

A new species of the *Homoneura* (*Homoneura*) *beckeri* (Diptera: Lauxaniidae) group from Taiwan Island, China

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Abstract: In the *Homoneura* (*Homoneura*) *beckeri* group, a species *H. (H.) annulata* Liu & Shi **sp. nov.** is described as new to science. Morphological descriptions and photos of this new species are provided. A list of 29 species of the *Homoneura* (*Homoneura*) *beckeri* group in Oriental Region and a key to separate them are provided.

Key words: Homoneurinae; key; morphological taxonomy

中国台湾岛贝氏同脉缟蝇种团一新种记述（双翅目：缟蝇科）

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摘要: 记述采自中国台湾岛贝氏同脉缟蝇种团 1 新种环带同脉缟蝇 *H. (H.) annulata* Liu & Shi **sp. nov.**，提供了新种的形态描述和特征图；编制了该种团于中国分布 29 种的分种检索表。

关键词: 同脉缟蝇亚科；检索表；形态分类

Introduction

Taiwan Island is the largest island of China, with approximate 2/3 of its total area being mountains and hills. The main peak of Yushan in Taiwan Island, towering at 3,952 meters, stands as the highest peak in eastern China. This vast altitude discrepancy contributes to the richness of biodiversity in this region.

The *Homoneura* (*Homoneura*) *beckeri* group (Lauxaniidae: Homoneurinae) was initially proposed by Papp (2006) and consists of a total of 28 known species in China (Shi & Yang 2009a, b; Li & Yang 2012). Among these species, only three, namely *H. (H.) beckeri* (Kertész), *H. (H.) fasciventris* Malloch, and *H. (H.) occipitalis* Malloch, are found on Taiwan Island and were first described a century ago. Lin & Chen (1999) published a comprehensive book titled “The Name List of Taiwan Diptera”, which includes 2,908 species (including subspecies) from 818 genera across 83 families in Diptera. In this book, there are 72 species belonging to 18 genera and 2 subfamilies in Lauxaniidae, with only 29 species falling under the subgenus *Homoneura*. Furthermore, 41 species of the subgenus *Homoneura* are documented on the TaiCoL website (<http://taibnet.sinica.edu.tw>, updated in 2023), which

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provides a catalogue of life in Taiwan Island.

This group can be recognized by the following characteristics: body black or brown with whitish gray pruinescence; frons with two narrow brown stripes along fronto-orbital setae in rows and a narrow brown triangular median stripe; arista plumose; mesoscutum with 0+3 dorsocentral setae; wing at most with brown stripe-like spot on crossveins r-m and dm-cu; hypandrium W-shaped (Shi & Yang 2009a, b; Li & Yang 2012).

A new species *H. (H.) annulata* Liu & Shi **sp. nov.** of the *Homoneura* (*Homoneura*) *beckeri* group is reported from Taiwan Island in this paper. A key to separate 29 species of the species group in China is provided.

Material and methods

The general terminology follows Cumming & Wood in Kirk-Spriggs & Sinclair 2017. Genitalia preparations were made by removing and macerating the apical portion of the abdomen in warm lactic acid for 5–15 min, then rinsing them with purified water for dissection and study. After finishing the examination, genitalia were transferred and stored in a microvial with glycerin. Specimens were examined with a dissection microscope (Nikon 1270). Adult images were taken with a digital camera (Nikon DS-Fi3) and a series of images were montaged using Helicon Focus (©HeliconSoft). All images were further processed with Adobe Photoshop CS 6.0®.

Specimens examined are deposited in the Entomological Museum of China Agricultural University (CAU), Beijing.

Taxonomy

Checklist of the *Homoneura* (*Homoneura*) *beckeri* group in China

1. *H. (H.) annulata* Liu & Shi **sp. nov.** — China (Taiwan)
2. *H. (H.) apicomata* Shi & Yang, 2009 — China (Hainan)
3. *H. (H.) baihualingensis* Li & Yang, 2012 — China (Yunnan)
4. *H. (H.) beckeri* (Kertész, 1900) — China (Hainan, Taiwan)
5. *H. (H.) bomiensis* Gao & Yang, 2003 — China (Tibet)
6. *H. (H.) brevituba* Li & Yang, 2012 — China (Yunnan)
7. *H. (H.) columnaria* Shi & Yang, 2009 — China (Hainan)
8. *H. (H.) conica* Li & Yang, 2012 — China (Yunnan)
9. *H. (H.) convergens* Shi & Yang, 2009 — China (Hainan).
10. *H. (H.) cornis* Li & Yang, 2012 — China (Yunnan)
11. *H. (H.) dulongjiangica* Li & Yang, 2012 — China (Yunnan)
12. *H. (H.) ensata* Li & Yang, 2012 — China (Yunnan)
13. *H. (H.) fasciventris* Malloch, 1927 — China (Taiwan); Laos; Malaysia (Borneo); Vietnam
14. *H. (H.) flavida* Shi & Yang, 2009 — China (Hainan)
15. *H. (H.) gemmiformis* Li & Yang, 2012 — China (Yunnan)

16. *H. (H.) immaculata* (de Meijere, 1910) — China (Guizhou, Guangxi, Hainan)
17. *H. (H.) latissima* Shi & Yang, 2009 — China (Hainan)
18. *H. (H.) latizona* Li & Yang, 2012 — China (Yunnan)
19. *H. (H.) longiprocessa* Li & Yang, 2012 — China (Yunnan)
20. *H. (H.) nigrantennata* Yang, Hu & Zhu, 2002 — China (Hainan)
21. *H. (H.) nigritarsis* Shi & Yang, 2009 — China (Hainan)
22. *H. (H.) occipitalis* Malloch, 1927 — China (Zhejiang, Guangdong, Taiwan)
23. *H. (H.) pilifera* Li & Yang, 2012 — China (Yunnan)
24. *H. (H.) semicircularis* Shi & Yang, 2009 — China (Zhejiang)
25. *H. (H.) tortifurcata* Shi & Yang, 2009 — China (Hainan)
26. *H. (H.) trilineata* Li & Yang, 2012 — China (Yunnan)
27. *H. (H.) yinggelingica* Shi & Yang, 2009 — China (Hainan)
28. *H. (H.) yunnanensis* Li, Li & Yang, 2008 — China (Yunnan)
29. *H. (H.) zhangae* Shi & Yang, 2009 — China (Hainan)

Key to species of the *Homoneura (Homoneura) beckeri* group in Oriental Region

(Modified from Shi & Yang 2009b. Note: females of *H. (H.) columnaria*, *H. (H.) convergens*, *H. (H.) nigritarsis*, *H. (H.) yinggeling*, and *H. (H.) zhangae* are unknown)

1. Abdominal tergites 1–5 entirely black or at least tergites 1–2 entirely black..... 2
- Abdominal tergites 1–5 mostly yellow with brown triangle median spots and narrow transverse band on hind margin 8
2. Abdominal tergites 1–2 entirely black and tergite 3–5 partly black 3
- Abdominal tergites 1–5 entirely deep black 4
3. Upper half of occiput with a large brown spot on each side, extending to top margin of eye; abdominal tergite 3 mostly black except narrow yellow anterior margin, teriges 4–5 black on posterior 1/2 and yellow on anterior 1/2 *H. (H.) occipitalis* Malloch
- Occiput with a wide grayish black stripe confluent with ocellar triangle; abdominal tergite 3 mostly black except yellow anterolaterally; tergites 4–5 each with a black median spot, confluent with black posterior transverse band *H. (H.) trilineata* Li & Yang
4. Face mostly black except yellow spot near ventral margin; abdominal tergite 6 entirely black; phallus acute apically without lateral processes in ventral view *H. (H.) bomiensis* Gao & Yang
- Face yellow with a pair of black spots or a large brown median spot; abdominal tergite 6 yellow with brown median spot and/or lateral transverse band; phallus not as above 5
5. Face with a large brown median spot; phallus with 3 pair of long sword-like apical processes *H. (H.) ensata* Li & Yang
- Face yellow with a pair of black spots; phallus not as above 6
6. Antenna 1st flagellomere yellowish brown; phallus blunt with a pair of acute lateral processes in ventral view *H. (H.) immaculata* (de Meijere)
- Antenna 1st flagellomere entirely blackish brown or at least blackish brown in apical half; phallus not as above 7
7. First flagellomere yellow in basal half and blackish brown in apical half; mesoscutum with a pair of brownish yellow lateral stripes; phallus trifurcated at apex with a pair of median lateral processes on dorsal sclerites *H. (H.) dulongjiangica* Li & Yang
- First flagellomere entirely blackish brown; mesoscutum without lateral stripes; phallus apically ox horn-like with a pair of lateral median teeth on dorsal sclerites *H. (H.) cornis* Li & Yang

8. Face with brown stripe or spot 9
 -. Face without stripe or spot 15
9. Face with one transverse band or two horizontal spots on ventral 1/3 or near ventral margin 10
 -. Face with a pair of large brown elliptical median spots (sometimes two spots slightly confluent) occupied majority of face 12
10. Antennal 1st flagellomere yellow except dark at tip; phallus with many apical teeth and a pair of acuate lateral processes in ventral view *H. (H.) beckeri* (Kertész)
 -. Antennal 1st flagellomere entirely brown or black; phallus not as above 11
11. Abdominal tergites 3–5 each with a brown triangular median spot confluent with the brown posterior band; phallus with a pair of slender dorsal sclerites excurved at apex in ventral view
 *H. (H.) annulata* Liu & Shi **sp. nov.**
 -. Antennal tergites 3–5 with a black median spot and a pair of black lateral spots; phallus with a few apical teeth but no acuate lateral processes in ventral view *H. (H.) nigrantennata* Yang, Hu & Zhu
12. Abdominal tergite 5 with a triangular median spot but no blackish brown transverse band; syntergosternite with a ventral segment; phallus consisting of a basal anterior sclerite with a pair of triangular lateral processes, a pair of basally furcated dorsal sclerites convergent at middle and a pair of hammer-like dorsal processes in ventral view *H. (H.) convergens* Shi & Yang
 -. Abdominal tergite 5 with a triangular median spot confluent with blackish brown transverse posterior band; syntergosternite without ventral segment; phallus not as above 13
13. Antennal 1st flagellomere entirely black; phallus with a pair of acuate lateral processes and a pair of furcated dorsoapical processes constricted subapically in ventral view ... *H. (H.) columnaria* Shi & Yang
 -. Antennal 1st flagellomere brownish or dark brown except yellow base; phallus not as above 14
14. Mid femur with 6 anterior setae; syntergosternite with a ventral segment; phallus with a pair of lateral median teeth and a pair of lateral median processes *H. (H.) baihualingensis* Li & Yang
 -. Mid femur with 5 anterior setae; syntergosternite without ventral segment; phallus with a pair of preapical lateral processes *H. (H.) conica* Li & Yang
15. Fore tibia with an incomplete brown ring at basal 1/3 *H. (H.) gemmiformis* Li & Yang
 -. Fore tibia without brown ring at basal 1/3 16
16. Antennal 1st flagellomere unicolor 17
 -. Antennal 1st flagellomere bicolor 20
17. Antennal 1st flagellomere brownish yellow; phallus with a pair of acuate lateral processes, a pair of incurved horn-like apical processes in ventral view *H. (H.) yinggelingica* Shi & Yang
 -. Antennal 1st flagellomere entirely black 18
18. Wing clear, without stripes or spots; phallus with a pair of lateral median teeth, a pair of ventral teeth and a pair of dorsal teeth *H. (H.) longiprocessa* Li & Yang
 -. Wing with a narrow brown stripe or spot on crossvein dm-cu; phallus not as above 19
19. Mesoscutum with brown stripes; tergite 6 with a small brown median spot; phallus with a pair of acuate triangular ventral processes and a pair of subuliform dorsal processes in ventral view
 *H. (H.) flavida* Shi & Yang
 -. Mesoscutum without brown stripes; tergite 6 without spot; phallus with a pair of acuate lateral processes and a pair of wide S-shaped and furcated dorsoapical processes in ventral view
 *H. (H.) tortifurcata* Shi & Yang
20. Wing clear, without stripe or spot on crossvein dm-cu; abdominal tergite 2 yellow without brown or black spots or transverse bands 21
 -. Wing with a narrow brown stripe or spot on crossvein dm-cu; abdominal tergite 2 yellow or yellowish

- brown with brown or black median spot or a pair of transverse lateral bands, or yellow at middle and black at two lateral sides..... 22
21. Abdominal tergites 3–5 each with an entirely blackish brown posterior band and triangular median spots, and a triangular median spot confluent with a blackish brown posterior band; phallus with bifurcated sclerite ventrally and two pairs of spine-like processes on dorsal and ventral membranous parts
..... *H. (H.) fasciventris* Malloch
- Abdominal tergites 3–5 each with a black median spot and a pair of black lateral bands; phallus obliquely truncate at tip with a small acute process *H. (H.) zhangae* Shi & Yang
22. Abdominal tergite 6 without brown spot; phallus with a pair of dorsoapical teeth
..... *H. (H.) apicomata* Shi & Yang
- Abdominal tergite 6 with a brown median spot and/or a pair of posterior lateral bands; phallus not as above 23
23. Abdominal tergites 6 each with a brown median spot and a pair of blackish brown lateral posterior bands; phallus with a large apical incision, a pair of dorsal sclerites and 3 pairs of preapical dorsal teeth
..... *H. (H.) latizona* Li & Yang
- Abdominal tergite 6 only with a brown median spot; phallus not as above..... 24
24. Tarsomere 5 entirely yellow to brownish yellow; phallus with a pair of goblet-like dorsal sclerites, constricted at middle, and a pair of acute dorsal middle processes and a pair of apical processes slightly furcated and contorted on dorsal sclerites..... *H. (H.) semicircularis* Shi & Yang
- Tarsomere 5 partly or entirely brown to black; phallus not as above 25
25. Tarsomere 5 brownish black..... 26
- Tarsomere 5 brown on apical half..... 27
26. Mesoscutum with a pair of narrow yellow stripes along dorsocentral setae in rows; phallus with a pair of curved subuliform processes, a pair of acute lateral processes and a pair of dorsal teeth on dorsal sclerites.....
..... *H. (H.) nigratarsis* Shi & Yang
- Mesoscutum without narrow yellow stripes along dorsocentral setae in rows; phallus with more than three pairs of teeth on dorsal sclerites in lateral view *H. (H.) yunnanensis* Li, Li & Yang
27. Abdominal tergite 2 with a pair of brown or black lateral posterior transverse bands; phallus with a pair of broad dorsal sclerites and a pair of dorsal apical teeth *H. (H.) brevituba* Li & Yang
- Abdominal tergite 2 with a brown median spot; phallus not as above..... 28
28. Antennal 1st flagellomere blackish brown except pale yellow on apical 1/3–1/2; phallus curved laterally, with two pairs of ventrolateral teeth, a pair of dorsal median teeth and two pairs of contorted apical processes in ventral view.....
..... *H. (H.) latissima* Shi & Yang
- Antennal 1st flagellomere blackish brown except dull brown ventrally and around arista; phallus with a pair of slender dorsal sclerites excurved apically and a pair of long coniform lateral processes at base in ventral view *H. (H.) pilifera* Li & Yang

***Homoneura (Homoneura) annulata* Liu & Shi sp. nov.** (Figs 1, 2)

Description. Male. Body length 4.2–5.2 mm, wing length 4.1–4.6 mm.

Head (Fig. 1A) pale yellow. Face with one transverse band near ventral margin. Frons about as long as wide and parallel-sided, with two narrow blackish gray stripes along ocellar setae in rows and a narrow brown triangular median stripe extending to ocellar triangle; ocellar triangle grayish black; ocellar setae strong, about as long as anterior fronto-orbital seta, anterior fronto-orbital seta slightly shorter than posterior fronto-orbital seta. Gena about 1/9 height of eye. Occiput with a wide grayish black stripe confluent with ocellar triangle.

Antennal scape brown, pedicel blackish brown, 1st flagellomere brown, 1st flagellomere 1.5 times longer than high; arista long plumose, blackish brown except brownish basally, with longest hairs longer than height of 1st flagellomere. Proboscis pale yellow, with yellowish and blackish setulae; palpus pale yellow with blackish setulae.

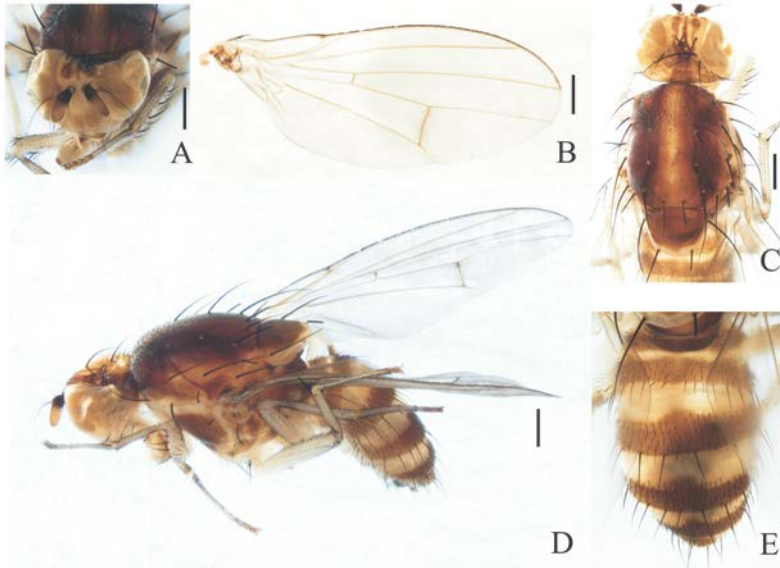


Figure 1. *Homoneura* (*Homoneura*) *annulata* Liu & Shi **sp. nov.**, holotype male. A. Head, anterior view; B. Wing; C. Head and thorax, dorsal view; D. Habitus, lateral view; E. Abdomen, dorsal view. Scale bars = 0.5 mm.

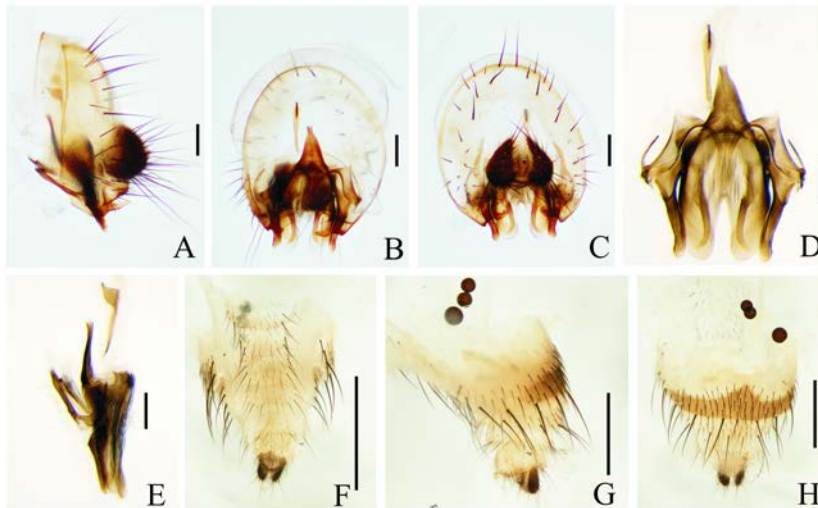


Figure 2. *Homoneura* (*Homoneura*) *annulata* Liu & Shi **sp. nov.** A–E. Paratype male; F–H. Paratype female. A. Syntergosternite and epandrial complex, lateral view; B. Syntergosternite and phallus complex, ventral view; C. Epandrial complex, posterior view; D, E. Phallus complex, ventral and lateral views; F. Abdominal sternites 5–9, ventral view; G. Abdominal tergites, sternites 5–9 and spermathecae, lateral view; H. Abdominal tergites 5–9 and spermathecae, dorsal view. Scale bars = 0.1 mm (A–E); 0.5 mm (F–H).



Figure 3. *Homoneura (Homoneura) beckeri* (Kertész, 1900), ♂. A. Habitus, lateral view; B. Head and thorax, dorsal view; C. Head, anterolateral view; D. Abdomen, dorsal view. Scale bars = 0.5 mm.

Thorax (Fig. 1C) blackish brown with grayish white pruinescence. Mesoscutum with white pruinescence on anterior margin, 0+3 dorsocentral setae (anterior dorsocentral seta clearly behind transverse scutal suture), acrostichal setulae in 8 somewhat irregular rows. Anepisternum and dorsal margin of katepisternum blackish brown, anepimeron and katepimeron blackish brown. Scutellum brownish black except yellow apical margin, with yellowish gray pruinescence. Legs pale yellow; fore femur with a brown spot behind the base and a brown spot behind the posterior; mid femur with an incomplete brown basal ring; hind tibia with an incomplete brown basal ring. Tarsomere 3–5 brown. Fore femur with 7 posterior dorsal setae and 4 posterior ventral setae, ctenidium with 14–15 short setae; fore tibia with a long preapical anterior dorsal seta and a short apical ventral seta. Mid femur with 6 anterior setae and an apical posterior seta; mid tibia with a strong preapical dorsal seta and 3 strong apical ventral setae. Hind femur with a preapical anterior dorsal seta hind tibia with a weak preapical anterior dorsal seta and a short apical ventral seta. Wing (Fig. 1B) slightly yellow, with a narrow pale brown elliptical spot on dm-cu; subcostal cell hyaline; costa with 2nd (between R_1 and R_{2+3}), 3rd (between R_{2+3} and R_{4+5}) and 4th (between R_{4+5} and M_1) sections in proportion of 2.3 : 0.8 : 0.5; crossvein r-m at middle of discal cell; ultimate and penultimate sections of M_1 in proportion of 1.6 : 2.0; ultimate section of CuA_1 about 1/7 of penultimate. Halter pale yellow.

Abdomen (Fig. 1E) yellow with sparse silvery white pruinescence; tergites 1–5 each with a broad brown posterior band and tergites 3–5 each with a brown triangular median spot confluent with the brown posterior band; tergite 6 with a small brown median spot (sometimes absent). Male genitalia (Figs 2A–E): syntergosternite semicircular; epandrium

nearly oblong and surstylus incurved claviform in lateral view; hypandrium M-shaped, with a pair of excurved ventral processes; gonopod columniform; phallapodeme triangular and shorter than phallus; phallus with a pair of slender dorsal sclerites excurved at apex and a deep apical incision.

Female. Body length 4.4–4.6 mm, wing length 4.1–4.2 mm. Terminalia spermathecae (2+1) spherical (Figs 2F–H).

Holotype. ♂ (CAU), **China**, Taiwan, Yilan, Fushan Botanical Garden, 635 m, 12-XI-2010, Ding YANG. **Paratypes.** **China**, Taiwan, 1♂ (CAU), data same as holotype; 2♀ (CAU), Pingdong, Dahanshan, 1,485 m, 09-XI-2010, Ding YANG; 1♀ (CAU), Yilan, Fushan Botanical Garden, 670 m, 11-VI-2011, Ding YANG; 1♂ (CAU), Gaoxiang, Maolin, Duonalindao, 300 m, 03-VI-2011, Xiaoyan LIU.

Etymology. Latin word “annulata”, meaning annular, refers to the abdominal tergites 1–5 each having a black annular band on posterior margin.

Diagnosis. Face with one transverse band near ventral margin. Wing slightly yellow, with a narrow pale brown elliptical spot on crossvein dm-cu. Abdomen tergites 1–5 each with a brown posterior band and tergites 3–5 each with a brown triangular median spot confluent with the brown posterior band; tergite 6 with a small brown median spot.

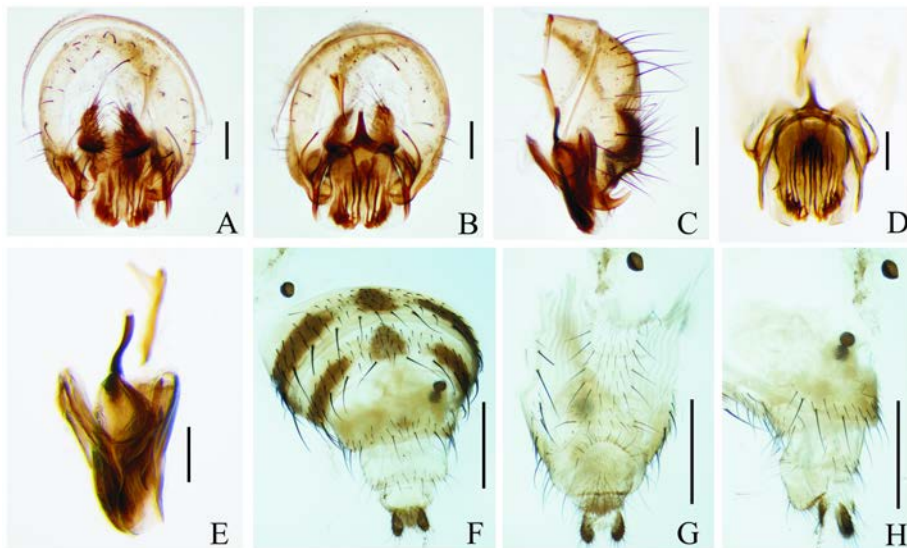


Figure 4. *Homoneura* (*Homoneura*) *beckeri* (Kertész, 1900). A–E. ♂; F–H. ♀. A, C. Syntergosternite and epandrial complex, posterior and lateral views; B. Syntergosternite and phallus complex, ventral view; D, E. Phallus complex, ventral and lateral views; F. Abdominal tergites 4–9 and spermathecae, dorsal view. G. Abdominal sternites 4–9 and spermathecae, ventral view; H. Abdominal tergites 4–9, sternites 6–9 and spermathecae, lateral view. Scale bars = 0.1 mm (A–E); 0.5 mm (F–H).

Remarks. The new species is similar to *Homoneura* (*Homoneura*) *brevituba* Li & Yang, 2012 from China (Yunnan) in the following characters: tergites 3–5 each having a posterior band; tergite 6 having a small brown median spot; phallapodeme being short. But it can be separated from the latter by the following features: face having a transverse band near ventral

margin; wing having a narrow pale brown elliptical spot on crossvein dm-cu; tergites 1–2 each having a broad brown posterior band; surstylus having a single process. In *H. (H.) brevituba*, face lacks spots; wing lacks brown spot on crossveins; tergite 2 has a pair of blackish brown lateral posterior bands; surstylus has double processes. The new species is also similar to *H. (H.) beckeri* (Kertész, 1900) (Figs 3, 4) from China (Hainan and Taiwan Islands) in the face having one transverse band near ventral margin. But in *H. (H.) beckeri*, tergites 1–5 have a pair of blackish brown lateral transverse bands; tergites 2–6 each have a black median spot.

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