial surstylus having 2 black and same-sized prensisetae (Fig. 22). Distiphallus (Fig. 23) membranous basally, well sclerotized apically.

Distribution. China (Shaanxi, Hubei).

Material examined. Holotype ♀ (IZCAS), China, Shaanxi, Ankang, Ningshan, Huoditang Miaopu, 16 July 2016, 1552 m, leg. Yong Wang. Paratypes. 1 ♂ (IZCAS), Shaanxi, Ankang, Ningshan, Huodigou, 22 July 2016, 1552 m, leg. Yong Wang; 1 ♀, Shaanxi, Ankang, Ningshan, Huoditang Miaopu, 11 July 2016, 1552 m, leg. Yong Wang; 1 ♀ (IZCAS), Shaanxi, Ankang, Ningshan, Huoditang, 26 June 1999, 1580–1650 m, leg. Decheng Yuan. 1 ♂ (YU), Hubei, Shennongjia, Wenshui-linchang, 18 July 2003, 1700–2000 m, leg. Qinghua Zhou.



Figures 14–26. *Ortalotrypeta straighta* Chen & Wang, **sp. nov.** 14. Habitus, dorsal view; 15. Habitus, lateral views; 16. Head, dorsal view; 17. Head, lateral view; 18. Scutum, dorsal view; 19. Abdomen, dorsal view; 20. Wing; 21. Epandrium and surstyli, lateral; 22. Epandrium and surstyli, posterior; 23. Aedeagus; 24. Spermathecae; 25. Aculeus and eversible membrane, ventral view; 26. Aculeus and eversible membrane, lateral view.



Figures 27–34. Habitus of living *Ortalotrypeta* Hendel. 27–28. *O. costamacula* Chen & Wang, **sp. nov.**; 29–30. *O. gansuica*; 31–32. *O. trypetoides*; 33–34. *O. ziae*.

Etymology. The name of this species is an adjective in reference to the straight band along vein Cu_1 of the wing.

Biology. The flies and their collection sites were observed in Huoditang, Shannxi Province, China by Xiaolin Chen and Yong Wang in the summer, 2016. The collection site had high humidity and dense vegetation, located at an elevation of 1552 m. The habitat was a broad-leaved forest along a small walking path. The flies were on the underside of tree leaves, and trees grew on the sides of the path. Interestingly, we found two closely related species, *O. costamacula* Chen & Wang, **sp. nov.** and *Cyaforma shenonica* Wang, under the trees. They lived in the habitat where *Pilea* and gramineous plants were the dominant vegetation.

Remarks. This species is similar to *O. ziae* Norrbom in the general wing pattern, but differs from the latter by cell c, sc , r_1 and r_{2+3} evenly yellowish, the stigma not apically dark brown, having no dark brown markings or band covering on crossvein R-M, and all wing markings and bands yellow to yellow-brown. This species might have similar biology with *O. ziae* because both species have been found living on the back of leaves and stems of trees.

3.2 Additional species with some adult habitat and behavior observations

3.2.1 *Ortalotrypeta gansuica* Zia, 1938 (Figs 29–30)

Ortalotrypeta gansuica Zia in Zia & Chen, 1938: 13; Chen, 1948: 77; Zia, 1963: 637; Foote, 1984: 108; Norrbom, 1994: 8; Wang, 1996: 116. Type-locality: Maxianshan [Mahoshan], Gansu [Kansu], China.

Diagnosis. Length. Body 8.2–8.5 mm; wing 9.0–9.3 mm. This species is very similar to *O. idana* Hendel in general appearance, but differs from the latter by having 3 postpronotal setae, of which the anterior one is about half as long as the others; cell bcu largely brown; abdomen yellow tinged with black on tergites 1–3; oviscapae entirely black, about as long as tergites 5–6.

Distribution. China (Gansu, Qinghai, Xizang, Yunnan).

Material examined. Holotype ♂ (IZCAS), China, Gansu, Maxianshan, 15 July 1918. Other materials. 1♂1♀ (IZCAS), China, Gansu, Yongdeng, 2280 m, 26 July 1991, leg. Guoqing Mai; 1♂ (IZCAS), China, Xizang, Bomi, Zhamo, 2700 m, 24 July 1978, leg. Suofu Li; 1♂ (IZCAS), China, Qinghai, Mengda, 2000 m, August 2009, leg. Zaihuang Yang; 4♂3♀ (IZCAS), China, Yunnan, Xianggelila, Xiaozhongdian, 3167 m, 18 June 2020, leg. Xiaolin Chen, Yong Wang and Ning Huangfu; 1♀ (IZCAS), China, Yunnan, Xianggelila, Songzanlinsi, 3280 m, 17 June 2020, leg. Xiaolin Chen, Yong Wang and Ning Huangfu; 1♀ (HU), China, Ningxia, Jingyuan, Dongshanpo Linchang, 3–4 August 2008, leg. Guodong Reng.

Biology. The flies and their collection sites (Figs 29–30) were observed and photographed in Xiaozhongdian, Shangri-La, Yunnan, China by Xiaolin Chen, Yong Wang, and Ning Huangfu in the summer of 2020. The collection site had low humidity (about 40%), moderate temperature (approximately 26°C), strong sunlight, and sparse vegetation, located at an elevation of 3167 m. The habitat was a plateau meadow with shrubs and one Fagaceae plant (possibly *Quercus aquifolioides* Rehd. & Wils.) as the dominant vegetation. The terrain was undulating with slopes and ravines, with some small streams at lower places. The flies were hidden in *Q. aquifolioides* and often difficult to collect. Some shrubs were also destroyed by moth larvae (probably Tortricidae), which rolled the leaves and formed a ‘nest’. The plants were also damaged by larger moth larvae, which might belong to Lymantriidae. The population of *O. gansuica* Zia at the site was relatively large. In addition, one male fly was found trying to feed a female fly and two males were found fighting with each other.

3.2.2 *Ortalotrypeta trypetoides* Chen, 1948 (Figs 31–32)

Ortalotrypeta trypetoides Chen, 1948: 119; Zia, 1963: 637; Norrbom, 1994: 8; Wang, 1996: 118. Type-locality: Kangding [Kongting], Sichuan [Sikong], China.

Diagnosis. This species is readily distinguished from other known *Ortalotrypeta* by the unusual wing pattern: hyaline and yellowish in ground color, with 5 isolated brown spots; 2 postpronotal setae present, intrapostalars usually lacking; oviscapae yellowish brown marked with black at the apex, shorter than tergites 5–6.

Length. Body 5.0–8.5 mm; wing 7.0–9.5 mm.

Distribution. China (Sichuan, Yunnan, Shannxi).

Material examined. Holotype ♂, China, Sichuan, Kangding, 27 September 1939. Paratype [as allotype], 1♀, same data as holotype (IZCAS). Other materials. 23♂30♀ (IZCAS), China, Sichuan, Mt. Emei, 1800–2000 m, 15 June–30 August 1957, leg. Kereng Huang, Fuxing Zhu; 7♂8♀ (IZCAS), China, Sichuan, Mt. Emei, 1800 m, 20 July 1992, leg. Xingjian Wang; 8♂3♀ (IZCAS), China, Sichuan, Mt. Emei, Leidongping, 23–24 August 2019, leg. Yong Wang and Ning Huangfu; 1♂ (IZCAS), China, Yunnan, Weixi, 2920 m, 18 July 1981, leg. Subai Liao; 1♂ (IZCAS), China, Yunnan, Deqin, 3300 m, 30 August 1981, leg. Subai Liao; 1♂ (IZCAS), China, Yunnan, Zhongdian, 3220 m, 3 August 1981, leg. Subai Liao; 1♂

(IZCAS), China, Shannxi, Ningshan, Pinhheliang, 2020 m, 29 July 1998, Jun Chen.

Biology. The habitat had dominant vegetation of *Pilea* (probably *Pilea pumila* (L.)), which grew on both sides of the walking paths and under the broad-leaved forest. We found that the flies usually mated on the back of the leaves and stems of *Pilea*. The mating time was between 17:00 and 20:00, and usually lasted for 30–50 minutes. After mating, the male always fed the female with food. There were also some moth (probably Geometridae) and sawfly larvae in the habitat, and a female fly was observed to prick the body of a moth larva quickly with its abdomen.

3.2.3 *Ortalotrypeta ziae* Norrbom, 1994 (Figs 33–34)

Ortalotrypeta ziae Norrbom, 1994: 9; Wang, 1996: 118. Type-locality: Musha, Taiwan, holotype male in USNM.

Diagnosis. Medium to large sized. Body 7.5–9.5 mm; wing 8.0–10.7 mm. Head usually with 3 pairs frontal setae. Scutum with 3 postpronotal setae and 1 intrapostalar seta; wing with a narrow costal brown band extending from the end of vein R_1 to the apex of cell r_{2+3} and joined with the apical brown markings of wing (not apparent in Figs 33–34); dark brown markings covering crossvein R-M; vein CuA_1 distinctly marked with brownish border, and cell sc with a small brown spot at the apex.

Length. Body 7.5–9.5 mm; wing 8.0–10.7 mm.

Distribution. China (Hubei, Taiwan, Yunnan).

Material examined. 1♀ (YU), China, Hubei, Shennongjia, Wenshui Linchang, 1700–2000 m, 19 July 2003, leg. Hua He; 1♀ (YU), China, Hubei, Shennongjia, Wenshui Linchang, 1600–1800 m, 22 July 2003, leg. Xiuying Zhang; 3♂2♀ (IZCAS), China, Yunnan, Lushui, Yaojiaping, 10 June 2020, leg. Xiaolin Chen, Yong Wang and Ning Huangfu.

Biology. The flies and their collection sites were observed and photographed in Yaojiaping Management and Protection Station, Lushui, Yunnan Province, China by Xiaolin Chen, Yong Wang, and Ning Huangfu in the summer, 2020. The collection site had high humidity (76–80%), comfortable temperature (approximately 21°C), less sunlight and dense vegetation, located at an elevation of 2380 m. The habitat was an open ground in a dense broad-leaved forest, where the flies were usually on the underside of the leaves and stems of *Debregeasia longifolia* (Burm. F.) trees. There were also some Lepidoptera larvae on the trees in the habitat. In addition, the tree grew on the open ground and a dominant vegetation of *Pilea* was under the trees. Interestingly, another closely related species, *C. macula* (Wang), was found living in the grass of *Pilea*.

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