

ORIGINAL ARTICLE

# Taxonomic study of *Gonia* Meigen (Diptera: Tachinidae) from China

Peng Hou<sup>1, 2</sup>, Xin Li<sup>2</sup>, Ding Yang<sup>1 \*</sup>, Chuntian Zhang<sup>2 \*</sup>

<sup>1</sup>Department of Entomology, China Agricultural University, Beijing 100193, China

<sup>2</sup>Liaoning Key Laboratory of Evolution and Biodiversity, Shenyang Normal University, Shenyang 110034, China

\*Corresponding authors, E-mails: dyangcau@126.com; 13478194638@163.com

**Abstract** The genus *Gonia* Meigen, 1803 (Diptera, Tachinidae) is reviewed from China. One new species, *G. yunnanensis* Hou, Yang & Zhang, **sp. nov.**, are described and illustrated. Three newly records from China, *G. foersteri* Meigen, 1938, *G. nigricoma* Lee & Han, 2010 and *G. olgae* (Rohdendorf, 1927) are noted and illustrated too. Diagnoses of species examined and a key to 14 species of *Gonia* in China are provided.

**Key words** Calyptratae, Exoristinae, Goniini, new species, key.

## 1 Introduction

The genus *Gonia* (Diptera, Tachinidae) was erected by Meigen (1803), and the type species *Gonia bimaculata* Wiedemann was designated by Sabrosky and Arnaud (1965) subsequently. It is known that incubated microtype eggs of Goniini in which ova are ingested by hosts as they feed and hatch in the gut, and the emerging first-instar larvae burrow into the hemocoel (Stiremann *et al.*, 2006).

Over 60 species of *Gonia* are widely distributed in the world, of which 26 are from the Palearctic Region (Herting & Dely-Draskovits, 1993; Lee & Han, 2010). In this study, ten known species, three newly recorded species in China and one new species of *Gonia* from Yunnan Province are recognized here, with descriptions and illustrations given below. The diagnoses of species examined and a key (based on Fan *et al.*, 1992) to 14 species of *Gonia* in China are provided.

## 2 Materials and methods

Materials were studied from the collections of the following institutions:

CAU—Department of Entomology, China Agricultural University, Beijing, China.

IMU—School of Life Science, Inner Mongolia University, Hohhot, China.

SMNS—Staatliches Museum für Naturkunde, Stuttgart, Germany.

SYNU—Liaoning Key Laboratory of Evolution and Biodiversity, Shenyang Normal University, Shenyang, China.

Terminology for morphology and measurements follow Tschorsnig and Richer (1998). Dissection of male terminalia and citation of label data follow the methods described in detail by O'Hara (2002). The terminalia of each dissected male are preserved in glycerine in a small plastic vial pinned together with the source specimen.

Consecutive digital images of adults were taken with a Canon EOS 60D digital camera attached to an Olympus SZX7 stereo microscope. Genitalia were taken with a Canon EOS 5D Mark III digital camera attached to ZEISS Stemi 2000-c

urn:lsid:zoobank.org:pub:7BA0E2F2-6E87-457C-BEBE-21758FF7EEF1

Received 5 August 2017, accepted 16 April 2018

Executive editor: Fuqiang Chen

stereo microscope. The images were blended with Helicon Focus ® (ver. 6.10) and retouched in Adobe Photoshop CC ®.

The holotype and other examined specimens were deposited in the Collection of Shenyang Normal University, Shenyang, Liaoning, China (SYNU).

### 3 Taxonomy

#### 3.1 Genus *Gonia* Meigen, 1803

*Gonia* Meigen, 1803: 280, subsequent designated by Sabrosky & Arnaud, 1965; Herting & Dely-Draskovits, 1993: 257; Chao *et al.*, 1998: 1941; O'Hara *et al.*, 2009: 108; Lee & Han, 2010: 175; Zhang *et al.*, 2016: 406.

Type species: *Gonia bimaculata* Wiedemann, 1819.

Generic diagnosis. The genus is different from others by: wide frons, wide parafacial with hairs or setae; orbital setae present in both sexes; ocellar setae very strong and reclinate; outer vertical setae strong; arista thickened on basal half to apex; basicosta reddish yellow; vein  $R_{4+5}$  with setulae on basal third up to crossvein R-M; section of M between crossveins r-m and dM-Cu distinctly longer than section between dM-Cu and bend of M.

Description (based on Chinese *Gonia*). Head yellowish except on occiput and eyes; frontal vitta not darker in ground colour; largely covered with ivory white to golden pruinosity especially on frons and parafacialia; ocellar triangle dark brown; lunule bare. Flagellomere 1 reddish yellow to dark brown; arista dark brown. Palpi reddish yellow; prementum and labella dark brown. Frons and facial regions exceptionally wide; frontal orbital plate much wider than frontal vitta area, frons with one or two additional rows of reclinate or mediocline setae lateral to frontal row; parafacial with hairs or setae; ocellar setae very strong and reclinate, divergent; orbital setae present in both sexes; outer vertical setae strong; face flat; vibrissae and genal dilation well developed; occiput densely with relatively long, yellow brown setulae. Eye bare. Antennae conspicuously longer in males than in females, male 1st flagellomere 1.5 to 2 times as long as that of female; 1st flagellomere at least 3 times as long as wide, arista bare, thickened on basal half to apex, usually a strong bend at junction of second and third arisal segments giving arista a geniculate appearance, second aristemere 1 to 12 times as long as wide; facial ridges with only a few setae at bases. Prementum 3 to 12 times as long as wide.

Thorax dark brown in ground color with reddish brown pruinosity; dorsum with black or yellow setae or hairs; scutum with four narrow dark brown longitudinal vittae; median vittae straight; short triangular lateral vittae; median vittae short, connected with median presutural vittae; lateral postsutural vittae about twice as long as median vittae with anterior and posterior tips sharply pointed; 3+3 acrostichal setae, 3+4 dorsocentral setae, 1+3 intra-alar setae, two posthumeral, one presutural, three supra-alar, two strong postalar setae; postpronotal lobe reddish brown with three strong setae; notopleuron with two strong and one weak setae; postalar callus reddish brown; proepisternum with single seta; proepimeron with single seta; 3 or 4 katepimeronal setae; anepimeron with one long and one short setae; katepimeron, katatergite, anatergite bare. Wing hyaline with veins yellow brown; tegula and basicosta yellow brown. vein  $R_{4+5}$  with setulae on basal third up to crossvein R-M, but if with less setulae, then either tegula yellow or wing with an apical dark spot; section of M between crossveins r-m and dM-Cu distinctly longer than section between dM-Cu and bend of M; cell  $r_{4+5}$  open far away wing top. Lower squamae bare above. Legs predominantly black or reddish yellow; with black or reddish yellow setae and setulae; fore tibia with regular rows of anterodorsal, posterodorsal setulae, medially with two posterior setae; mid femur with posterior apically with 3 to 4 setae; mid tibia with regular rows of anterodorsal, posterodorsal setulae, with two posterior and two ventral setae; hind tibia with regular rows of anterodorsal, posterodorsal setae and 2 to 5 ventral setae.

Abdomen yellow brown to black with white to reddish yellow pruinosity except for syntergite 1+2. Mid excavation of syntergite 1+2 extending to or not to posterior margin. Male terminalia reddish yellow to dark brown; sternite 5 posteriorly with deep median cleft at least 0.6 sternite length; epandrium dorsally and cercus basally with long setae; surstylus very short; and intermedium very small; apical part of pregonite with several setulae; hypandrial arms fused like a bridge; epiphallus apically pointed; ventral surface of distiphallus covered with fine spinules. Female terminalia yellow brown to dark brown, with yellow brown to black setulae; cercus rectangular shape, posterior apically round in lateral view; subanal plate triangular in ventral view (revised after Lee & Han, 2010).

Remarks. Tschorsnig (1985) divided the Goniini into four groups based on their male terminalia structures, according to this classification, *Gonia* belongs to the *Gonia* group along with *Onychogonia*, *Pseudogonia*, and *Spallanzania* sharing the following characters: hypandrial arms characteristically fused like a bridge; surstylus very short; and intermedium very small. But *Gonia* can be separated from *Spallanzania* by the vein  $R_{4+5}$  with setulae on basal third up to crossvein R-M, reddish yellow tegula and from *Pseudogonia* and *Onychogonia* by the most species with reddish yellow tegula and basicosta.

Distribution. Widely in the World (O'Hara, 2016).

### 3.1.1 *Gonia asiatica* (Rohdendorf, 1928)

*Asiogonia asiatica* Rohdendorf, 1928: 101. Type localities: China (Inner Mongol, Helan Shan [as "Prov. Alashaj"]), localities of Tszosto, Tilatshido-Sykuza, and Dzjanj-Juanj), Armenia (Yerevan [as "Erivanj"]), Kazakhstan (Kostanayskaya Oblast' [as "Prov. Turgaj"]), Mugodzharskaja Railway Station), and Turkmenistan (Dzhebel [as "Dzhebelj"] Railway Station).

*Gonia asiatica*: Herting & Dely-Draskovits, 1993: 257; O'Hara *et al.*, 2009: 109.

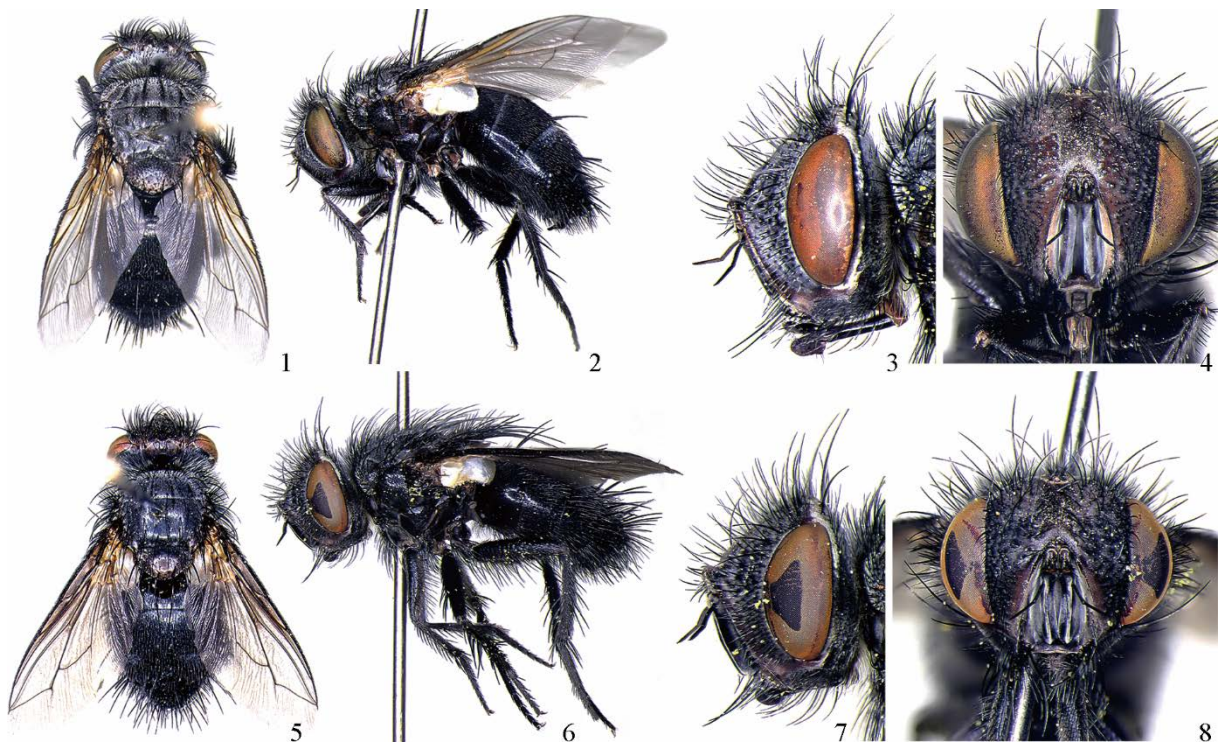
Distribution. China (Inner Mongolia), Kazakhstan, Turkmenistan, Armenia, Europe.

### 3.1.2 *Gonia atra* Meigen, 1826 (Figs 1–8)

*Gonia atra* Meigen, 1826: 7; Herting, 1972: 4; Herting & Dely-Draskovits, 1993: 258; Chao *et al.*, 1998: 1944; O'Hara *et al.*, 2009: 109; Zhang *et al.*, 2016: 407. Type locality: France.

Material examined. China: Inner Mongolia. 5♂1♀, Xilinguoluo Prefecture, Baiyinxile Pasture, 43°38'N, 116°42'E, IX.2016, D.H. Wang (IMU). Inner Mongolia, 1♂, Alxa Left Banner, Mt. Helan, Yaoba, 2200–2350 m, 3–6.VIII.2010, S.D. Wang & Z. Zhao. Ningxia. 2♂, Jingyuan, Mt. Liupan, Laonitan, 1900–1950 m, 13.VII.2009, Z. Zhao. Shanxi. 1♀, Hunyuan, Mt. Hengshan, 28.VI.1980, M.F. Wang (SYNU). Spain: 1♂, Prov Salamanca Villar de la Yegua, Vado de la Viña, 24.IV.2011, leg. Tschorsnig. 1♀, Prov Salamanca Villar de Ciervo, Puente Quebrada, 27.IV.2011, leg. Tschorsnig (SMNS).

Distribution. China (Gansu, Inner Mongolia, Ningxia, Shanxi, Xinjiang, Tibet, Yunnan), Mongolia, Russia (W. Siberia, E. Siberia), Kazakhstan, Transcaucasia, Europe.



Figures 1–8. *Gonia atra* Meigen. 1–4. Male. 5–8. Female. 1, 5. Body in dorsal view. 2, 6. Body in lateral view. 3, 7. Head in lateral view. 4, 8. Head in anterior view.

### 3.1.3 *Gonia bimaculata* Wiedemann, 1819 (Figs 9–16)

*Gonia bimaculata* Wiedemann, 1819: 25; Herting & Dely-Draskovits, 1993: 258; Chao *et al.*, 1998: 1944; O'Hara *et al.*, 2009: 109; Zhang *et al.*, 2016: 408. Type locality: South Africa, Cape Province.

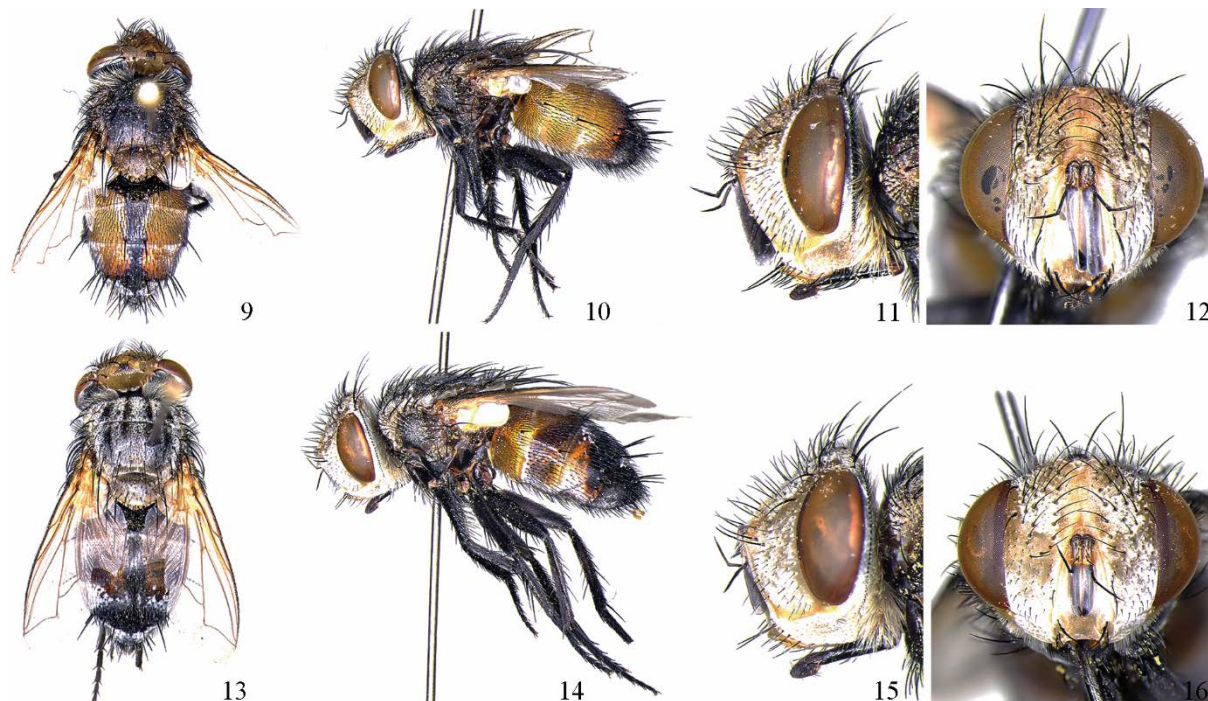
Material examined. China: Liaoning. 1♀, Benxi, Xinling, 4.V.1964, W.Q. Xue. Xinjiang. 3♂3♀, Shihezi, 24–28.V.1979, H.Y. Wang (SYNU). Spain: 1♂, 2 km NE Los Christianos, Tenerife, 27.IV.1996, leg. Tschorsnig. 1♀, Prov Salamanca Villar de Ciervo, 2.VII.1990, leg. Tschorsnig (SMNS).



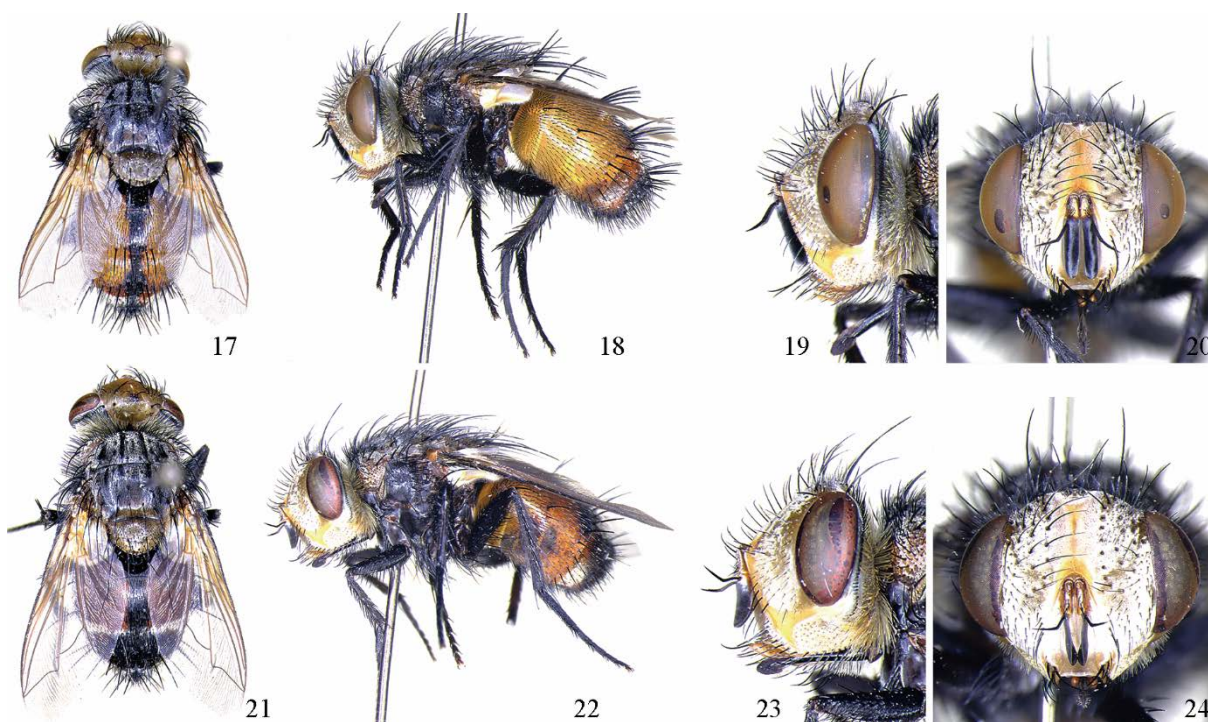
Distribution. China (Liaoning, Inner Mongolia, Beijing, Hebei, Shanxi, Shandong, Henan, Ningxia, Gansu, Qinghai, Xinjiang, Shanghai, Jiangsu, Zhejiang, Fujian, Guangxi), Europe, C. Asia, M. East, Transcaucasia, Yemen, N. Africa, Afrotropical widespread (except western Africa).

### 3.1.4 *Gonia capitata* (de Geer, 1776) (Figs 17–24)

*Musca capitata* de Geer, 1776: 23. Type locality: not given.



Figures 9–16. *Gonia bimaculata* Wiedemann. 9–12. Male. 13–16. Female. 9, 13. Body in dorsal view. 10, 14. Body in lateral view. 11, 15. Head in lateral view. 12, 16. Head in anterior view.



Figures 17–24. *Gonia capitata* (de Geer). 17–20. Male. 21–24. Female. 17, 21. Body in dorsal view. 18, 22. Body in lateral view. 19, 23. Head in lateral view. 20, 24. Head in anterior view.

*Gonia capitata*: Herting & Dely-Draskovits, 1993: 258; Chao *et al.*, 1998: 1944; O'Hara *et al.*, 2009: 109; Zhang *et al.*, 2016: 409.

Material examined. France: 1♂, Hautes-Alpes, W. l'Argentière, les Têtes Charbonnières, 15.VIII.1997, leg. Tschorsnig. 1♀, H.-Alpes, NW. of St-Crépin, 4.VIII.1998, leg. Tschorsnig (SMNS).

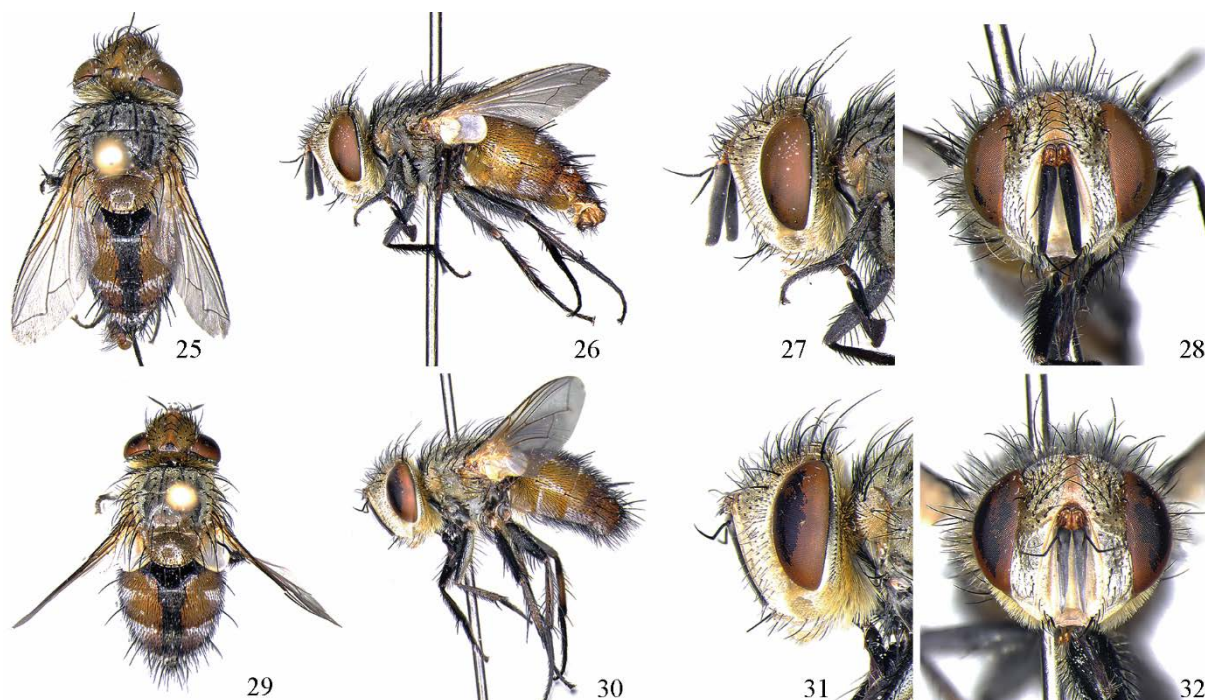
Distribution. China (Inner Mongolia, Beijing, Shanxi, Sichuan), Russia (W. Russia, W. Siberia), Mongolia, Europe.

### 3.1.5 *Gonia chinensis* Wiedemann, 1824 (Figs 25–32)

*Gonia chinensis* Wiedemann, 1824: 47; Herting & Dely-Draskovits, 1993: 258; Chao *et al.*, 1998: 1944; O'Hara *et al.*, 2009: 109; Lee & Han, 2010: 182; Zhang *et al.*, 2016: 411. Type locality: China, Tianjin.

Material examined. China: Beijing. 1♀, 21.IX.1950, C.K. Yang. Hebei. 1♀, Zhuoxian, 15.V.1965, F.S. Li; Guizhou. 1♀, Huishui, 960 m, 1.VI.1981, F.S. Li (CAU). Guizhou. 2♀, Mt. Fanjing, 1200 m, 10.IX.1993, Y.S. Cui & H.W. Chen. Liaoning. 2♀, Xinbin, 7.VII.2005, C.T. Zhang. Benxi, Mt. Tiecha, 500–912 m, 1♂4♀, 9.VII.2006, Y. Zhi, Z.Q. Yang, J. Lian & J. Hao, 1♀, 13.VIII.2006, Z.P. Ge; 1♀, 30.V.2008, J. Hao; 1♂2♀, 30.V.2009, C.T. Zhang, Y.Y. Zhou; 4♂8♀, 23.VI.2009, C.T. Zhang, Z. Zhao; 1♀, 13.VI.2010, B. Li; 1♀, 3.VII.2010, Z. Zhao; 19♀, 3.VII.2010, S.D. Wang. 1♀, Benxi, Tanggou, Heshangmaozi, 600–1200 m, 16.VIII.2006, C.T. Zhang; 3♀, 22–24.VII.2008, C.T. Zhang, Y. Chi, J. Hao. Huanren, Laotudingzi, 1100–1330 m, 1♀, 14.VIII.2006, Z.P. Ge; 1♂2♀, 17.IX.2006, Z.Y. Yao; 1♂9♀, 17.IX.2006, J.Y. Liu; 4♀, 24–26.VI.2009, C.T. Zhang, Z. Zhao; 4♀, 26–27.VIII.2009, Q. Wang. 2♀, Anshan, Mt. Qianshan, 22–25.VI.2006, C.T. Zhang. Kuandian, Baishilazi, 400–700 m, 7♀, 18–20.VIII.2007, C.T. Zhang, Z.Y. Yao, J. Hao, Z.P. Ge & Y. Zhi. 1♀, Fengcheng, Sitaizi, 20.VI.2014, W.J. Xu. Sichuan. 1♀, Luding, Yanzigou, 2000–2600 m, 17.VII.2006, L.Y. Feng. Guangxi. 1♂4♀, Napo, Defu, 1050–1450 m, 7–10.V.2011, C.T. Zhang; 3♀, Napo Defu, 1050–1450 m, 7–10.V.2011, Q. Wang. Shanxi. 4♀, Qinchui, Xiachuan, 1200–1600 m, 12–16.VII.2012, Q. Wang. Tibet. 1♀, Linzhi, Baji, Niang'e ferry, 2850–2950 m, 5.VIII.2013, C.T. Zhang; 2♀, Milin, Paizhen, 2850–3000 m, 13–14.VIII.2013, C.T. Zhang & X.Y. Li; 3♀, Linzhi, Gongbujiangda, 3200–3500 m, 15–16.VIII.2013, P. Hou. Xinji ang. 1♂, Shihezi, 20.VI.1965, M.W. Qi (SYNU).

Distribution. China (Inner Mongolia, Beijing, Tianjin, Hebei, Shanxi, Shandong, Henan, Gansu, Xinjiang, Shanghai, Jiangsu, Anhui, Zhejiang, Hubei, Jiangxi, Hunan, Fujian, Taiwan, Guangdong, Hainan, Hong Kong, Guangxi, Sichuan, Chongqing, Guizhou, Yunnan, Tibet), Japan, Korea, M. Asia, India, Nepal, Pakistan, Vietnam, Philippines, Malaysia.



Figures 25–32. *Gonia chinensis* Wiedemann. 25–28. Male. 29–32. Female. 25, 29. Body in dorsal view. 26, 30. Body in lateral view. 27, 31. Head in lateral view. 28, 32. Head in anterior view.

### 3.1.6 *Gonia desertorum* (Rohdendorf, 1928)

*Salmacia (Eremogonia) desertorum* Rohdendorf, 1928: 99. Type locality: Turkmenistan, Ashkhabad (Central Asia, Turkmenistan).



*Gonia desertorum*: Herting, 1984: 81; Herting & Dely-Draskovits, 1993: 258; O'Hara *et al.*, 2009: 109.

Distribution. W. China, C. Asia.

### 3.1.7 *Gonia divisa* Meigen, 1826 (Figs 33–40)

*Gonia divisa* Meigen, 1826: 4; Herting & Dely-Draskovits, 1993: 259; Chao *et al.*, 1998: 1944; O'Hara *et al.*, 2009: 109; Lee & Han, 2010: 184. Type locality: Austria.

Material examined. China: Beijing. 1♀, Jushan Farm, 4.IV.1981, D.Y. Xue; 2♂3♀, Jushan Farm, 5.IV.1981, D.Y. Xue (CAU). Liaoning. Benxi, Nandian, 1♂, 9.IV.1978, W.Q. Xue; 1♂, 9.V.1978, W.Q. Xue; 1♂, 12.III.1986, W.Q. Xue; 1♀, Benxi, Xinling, 8.V.1964, W.Q. Xue; 1♀, Benxi, Xiadian, 29.IV.1973, W.Q. Xue; 1♀, information unknown (SYNU). Germany: 1♀, Germany Haard b Haltern, 24.IV.1962, Sammlung Herting (SMNS).

Distribution. China (Liaoning, Beijing, Shanghai, Jiangsu), Russia (W. Russia, W. & E. Siberia, S. Far East), Japan, Europe.



Figures 33–40. *Gonia divisa* Meigen. 33–36. Male. 37–40. Female. 33, 37. Body in dorsal view. 34, 38. Body in lateral view. 35, 39. Head in lateral view. 36, 40. Head in anterior view.

### 3.1.8 *Gonia foersteri* Meigen, 1938 (Figs 41–48)

*Gonia foersteri* Meigen, 1838: 246; Herting & Dely-Draskovits, 1993: 259; Lee & Han, 2010: 186. Type locality: Germany: Stolberg.

Diagnosis. The species is different from other species by: frontal vitta, fronto-orbital plate, parafacial, gena orange; upper occiput dark reddish yellow; antenna black; palpus reddish yellow; frons of male about 0.63–0.65 of head width; parafacial with 4–5 rows black setae, near facial ridge thicken and lengthen gradually; 2 pairs of proclinate outer orbital setae; 4 pairs of orbital setae; facial ridge above vibrissa with 5–6 setae; antenna with 1st flagellomere about 2.8–2.9 times as long as pedicel; thorax brown; 3 postpronotal setae, aligned; 4 katepisternal setae; scutellum brown, 1 pair of apical scutellar setae, parallel and upward posterior; proepisternum with tiny black setae; tegula, basicosta reddish yellow; base of vein  $R_{4+5}$  with 6–7 setulae; the length between the bend of vein M and wing posterior margin about 2.5 times the length of vein M from crossvein dM-Cu to its bend; legs entirely black, fore claw of male shorter than tarsomere 5, fore tibia with 2–3 posterior setae; mid tibia with 5 anterodorsal setae; hind tibia with 2 anterodorsal setae. Abdomen black, anterior 1/7 of tergite 3, anterior 1/6 of tergite 4, anterior 1/3 of tergite 5 with thin silver pruinosity.

Material examined. China: Liaoning. 2♂, Benxi, Xiadian, 21.IV.1973, W.Q. Xue; 1♀, Wangxi Park, 12.V.1964, W.Q. Xue (SYNU).

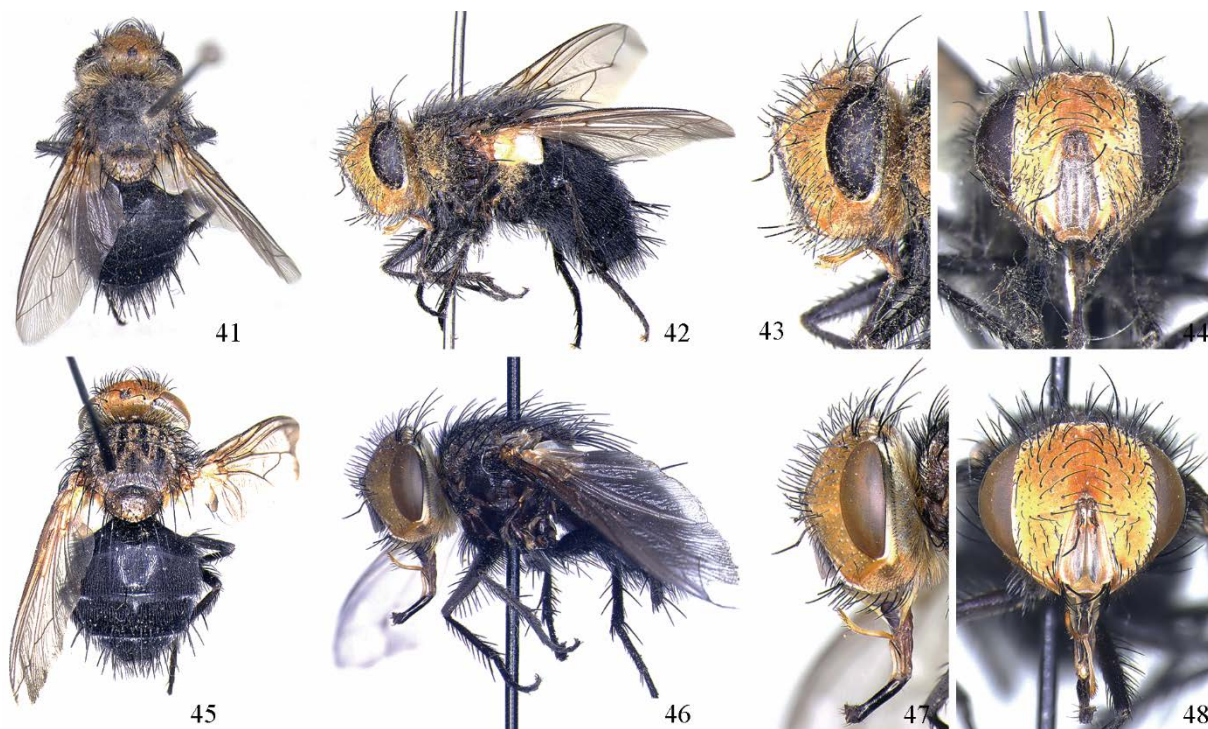
Distribution. China (Liaoning), Japan, Korea, Austria, Czech, Slovakia, Germany, Greece, Israel, Italy, Ukraine.

Remarks. The species is reported in China for the first time.

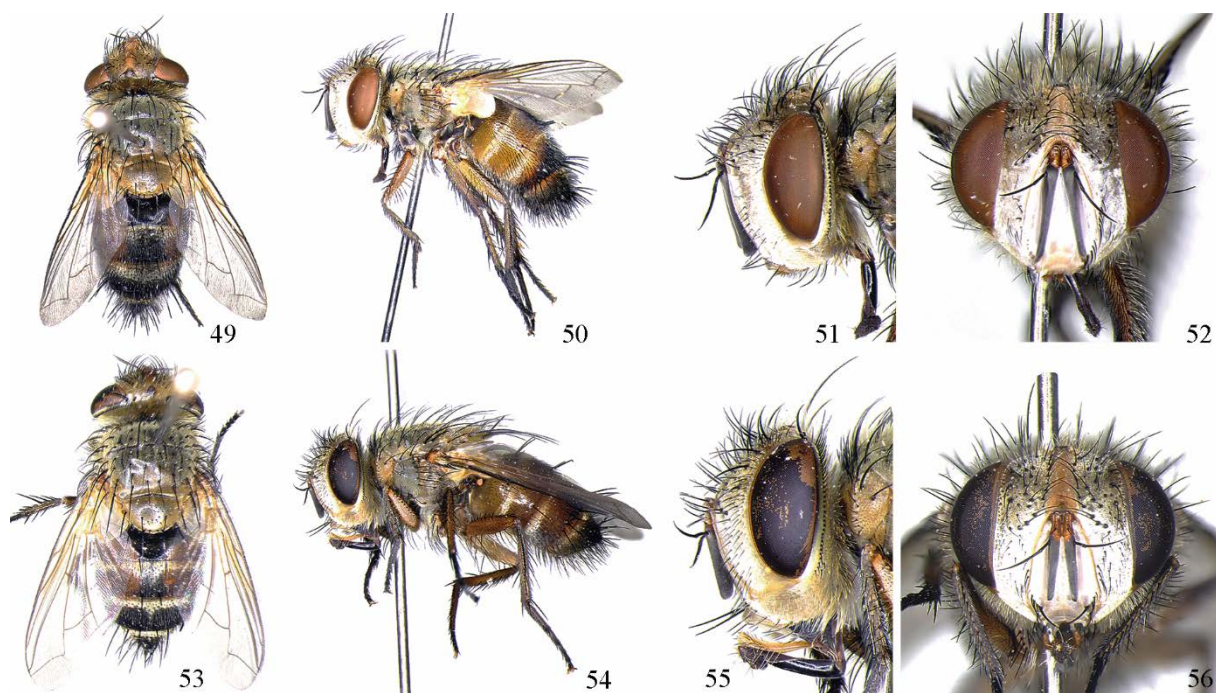
### 3.1.9 *Gonia klapperichi* (Mesnil, 1956) (Figs 49–56)

*Turanogonia klapperichi*, Mesnil, 1956: 532. Type locality: China, Fujian, Kwangtse.

*Gonia klapperichi*: Chao, 1998: 1944; O'Hara *et al.*, 2009: 109; Lee & Han, 2010: 187; Zhang *et al.*, 2016: 413.



Figures 41–48. *Gonia foersteri* Meigen. 41–44. Male. 45–48. Female. 41, 45. Body in dorsal view. 42, 46. Body in lateral view. 43, 47. Head in lateral view. 44, 48. Head in anterior view.



Figures 49–56. *Gonia klapperichi* (Mesnil). 49–52. Male. 53–56. Female. 49, 53. Body in dorsal view. 50, 54. Body in lateral view. 51, 55. Head in lateral view. 52, 56. Head in anterior view.



Material examined. China: Liaoning. 1♀, Benxi, Huangbaiyu, 4.IX.1965. 1♂, Benxi, Dayugou, 18.VIII.1979, W.Q. Xue; 1♀, Benxi, Mt. Tiecha 500–950 m, 28.V.2006, J.Y. Liu. Guangdong. 4♂, Fengkai, Heishiding, 250–928 m, 17–19.VII.2004, C.T. Zhang. Guangxi. 1♂1♀, Napo, Defu, 1050–1450 m, 7–10.V.2011, C.T. Zhang, Q. Wang; 1♀, Jinxiu, Mt. Dayao, 630–730 m, 17–18.V.2011, Q. Wang (SYNU).

Distribution. China (Liaoning, Shaanxi, Qinghai, Xinjiang, Fujian, Zhejiang, Guangdong, Guangxi, Guizhou, Sichuan, Yunnan), Korea, India, Myanmar.

### 3.1.10 *Gonia nanshanica* (Rohdendorf, 1928)

*Salmacia* (*Salmacia*) *divisa nanshanica* Rohdendorf, 1928: 100. Syntypes, 2 females. Type locality: China, Inner Mongolia, Qilian Shan [as “Nanj-Schanj-Gebirge”, near Gansu border], Tsinj-tshzhou.

*Gonia nanshanica*: Herting & Dely-Draskovits, 1993: 260; O'Hara *et al.*, 2009: 109.

Distribution. China (Inner Mongolia near Gansu border).

### 3.1.11 *Gonia nigricoma* Lee & Han, 2010 (Figs 57–60)

*Gonia nigricoma* Lee & Han, 2010: 188. Type locality: Korea, Wonju-si.

Diagnosis. The species is different from other species by: frontal vitta dark orange; fronto-orbital plate yellowish; parafacial dark yellow; gena brown; upper occiput reddish yellow, occipital setulae dark brown to black; antenna black; palpus reddish yellow; frons of male about 5/9 of head width; the narrowest of parafacial in lateral view about 2.6 times as wide as 1st flagellomere; fronto-orbital plate with 3–4 rows black setae; parafacial with 4 rows black setae; 2 pairs of proclinate orbital setae; 2 pairs of reclinate orbital setae; antenna with 1st flagellomere about 4 times as long as pedicel; 3 postpronotal setae, aligned; 4 katepisternal setae; scutellum brown, anterior margin 1/3 pale; tegula brown; basicosta reddish yellow; dorsum of vein  $R_{4+5}$  with 8 setulae, reaching 1/2 as long as length of  $R_{4+5}$  to r-m; the length between the bend of vein M and wing posterior margin about 1.5 times the length of vein M from crossvein dM-Cu to its bend; legs black except femora brown black; fore claw of male shorter than tarsomere 5; abdomen black, with ivory white pruinosity, syntergite 1+2 excavated to posterior margin, with median marginal setae in both sexes.

Material examined. China: Liaoning. 1♂, Benxi, Xinling, 18.IV.1964, W.Q. Xue (SYNU).

Distribution. China (Liaoning), Korea.

Remarks. The species is reported in China for the first time.



Figures 57–60. *Gonia nigricoma* Lee & Han. 57–60. Male. 57. Body in dorsal view. 58. Body in lateral view. 59. Head in lateral view. 60. Head in anterior view.

### 3.1.12 *Gonia olgae* (Rohdendorf, 1927) (Figs 61–68)

*Salmacia olgae* Rohdendorf, 1927: 94. Type locality: Tashkent.

*Gonia olgae*: Herting & Dely-Draskovits, 1993: 259; Lee & Han, 2010: 190.

Diagnosis. The species is different from other species by: Frontal vitta yellow; fronto-orbital plate dark yellow; parafacial yellow; gena yellow; occiput mostly black, near vertex triangular area yellow; antenna and arista black; palpus yellow; frons of male 0.58–0.60 of head width; fronto-orbital plate with 2 rows bristles and several short fine black hairs; parafacial with 5 rows black fine bristles, near facial ridge 1 row thick and seta-like; 2 pairs of proclinate orbital setae; 3 pairs of orbital setae; occiput setae black, the rest with yellow long hairs; 4 katepisternal setae; scutellum reddish yellow; 1

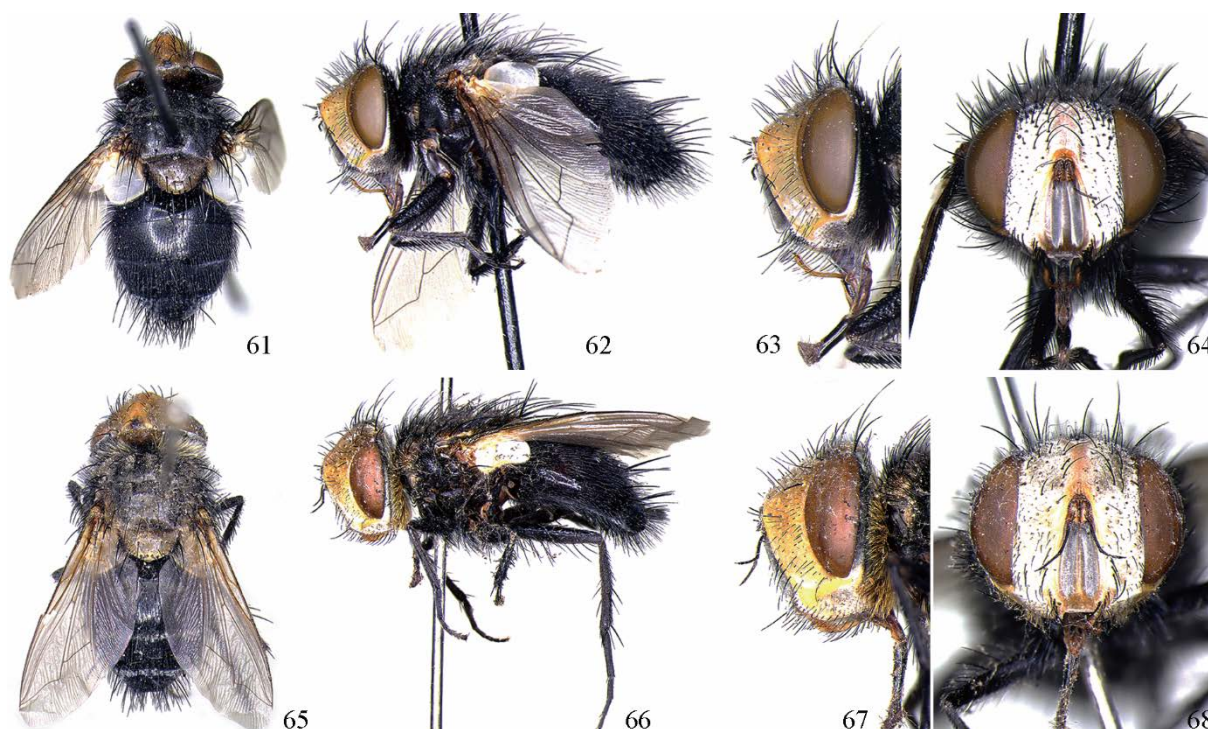


pair of apical scutellar setae, parallel upward; proepisternum with black seta; tegula, basicosta reddish yellow; vein R<sub>4+5</sub> with 5–6 setulae on base; the length between bend of vein M and wing posterior margin 2.6–2.7 times the length of vein M from crossvein dM-Cu to its bend; legs brown black; fore claw of male shorter than tarsomere 5; fore tibia with 3 posterior setae; hind tibia 3 ventral setae; abdomen brown black; abdominal tergite black medially, reddish brown on both sides, with reclined black hairs; syntergite 1+2 medially excavated to posterior margin.

Material examined. China: Hebei. 2♂3♀, Qinhuangdao, Yansehu, VII.1987, B.G. Zhao; 3♂, no information. Liaoning. 1♂, Benxi, Qinghecheng, 30.III.1959, W.Q. Xue; 1♂3♀, Benxi, Xinling, 8.IV.1964, 18.IV.1964, 8, 14.V.1964, W.Q. Xue. 7♂2♀, Benxi, Xiadian, 17–21.IV.1973, W.Q. Xue. 1♂, Benxi, Nandian, 9.V.1978, W.Q. Xue. Ningxia. 1♂1♀, Longde, Sutai Forest Farm, 2140–2200m, 21–26.VI.2008, Z.Y. Yao (SYNU). Inner Mongolia, 1♂, Alxa League, Xuguitu, 28.V.2016, G.L. Chen (IMU).

Distribution. China (Liaoning, Inner Mongolia, Hebei, Ningxia), Japan, Korea, Uzbekistan, Turkey, Germany, Spain.

Remarks. The species is reported in China for the first time.



Figures 61–68. *Gonio olgae* (Rohdendorf). 61–64. Male. 65–68. Female. 61, 65. Body in dorsal view. 62, 66. Body in lateral view. 63, 67. Head in lateral view. 64, 68. Head in anterior view.

### 3.1.13 *Gonio ornate* Meigen, 1826 (Figs 69–76)

*Gonio ornata* Meigen, 1826: 3; Herting & Dely-Draskovits, 1993: 259; Chao *et al.*, 1998: 1949; O'Hara *et al.*, 2009: 110; Zhang *et al.*, 2016: 414. Type locality: France, Lyon.

Material examined. Spain: 1♂, Salamanca Villar de Ciervo, 16.III.2014, leg. Tschorsnig; 1♀, Villar de Ciervo, 19.III.2014, leg. Tschorsnig (SMNS).

Distribution. China (Jilin, Inner Mongolia, Beijing, Shanxi, Ningxia), Russia (W. Siberia, S. Far East), M. East, Transcaucasia, Mongolia, Europe, C. Asia.

### 3.1.14 *Gonio picea* (Robineau-Desvoidy, 1830) (Figs 77–84)

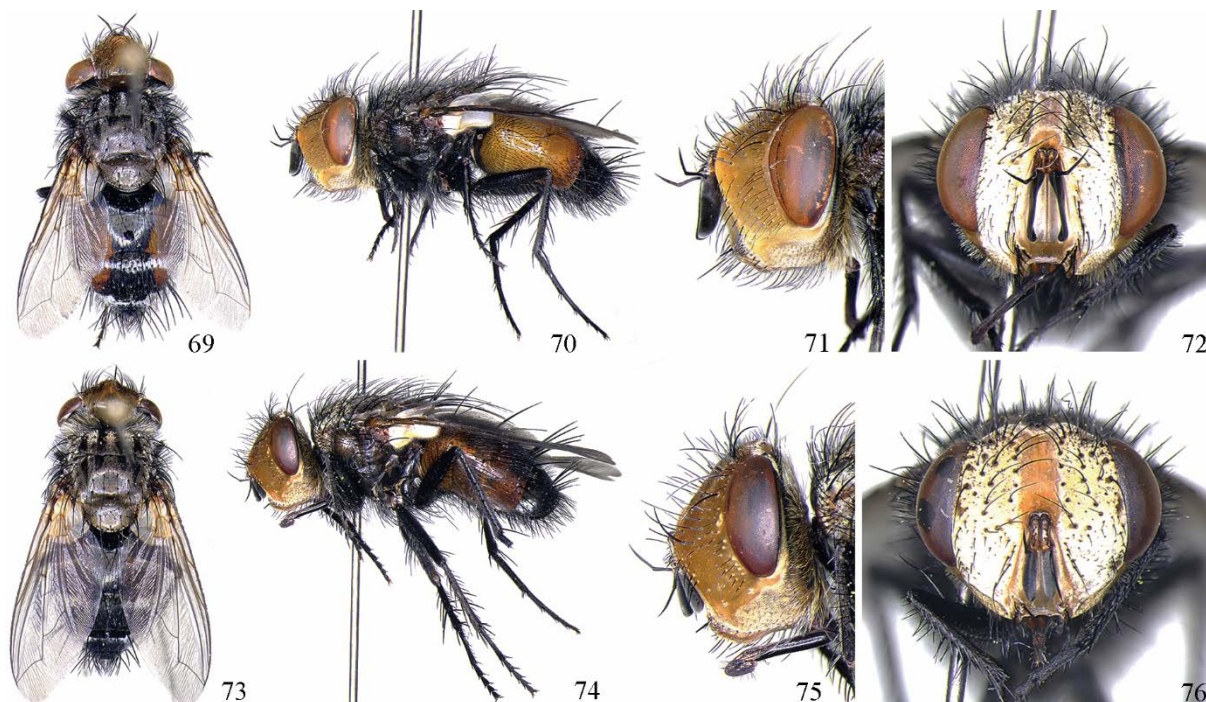
*Spallanzania picea* Robineau-Desvoidy, 1830: 78. Type localities: Spain and France.

*Gonio picea*: Herting & Dely-Draskovits, 1993: 259; Chao, 1998: 1949; O'Hara *et al.*, 2009: 110; Zhang *et al.*, 2016: 415.

Material examined. Spain: 1♂, Prov Salamanca Villar de Ciervo, Las Coronas, 26.II.2011, leg. Tschorsnig; 1♀, Prov Salamanca Villar de la Yegua, Vado de la Viña, 24.IV.2011, leg. Tschorsnig (SMNS).

Distribution. China (Heilongjiang, Jilin, Liaoning, Inner Mongolia, Beijing, Tianjin, Hebei, Shanxi, Shandong, Henan,

Shaanxi, Qinghai, Xinjiang, Shanghai, Jiangsu, Anhui, Zhejiang, Jiangxi, Fujian, Taiwan, Guizhou, Sichuan, Chongqing, Yunnan, Tibet), Russia (W. Siberia, S. Far East), M. East, Transcaucasia, Mongolia, Japan, Europe, C. Asia.



Figures 69–76. *Gonia ornate* Meigen. 69–72. Male. 73–76. Female. 69, 73. Body in dorsal view. 70, 74. Body in lateral view. 71, 75. Head in lateral view. 72, 76. Head in anterior view.



Figures 77–84. *Gonia picea* (Robineau-Desvoidy). 77–80. Male. 81–84. Female. 77, 81. Body in dorsal view. 78, 82. Body in lateral view. 79, 83. Head in lateral view. 80, 84. Head in anterior view.

### 3.1.15 *Gonia ussuriensis* (Rohdendorf, 1928) (Figs 85–92)

*Salmacia* (*Chrysoceroгон*) *ussuriensis* Rohdendorf, 1928: 99. Type localities: Russia (Yakovlevka and Stelyanukha).

*Gonia ussuriensis*: Herting & Dely-Draskovits, 1993: 260; Chao *et al.*, 1998: 1949; O'Hara *et al.*, 2009: 110; Lee & Han, 2010: 191; Zhang *et al.*, 2016: 417.



Material examined. China: Liaoning. 1♂, Benxi, Caohekou, 19.V.1980, W.Q. Xue. Benxi, Mt. Tiecha, 500–910m, 1♀, 4.VI.1989, C.T. Zhang; 2♂, 28–30.V.2006, C.T. Zhang, J.Y. Liu. 1♀, Benxi, Dayugou, 13.V.1980, W.Q. Xue. 1♀, Huanren, Yujiabao, 22.VI.1974, W.Q. Xue. 1♀, Huanren, Laotudingzi, 500–1330m, 30.V.2006, L.Y. Feng; 3♀, 24–26.VI.2009, C.T. Zhang, C. Fu. Shenyang, Beiling, 1♀, 15.IX.1990, M. Yu; 2♀, 14.V.1994, Y.S. Cui; 1♀, 18.V.1995, Y.S. Cui; 2♀, 13.V.2007, J. Hao. 7♀, Xiuyan, Mt. Yaoshan, 400–800m, 18–19.V.2007, C.T. Zhang, Z.P. Ge, J. Hao. 2♀, Jianchang, Mt. Dahei, 500–1142m, 3.VI.2007, 25–26.VI.2010, C.T. Zhang, S.Z. Zhao. Shanxi. 2♀, Qinyuan, Mt. Lingkong, 4–6.VI.1999, M.F. Wang (SYNU).

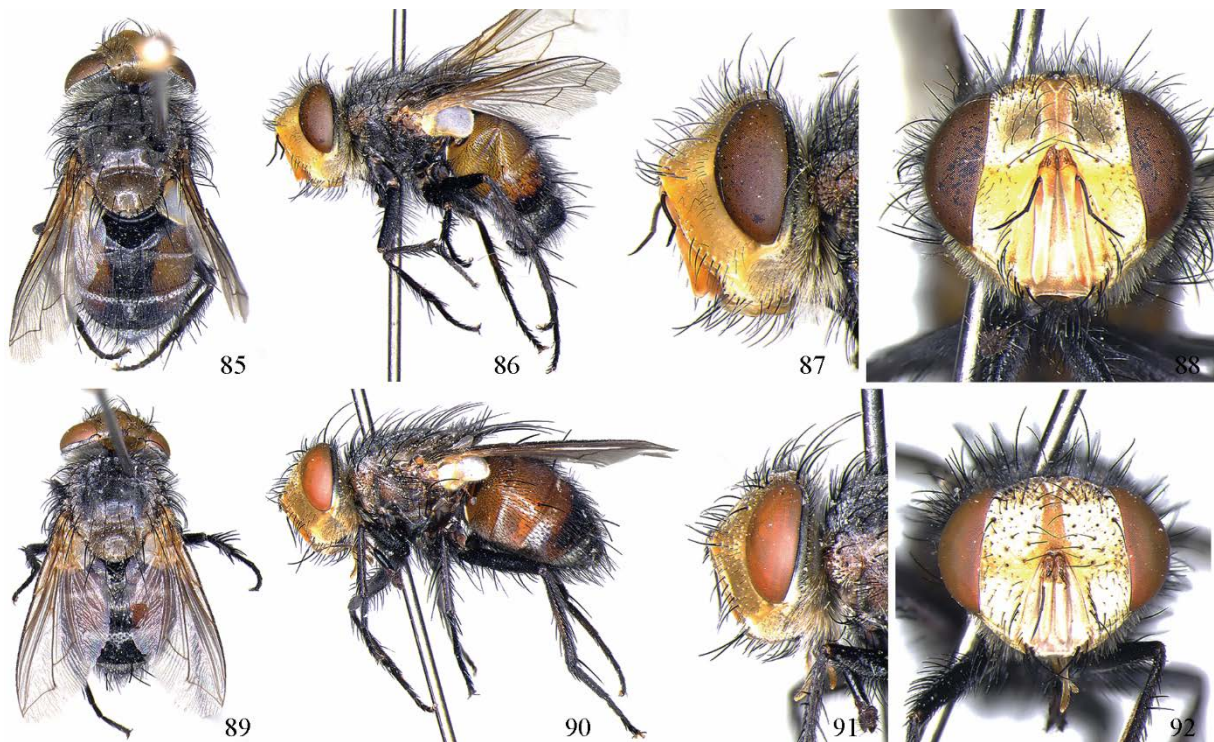
Distribution. China (Heilongjiang, Liaoning, Shanxi, Shanghai), Russian Far East, Japan, Korea.

### 3.1.16 *Gonia vacua* Meigen, 1826 (Figs 93–96)

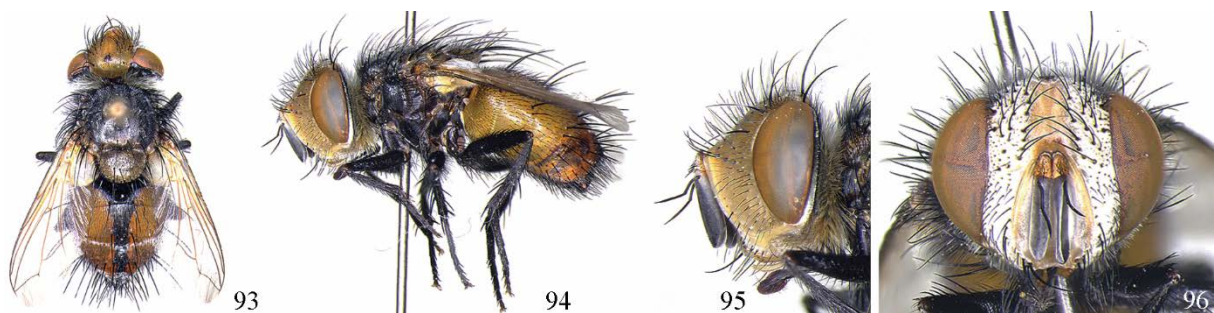
*Gonia vacua* Meigen, 1826: 4; Herting & Dely-Draskovits, 1993: 260; Chao & Shi, 1982: 275; Chao *et al.*, 1998: 1949; O'Hara *et al.*, 2009: 110. Type locality: not given (probably Germany: Stolberg).

Material examined. Germany: 1♂, Markgröningen, 13.V.1975, Samm lung Herting (SMNS).

Distribution. China (Beijing, Hebei, Shanxi, Shandong, Gansu, Qinghai, Xinjiang, Tibet), Europe, Russia (W. Russia), Transcaucasia.



Figures 85–92. *Gonia ussuriensis* (Rohdendorf). 85–88. Male. 89–92. Female. 85, 89. Body in dorsal view. 86, 90. Body in lateral view. 87, 91. Head in lateral view. 88, 92. Head in anterior view.



Figures 93–96. *Gonia vacua* Meigen. 93–96. Male. 93. Body in dorsal view. 94. Body in lateral view. 95. Head in lateral view. 96. Head in anterior view.

**3.1.17 *Gonia yunnanensis* Hou, Yang & Zhang, sp. nov.** (Figs 97–107)

**Diagnosis.** The species is different from other species of *Gonia* by: frons about 1/2 of head width; the narrowest of parafacial in lateral view about 1.9–2.0 times as wide as 1st flagellomere; fronto-orbital plate with 3 rows of black setae; parafacial with 5 rows of black setae; 2 proclinate outer orbital setae; 4 orbital setae; apical scutellar setae upward; tegula brown; basicosta dark yellow; legs brown black; fore claw of male shorter than tarsomere 5; mid tibia with 6 anterodorsal, 2 posterior and 2 ventral setae; hind tibia with 5 anterodorsal, 3 posterior and 1 ventral setae; abdominal syntergite 1+2 with 2 median marginal setae.

**Description.** Body length 10.0–11.0 mm.

**Male** (Figs 97–100). Head half spherical, reddish yellow, covered with silvery pruinosity; frontal vitta reddish yellow; fronto-orbital plate pale brown, with silver pruinosity; parafacial dark yellow, with silver pruinosity; gena pale brown, with silver pruinosity; lunule dark brown; occiput mostly greyish black, upper reddish yellow, with silver pruinosity. Antenna black; palpus brown; rod-like, with black hairs; prementum shiny black; labella grey brown. Frons about 1/2 of head width; the narrowest of parafacial in lateral view about 1.9–2.0 times as wide as 1st flagellomere; gena about 2/5 as height as eyes. Eyes bare. Frontal setae crossed, proclinate, 9–10 pairs, the lowest one falling to level at middle pedicel; ocellar setae reclinate and outward, the distance between ocellar setae shorter than the distance between post ocelli, about 4/5 as long as inner vertical setae; 2 pairs of postocellar setae, shorter than ocellar setae; inner vertical setae about 4/5 as long as eye height; outer vertical setae about 3/4 as long as inner vertical setae; ocellar triangular area with tiny black hairs; fronto-orbital plate with 3 rows of black setae; parafacial with 5 rows of black setae; 2 pairs of proclinate outer orbital setae; 4 pairs of orbital setae; facial ridge with 3–4 setae on base; vibrissa strongly crossed, situated below lower margin of face, lower margin of face not protruding, with a row of subvibrissal setae; occiput slightly bulged, upper portion with tiny black setae, the rest with grey yellow hairs. Antenna with 1st flagellomere 4.5–5.0 times as long as width, about 3 times as long as pedicel; pedicel with black setae on anterior margin 1/2; arista black, about 4/5 as long as 1st flagellomere, distal 1/6 becoming narrowly, 2nd aristomere prolong, about 5 times as long as wide; prementum about 5 times as long as wide, with tiny hairs; palpus with hairs, about 3/4 as long as 1st flagellomere; labella large.

Thorax brown black, with black hairs, with thin greyish white pruinosity; presutural scutum with 4 broad black longitudinal vittae, the distance between inner vittae about 1.1–1.2 times as wide as the distance between inner and outer vittae, thoracic vittae only extending to anterior half portion on postsutural scutum; scutellum brownish black on base and brownish yellow on apical 1/3, with thin greyish white pruinosity. 3 postpronotal setae arranged in a straight line; 3 notopleural setae; 3 presutural and 3 postsutural acrostichal setae; 3 presutural and 4 postsutural dorsocentral setae; 1 presutural and 3 postsutural intra-alar setae; 3 supra-alar setae, the first one (prealar seta) about 1.1–1.3 times as long as notopleural seta; 4 katapisternal setae; scutellum with suberected reclinate black setae dorsally; a pair of discal scutellar setae, 1.3–1.4 times as long as scutellum; a pair of apical scutellar setae upward, about 1/2 as long as scutellum; subapical scutellar setae parallel and extending backwards, 1.8–1.9 times as long as scutellum; a pair of lateral scutellar setae, about 2 times as long as scutellum; a pair of basal scutellar setae, 1.8–1.9 times as long as scutellum; prosternum and proepisternum with black setulae; katapimeron bare. Wing pale hyaline; tegula brown; basicosta dark yellow; costal spine undeveloped; relative lengths of 2nd, 3rd and 4th costal sectors approximately 2.5:1; vein  $R_{4+5}$  with 8 setulae dorsally, reaching 1/2 length between vein  $R_{4+5}$  and crossvein R-M, and 3 ventral setulae; bend of vein M blunt-angled; cell  $r_{4+5}$  open; the length of vein M between crossvein R-M and dM-Cu about 2.6–2.7 times as long as the length of vein M from crossvein dM-Cu to its bend; the length between vein M and wing posterior margin about twice as long as the length of vein M from crossvein dM-Cu to its bend. Lower calypteres developed, yellow white; halter reddish yellow. Legs brown black; pulvillus greyish white; fore claw shorter than tarsomere 5; fore tibia with a row of anterodorsal and posterodorsal, and 2 posterior setae; mid tibia with 6 anterodorsal, a row of posterodorsal, 2 posterior and 2 ventral setae; hind tibia with 5 anterodorsal, a row of posterodorsal, 3 posterior and 1 ventral setae.

Abdomen long ovate, brown, with black setae; syntergite 1+2 black, both sides brown; tergite 3 medially black; tergite 4 brown on both sides of anterior 1/2, the rest portion black; tergite 5 entirely black; tergite 3 anterior 1/7, anterior 1/2 of tergite 4 and anterior 1/2 of tergite 5 with thin silvery pruinosity; anterior 1/8–1/7 of each tergites without tiny black setulae; syntergite 1+2 medially excavated to posterior margin, with 2 median marginal setae, a pair of lateral marginal setae; tergite 3 with 2 median marginal setae, a pair of lateral marginal setae; tergite 4 and 5 each with a row of marginal setae. Sternite 5 (Fig. 107) with posterior lobes somewhat trapezoid, with many long hairs on inner apical margin as shown in the figures.

**Male terminalia** (Figs 105–106). Cerci narrow in posterior view, thick haired dorsally, and with a suture medially; separated apically, apex slightly curved ventrally in lateral view. Surstylus curved and short in lateral view. Shape of epandrium, aedeagal apodeme, hypandrium, phallus, pregonite and postgonite as shown in figures.

**Female** (Figs 101–104). Frons 0.63–0.64 of head width; 1st flagellomere about twice as long as pedicel; pedicel with

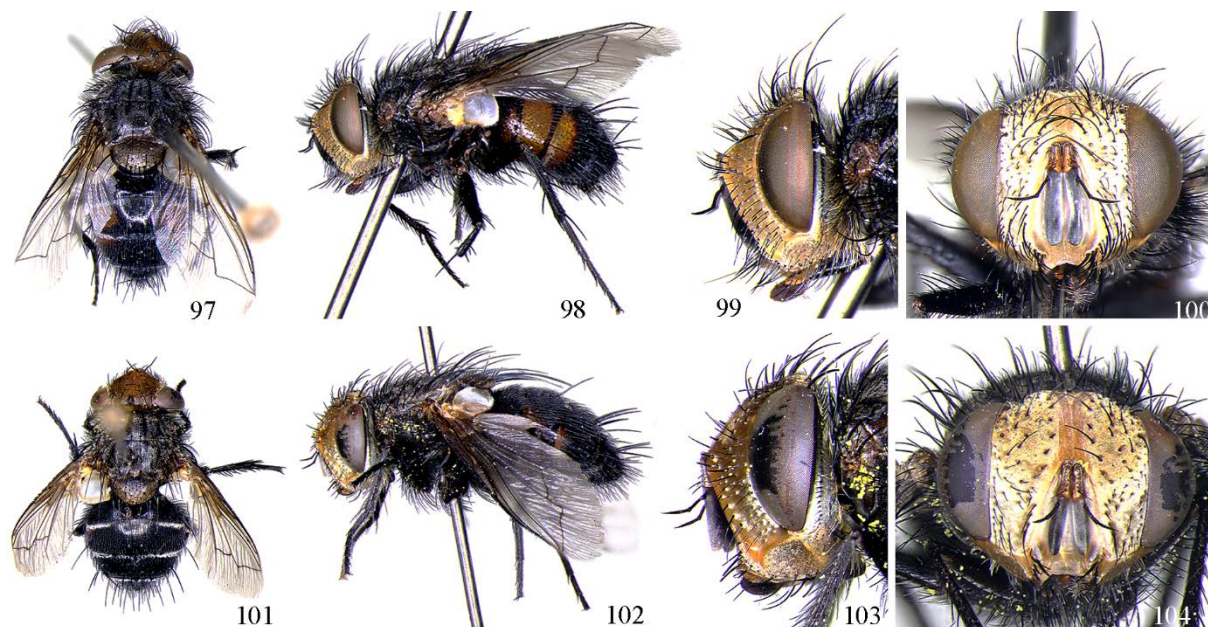


tiny black setae; relative lengths of 2nd, 3rd and 4th costal sectors approximately 4:8:3. Other characters are same as male.

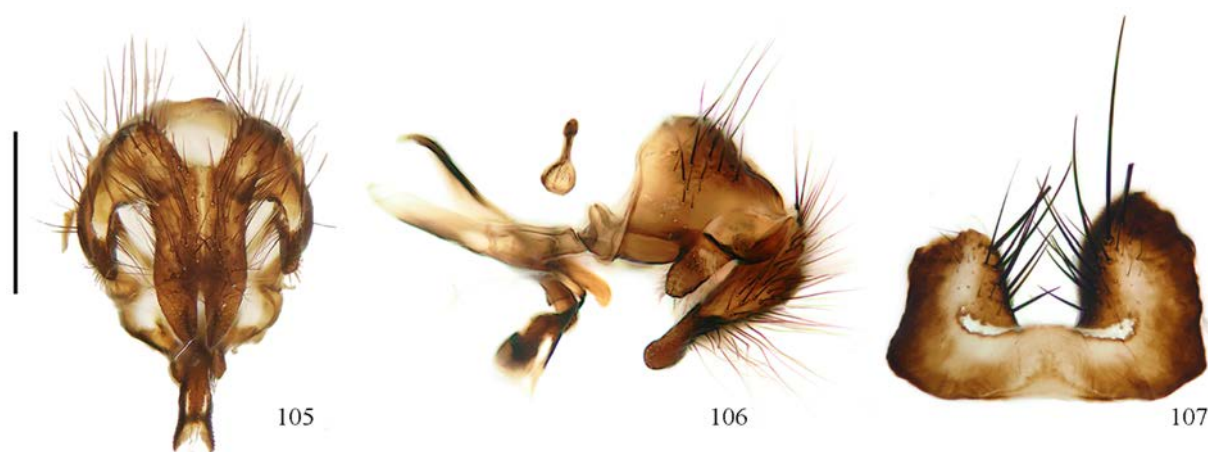
Material examined. Holotype ♂, China, Yunnan, Shangri-la, Napahai, 3300 m, 27.V.2007, D.D. Wang (SYNU). Paratypes. China, Yunnan, 1♂, Zhongdian to Zhongshan, 3350 m, 20.V.2001, Y.F. Tong; 1♀, Bitahai, 3700 m, 26.V.2007, S.C. Bai; 2♀, same as holotype (SYNU).

Etymology. Specific name is taken from the type locality, Yunnan.

Distribution. China (Yunnan).



Figures 97–104. *Gonio yunnanensis* Hou, Yang & Zhang, **sp. nov.** 97–100. Male. 101–104. Female. 97, 101. Body in dorsal view. 98, 102. Body in lateral view. 99, 103. Head in lateral view. 100, 104. Head in anterior view.



Figures 105–107. *Gonio yunnanensis* Hou, Yang & Zhang, **sp. nov.** 105. Cerci, surstylus and epandrium in posterior view. 106. Cerci, surstylus, epandrium, aedeagal apodeme, hypandrium, phallus, pregonite and postgonite in later view. 107. Sternite 5. Scale bar = 0.5 mm.

#### Key to species of *Gonio* from China.

1. Parafacial with 5 rows of long black setae; tegula brown; basicosta dark yellow ..... *G. yunnanensis* Hou, Yang & Zhang, **sp. nov.**  
Parafacial usually with 1–4 rows weak hairs; few with a row of strong setae ..... 2
2. Thorax with yellow hairs; tegula and basicosta yellow; tergite 5 only with median discal setae ..... 3  
Thorax with black hairs, without yellow hairs ..... 4

3. Postsutural dorsum with black hairs; femora black; abdomen with evenly dense pruinosity, without black band.....*G. chinensis*  
 Postsutural dorsum with yellow hairs; legs yellow .....*G. klapperichi*
4. Abdomen syntergite 1+2 medially not excavated to posterior margin, without median marginal seta; upper occiput behind postocular setae with a row of black setae..... *G. atra*  
 Abdomen syntergite 1+2 medially excavated to posterior margin; upper occiput behind postocular setae without black seta.....5
5. Abdomen yellow brown to orange brown; tergite medially with black pruinosity band.....6  
 Abdomen almost completely black or dark brown.....13
6. Antenna entirely orange, fronto-orbital plate setae slightly fine .....*G. ussuriensis*  
 Antenna black or most black, fronto-orbital plate setae normal or thick.....7
7. Parafacial setae on anterior portion slightly larger than posterior ones; postocular setae fine .....8  
 Parafacial setae on anterior portion strongly larger than posterior ones; postocular setae stubby.....12
8. Parafacial narrowly anteriorly, vibrissa about 1/2 as long as parafacial ..... *G. ornata*  
 Parafacial widely anteriorly, vibrissa longer than 1/2 parafacial.....9
9. Parafacial, fronto-orbital plate with weak pruinosity, 2 postvertical setae .....10  
 Parafacial, fronto-orbital plate with densely greyish white pruinosity, 1 postvertical seta.....11
10. Parafacial slightly narrow, female and male abdominal syntergite 1+2 both with median marginal setae, tergites 3 and 4 of male with erect tiny hairs.....*G. divisa*  
 Parafacial slightly wide, only male abdominal syntergite 1+2 with 2 median marginal setae, tergite 3 and 4 of female and male both with inclined tiny hairs..... *G. foersteri*
11. Abdomen with a narrow reverse triangular black marking, base of tergites 3 and 4 with grey white pruinosity band, tergite 5 entirely with thin greyish white pruinosity..... *G. vacua*  
 Abdomen tergites 3 and 4 with reddish yellow marking on both sides, base of tergites 3 to 5 separately with greyish white pruinosity band.....*G. picea*
12. Abdominal syntergite 1+2 with 2 median marginal setae ..... *G. capitata*  
 Abdominal syntergite 1+2 without median marginal seta .....*G. bimaculata*
13. Occipital hairs yellow brown, only male abdominal syntergite 1+2 with 2 median marginal setae ..... *G. olgae*  
 Occipital hairs black, female and male abdominal syntergite 1+2 both with 2 median marginal setae ..... *G. nigricoma*

**Funding** This study was supported by the National Natural Science Foundation of China (312722279, 31750002) and Ministry of Science and Technology of the People's Republic of China (2005DKA21402).

**Acknowledgements** We are particularly grateful to Dr. H.P. Tschorsnig (Staatliches Museum für Naturkunde, Stuttgart, Germany, SMNS), who generously provided the valuable material for species comparison, and the collectors of the Chinese specimens of *Gonia* for their contributions to this study, and two anonymous reviewers and the editor, Dr. Fuqiang Chen, for their useful suggestions and patient correction to this paper.

## References

- Chao, C.M., Shi, Y.S. 1982. Diptera: Tachinidae-Tachininae. In: The Scientific Expedition Team of Chinese Academy of Sciences to the Qinghai-Xizang Plateau (eds), *Insects of Xizang*. Vol. 2. Science Press, Beijing. pp. 235–281.
- Chao, C.M., Shi, Y.S., Liang, E.Y., Zhou, S.X., Sun, X.K. 1998. Family Tachinidae. In: Xue, W.Q., Chao, C.M. (eds.), *Flies in China*, Vol. 2. Liaoning Science and Technology Press, Shenyang. pp. 1661–2206.
- de Geer, C. 1776. *Memoires Pour Servir a l'Histoire des Insectes*. Tome sixieme. P. Hesselberg, Stockholm. viii+522+[1 (Errata)] pp.+30 pls.
- Fan, Z.D., Chao, J.M., Chen, Z.Z. 1992. *Key to The Common Flies of China. Edition II*, Science Press, Beijing. 1080pp.
- Lee, H.S., Han, H.Y. 2010. A systematic revision of the genus *Gonia* Meigen (Diptera: Tachinidae) in Korea. *Animal Cells and Systems*, 14(3): 175–195.
- Herting, B. 1972. Die Typenexemplare der von Meigen (1824–1838) beschriebenen Raupenfliegen (Dipt. Tachinidae). *Stuttgarter Beiträge zur Naturkunde*, 243: 1–15.
- Herting, B. 1984. Catalogue of Palearctic Tachinidae (Diptera). *Stuttgarter Beiträge zur Naturkunde*. Serie A (Biologie), 369: 1–228.
- Herting, B., Dely-Draskovits, Á. 1993. Family Tachinidae. In: Soós, Á., Papp, L. (eds.), *Catalogue of Palearctic Diptera. Volume 13. Anthomyiidae–Tachinidae*. Hungarian Natural History Museum, Budapest. pp. 118–458.
- Meigen, J.W. 1803. Versuch einer neuen Gattungs Eintheilung der europäischen zweiflügligen Insekten. *Magazin für Insektenkunde*, 2: 259–281.



- Meigen, J.W. 1826. *Systematische Beschreibung der Bekannten Europäischen Zweiflügeligen Insekten*. Fünfter Theil. Schulz, Hamm. xii +412pp.+pls. 42–54.
- Meigen, J.W. 1838. *Systematische Beschreibung der Bekannten Europäischen Zweiflügeligen Insekten*. Siebenter Theil oder Supplementband. Schulz, Hamm. xii+434pp.+pls. 67–74.
- Mesnil, L.P. 1956. 64g. Larvaevorinae (Tachininae). *Die Fliegen der Palaearktischen Region*, 10 (Lieferung 192): 513–554.
- O'Hara, J.E. 2002. Revision of the Polideini (Tachinidae) of America north of Mexico. *Studia dipterologica*, Supplement 10: 1–170.
- O'Hara, J.E. 2016. World genera of the Tachinidae Diptera and their regional occurrence. Version 9.0. PDF document, 93 pp. Available from [http://www.nadsdiptera.org/Tach/WorldTachs/Genera/Gentach ver9.pdf](http://www.nadsdiptera.org/Tach/WorldTachs/Genera/Gentach%20ver9.pdf) (accessed 7 April 2017).
- O'Hara, J.E., Shima, H., Zhang, C.T. 2009. Annotated catalogue of the Tachinidae (Insecta: Diptera) of China. *Zootaxa*, 2190: 1–236.
- Robineau-Desvoidy, J.B. 1830. Essai sur les myodaires. *Mémoires présentés par divers Savans a l'Académie Royale des Sciences de l'Institut de France. Sciences Mathématiques et Physiques*, Sér. 2, 2: 1–813.
- Rohdendorf, B.B. 1927. Kurze Uebersicht der paläarktischen *Salmacia* (*Gonia*) Arten, nebst der Beschreibung einer neuen Art aus Turkestan (Diptera, Tachinidae). *Russkoe Entomologicheskoe Obozrenie*, 21: 91–95.
- Rohdendorf, B.B. 1928. Beiträge zur Kenntnis der *Salmacia* (*Gonia*) Gruppe. (Diptera, Tachinidae). *Zoologischer Anzeiger*, 78: 97–102.
- Sabrosky, C.W., Arnaud, P.H. Jr. 1965. Family Tachinidae (Larvaevoridae). In: Stone, A., Sabrosky, C.W., Wirth, W.W., Foote, R.H., Coulson, J.R. (eds.), *A Catalog of the Diptera of America North of Mexico*. United States Department of Agriculture. Agriculture Handbook 276. iv+1696 pp.
- Stireman, J.O., O'Hara, J.E., Wood, D.M. 2006. Tachinidae: evolution, behavior, and ecology. *Annual Review of Entomology*, 51: 525–555 + 2 pls.
- Tschorsnig, H.P. 1985. Taxonomie forstlich wichtiger Parasiten: Untersuchungen zur Struktur des männlichen Postabdomens der Raupenfliegen (Diptera, Tachinidae). *Stuttgarter Beiträge zur Naturkunde. Serie A (Bilologie)*, 383: 1–137.
- Tschorsnig, H.P., Richter, V.A. 1998. Family Tachinidae. In: Papp, L., Darvas, B. (eds.), *Contributions to a Manual of Palaearctic Diptera (with special reference to flies of economic importance)*. Volume 3. Higher Brachycera. Science Herald, Budapest. pp. 691–827.
- Wiedemann, C.R.W. 1819. Beschreibung neuer Zweiflügler aus Ostindien und Afrika. *Zoologisches Magazin*, 1(3): 1–39.
- Wiedemann, C.R.W. 1824. *Munus rectoris in Academia Christiana Albertina aditurus analecta entomologica ex Museo Regio Havniensi*. Kiel. 60 pp. + 1 pl.
- Zhang, C.T. *et al.* 2016. *Tachinidae of Northeast China*. Science Press, Beijing. 698 pp.