

# Three new species and a new record species of the genus *Homoneura* (Diptera: Lauxaniidae) from the Qinling Mountains, China

Shunde LI, Xuefeng GAO, Li SHI<sup>①</sup>

*College of Agronomy, Inner Mongolia Agricultural University, Hohhot, Inner Mongolia 010019, China*

**Abstract:** Three species from the Qinling Mountains are described as new to science: *Homoneura* (*Homoneura*) *fopingensis* Gao & Shi sp. nov. in the *H. (H.) quinquenotata* group, and *H. (H.) aliena* Gao & Shi sp. nov. and *H. (H.) heilongtanensis* Gao & Shi sp. nov. in the *H. (H.) sauteri* group. *H. (H.) stigmata* Papp, 1984 in the *H. (H.) quinquenotata* group is recorded from China for the first time. The diagnosis of two species groups is presented. Keys to divide these two species groups and separate known species from the new species are provided.

**Key words:** Cyclorrhapha; Lauxanioideu; species group; taxonomy

中国秦岭同脉縟蝇属三新种及一中国新纪录种（双翅目：縟蝇科）

李顺德，高雪峰，史丽<sup>①</sup>

内蒙古农业大学农学院，内蒙古 呼和浩特 010019

**摘要:** 记述中国秦岭縟蝇科同脉縟蝇属 3 新种和 1 中国新纪录种：佛坪同脉縟蝇 *Homoneura* (*Homoneura*) *fopingensis* Gao & Shi sp. nov. 和斑点同脉縟蝇 *H. (H.) stigmata* Papp, 1984 属于五斑同脉縟蝇种团 *H. (H.) quinquenotata* group；奇异同脉縟蝇 *H. (H.) aliena* Gao & Shi sp. nov. 和黑龙潭同脉縟蝇 *H. (H.) heilongtanensis* Gao & Shi sp. nov. 属于索氏同脉縟蝇种团 *H. (H.) sauteri* group。文中还列出了 2 个种团的主要特征；提供了分种团和分种检索表。

**关键词:** 环裂亚目；縟蝇总科；种团；分类

## Introduction

The Qinling Mountains are a fold mountain range running across central China. The complex topography of the Qinling Mountains experienced the geological transformation of Paleozoic, Triassic, Mesozoic and Himalayan movements, and finally formed the present geological pattern (Zhang 1998). Its main body is located in the south-central area of Shaanxi Province, which is the boundary line between the Guanzhong region and the southern area of Shaanxi Province. The Qinling-Huaihe line, corresponding roughly to the 33rd degree north latitude parallel, is the geographical dividing line between the north and the south of China. It Divides China into two regions that differ from each other in climate and biogeography (data from China's Economic Networks).

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① Corresponding author, E-mail: lirui2003@imau.edu.cn

The subgenus *Homoneura* Wulp, 1891 (Lauxaniidae: Homoneurinae: *Homoneura*) can be separated from other subgenera by the following characters: mesonotum with 0–1+3 dorsocentral setae, acrostichal setae in 4–12 rows, supra-alar seta and intra-alar seta absent. Fore tibia not compressed in male; mid tibia with 2–3 apicoventral setae, posterior seta absent. Hind legs with tarsomere 2 not black. Wing with small black costal spines extending to tip of  $R_{4+5}$ , occasionally before tip of  $R_{4+5}$ ;  $M_1$  not curved upward and close to  $R_{4+5}$  (Miller 1977; Stuckenberg 1971). There are 696 species of the subgenus *Homoneura* worldwide, 415 in the Oriental Region, 108 in the Palearctic Region, and 208 in China (Shi & Yang 2009a, b, 2014; Shi *et al.* 2012, 2017; Gao *et al.* 2016; Shen *et al.* 2017, 2018).

Here the authors compare all species of the subgenus *Homoneura* from Palearctic and Oriental Regions because the Qinling-Huaihe line is a divider between these two regions in China. Finally three species, *H. (H.) fopingensis* sp. nov., *H. (H.) aliena* sp. nov., and *H. (H.) heilongtanensis* sp. nov., from the Qinling Mountains are described as new to science. The species *H. (H.) stigmata* Papp, 1984 is recorded from China for the first time. Keys are presented to divide the two species groups and separate these new species from known species of the subgenus *Homoneura* from China.

## Material and methods

The general terminology follows Cumming & Wood (2009), Gaimari & Silva (2010) and Shi & Yang (2014). Genitalia preparations were made by removing and macerating the apical portion of the abdomen in warm lactic acid for 10–20 minutes, then rinsing and neutralizing them with distilled water for dissection and study. After examination in glycerin, genitalia were transferred and stored in a microvial with glycerin pinned below each specimen.

Specimens were examined with a Nikon 1500 dissection microscope. Adult images were taken with a Nikon DS-Fi2 digital camera and the series of images montaged using Helicon Focus (©HeliconSoft). All images and drawings were further processed with Adobe Photoshop CS 6.0 and Adobe Illustrator CS 6.0.

The types of these new species are deposited in the Insect Collection of Inner Mongolia Agricultural University, Hohhot, Nei Mongol, China (IMAU).

## Taxonomy

### Key to two species groups of the subgenus *Homoneura* in China

[Modified from Shi & Yang 2014]

1. Wing clear or only crossvein *dm-cu* and/or *r-m* with brown spots..... *H. (H.) sauteri* group
- . Wing with five isolated brown spots on crossveins and longitudinal veins..... *H. (H.) quinquenotata* group

### *Homoneura* (s. str.) *quinquenotata* group

Diagnosis. Wing with five isolated brown spots: brown elliptical preapical spots on  $R_{2+3}$ ,  $R_{4+5}$  and  $M_1$ , brown stripe-like or small brown round spots on *r-m* and *dm-cu*. Male genitalia: surstylus with 1–3 processes; hypandrium H-shaped, reverse U-shaped, Y-shaped or transverse band-like.

### Key to 17 species in the *Homoneura (H.) quinquenotata* group in China

[Modified from Shen *et al.* 2018]

1. Mesonotum with at least one pair of long acrostichal setae (see Shi *et al.* 2012: Fig. 58)..... 2
- Mesonotum without long acrostichal setae..... 5
2. Wing with brown apex of veins  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$ , but no brown round apical spots; epandrium with three apical processes, surstylus broad with many tiny teeth (see Shen *et al.* 2018: Fig. 14).....  
..... *H. (H.) biumbrata* Loew
- Wing with distinct brown apical spots on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$  partly confluent or isolated..... 3
3. Wing with brown apical spots on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$  isolated..... 4
- Wing with brown apical spots on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$  partly confluent and long brown stripe-like apical spot on  $R_{4+5}$  extending to top of brown cloud on *dm-cu* (Shi & Yang 2014: Fig. 13).... *H. (H.) levis* (Wiedemann)
4. Wing with subcostal cell yellow (see Shi *et al.* 2012: Fig. 62); male genitalia: surstylus round at apex with strong setae and many setulae in lateral view; postgonite short and triangular in ventral view (see Papp 1984: Figs. 15, 17)..... *H. (H.) stackelbergiana* Papp
- Wing with subcostal cell brown at apex (Fig. 18); male genitalia: surstylus nearly truncate with sparse setulae in lateral view; postgonite long and subuliform in ventral view (Figs. 19, 22) ..... *H. (H.) stigmata* Papp
5. Wing with brown subapical spots on  $R_{4+5}$ , and  $M_1$  confluent, far from preapical spot on  $R_{2+3}$  (see Yang *et al.* 2003: Figs. 29–802); face with a brown spot; mesonotum with a large black spot between two dorsocentral setae rows before scutoscutellar suture..... *H. (H.) suturalis* Yang, Zhu & Hu
- Wing with brown preapical spots on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$  separated entirely; face and mesonotum not as above..... 6
6. Wing with brown spots on upper and lower margins of *dm-cu* ..... 7
- Wing with a brown stripe-like spot or brown cloud on *dm-cu* ..... 9
7. Mesonotum without brown median and lateral stripes; surstylus consisting of a long unguulate process curved backward and a tiny spine-like inner process on posteroventral corner in lateral and posterior views (see Sasakawa & Kozánek 1995: Figs. 1, 2)..... *H. (H.) haejuana* Sasakawa & Kozánek
- Mesonotum with two brown median stripes extending to apex of scutellum and two brown lateral stripes after suture; surstylus not as above ..... 8
8. Wing with a shorter stripe-like subapical spot on  $M_1$ , lower margin of crossvein *dm-cu* without brown spots (Fig. 7); surstylus blunt apically with many setulae in lateral view (Fig. 9)..... *H. (H.) fopingensis* **sp. nov.**
- Wing with a longer stripe-like subapical spot on  $M_1$ , lower margin of crossvein *dm-cu* with brown spot; surstylus sharp at apex with a long setula in lateral view (see Shen *et al.* 2018: Fig. 23) .....  
..... *H. (H.) cerina* Shatalkin
9. Mesonotum with brown stripes (occasionally absent in *H. (H.) brevicornis* and *spinicauda*) ..... 10
- Mesonotum without brown stripes ..... 13
10. Palpus entirely yellow..... 11
- Palpus black on apical 1/3 ..... 12
11. Mesonotum with a wide blackish brown median stripe extending to apical margin of scutellum; wing with a brown spot at tip of  $R_1$  and Sc, spot on  $R_{2+3}$  with same vertical level as brown spot on *dm-cu* (see Li & Yang 2013: Figs. 14, 15) ..... *H. (H.) crispa* Li & Yang
- Mesonotum without brown median stripes extending to apical margin of scutellum (see Shen *et al.* 2018: Fig. 29); wing without brown spot at tip of  $R_1$  and Sc, spot on  $R_{2+3}$  close to tip of vein (see Shen *et al.* 2018: Fig. 31)..... *H. (H.) spinicauda* Sasakawa & Ikeuchi
12. Wing with distinct brown spots; apical spots on  $R_{2+3}$  and  $R_{4+5}$  extending upward to costal margin; phallic sclerites with a pair of semicircular apical concavities in ventral view (see Shi *et al.* 2012: Figs. 23, 37).....  
..... *H. (H.) brevicornis* (Kertész)

- Wing with obscure dark spots; subapical spot on  $R_{2+3}$  nearly at same vertical level of brown stripe-like spot on *dm-cu*, not extending upward to costal margin; phallus with deeply incised with apicolateral sclerites convergent, with a pair of dark inner furcated apical segments in ventral view (see Shi *et al.* 2012: Figs. 41, 47)..... *H. (H.) litorea* Shi, Gaimari & Yang
13. Mesonotum with acrostichal setae in 6 rows; antenna yellow or yellowish brown ..... 14
- Mesonotum with acrostichal setae in 10 rows; antennal 1st flagellomere black on apical 1/3 ..... 15
14. Abdominal tergites 5–6 with a blackish brown medial spot; surstylus short with a small process in lateral view; postgonite short; phallus straight apically in lateral view (see Li & Yang 2013: Figs. 26, 30) ..... *H. (H.) semiannulata* Li & Yang
- Abdomen yellow; surstylus long and slightly curved in lateral view; postgonite long; phallus curved backward apically in lateral view (see Li & Yang 2013: Figs. 6, 10)..... *H. (H.) cangshanensis* Li & Yang
15. A brown stripe-like spot on *dm-cu* constricted and becoming narrow at middle; surstylus including two outer processes and an inner process; phallus broadened and blunt apically in lateral view (see Li & Yang 2013: Figs. 32, 36, 40)..... *H. (H.) trisurstylata* Li & Yang
- A brown stripe-like spot on *dm-cu* broadening at middle (see Shi & Yang 2014: Fig. 211); surstylus not as above..... 16
16. Surstylus single, originated from tip of epandrium; phallus acute apically and pointing backward, but no apical teeth in lateral view (see Shi & Yang 2014: Figs. 212, 216)..... *H. (H.) quinquenotata* (Meijere)
- Surstylus originated before tip of epandrium; hypandrium reverse U-shaped; phallus rounded apically with an acute apical tooth in lateral view (see Shi & Yang 2009a: Figs. 7, 11) ..... *H. (H.) longinotata* Shi & Yang

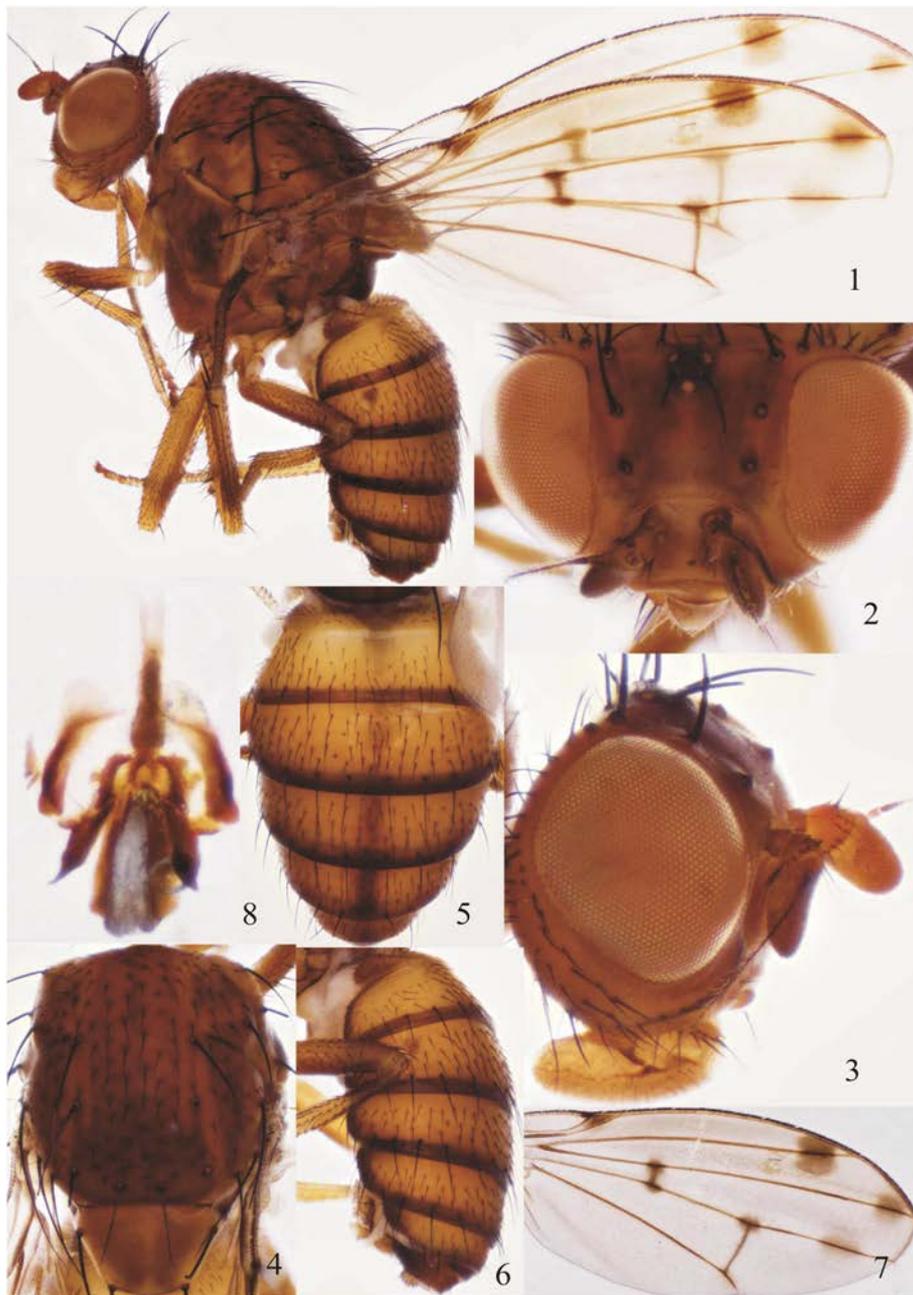
1. ***Homoneura (H.) fopingensis* Gao & Shi sp. nov.** (Figs. 1–13)

Male. Body length 4.2 mm, wing length 4.3 mm.

Head (Figs. 2, 3) yellow. Frons yellow, 1.3 times longer than wide. Ocellar setae developed, longer than anterior fronto-orbital setae. Parafacial yellow with a row of short setulae on apical half of inner margin. Gena about 1/7 height of eye. Antenna yellow, 1st flagellomere 1.8 times longer than high; arista blackish brown, pubescent, with longest ray about 1/3 height of 1st flagellomere. Proboscis and palpus yellow.

Thorax (Fig. 4) yellow. Mesonotum with a pair of brown medial stripes extending to apex of scutellum and a pair of brown lateral stripes extending to third dorsocentral setae after transverse suture; 0+3 dorsocentral setae (1st post-sutural dorsocentral seta behind transverse suture), acrostichal setulae in 6 rows; a pair of prescutellar setae longer than first dorsocentral setae. Legs mostly yellow, front femur brownish yellow with brown rectangular spots on apicoventral side and inner side; mid femur with a brown rectangular spot on apicoventral side; hind femur entirely brown on ventral side, hind tibia with a brown rectangular ventral spot at base; tarsomeres 3–5 brown. Fore femur with 6 posterodorsal setae, 4 posteroventral setae and ctenidium with 10 short setae; fore tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Mid femur with 5 anterior setae and 1 short apicoposterior seta; mid tibia with 1 strong preapical antero dorsal seta and 2 strong apicoventral setae. Hind femur with 2 preapical anterodorsal setae; hind tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Wing (Fig. 7) hyaline, brown preapical spot, apical spot, subapical spot respectively on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$ ; crossveins *r-m* and *dm-cu* with brown spots; subcostal cell brown; 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 4.6 : 1.6 : 1; *r-m* after middle of discal cell; ultimate and penultimate sections of  $M_1$  in proportion of 1 : 1.6; ultimate sections of  $CuA_1$  about 1/9. Halter

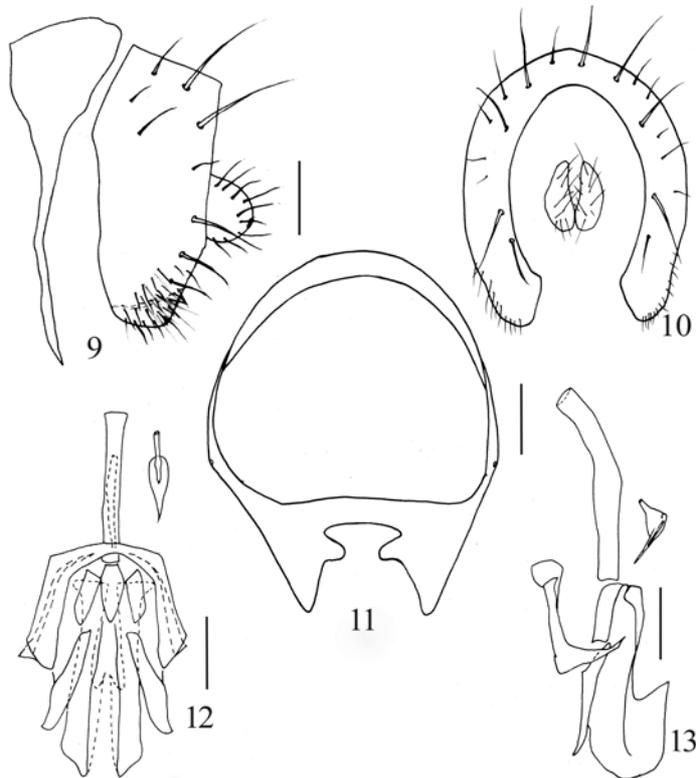
pale yellow.



Figures 1–8. *Homoneura* (*H.*) *fopingensis* sp. nov., ♂, holotype. 1. Habitus, lateral view; 2, 3. Head, anterior and lateral views; 4. Thorax, dorsal view; 5, 6. Abdomen, dorsal and lateral views; 7. Wing; 8. Male genitalia, ventral view.

Abdomen (Figs. 5, 6) yellow, tergites 2–6 with brown posterior margin and tergites 3–6 with brown median stripe. Male genitalia (Figs. 9–13): syntergosternite 7+8 being a complete

ring, with a pair of large triangular processes and a pair of small digital processes on ventral margin; epandrium slender and surstylus blunt at apex with many setulae in lateral view; hypandrium nearly U-shaped; pregonite subuliform and narrow at apex; phallus curved backwards and sharp at apex; phallapodeme as long as phallus.



Figures 9–13. *Homoneura (H.) fopingensis* sp. nov., ♂, holotype. Male genitalia. 9. Syntergosternite and epandrial complex, lateral view; 10. Epandrial complex, posterior view; 11. Syntergosternite, anterior view; 12. Phallus complex, ventral view; 13. Phallus complex, lateral view. Scale bars = 0.1 mm.

Female. Unknown.

**Holotype.** ♂, **China**, Shaanxi, Qinling, Longcaoping, 515 m, 31-VII-2013, Yuyu WANG leg.

Etymology. This new species is named after the collecting locality Foping.

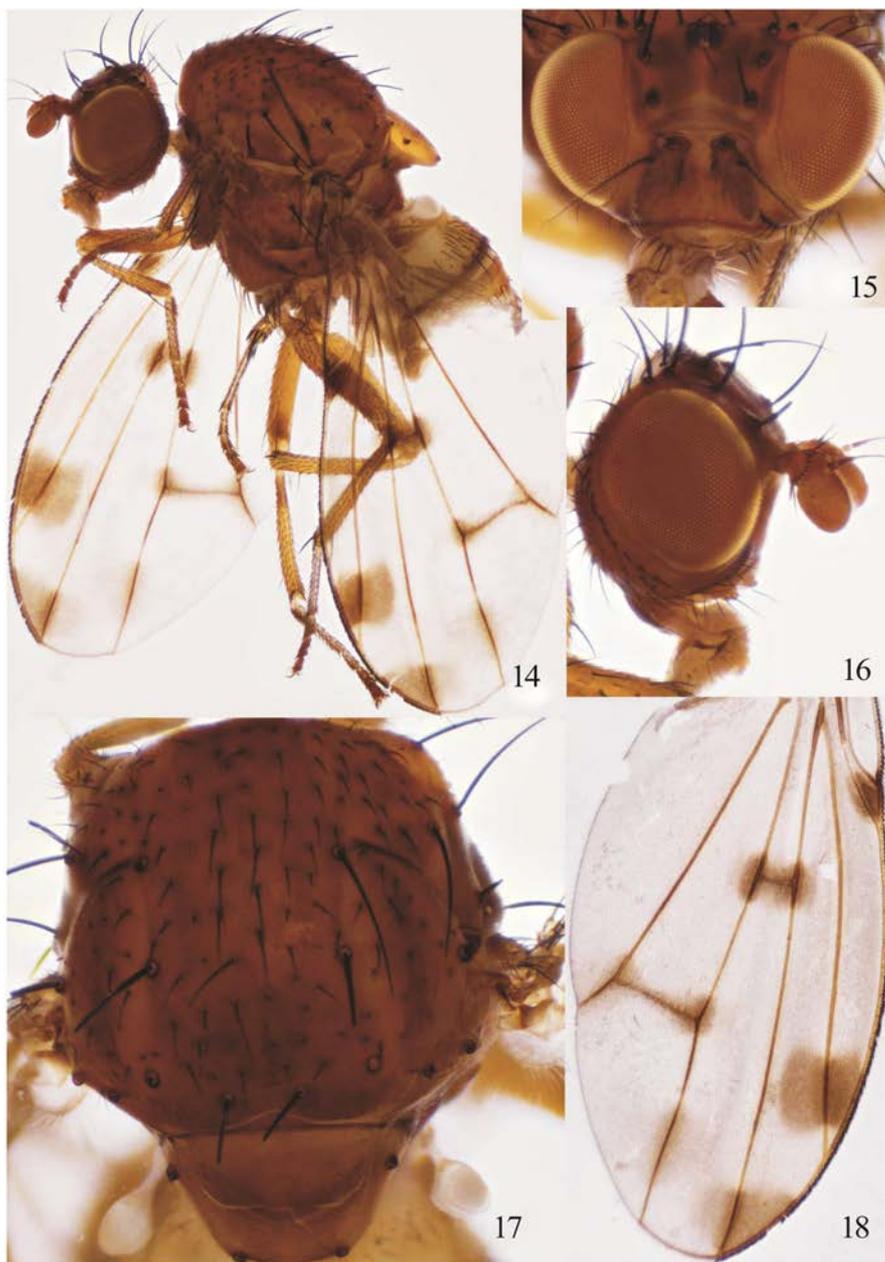
Distribution. China (Shaanxi).

Remarks. This new species is similar to *Homoneura (H.) stigmata* Papp, 1984 from Russia and North Korea, but the latter has the following features:  $R_{4+5}$  with brown apical spot extending upwards at wing margin, hind femur with a brown apicoventral spot, surstylus with a sharp triangular apical process, gonite short and small in lateral view, and phallus hook-like apically with a sharp triangular process turning outward in lateral view.

2. *Homoneura (H.) stigmata* Papp, 1984 (Figs. 14–23), new record to China

*Homoneura stigmata* Papp, 1984: 170. Type locality: North Korea.

*Homoneura (H.) stigmata* Papp, 1984: Shatalkin, 2000: 27.



Figures 14–18. *Homoneura (H.) stigmata* Papp, 1984, ♂, nontype. 14. Habitus, lateral view; 15, 16. Head, anterior and lateral views; 17. Thorax, dorsal view; 18. Wing.

Male. Body length 3.9–4.4 mm, wing length 4.0–4.2 mm.

Head (Figs. 15, 16) yellow. Frons yellow, 1.4 times longer than wide. Ocellar setae longer than posterior fronto-orbital setae. Parafacial yellow with a row of short setulae on apical half

of inner margin. Gena about 1/11 height of eye. Antenna yellow, 1st flagellomere 1.8 times longer than high; arista blackish brown, short plumose, with longest ray half height of 1st flagellomere. Proboscis and palpus yellow.

Thorax (Fig. 17) yellow. Mesonotum with 0+3 dorsocentral setae (1st post-sutural dorsocentral seta behind transverse suture), acrostichal setulae in 6–7 rows (two median rows longer) and a pair of prescutellar setae longer than first fronto-orbital seta. Legs mostly yellow, all femora with a brown long elliptical apicoventral spot, and tarsomeres 3–5 brown. Fore femur with 6 posterodorsal setae, 4 posteroventral setae and ctenidium with 9–10 short setae; fore tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Mid femur with 6 anterior setae and 1 short apicoposterior seta; mid tibia with 1 strong preapical anterodorsal seta and 2 strong apicoventral setae. Hind femur with 1 preapical anterodorsal seta; hind tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Wing (Fig. 18) hyaline, a brown preapical spot, apical spot and subapical spot respectively on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$ , brown apical spot on  $R_{4+5}$  expanding upwards at wing margin, and brown subapical spot on  $M_1$  narrow; crossveins *r-m* and *dm-cu* with brown spots; subcostal cell brown; 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 4 : 1.6 : 1; *r-m* at middle of discal cell; ultimate and penultimate sections of  $M_1$  in proportion of 1 : 2.1; ultimate sections of  $CuA_1$  about 1/11. Halter pale yellow.

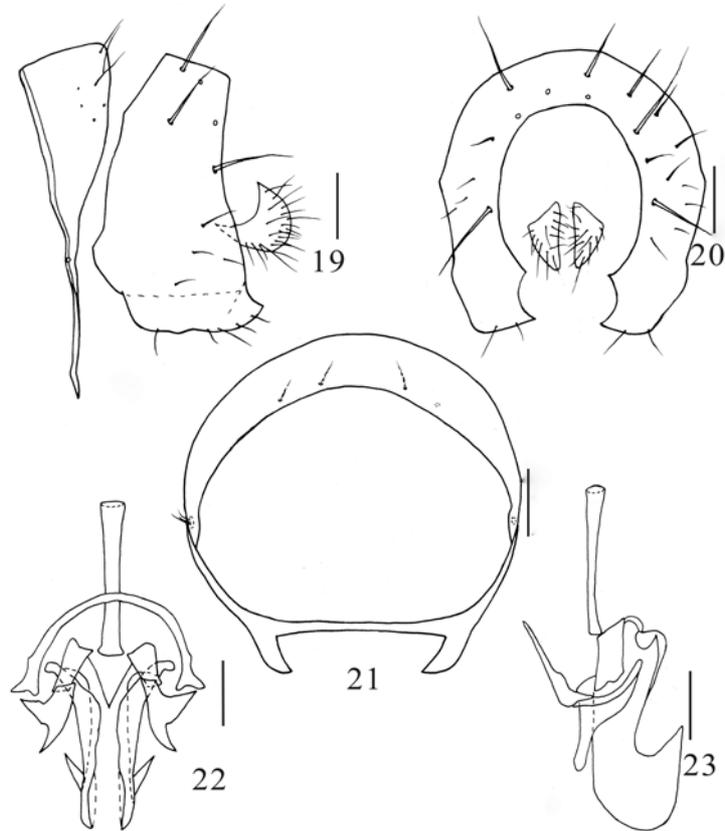
Abdomen (Fig. 14) mostly yellow, male tergites 2–6 with brown posterior margin, tergites 2–6 each with a brown median stripe and tergites 1–6 with brown lateral margin. Male genitalia (Figs. 19–23): syntergosternite 7+8 being a complete ring with a pair of triangular ventral processes; surstylus broad with dark brown on margin and a sharp triangular process extending backwards in lateral view; hypandrium narrow, semicircular; pregonite slightly sharp at apex in ventral view and blunt apically in lateral view; phallus concaved apically in ventral view, a pair of lateral teeth beyond middle in posterior view, hook-like apically with dark brown sharp processes in lateral view; phallopodeme longer than phallus, long, columnar.

Female. Body length 4.2–4.6 mm, wing length 4.0–4.5 mm. Abdominal tergites 2–6 with brown lateral margin.

**Specimens examined.** China, Shaanxi, 1♂3♀, Foping County, Yueba, Heilongtan, Protection Station, 1200 m, 27-VIII-2014, 28-VII-2013, Xiumei LU & Yuyu WANG leg.; 1♂, Foping County, Qinling, Longcaoping, 515 m, 31-VII-2013, Yuyu WANG leg.; 3♂, Yingpan, Wenmucao, 2016 m, 29-VII-2014, Shuangmei DING leg.; 1♂, Ningshan County, Huoditang Forestry Center, 1108 m, 15-VIII-2013, Yuqiang XI leg.; 1♂, Liuba County, Mt. Zibai, 1386 m, 19-VIII-2013, Yuqiang XI leg.; 3♂2♀, Zhouzhi County, Houzhenzi, Huaerping Village, 1278–1354 m, 26-VIII-2013, 20-VIII-2014, Yuqiang XI & Xuankun LI leg.; 2♂, Xunyangba Town, Malaise trap, 1365 m, 13-VIII-2013, Yuqiang XI leg.

Distribution. China (Shaanxi); North Korea; Russia.

Remarks. This species is similar to *Homoneura (H.) semiannulata* Li & Yang, 2013 from Yunnan, but the latter has the following features: abdominal tergites 5–6 each with a blackish brown median spot, syntergosternite 7+8 semicircular, hypandrium H-shaped with two ventral arms long and close. This species is also similar to *Homoneura (H.) cornuta* Sasakawa, 2001 from China and Vietnam, but the latter has the following features: mesonotum with acrostichal setulae in 10 rows, abdominal tergites 5–6 each with a brown triangular median stripe, surstylus includes three slender processes.



Figures 19–23. *Homoneura (H.) stigmata* Papp, 1984, ♂, nontype. Male genitalia. 19. Syntergosternite and epandrial complex, lateral view; 20. Epandrial complex, posterior view; 21. Syntergosternite, anterior view; 22. Phallus complex, ventral view; 23. Phallus complex, lateral view. Scale bars = 0.1 mm.

### *Homoneura (s. str.) sauteri* group

Diagnosis. Wing only with brown spots on *dm-cu* and/or *r-m*. Abdomen with brown spots or absent; male genitalia: surstylus with 1–2 processes; hypandrium Y or H-shaped.

#### Key to species in the *Homoneura (H.) sauteri* group

[Modified from Shen *et al.* 2018]

1. Wing only with brown spots on *dm-cu* ..... 2
- Wing with brown spots on *r-m* and *dm-cu* ..... 4
2. Abdominal tergites 5–6 in males (5–7 in females) each with two pairs of black quadrate spots, occasionally tergite 4 with a pair of brown round spots; surstylus short, nearly round and concaved at middle in lateral view; hypandrium nearly H-shaped in ventral view (see Shi & Yang 2014: Figs. 97, 100) ..... *H. (H.) degenerata* Shi & Yang
- Abdomen without brown spots; surstylus and hypandrium not as above ..... 3
3. Surstylus claviform, blunt round apically in lateral view; hypandrium Y-shaped with a middle ventral segment; phallus with an apical process in lateral view (see Shi & Yang 2014: Figs. 230, 234) ..... *H. (H.) sauteri* Malloch
- Surstylus finger-like in lateral view and acute and rolled back at apex in ventral view; hypandrium broad

- bar-like in ventral view; phallus with a middle and distal dorsal process in lateral view (see Shi & Yang 2014: Figs. 267, 271) ..... *H. (H.) simplicissima* (Meijere) 5
4. Abdomen without brown spots ..... 5
- Abdomen with brown spots in different patterns ..... 8
5. Wing with basal tips of  $R_{4+5}$  and  $CuA_1$  slightly brown; surstylus narrow, curved and acute apically with short setulae in lateral view (see Shi & Yang 2014: Figs. 235, 239) ..... *H. (H.) septentrionalis* Loew
- Wing without brown basal tips of  $R_{4+5}$  and  $CuA_1$ ; surstylus not as above ..... 6
6. Male sternite 5 with 6–8 teeth-like processes; male genitalia: surstylus with two teeth-like processes (see Merz 2003: Figs. 16, 18) ..... *H. (H.) mediospinosa* Merz
- Male sternite 5 without 6–8 teeth-like processes; male genitalia: surstylus without two teeth-like processes ..... 7
7. Arista long plumose, with longest ray as long as height of 1st flagellomere (Fig. 37); male genitalia: surstylus with a slender bar-like process in lateral view (Fig. 42) ..... *H. (H.) heilongtanensis* **sp. nov.**
- Arista pubescent, with longest ray as long as 1/5 height of 1st flagellomere (Fig. 26); male genitalia: surstylus with two processes in lateral view (Fig. 30) ..... *H. (H.) aliena* **sp. nov.**
8. Abdominal tergite 3 without brown spot, tergite 4 with a pair of black lateral transverse bands along posterior margin, tergites 5–6 each with a black medial stripe-like spot; surstylus consisting of a small acute triangular outer process and a large inner process in lateral view (see Shi & Yang 2014: Fig. 76) ..... *H. (H.) conspicua* Sasakawa
- Abdominal tergite 3 with a black medial spot close to posterior margin, tergite 4 black except for yellowish brown posterior margin and tergites 5 with a black medial spot and a pair of small black lateral spots, tergite 6 with a black medial spot; male unknown ..... *H. (H.) longiplumaria* Yang, Hu & Zhu

### 3. *Homoneura (H.) aliena* Gao & Shi **sp. nov.** (Figs. 24–34)

Male. Body length 3.0–3.4 mm, wing length 3.1–3.5 mm.

Head (Figs. 25, 26) yellow. Ocellar setae longer than anterior fronto-orbital setae. Parafacial yellow with a row of short setulae on apical half of inner margin. Gena about 1/8 height of eye. Antenna yellow, 1st flagellomere 1.5 times longer than high; arista blackish brown, pubescent, with longest ray as long as 1/5 height of 1st flagellomere. Proboscis and palpus yellow.

Thorax (Fig. 27) yellow. Postpronotum pale yellow. Mesonotum with 0+3 dorsocentral setae (1st post-sutural dorsocentral setae far from transverse suture), acrostichal setulae in irregular 4 rows, a pair of prescutellar setae longer than first dorsocentral setae. Legs mostly yellow, tarsomeres 3–5 brown. Fore femur with 6 posterodorsal setae, 3 posteroventral setae and ctenidium with 6 short setae; fore tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Mid femur with 4 anterior setae and 1 short apicoposterior seta; mid tibia with 1 strong preapical anterodorsal seta and 2 strong apicoventral setae. Hind femur with 1 preapical anterodorsal seta; hind tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Wing (Fig. 29) hyaline, crossveins *r-m* and *dm-cu* with brown spots; 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 4.1 : 1.5 : 1; *r-m* at middle of discal cell; ultimate and penultimate sections of  $M_1$  in proportion of 1 : 1.4; ultimate sections of  $CuA_1$  about 1/4. Halter pale yellow.



Figures 24–29. *Homoneura (H.) aliena* sp. nov., ♂, paratype. 24. Habitus, lateral view; 25, 26. Head, anterior and lateral views; 27. Thorax, dorsal view; 28. Abdomen, lateral view; 29. Wing.

Abdomen (Fig. 28) yellow. Male genitalia (Figs. 30–34): syntergosternite 7+8 broad and semicircular; epandrium broad, surstylus with a large triangular blunt process and a sharp process in posterior view; hypandrium degenerating into two narrow bar-like sclerites; pregonite columnar and slightly curved, postgonite very short and hook-like; phallus with two rectangular sclerites and a columnar median sclerite at basal half in ventral view;

phallapodeme short, Y-shaped.

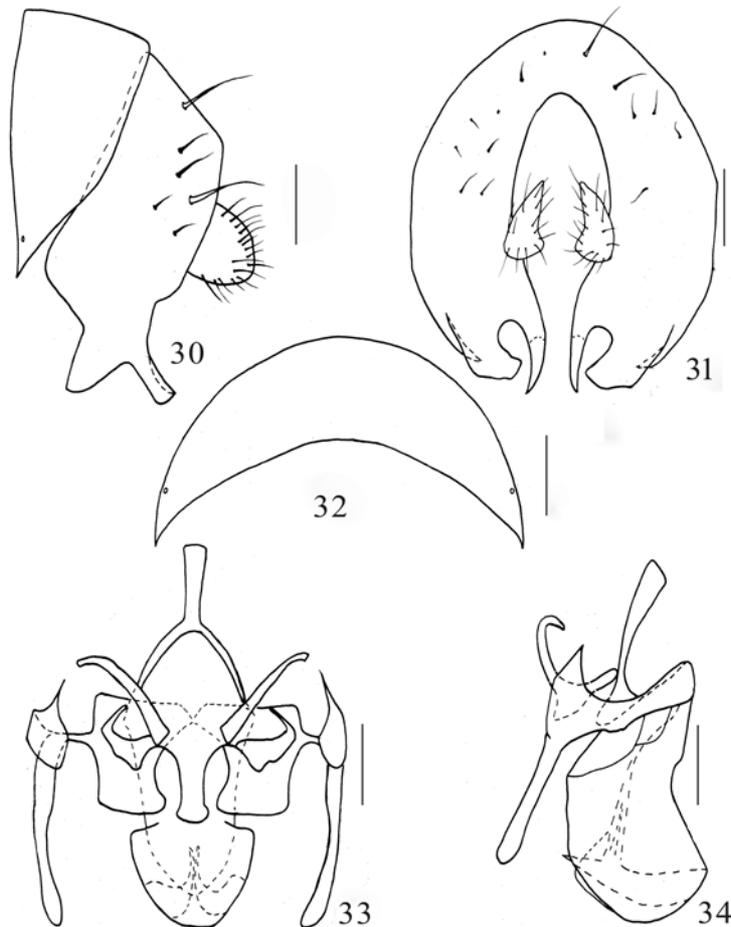
Female. Body length 3.5 mm, wing length 3.3 mm.

**Holotype.** ♂, **China**, Shaanxi, Xunyang County, Zhima Village, 695 m, 2-VIII-2014, Anonym. **Paratypes.** **China**, Shaanxi, 6♂, Foping County, Yueba Protection Station, 1200 m, 28-VII-2013, Yuyu WANG leg.; 1♀, Xunyang County, Bailiu Town, Qianping Village, 621 m, 23-VI-2014, Lei ZHANG leg.

Etymology. Latin, *aliena*, means peculiar and refers to the phallic being complex and peculiar in ventral view.

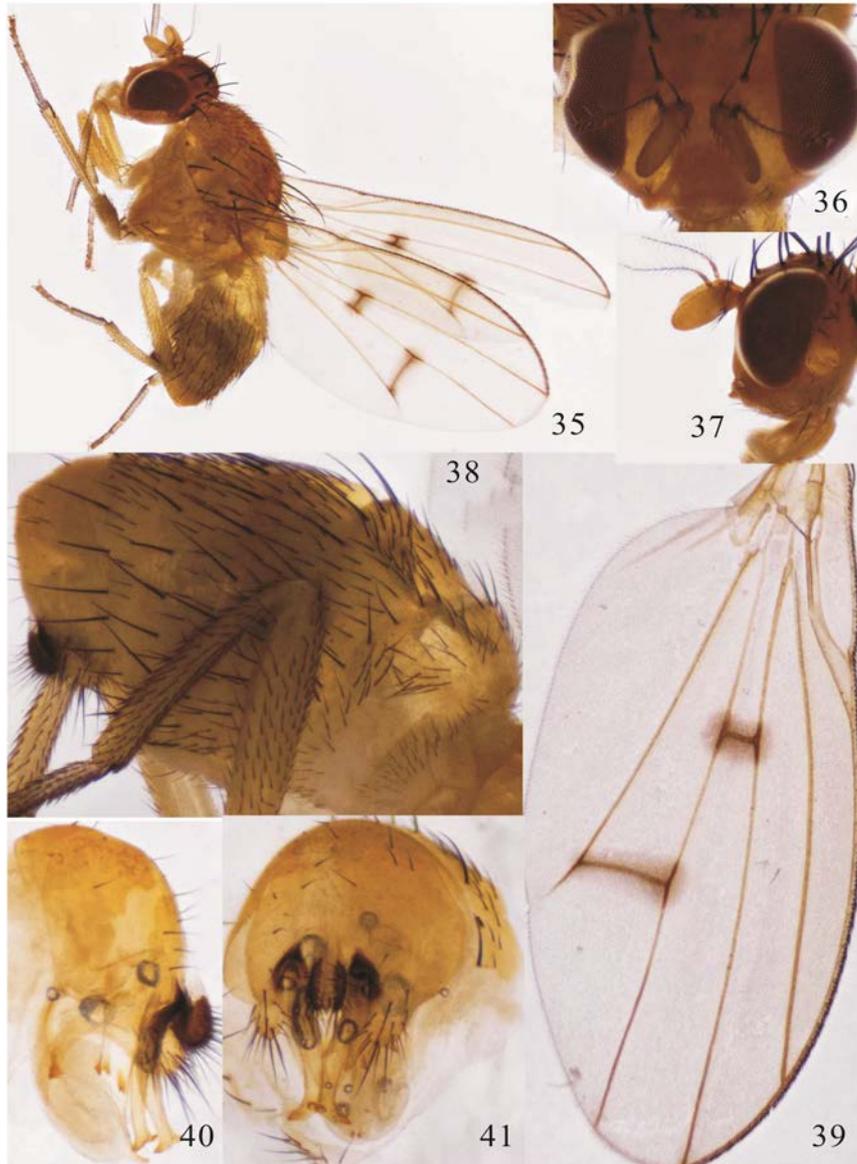
Distribution. China (Shaanxi).

Remarks. This new species is similar to *Homoneura (H.) septentrionalis* (Loew, 1847) from the Palearctic Region, but the latter has the following features:  $R_{4+5}$  and  $CuA_1$  brown at base, surstylus without bifurcation at apex in lateral view.



Figures 30–34. *Homoneura (H.) aliena* sp. nov., ♂, paratype. Male genitalia. 30. Sytergosternite and epandrial complex, lateral view; 31. Epandrial complex, posterior view; 32. Sytergosternite, anterior view; 33. Phallus complex, ventral view; 34. Phallus complex, lateral view. Scale bars = 0.1 mm.

4. *Homoneura (H.) heilongtanensis* Gao & Shi sp. nov. (Figs. 35–46)

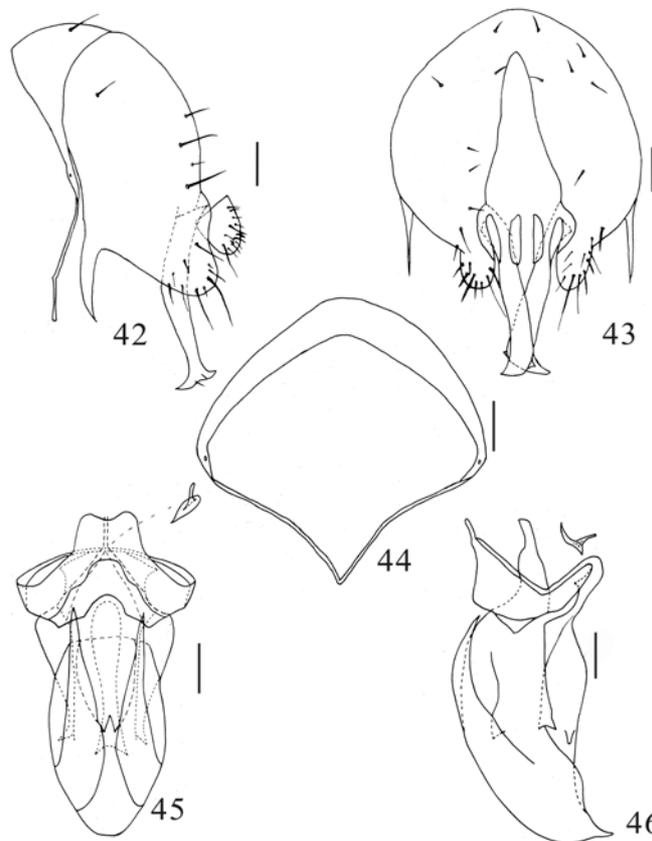


Figures 35–41. *Homoneura (H.) heilongtanensis* sp. nov., ♂, paratype. 35. Habitus, lateral view; 36, 37. head, anterior and lateral views; 38. Abdomen, lateral view; 39. Wing; 40, 41. Male genitalia, lateral and posterior views.

Male. Body length 3.9–4.3 mm, wing length 3.8–4.4 mm.

Head (Figs. 36, 37) yellow. Ocellar setae longer than anterior fronto-orbital setae. Parafacial yellow with a row of black setulae on apical half of inner margin. Gena about 1/9 height of eye. Antenna yellow, 1st flagellomere 2.1 times longer than high; arista dark brown, long plumose, with longest ray as long as height of 1st flagellomere. Proboscis pale yellow

with white setulae. Palpus yellow with black setulae.



Figures 42–46. *Homoneura (H.) heilongtanensis* sp. nov., ♂, paratype. Male genitalia. 42. Sytergosternite and epandrial complex, lateral view; 43. Epandrial complex, posterior view; 44. Sytergosternite, anterior view; 45. Phallus complex, ventral view; 46. Phallus complex, lateral view. Scale bars = 0.1 mm.

Thorax (Fig. 35) yellow, postpronotum pale yellow. Mesoscutum with 0+3 dorsocentral setae (anterior dorsocentral seta close to transverse suture), acrostichal setulae in 6 rows. Legs mostly yellow, tarsi brown. Fore femur with 3 posterodorsal setae, 3 posteroventral setae and ctenidium with 7–8 short setae; fore tibia with 1 long preapical anterodorsal seta and 1 short apicoventral seta. Mid femur with 4 anterior setae and 1 short apicoposterior seta; mid tibia with 1 strong preapical anterodorsal seta, 3 strong apicoventral setae. Hind femur with 1 preapical anterodorsal seta; hind tibia with 1 weak preapical anterodorsal seta and 1 short apicoventral seta. Wing (Fig. 39) hyaline, with brown spots on crossveins *r-m* and *dm-cu*; 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  $M_{1+2}$ ) sections in proportion of 4.1 : 1.4 : 1; *r-m* at middle of discal cell; ultimate and penultimate sections of  $M_1$  in proportion of 1 : 1.4; ultimate sections of  $CuA_1$  about 1/6. Halter pale yellow.

Abdomen (Fig. 38) yellow, but epandrium mostly yellow except for dark brown connection between epandrium and surstylus, and cercus dark brown. Male genitalia (Figs.

42–46): sytergosternite 7+8 being a complete ring with triangular ventral margin; epandrium broad with a sharp process on anterior ventral corner and blunt apically with many setulae; surstylus slender with two sharp dorsoapical processes; hypandrium short, Y-shaped; gonites degenerated; phallus with a pair of sharp processes at apex and a reverse U-shaped concavity at middle in ventral view, and two sharp triangular lateral processes, a tooth-like dorsal process at middle, and curved backwards and sharp apically in lateral view; phallapodeme short.

Female. Body length 3.8–4.3 mm, wing length 3.7–4.4 mm.

**Holotype.** ♂, **China**, Shaanxi, Foping County, Yueba, Heilongtan, 27-VIII-2014, Xiumei LU leg. **Paratypes.** **China**, Shaanxi, 8♀, Zhashui County, Niujiliang, 1000 m, VII-2013, Yuyu WANG leg.; 1♂, Hanzhong City, Liuba County, Weituogou, 1359 m, 20-VIII-2013, Yuqiang XI leg.; 9♂1♀, Zhouzhi County, Taibai Mountain-Laoxiancheng, 1648–1846 m, 17–19-VIII-2014, Xuankun LI & Xiumei LU leg.; 2♂, Ningshan County, Guanghuojie Protection Station, 1590 m, 10-VIII-2013, Yuqiang XI leg.; 2♂1♀, Zhen'an County, Yungaisi Town, Heiyaogou Forestry Center, 1217 m, 20-VI-2014, Lei ZHANG leg.; 1♂, Gengling Town, around Xingqi Hotel, 694 m, 13-VIII-2014, Shuangmei DING leg.

Etymology. This new species is named after the collecting locality Heilongtan.

Distribution. China (Shaanxi).

Remarks. This new species is similar to *Homoneura* (*H.*) *yamagishii* Sasakawa & Ikeuchi, 1982 from Japan, but the latter has the following features: wing clear, pale brownish yellow, rarely crossveins with brown cloudy spots and brown apical spots on  $R_{2+3}$ ,  $R_{4+5}$ , and  $M_1$ ; antenna short plumose; epandrium projected downwards apically; surstylus slender, curved backwards and arciform. This new species is also similar to *Homoneura* (*H.*) *septentrionalis* Loew, 1847 from the Palearctic Region, but the latter has acrostichal setulae in 2 rows on mesonotum and surstylus has a sharp process on posterior margin.

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## References

- Cumming JM & Wood DM. 2009. Adult morphology and terminology. In: Brown BV, Borkent A, Cumming JM, Wood DM & Woodley NE (Eds.), *Manual of Central American Diptera. Vol. 1*. NRC Research Press, Ottawa, Ontario, Canada, pp. 9–50.
- Gaimari SD & Silva VC. 2010. Lauxaniidae (Lauxaniid flies). In: Brown BV, Borkent A, Cumming JM, Wood DM & Woodley NE (Eds.), *Manual of Central American Diptera, Vol. 2*. NRC Research Press, Ottawa, Ontario, Canada, pp. 971–995.
- Gao XF, Shi L & Han Y. 2016. Descriptions of three new species of subgenus *Homoneura* from Qinling Mountain in China (Diptera, Lauxaniidae, *Homoneura*). *Journal of Inner Mongolia Agricultural University (Natural Science Edition)*, 37(6): 13–22.
- Li WL & Yang D. 2013. Four new species of *Homoneura* s. str. from Yunnan, China (Diptera, Lauxaniidae).

- Revue Suisse de Zoologie*, 120(4): 549–561.
- Merz B. 2003. The Lauxaniidae (Diptera) described by C. F. Fallén with description of a misidentified species of *Homoneura* van der Wulp. *Insect Systematics and Evolution*, 34(3): 345–360.
- Miller RM. 1977. Taxonomy and biology of the Nearctic species of *Homoneura* (Diptera: Lauxaniidae). 2. Subgenus *Homoneura*. *Iowa State Journal Research*, 52(2): 177–252.
- Papp L. 1984. Lauxaniidae (Diptera), new Palaearctic species and taxonomical notes. *Acta Zoologica Hungarica*, 30(1-2): 159–177.
- Sasakawa M. 2001. Oriental Lauxaniidae (Diptera) Part 2. Fauna of the Lauxaniidae of Vietnam. *Scientific Reports of Kyoto Prefectural University Human Environment and Agriculture*, 53: 39–94.
- Sasakawa M & Ikeuchi S. 1982. A revision of the Japanese species of *Homoneura* (*Homoneura*) (Diptera, Lauxaniidae). Part 1. *Kontyû*, 50(3): 477–499.
- Sasakawa M & Kozánek M. 1995. Lauxaniidae (Diptera) of North Korea, Part 1. *Japanese Journal of Entomology*, 63(1): 67–75.
- Shatalkin AI. 2000. Keys to the Palaearctic flies of the family Lauxaniidae (Diptera). *Zoologicheskie Issledovaniya*, 5: 1–102.
- Shen RR, Gao XF & Shi L. 2017. Descriptions of a new species of *Homoneura* (*Homoneura*) *quinquevittata* group in China (Diptera, Lauxaniidae, *Homoneura*). *Journal of Inner Mongolia Agricultural University (Natural Science Edition)*, 38(5): 17–21.
- Shen RR, Shi L, Li WL & Wang JX. 2018. A new species of subgenus *Homoneura* from Northern China, with information of 12 species newly recorded (Diptera: Lauxaniidae: *Homoneura*). *Zootaxa*, 4418(6): 501–525.
- Shi L, Gaimari S & Yang D. 2012. Notes on the *Homoneura* subgenera *Euhomoneura*, *Homoneura* and *Minettioides* from China (Diptera: Lauxaniidae). *Zootaxa*, 3238: 1–22.
- Shi L, Gao XF & Shen RR. 2017. Four new species of the subgenus *Homoneura* from Jiangxi Province, China (Diptera: Lauxaniidae: *Homoneura*). *Zootaxa*, 4365(3): 361–377.
- Shi L & Yang D. 2009a. Notes on species groups of subgenus *Homoneura* from China with descriptions of two new species (Diptera, Lauxaniidae). *Acta Zootaxonomica Sinica*, 34(3): 462–471.
- Shi L & Yang D. 2009b. Notes on the *Homoneura* (*Homoneura*) *beckeri* group from the Oriental Region, with descriptions of ten new species from China (Diptera: Lauxaniidae). *Zootaxa*, 2325: 1–28.
- Shi L & Yang D. 2014. Supplements to species groups of the subgenus *Homoneura* in China (Diptera: Lauxaniidae: *Homoneura*), with descriptions of twenty new species. *Zootaxa*, 3890(1): 1–117.
- Stuckenberg BR. 1971. A review of the Old World genera of Lauxaniidae (Diptera). *Annals of the Natal Museum*, 20: 499–610.
- The Historical Materials of the Qinling Mountains [EB/OL]. China's Economic Networks [Reference date 2014-07-28] [http://www.ce.cn/cysc/ztpd/2007/xhgsxzt/whzl/200708/20/t20070820\\_12610913.shtml](http://www.ce.cn/cysc/ztpd/2007/xhgsxzt/whzl/200708/20/t20070820_12610913.shtml).
- Wulp FM van der. 1891. Eenige uitlandsche Diptera. *Tijdschrift voor Entomologie*, 34(1890–1891): 193–218.
- Yang D, Hu XY & Zhu F. 2002. Diptera: Lauxaniidae. In: Huang FS (Ed.), *Forest Insects of Hainan*. Science Press, Beijing, pp. 779–787.
- Yang D, Zhu F & Hu XY. 2003. Diptera: Lauxaniidae. In: Huang BK (Ed.), *Fauna of Insects in Fujian Province of China*. Vol. 8. Fujian Science and Technology Publishing House, Fuzhou, pp. 555–558.
- Zhang SM. 1998. *Geographical Regionalization of Agroforestry Insects in China*. Chinese Agricultural Press, Beijing, 304 pp.