



## A taxonomic revision of the genus *Diplonevra* Lioy (Diptera: Phoridae) from China

GUANG-CHUN LIU<sup>1</sup> & MENG YANG

Key Laboratory of Urban Integrated Pest Management and Ecological Security of Liaoning Province, College of Life Science and Bioengineering, Shenyang University, Shenyang, Liaoning, PR China

<sup>1</sup>Corresponding author. E-mail: [Liugc01@126.com](mailto:Liugc01@126.com)

### Abstract

The Chinese species of *Diplonevra* are revised, with 16 recognised species from both the Oriental and Palaearctic parts of China. The following 8 species are described as new to science: *D. corniculata* sp. nov., *D. trapezia* sp. nov., *D. vecticrassa* sp. nov., *D. lamella* sp. nov., *D. furcavectis* sp. nov., *D. brevicula* sp. nov., *D. triangulata* sp. nov., *D. spinibotra* sp. nov. All known species are re-identified, re-described and illustrated. Diagnostic characters of the base of the posterior face of the hind trochanter and femur are depicted in detail. A revised identification key to Chinese species based on males is presented.

**Key words:** Diptera, Phoridae, *Diplonevra*, new species, identification key, China

### Introduction

The genus *Diplonevra* Lioy is a large group of scuttle flies with 90 recorded species worldwide. The species of the genus are often of medium to large sizes and are frequently collected by general methods. The adults of some species tend to lay eggs on animal carcass (Schmitz 1949) and some are known to visit flowers (Disney 1994). The larvae of the genus include scavengers, fungivores, necrophages, sometimes associated with social insects (see review in Disney 1994). The necrophagous species *D. peregrina* Wiedemann distributed abundantly in China, the morphology of its immature stage were observed in detail (Feng & Liu 2012).

The Palaearctic species of the genus, especially in the western parts of the region, were intensively investigated. They were summarized by Schmitz (1949), and augmented by the key to British species (Disney 1983). The species from the Russian Far East were recorded by Michailovskaya (1990, 2000). For the Oriental Region, scattered records were made from India (Brunetti 1912; Schmitz 1915; Mitra et al. 2016), China (Taiwan) (Brues 1911, 1924), the Philippines (Brues 1936), Burma (Beyer 1958a) and Indonesia (Borgmeier 1967; Disney 1986, 1990). Disney (1986, 1990) discussed the hypopygium of the genus and keyed the Australasian and Oriental species.

China, belonging to the Palaearctic and Oriental regions, is important in zoogeographical terms. However, our knowledge of scuttle flies from this country is still limited, and the genus *Diplonevra* is particularly poorly known. The species *D. peregrina* (Wiedemann 1830) was the first scuttle fly recorded from mainland China. In addition to reporting its distribution of the aforementioned species, Brues (1911, 1924) also recorded the other two species, *D. fasciventris* (Brues) and *D. bifasciata* (Walker), from Taiwan. Prior to this study, there were six *Diplonevra* species known in mainland China (Liu 1993, 1995, 2001). In the present paper, 16 species from China are recorded, of which eight are described as new to science. All previously recorded species have been re-identified, re-described and illustrated. A revised key to the males of the Chinese species is provided.

## Materials and methods

Most specimens were collected into 80% ethanol by sweep nets and Malaise traps. The head, legs and wing were detached and slide-mounted according to Disney (1994).

The recognition of *Diplonevra* species is mostly based on males. Males and females are dimorphic in many characters, and cannot be confidently associated in most cases. Among males, the most important characters are found at the base of the posterior face of the hind femur and trochanter, which were first used by Schmitz (1927, 1949, in the genus *Dohrniphora*) and by Disney (1983, in the genus *Diplonevra*). Usually this area contains differentiated bristles and a process, which are different among species in morphology, number and arrangement. Most species need to be re-examined, to determine the character states in this part of the body, to allow development of a more rational basis for the species in the group (Corona & Brown 2005).

In this paper, all images have been prepared by using microscope Leica M205A and Leica DM5500B with CCD 450 multi-focus imaging system. The type specimens are deposited in the Shenyang University Museum of Natural History (SUMN), Shenyang, China.

## Genus *Diplonevra* Lioy

*Diplonevra* Lioy, 1864: 77. Type species: *Bibio florea* Fabricius, 1794=*Musca florescens* Turton, 1801.

*Diplonevra* (emend.): Enderlein, 1924: 272.

*Phorynchus* Brunetti, 1912: 445. Type species: *Phorynchus ater* Brunetti, 1912. Synonymized by Schmitz 1931: 43.

*Pentagynoplax* Enderlein, 1924: 273. Type species: *Phora crassicornis* Meigen, 1830. Synonymized by Schmitz 1927a: 50; 1929: 106.

*Apopterymyia* Beyer, 1958b: 121. Type species: *Apopterymyia gynaptera* Fuller & Lee, 1938. Synonymized by Disney 1990: 33.

**Diagnosis.** One pair reclinate supra-antennal bristles present. Anepisternum bare, undivided. Mid tibia with near basal pair of isolated bristles. Hind tibia with 2–3 longitudinal hair palisades. Posterior face of hind femur with some differentiated bristles and hairs. Wing vein  $R_{2+3}$  present. Small hairs limited to basal quarter of Rs. Costal cilia normally pubescent. Axillary ridge with more than one bristle. Base of cerci separated from epandrium.

**Distribution.** Cosmopolitan.

## Key to Chinese species (males only)

1. Hind tibia with 3 longitudinal hair palisades; wing vein  $R_{4+5}$  straight ..... 2
- Hind tibia with 2 longitudinal hair palisades; wing vein  $R_{4+5}$  curved ..... 4
2. Hind tibia with 1 anterodorsal bristle before apical quarter; left side of hypandrium elongate and semicircular at tip. ....  
..... *D. bifasciata* (Walker)
- Hind tibia with 2 or 3 anterodorsal bristles; left hypandrium not elongate. .... 3
3. Hind tibia with 2 anterodorsal bristles; dorsal and posterodorsal hair palisades on hind tibia converge at mid-length of tibia; abdominal venter pale yellow ..... *D. bisetifera* Liu
- Hind tibia with 3 anterodorsal bristles before apical quarter; dorsal and posterodorsal hair palisades of hind tibia not converged; abdominal venter dark brown. .... *D. abbreviata* (v. Roser)
4. Hind tibia with isolated bristle(s) before apical quarter ..... 5
- Hind tibia without any isolated bristle before apical quarter ..... 12
5. Hind tibia with anterodorsal bristles before apical quarter ..... 6
- Hind tibia without anterodorsal bristles, but with anteroventral bristles before apical quarter ..... 9
6. Hind tibia with 2–4 anteroventral bristles and 3–4 anterodorsal bristles; abdominal tergites alternated with yellow and black color. .... *D. peregrina* (Wiedemann)
- Hind tibia without anteroventral bristles; abdominal tergites uniformly dark brown. .... 7
7. Hind tibia with 1 anterodorsal bristles; basal ascending process of posterior face of hind femur short, trapezoid, with 2 fine and long hairs. .... *D. trapezia* sp. nov.
- Hind tibia with 2 anterodorsal bristles; without ascending process on posterior face of hind femur. .... 8
8. Base of posterior face of hind femur extending to the base and forming a horn-like process, bearing 4 bristles apically. ....  
..... *D. corniculata* sp. nov.
- Base of posterior face of hind femur not extending to the base and without a horn-like process; with 4 short bristles in a row. .  
..... *D. florescens* (Turton)

9. Proboscis elongated, narrow, and elbowed; hind trochanter with a cluster of very short blunt bristles . . . . *D. funebris* (Meigen)  
 - Proboscis short and frequently bulbous basally; hind trochanter with normally tapered bristles . . . . . 10
10. Base of posterior face of hind femur without an ascending process, with 4–5 bristles and several hairs; posterior face of trochanter with 5–6 bristles . . . . . *D. pachycera* (Schmitz)  
 - Base of posterior face of hind femur with an ascending process bearing bristles at the tip; posterior face of trochanter with curved bristles or bristles plus fine hairs . . . . . 11
11. Ascending process of posterior face of hind femur long, belt-like, with 2 stout bristles at the tip; posterior face of trochanter with 6 bristles plus several fine hairs . . . . . *D. vecticrassa* sp. nov.  
 - Ascending process of base of posterior face of hind femur composed of 2 lamellar structures, each bearing a strong bolt-like bristle apically; posterior face of trochanter with 4 curved bristles . . . . . *D. lamella* sp. nov.
12. Ascending process of posterior face of hind femur triangular . . . . . 13  
 - Ascending process of posterior face of hind femur rectangular, belt-like . . . . . 14
13. Base of posterior face of hind femur with 12–15 bristles, which thinner than those on trochanter . . . . . *D. spinibotra* sp. nov.  
 - Base of posterior face of hind femur with 4–8 bristles, which as thick as those on trochanter. . . . . *D. triangulata* sp. nov.
14. Last tarsomere of fore leg widened; hind trochanter with bifid bristles . . . . . *D. furcavectis* sp. nov.  
 - Last tarsomere of fore leg not widened; hind trochanter without bifid bristles . . . . . 15
15. Ascending process longer than broad with two long and fine hairs . . . . . *D. taigaensis* Michailovskaya  
 - Ascending process shorter than broad with three fine hairs . . . . . *D. brevicula* sp. nov.

## Description of species

### *Diplonevra bifasciata* (Walker)

(Figs. 1, 2, 33, 49)

*Phora bifasciata* Walker, 1860: 172 (♀: Celebes).

*Diploneura (Tristoechia) bifasciata* (Walker): Schmitz 1929: 105.

*Phora egregia* Brues, 1911: 534. Synonymized by Schmitz, 1929: 105.

*Phora bicolorata* Becker, 1914: 88. Synonymized by Schmitz, 1929: 105.

*Phora cinctiventris* Senior-White, 1922: 154. Synonymized by Schmitz, 1929: 79.

**Male:** Head. Frons black, subshining, with 16–18 scattered setae. Mean frontal width 0.41 of head width. First row of bristles convex, antial bristles further apart than either is from an anterolateral. Second row of bristles strongly concave, pre-ocellar bristles further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brownish yellow, oval. Arista dark brown. Palpus dusky orange and 3 times as long as its breadth, with 6 bristles on ventral apex. Proboscis short, pale yellow. Thorax. Scutum and scutellum black. Anepisternum and anepimeron dark brown; the other part of pleuron pale yellow. Notopleuron with 4 bristles. Scutellum with 4 long bristles. Legs yellow except for tips of hind femora and hind tibiae and tarsi. Front tibia with a dorsal bristle two fifths of length from base and with 7–10 small differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one sharply deflected onto anterior face and extending to the tip of tibia. Posterior face of hind trochanter with 1 stout differentiated bristle. Ventral region of posterior face of hind femur with 2 short bristles and several fine hairs, lacking ascending process. Hind tibia with 1 anterodorsal bristle. Wing 3.6–3.8 mm long. Costal index 0.51–0.52. Costal ratios 5.4–5.6:1.4–1.5:1. Costal cilia 0.06–0.07 mm long. Vein  $M_1$  straight. Axillary ridge with 3 bristles. All veins brown and membrane yellowish brown. Haltere pale yellow. Abdomen. Tergites dark brown except tergite 1 and anterior half of tergite 2 pale yellow, with small hairs on tergites 1–5, but longer hairs on tergite 6. Venter pale yellow. Hypopygium brown. Left side of epandrium narrow with 4–8 long hairs. Right side of epandrium broad, with about 8–10 long hairs toward posterior margin; ventral apex with an incurved hook. Left side of hypandrium elongate and arc-shaped apically; right side of hypandrium tomentose. Circus and stalk of circus pale yellow. Body length 3.0–4.0 mm.

Female. Head similar to male except as follows. Frons black, shining. Postpedicel orange yellow. Proboscis pale yellow, elbowed, elongate, extending beyond postpedicel. Wing 4.5–5.6 mm long. Costal index 0.5–0.51. Costal ratios 7–8.5:3.0–3.25:1. Costal cilia 0.1 mm long. Abdominal tergites 1 and 5 pale yellow, the other tergites dark brown. Body length 4.0–6.0 mm.

**Distribution.** China (Liaoning, Gansu, Guangdong, Guangxi, Guizhou, Yunnan, Hainan, Taiwan); Japan, Thailand, India.

**Specimens examined.** 2♂, Yunnan, Menglun (21°57'N, 101°15'E), 22–May–1991, Guangchun Liu; 1♀, Yunnan, Mengyang (22°09'N, 100°91'E), 6–Jun–1991, Guangchun Liu; 2♂5♀, Guangxi, Nonggang

(11°35'N, 106°89'E), 3–Jun–1993, Yongsheng Cui; 2♀, Hainan, Jianfeng (18°43'N, 108°48'E, 800m), 20–May–2004, Guangchun Liu; 1♂, Liaoning, Benxi, Xinbin (124°32'E, 41°91'N), 26–Aug–2009, Tao Li; 1♀, Guangdong, Nanling (24°45'N, 112°52'E, 1000m), 27–Jul–2011, Jianfeng Wang; 1♂, 25–Jul–2011, Gansu, Huixian, Fengshan Mountain (33°46'E, 106°04', 924m), Lixin Su; 2♂, 19–Jul–2015, Guizhou, Libo County (25°17'N, 107°56'E), Zhiqiang Cheng, Chaoyi Zhang; 1♀, Guizhou, Libo County (25°17'N, 107°56'E), 21–Jul–2015, Chaoyi Zhang; 1♂, Guangxi, Mulun (25°09'N, 108°01'E), 24–Jul–2015, Zhiqiang Cheng; 1♂1♀, Guangxi, Mulun (25°02'N, 108°02'E), 26–Jul–2015, Chaoyi Zhang; 2♀, Guangxi, Mulun (25°02'N, 108°02'E), 26–Jul–2015, Zhiqiang Cheng.

**Remarks.** The species is one of the largest-sized scuttle flies in the genus. It is easily distinguished from other species by the following characters: hind tibia with 3 longitudinal hair palisades and 1 anterodorsal bristle before apical quarter; wing vein  $M_1$  straight; abdominal tergites 2–5 dark brown and venter pale yellow; Female abdominal tergites 1 and 5 yellow.

### *Diplonevra abbreviata* (von Roser)

(Figs. 3, 4, 34, 50)

*Phora abbreviata* v. Roser, 1840: 64.

*Diplonevra (Tristoechia) abbreviata* (v. Roser): Schmitz, 1927a: 47.

*Phora sordipennis* Dufour, 1841: 422. Synonymized by Becker 1901: 22.

Male: Head. Frons black, with 40–50 scattered hairs. Mean frontal width 0.45 of head width. First row of bristles slightly convex, antial bristles further apart than either is from an anterolateral. Second row of bristles much concave, pre-ocellar bristles further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brownish yellow, oval. Palpus orange yellow and 2 times as long as its breadth, with 6 bristles on ventral apex and about 20 short bristles on venter. Proboscis pale yellow, broad and long. Thorax. Scutum and scutellum black. Anepisternum and anepimeron dark brown; the other part of pleuron pale yellow. Notopleuron with 4 bristles. Scutellum with 4 long bristles. Legs yellow except for tips of hind femora and hind tibiae and tarsi. Front tibia with a dorsal bristle two fifths of length from base and with 6–8 small differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one slightly deflected onto anterior face and extending to 5/6 (0.85) of tibia. Posterior face of hind trochanter without differentiated bristles. Posterior face of hind femur with 2 short bristles and several hairs along ventral region, lacking ascending process. Hind tibia with 3 anterodorsal bristles and 3 hair palisades, without converged. Wing 3.21 mm long. Costal index 0.46. Costal ratios 13.7:2.1:1. Costal cilia 0.1 mm long. Vein  $M_1$  straight. Axillary ridge with 3 axillary bristles. All veins brown and membrane yellowish brown. Haltere pale yellow. Abdomen. Tergites dark brown except tergite 1 pale yellow, with small hairs on tergites 1–5, but longer hairs on tergite 6. Venter dark brown. Hypopygium dark brown. Left side of epandrium narrow, with 8–10 long hairs and 1 bristle. Right side of epandrium broad, with about 14–20 long hairs toward posterior margin. Left side of hypandrium protruding transparent lobe, tomentose; right side of hypandrium large, ventral apex with an incurved hook. Stalk of circus yellow brown and circus pale yellow. Body length 2.7–3.2 mm.

Female. Head similar to male except as follows. Frons black, shining. Postpedicel orange yellow. Proboscis pale yellow, elongate, extending beyond postpedicel. Wing 4.0 mm long. Costal index 0.46–0.48. Costal ratios 8.1:1.6:1. Costal cilia 0.10 mm long. Abdominal tergites dark brown. Venter dark brown. Body length 3.6–4.0 mm.

**Distribution.** China (Jilin, Liaoning, Shaanxi, Guizhou, Yunnan, Hainan); Japan, Russia, Norway, United Kingdom, Slovakia.

**Specimens examined.** 1♂, Jilin, Changbai Mountain (43°25'N, 129°44'E), 27–Jul–2007, Hong Fang; 3♂, Liaoning, Shenyang (41°50'N, 123°35'E), 13–Aug–1991, Guangchun Liu; 1♂, Liaoning, Qianshan (41°14'N, 123°11'E), 8–Jul–2007, Hong Fang; 1♂, Jilin, Changbai Mountain (42°25'N, 129°45'E), 27–Jul–2003, Hong Fang; 1♀, Jilin, Changbai Mountain (42°25'N, 129°45'E), 26–Jul–2007, Hong Fang. 1♂, Jilin, Changbai Mountain (42°25'N, 129°45'E), 8–Jul–2004, Hong Fang, Hongtao Han; 1♂, Beijing (39°59'N, 110°12'E), 28–Jul–2011, Maoling Sheng; 1♀, Liaoning, Benxi, Xinbin (41°61'N, 124°98'E), 20–May–2008, Tao Li; 1♂, Liaoning, Benxi, Yanghugou (41°12'N, 124°40'E), 4–Jul–2013, Zhuo Zhang; 1♂, Shenyang, Forest Park (41°59'N, 123°39'E), 20–Aug–2003, Guangchun Liu; 1♀, Liaoning, Benxi, Yanghugou (41°12'N, 124°40'E), 28–Jul–2008, Guangchun Liu;

1♂, Shaanxi, Zhuque Park (33°54'N, 108°33'E), 17–Jul–2012, Jianfeng Wang; 1♂, Liaoning, Fushun, Xinbin (41°61'N, 124°98'E), 20–Jul–2009, Tao Li; 1♀, Yunnan, Menghai (41°62'N, 124°95'E), 11–Apr–2011, Hongwei Chen; 1♂, Guangxi, Mulun (25°02'N, 108°02'E), 21–Jul–2015, Zhiqiang Cheng; 1♂, Guizhou, Libo (25°17'N, 107°56'E), 20–Jul–2015, Zhiqiang Cheng; 1♂, Liaoning, Fushun, Wunvshan (41°19'N, 125°25'E), 6–Jul–2012, Meng Yang.

**Remarks.** The species is widely distributed in the Palaearctic Region. It can be distinguished from other species by hind tibia with 3 hair palisades and 2 anterodorsal bristles before apical quarter; wing vein  $M_1$  straight; abdominal tergites and venter uniformly dark brown.

### ***Diplonevra bisetifera* Liu**

(Figs. 5, 6, 35, 51)

*Diplonevra bisetifera* Liu, 1995: 256.

Male: Head. Frons black, subshining, with 40–50 scattered hairs. Mean frontal width 0.51 of head width. First row of bristles straight, antial bristles further apart than either is from an anterolateral. Second row of bristles much concave, pre-ocellar bristles further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brownish yellow, oval. Palpus orange yellow and 2 times as long as its breadth, with 6 bristles on ventral apex and about 20 short bristles on venter. Proboscis pale yellow. Thorax. Scutum black. Anepisternum and anepimeron dark brown, the other parts of pleuron pale yellow. Notopleuron with 4 long bristles. Scutellum with 4 bristles. Legs yellow except for tips of hind femur and hind tibia and tarsi. Front tibia with a dorsal bristle two fifths of length from base and with 7–10 small spines extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one slightly deflected onto anterior face and extending to 5/6 (0.85) of tibia. Posterior face of hind trochanter without differentiated bristles. Posterior face of hind femur with 2 short bristles and several hairs along ventral region, lacking ascending process. Hind tibia with 2 anterodorsal bristles and 3 palisades, which dorsal and posterodorsal ones converged at mid-length of tibia. Wing 3.7–3.8 mm long. Costal index 0.47. Costal ratios 12.3:2.6:1. Costal cilia 0.1 mm long. Vein  $M_1$  straight. Axillary ridge with 4–5 axillary bristles. All veins brown and membrane yellowish brown. Haltere pale yellow. Abdomen. Tergites dark brown except tergite 1 pale yellow, with small hairs on tergites 1–5, but longer hairs on tergite 6. Venter pale yellow. Hypopygium brown. Left side of epandrium narrow with 4–6 long hairs. Right side of epandrium broad, with about 6–10 long hairs toward posterior margin, ventral apex with an incurved hook. Left side of hypandrium broad, tomentose; right side of hypandrium large and broad, tomentose. Stalk of circus yellow brown and circus pale yellow. Body length 3.2 mm.

Female. Head similar to male except as follows. Frons black, shining. Postpedicel orange yellow. Proboscis pale yellow, elbowed, elongate, extending beyond postpedicel. Wing 4.0 mm long. Costal index 0.46. Costal ratios 8.5: 1.8:1. Costal cilia 0.12 mm long. Abdominal tergites dark brown. Body length 4.1 mm.

**Distribution.** China (Liaoning, Guizhou, Yunnan).

**Specimens examined.** 1♂(holotype), Yunnan, Mengyang (22°04'N, 100°52'E), 6–Jun–1991, Guangchun Liu; 1♂1♀(paratypes), Yunnan, Mengyang (22°04'N, 100°52'E), 6–Jun–1991, Guangchun Liu; 1♂, Liaoning, Funshun, Xinbin (41°61'N, 124°98'E), 5–Aug–2005, Guangchun Liu; 1♂, Liaoning, Qianshan Mountain (41°10'N, 123°06'E), 20–Jul–2007, Guangchun Liu; 1♂, Guizhou, Fanjing Mountain (27°54'N, 108°39'E), 9–Aug–2015, Zhiqiang Cheng; 1♂, Jiangxi, Jinggang Mountain (26°32'N, 114°09'E), 9–Aug–2005, Hong Fang.

**Remarks.** The species is similar to *D. abbreviata* v. Roser, it differs from latter by hind tibia with 3 hair palisades which dorsal and posterodorsal ones converged; hind tibia with 2 anterodorsal bristles before apical quarter; abdominal venter pale yellow.

### ***Diplonevra peregrina* (Wiedemann)**

(Figs. 7, 8, 36, 52)

*Trineura peregrina* Wiedemann, 1830: 600 (Canton).

*Diploneura peregrina*: Schmitz, 1929: 13.

*Phora sinensis* Schiner, 1868: 223. Synonymized by Schmitz 1949: 233.  
*Phora conventa* Brues, 1911: 537. Synonymized by Schmitz 1949: 233.  
*Dohrniphora setitibia* Malloch, 1925: 333. Synonymized by Borgmeier 1967: 131.

Male: Head. Frons yellow, with 80–100 scattered hairs. Mean frontal width 0.5 of head width. First row of bristles straight, all four bristles are equidistant. Second row of bristles concave, pre-ocellar bristles further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brownish yellow, spherical, with pointed tip. Palpus yellow and 3 times as long as its breadth, with 6–8 bristles on ventral apex and about 30 hairs on venter. Proboscis pale yellow. Thorax. Scutum and scutellum yellow. Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs yellow. Front tibia with a dorsal bristle two fifths of length from base and with 5–8 small differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one deflected onto anterior face and extending to 3/4 (0.71) of tibia. Posterior face of hind trochanter with about 10 short bristles. Posterior face of hind femur with 1 stout bristles and 20 fine hairs along ventral margin, lacking ascending process. Hind tibia with 2 palisades, 3 anterodorsal bristles and 2–4 anteroventral bristles. Wing 3.19–3.21 mm long. Costal index 0.49–0.50. Costal ratios 10.08–10.10:3.0–3.2:1. Costal cilia 0.06–0.07 mm long. Vein  $M_1$  curved. Axillary ridge with 3–5 axillary bristles. All veins brown and membrane yellowish brown. Haltere pale yellow. Abdomen. Tergites dark brown with pale yellow of anterior and posterior margins, with small hairs on tergites 1–5, but longer hairs on tergite 6. Venter light yellow. Hypopygium brown. Left side of epandrium narrow with 1 bristle and several hairs. Right side of epandrium broad, with 1 bristle and several short hairs toward posterior margin. Both sides of hypandrium broad, tomentose. Circus and stalk of circus pale yellow. Body length 3.0–4.0 mm.

Female. Head similar to male except as follows. Frons yellow, shining. Postpedicel orange yellow. Proboscis pale yellow, elongate, extending beyond postpedicel. Wing 2.75–4.25 mm long. Costal index 0.47–0.51. Costal ratios 8.5–11.4: 2.4–2.5:1. Costal cilia 0.06–0.07 mm long. Abdominal tergites dark brown, only four tergites. Body length 2.6–4.75 mm.

**Distribution.** Widely distributed in China, and in eastern and southern Asia, Japan, pacific Islands and Australia.

**Specimens examined.** 7♂5♀, Guangdong, Dinghu Mountain (23°10'N, 112°33'E), 24–Aug–1992, Guangchun Liu, WangMin; 1♂1♀, Guangxi, Guilin (25°16'N, 110°17'E), 4–Apr–1992, Guangchun Liu, Wang Min; 1♂, Guangxi, Longsheng (22°39'N, 114°01'E), 30–May–1992, Guangchun Liu, Wang Min; 1♂, Guangxi, Nanning (22°49'N, 108°22'E), 27–May–1992, Guangchun Liu, Wang Min; 4♂1♀, Guangxi, Nanning (22°49'N, 108°22'E), 15–May–1992, Guangchun Liu, Wang Min; 1♂, Guangxi, Nanning (22°49'N, 108°22'E), 10–May–1992, Guangchun Liu, Wang Min; 1♂, Guangxi, Baise (23°54'N, 106°37'E), 15–Aug–1981, Yiwang Xu; 1♂, Yunnan, Menglun (21°57'N, 101°15'E), 22–May–1991, Guangchun Liu, Yinglun Wang; 1♂, Hainan, Wuzhi Mountain (18°47'N, 109°34'E), 17–Apr–1992, Guangchun Liu, Wang Min; 1♂, Hainan, Jianfeng Mountain (18°41'N, 108°59'E), 6–Apr–1992, Guangchun Liu, Wang Min; 2♂, Shaanxi, Yangling (34°16'N, 108°07'E), 16–Oct–1991, Guangchun Liu; 1♂, Shaanxi, Yangling (34°16'N, 108°07'E), 25–Aug–1992, Guangchn Liu; 1♂, Shaanxi, Yangling (34°16'N, 108°07'E), 6–Aug–1992, Guangchun Liu; 1♂, Henan, Nanzhao (33°29'N, 112°26'E), 17–Aug–2005, Hong Fang; 1♂, Liaoning, Shenyang (41°45'N, 123°38'E), 31–Aug–1992, Guangchun Liu.

**Remarks.** The species is easily distinguished from other species of the genus by 2 hair palisades of hind tibia, 3 anterodorsal bristles and 2–4 anteroventral bristles before apical quarter of hind tibia and wing vein  $M_1$  curved.

### ***Diplonevra florescens* (Turton)**

(Figs. 9, 10, 37, 53)

*Musca florescens* Turton, 1801: 636.

*Diplonevra florescens*: Thompson & Pont, 1994:76

*Bibio florea* Fabricius, 1794: 255. Preocc. Linnaeus 1758: 519.

*Phora flexuosa* Egger, 1862: 1233. Synonymized by Schmitz, 1929: 23.

*Trineura palpina* Zetterstedt, 1848: 2868. Synonymized by Schmitz 1955: 350.

*Phora abdominalis* (Fallén), 1823: 5 (nec Meigen). Synonymized by Disney 1982: 113.

*Diploneura versicolor* (Schmitz), 1929: 184. Synonymized by Disney 1981:157.

Male: Head. Frons black, with 16–18 scattered hairs. Mean frontal width 0.48 of head width. First row of bristles slightly convex, antial bristles further apart than either is from an anterolateral. Second row of bristles concave, pre-ocellar bristles further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brownish yellow, spherical, with pointed tip. Palpus yellowish brown and 3 times as long as its breadth, with 6 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum black. Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs yellow brown. Front tibia with a dorsal bristle at mid-length and with 9 small differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one sharply deflected onto anterior face and extending 2/3 (0.68) of tibia. Posterior face of hind trochanter with 4–7 short bristles in a row and 3–5 fine hairs. Posterior face of hind femur with 5–8 short bristles and 5–6 scattered hairs, lacking ascending process. Hind tibia with 2 palisades, 2 anterodorsal bristles and lacking anteroventral bristles. Wing 3.55 mm long. Costal index 0.49. Costal ratios 5.2:2.8:1. Costal cilia 0.10 mm long. Vein  $M_1$  curved. Axillary ridge with 4–6 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown. Venter dark brown. Hypopygium dark brown. Left side of epandrium narrow with 6–8 long hairs. Right side of epandrium broad, with about 10–12 long hairs toward posterior margin, ventral apex with a recurved hook. Hypandrium tomentose, without bristles. Circus and stalk of circus pale yellow. Body length 3.5 mm.

Female. Head similar to male except as follows. Frons black, shining. Postpedicel orange yellow. Proboscis brown, longer than breadth, extending beyond postpedicel. Wing 3.5 mm long. Costal index 0.52. Costal ratios 5.18: 2.85:1. Costal cilia 0.05 mm long. Body length 3.4 mm.

**Distribution.** China (Liaoning, Ningxia, Guangxi); Russia, United Kingdom, Germany, Holland, Hungary, Italy, Austria, Portugal.

**Specimens examined.** 1♂, Ningxia, Liupan Mountain (35°47'N, 106°17'E), 10–Jul–2008, Lixin Su; 1♂1♀, Guangxi, Maoer Mountain (25°42'N, 110°48'E, 800m), 14–May–2004, Guangchun Liu; 1♂, Liaoning, Qianshan (41°08'N, 123°16'E), 8–Jul–2004, Hong Fang; 1♂, Ningxia, Liupan Mountain, (35°47'N, 106°17'E), 9–Jul–2008, Lixin Su.

**Remarks.** The species is different from other species of genus by wing vein  $M_1$  curved, hind tibia with 2 anterodorsal bristles, without ascending process on posterior face of hind femur, base of posterior face of hind femur with 4 short bristles in a row.

### ***Diplonevra corniculata* sp. nov.**

(Figs. 11, 12, 38, 54)

Male: Head. Frons black, with 20–30 scattered hairs. Mean frontal width 0.51 of head width. First row of bristles slightly convex, antial bristles further apart than either is from an anterolateral. Second row of bristles concave, pre-ocellars further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brown dorsally and yellow ventrally, spherical with pointed tip. Arista brown. Palpus yellow and 2.5 times as long as its breadth, with 6–7 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum black. Pleuron black brown, tomentose, shiny. Notopleuron with 4 bristles. Scutellum with 4 bristles. Legs brown. Front tibia with a dorsal bristle two fifths of length from base and with 8–10 small differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one sharply deflected onto anterior face and extending to 2/3 (0.68) of tibia. Posterior face of hind trochanter with 3 bristles laterally. The base of hind femur extending rearwards and forming a horn-like tip which bearing 3 bristles closed each other, lacking ascending process. Hind tibia with 2 stout, anterodorsal bristles, lacking anteroventral bristles. Wing 2.74 mm long. Costal index 0.56. Costal ratios 3.7: 2.0:1. Costal cilia 0.04–0.05 mm long. Vein  $M_1$  curved. Axillary ridge with 4 axillary bristles. All veins brown and membrane yellowish brown. Haltere pale brown. Abdomen. Tergites dark brown except tergite 1 and anterior half of tergite 2 pale yellow, with small hairs on tergites 1 to 5, but longer hairs on tergite 6. Venter brown. Hypopygium brown. Left side of epandrium narrow, finger-like, with 6–8 long hairs. Right side of epandrium broad, with about 14–18 long hairs toward posterior margin; ventral apex with an incurved hook. Hypandrium tomentose. Anal tube long. Circus and stalk of circus pale yellow. Body length 3.0 mm.

Female. Unknown.

**Distribution.** China (Guizhou, Hainan).

**Etymology.** The specific epithet refers to the horn-like base of hind femur.

**Holotype:** ♂, Guizhou, Leigong Mountain (26°23'N, 108°12'E), 2–Aug–2015, Chaoyi Zhang; **Paratypes:** 1♂, Guizhou, Leigong Mountain (26°23'N, 108°12'E), 2–Aug–2015, Zhiqiang Cheng; 1♂, Guizhou, Leigong Mountain (26°23'N, 108°12'E), 2–Aug–2015, Zhiqiang Cheng; 1♂, Guizhou, Leigong Mountain (26°23'N, 108°12'E), 3–Aug–2015, Lixin Su; 1♂, Guizhou, Leigong Mountain (26°23'N, 108°12'E), 1–Aug–2015, Lixin Su; 1♂, Guizhou, Leigong Mountain (26°23'N, 108°12'E), 1–Aug–2015, Lixin Su; Hainan, Jianfeng (18°41'N, 108°59'E), 28–May–1993, Yongsheng Cui.

**Remarks.** In the key to palaeartic species of *Diplonevra* (Schmitz 1949) the species runs to couplets 5 to *D. florescens*, but it can be easily distinguished by the horn-like base of hind femur.

### ***Diplonevra trapezia* sp. nov.**

(Figs. 13, 14, 39, 55)

**Male:** Head. Frons black, with 70–80 scattered hairs. Mean frontal width 0.52 of head width. First row of bristles slightly convex, antial bristles further apart than either is from an anterolateral. Second row of bristles slightly concave, pre-ocellars closer than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brown, spherical with pointed tip. Arista yellowish brown. Palpus pale yellow and 3 times as long as its breadth, with 6 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum black, Notopleuron with 4 bristles. Scutellum with 4 bristles. Legs yellow brown. Front tibia lacking near-dorsal bristle and differentiated hairs, tarsomere 5 widened. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight and extending to 1/4(0.27) of tibia. Posterior face of hind trochanter with 4–5 bristles. Posterior face of hind femur with 5–6 stout bristles and several fine hairs along ventral margin. Ascending Process short, trapezoid, with 2 long and 1 short hairs apically. Hind tibia with 1 weak, anterodorsal bristle. Wing 1.64 mm long. Costal index 0.52. Costal ratios 4.6:1.24:1. Costal cilia 0.06 mm long. Vein  $M_1$  curved. Axillary ridge with 3 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown except tergite 1 and anterior half of tergite 2 pale yellow, with small hairs on tergites 1–5, but longer hairs on tergite 6. Venter light yellow. Hypopygium brown, boot-like. Left side of epandrium triangular, with 18–20 long hairs. Right side of epandrium broad, with about 18–20 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus brown and stalk of circus pale brown. Body length 1.58 mm.

**Female.** Unknown.

**Distribution.** China (Inner Mongolia).

**Etymology.** The specific epithet refers to the trapezoid ascending process on the posterior face of the hind femur.

**Holotype:** ♂, Inner Mongolia, Wusutu (40°51'N, 111°58'E), 20–Jul–2004, Hong Fang.

**Remarks.** In the key to palaeartic species of *Diplonevra* (Schmitz 1949) the new species runs to couplet 5 to *D. florescens*, it differed from latter by 1 anterodorsal bristle of hind tibia, a short, trapezoid ascending process of posterior face of hind femur.

### ***Diplonevra funebris* (Meigen)**

(Figs. 15, 16, 40, 56)

*Phora funebris* Meigen, 1830: 221.

*Diploneura (Diploneura) funebirs*: Schmitz, 1927a: 44.

*Phora pseudoconcinna* Strobl, 1892: 199. Synonymized by Schmitz, 1949: 225.

*Phora luctuosa* Becker, 1901: 72. (nec Meigen). Synonymized by Schmitz, 1949: 225.

*Dohrniphora concinna* Malloch, 1912: 431. Synonymized by Schmitz, 1924: 316.

*Dohrniphora concinna* var. *rostralis* Schmitz, 1918: 111. Synonymized by Lundbeck, 1922: 154.

*Phora cimbicis* Aldrich, 1892: 143. Synonymized by Brues, 1904: 318.

**Male:** Head. Frons black, subshining, with 70–80 scattered hairs. Mean frontal width 0.51 of head width. First row of bristles straight, antial bristles further apart than either is from an anterolateral. Second row of bristles concave, all four bristles are equidistant. Supra-antennal bristles well below antials and close each other. Postpedicel brown,



spherical with pointed tip. Palpus yellow brown and 2.5 times as long as its breadth, with 6 bristles on ventral apex. Proboscis narrow, elongate. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles, the anterior pair being shorter than two behind. Legs dark brown. Front tibia with a dorsal bristle two fifths of length from base and with 8–10 differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight, extending to more than 1/2 (0.59) of tibia. Posterior face of hind trochanter with 20–15 short bristles on ventral region and three stronger bristles on lateral region. Ventral region of posterior face of hind femur with 6 bristles in a row, and with a long ascending process bearing two long hairs apically. Hind tibia with 2 hair palisades, 2–3 anteroventral bristles, lacking anterodorsal bristles. Wing 1.88 mm long. Costal index 0.45. Costal ratios 7.9: 1.3:1. Costal cilia 0.05 mm long. Vein  $M_1$  curved. Axillary ridge with 3 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown. Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow, finger-like, with 11–12 long hairs. Right side of epandrium broad, with about 15–20 long hairs toward posterior margin; ventral apex with an incurved hook. Hypandrium tomentose, without bristles. Circus brown and stalk of circus yellow brown. Body length 2.2–2.6 mm.

**Distribution.** China (Liaoning, Inner Mongolia, Beijing, Gansu); widely distributed in Holarctic Region.

**Specimens examined.** 2♂, Beijing, Xiangshan (39°59'N, 110°12'E), 17-Jul-2004, 6♂, Inner Mongolia, Hohhot, Zhaojun Tomb (40°42'N, 111°41'E), 19-Jul-2004, Hong Fang; 1♂, Inner Mongolia, Hohhot, Botanical Park (40°49'N, 111°41'E), 19-Jul-2004, Hong Fang; 1♂, Ningxia, Qingtongxia (38°03'N, 106°05'E), 24-Jul-2004, Hong Fang; 1♂, Gansu, Dunhuang (40°08'N, 94°40'E), 4-Aug-2004, Hong Fang; 1♂, Liaoning, Huludao, Nanpiao (41°06'N, 120°45'E), 20-Jul-2005, Hongtao Han; 2♂, Liaoning, Xiongyue (40°12'N, 122°08'E), 5-Jul-2005, Hongtao Han; 1♂, Inner Mongolia, Helan Mountain (38°50'N, 105°40'E), 28-Jul-2010, Yunlong Cai; 1♂, Inner Mongolia, Helan Mountain (38°50'N, 105°40'E), 4-Aug-2010, Yunlong Cai.

**Remarks.** The species is differentiated from others by a narrow, elongate proboscis, 2 hair palisades on hind tibia, 2–3 anteroventral bristles before apical quarter, a long ascending process on posterior face of hind femur.

### *Diplonevra vecticrassa* sp. nov.

(Figs. 17, 18, 41, 57)

Male: Head. Frons dark brown, subshining, with 30–40 scattered hairs. Mean frontal width 0.54 of head width. First row of bristles straight, all four bristles are equidistant. Second row of bristles straight, all four bristles are equidistant. Supra-antennal bristles well below antials and close each other. Postpedicel dark brown, oval. Palpus pale yellow, and 5 times as long as its breadth, with 6 bristles on ventral apex. Proboscis short, pale yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs dark brown. Front tibia lacking dorsal bristle and differentiated hairs. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight and extending near to 1/2 (0.46) of tibia. Posterior face of hind trochanter with 4 stout bristles on ventral region and 2 stout bristles on lateral region and 8–10 hairs on dorsal side. Posterior face of hind femur with 3 bristles and 20 fine hairs; with a short ascending process bearing two strong bristles apically. Hind tibia with 2 palisades, 2–3 anteroventral bristles, lacking anterodorsal bristles. Wing 2.1 mm long. Costal index 0.52. Costal ratios 3.9: 1.1:1. Costal cilia 0.07 mm long. Vein  $M_1$  curved. Axillary ridge with 4 axillary bristles. All veins brown and membrane yellowish brown. Haltere dark brown. Abdomen. Tergites dark brown. Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 18–20 long hairs. Right side of epandrium broad, with about 20–22 long hairs toward posterior margin; ventral apex with an incurved hook. Hypandrium tomentose, without bristles. Circus dark brown and stalk of circus pale brown. Body length 2.2 mm.

Female: Unknown.

**Distribution.** China (Qinghai, Hebei).

**Etymology.** The specific epithet refers to the bristles on ascending process on posterior face of hind femur.

Holotype: ♂, Qinghai, Huzu (36°51'N, 102°51'E), 29-Jul-2004, Hong Fang; Paratype: 1♂, Hebei, Weixian (32°56'N, 104°41'E), 23-Aug-2005, Hong Fang.

**Remarks.** The species is distinguished from others of the genus by a long belt-like ascending process of posterior face of hind femur and 2–3 anteroventral bristles of hind tibia.

### ***Diplonevra pachycera* (Schmitz)**

(Figs. 19, 20, 42, 58)

*Dohrniphora concinna* var. *pachycera* Schmitz, 1918: 110 (♂).

*Dohrniphora pachycera*: Schmitz, 1920: 99.

*Diploneura pachycera*: Schmitz, 1927b: 71.

Male: Head. Frons brown, subshining, with 100–120 scattered hairs. Mean frontal width 0.57 of head width. First row of bristles slightly convex, antials further apart than either is from an antrolateral. Second row of bristles slightly concave, all four bristles are equidistant. Supra-antennal bristles well below antials and close each other. Postpedicel dark brown, spherical with pointed tip. Palpus brown and 3 times as long as its breadth, with 4–5 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs brown. Front tibia with a dorsal bristle and 6–7 differentiated hairs. Mid tibia with 2 longitudinal hair palisades, anterodorsal one sharply deflected onto anterior face and extending to 2/3 (0.65) of tibia. Posterior face of hind trochanter with 6 stout and short bristles and several fine hairs. Ventral region of posterior face of hind femur with 4 bristles in a row, lacking ascending process. Hind tibia with 2 hair palisades, 1 anteroventral bristle, lacking anterodorsal bristles. Wing 1.66 mm long. Costal index 0.56. Costal ratios 4.1:1.1:1.1. Costal cilia 0.08 mm long. Vein  $M_1$  curved. Axillary ridge with 3 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 8–10 long hairs. Right side of epandrium broad, triangular, with about 10–12 long hairs toward posterior margin; ventral apex with an incurved hook. Hypandrium tomentose, without bristles. Circus dark brown and stalk of circus pale brown. Body length 1.6–2.3 mm.

Female. Head similar to male except as follows. Frons black, shining. Postpedicel orange yellow. Proboscis pale yellow, elongate, extending beyond postpedicel. Wing 2.27 mm long. Costal index 0.5. Costal ratios 5.5:1.5:1.1. Costal cilia 0.05 mm long. Body length 2.30 mm.

**Distribution.** China (Jilin, Liaoning); Russia, United Kingdom, Holland, Germany.

**Specimens examined.** 1♂, Jilin, Changbai Mountain (42°02'N, 127°46'E), 30-Jul-2008, Lixin Su; 2♂, Jilin, Changbai Mountain (42°23'N, 129°41'E), 27-Jul-2003, Hong Fang; 1♀, Jilin, Daxinggou (43°25'N, 129°40'E), 20-Jul-2005, Hong Fang; 1♂, Liaoning, Laotie Mountain (38°45'N, 121°11'E), 11-Jun-2010, Jianfeng Wang.

**Remarks.** The species differs from its congeners by 4–5 bristles on posterior face of hind femur and absence of ascending process.

### ***Diplonevra lamella* sp. nov.**

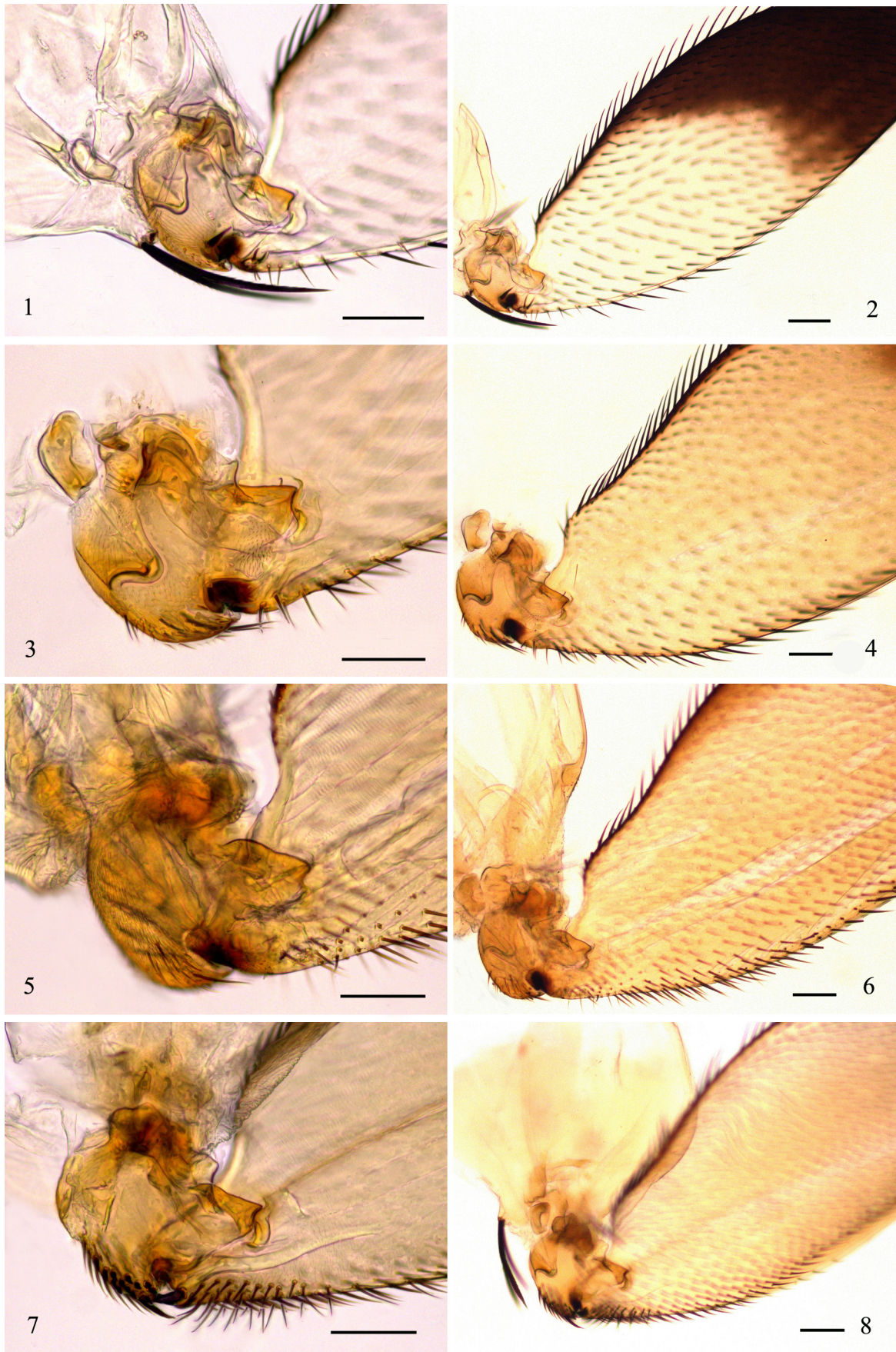
(Figs. 21, 22, 43, 59)

Male: Head. Frons black, subshining, with 70–80 sparse hairs. Mean frontal width 0.58 of head width. First row of bristles convex, antial bristles further apart than either is from an anterolateral. Second row of bristles concave, pre-ocellar bristles further apart than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brown, spherical with pointed tip. Palpus yellow brown and 2.5 times as long as its breadth, with 6 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs dark brown. Front tibia with a near-dorsal bristle two fifths of length from base and with 6–7 small differentiated hairs extending below this to the tip. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight and extending to 2/3 (0.66) of tibia. Posterior face of hind trochanter with 4 curved bristles on lateral region. Posterior face of hind femur with 2 long, lamellar, ascending process, each of them bearing a blunt, strong bristles. Hind tibia with 2 palisades, 2–3 anteroventral bristles, lacking anterodorsal bristles. Wing 1.56 mm long. Costal index 0.45. Costal ratios 9.5:1.9:1.1. Costal cilia 0.05 mm long. Vein  $M_1$  curved. Axillary ridge with 3 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow, finger-like, with 12–14 long hairs. Right side of epandrium broad, with about 16–20 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus pale yellow and stalk of circus brown. Body length 1.8–2.0 mm.

Female: unknown.

**Distribution.** China (Liaoning, Henan).

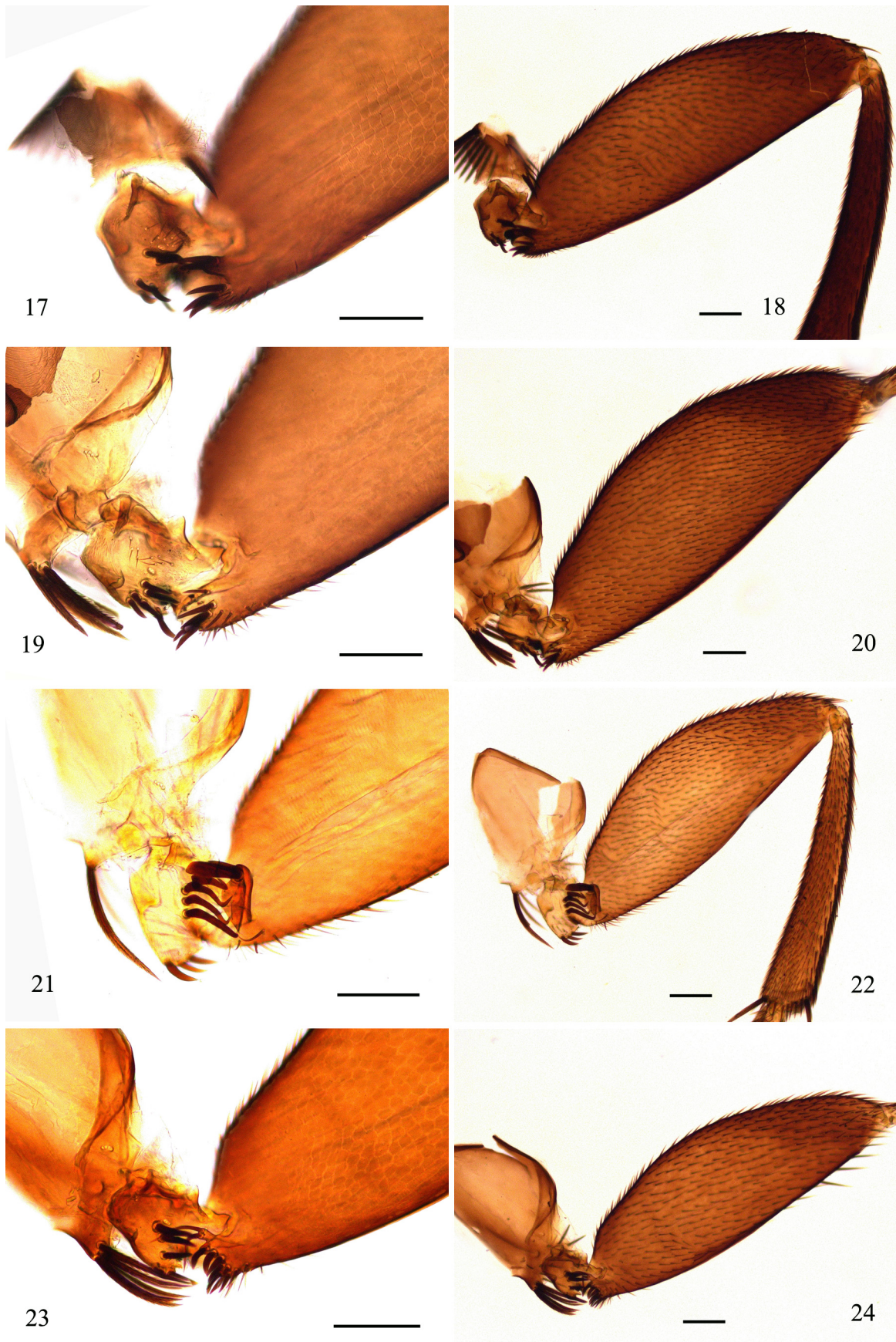
**Etymology.** The specific epithet refers to the likeness of ascending process of posterior face of hind femur.



**FIGURES 1–8.** Hind femora and trochanters, posterior view. 1–2. *D. bifasciata* (Walker); 3–4. *D. abbreviata* (v. Roser); 5–6. *D. bisetifera* Liu; 7–8. *D. peregrina* (Wiedemann). Scale bar = 0.1 mm.



**FIGURES 9–16.** Hind femora and trochanters, posterior view. 9–10. *D. florescens* (Turton); 11–12. *D. corniculata* sp. nov. ; 13–14. *D. trapezia* sp. nov.; 15–16. *D. funebris* (Meigen). Scale bar = 0.1 mm.



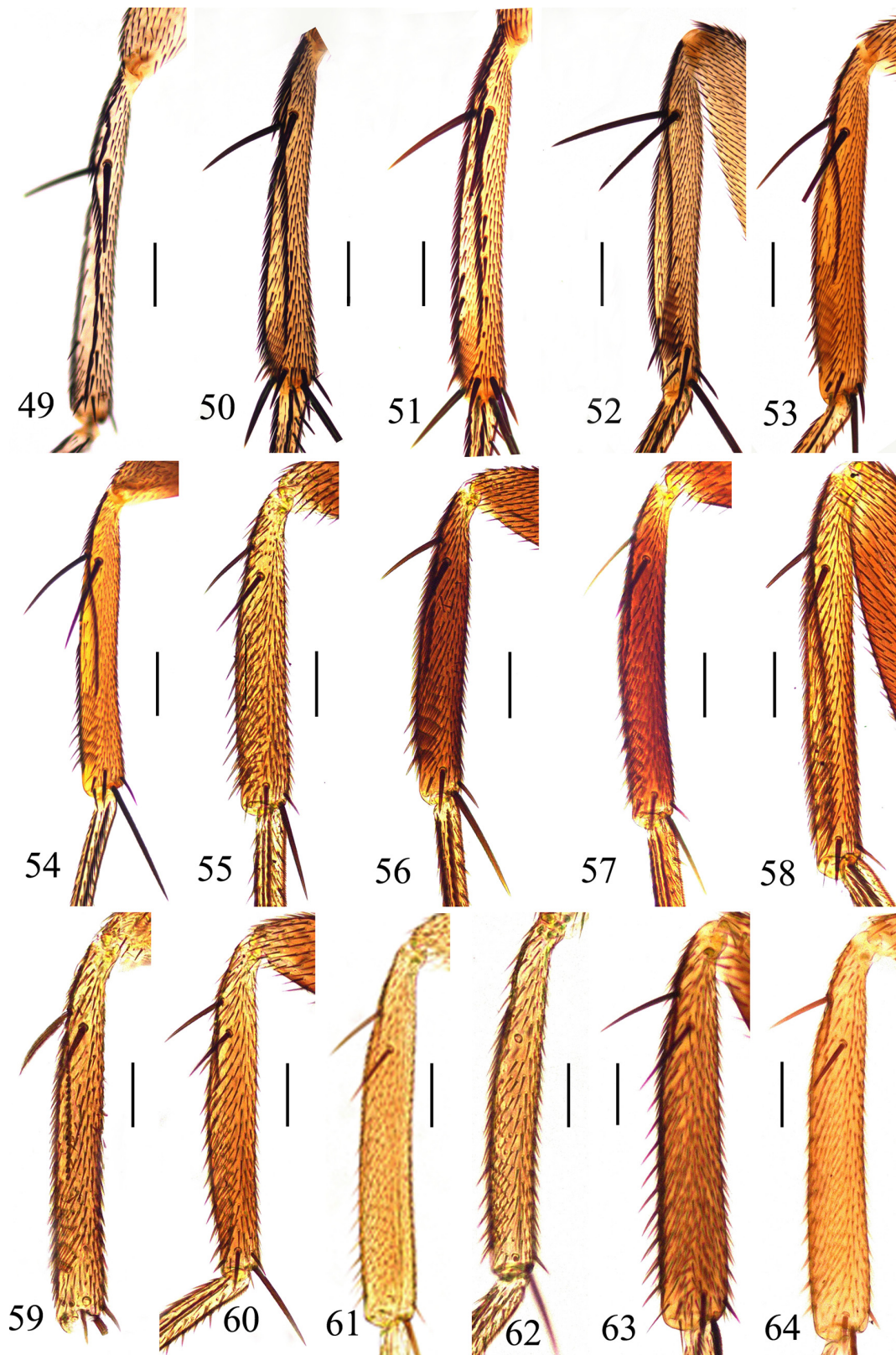
**FIGURES 17–24.** Hind femora and trochanters, posterior view. 17–18. *D. vecticrassa* sp. nov.; 19–20. *D. pachycera* (Schmitz); 21–22. *D. lamella* sp. nov.; 23–24. *D. taigaensis* Michailovskaya. Scale bar =0.1 mm.



**FIGURES 25–32.** Hind femora and trochanters, posterior view. 25–26. *D. furcavectis* sp. nov.; 27–28. *D. brevicula* sp. nov.; 29–30. *D. triangulata* sp. nov.; 31–32. *D. spinibotra* sp. nov. Scale bar = 0.1 mm.



**FIGURES 33–48.** Hind tibiae, anterior view. 33. *D. bifasciata* (Walker); 34. *D. abbreviata* (v. Roser); 35. *D. bisetifera* Liu; 36. *D. peregrina* (Wiedemann). 37. *D. florescens* (Turton); 38. *D. corniculata* sp. nov.; 39. *D. trapezia* sp. nov.; 40. *D. funebris* (Meigen); 41. *D. vecticrassa* sp. nov.; 42. *D. pachycera* (Schmitz); 43. *D. lamella* sp. nov.; 44. *D. taigaensis* Michailovskaya; 45. *D. furcavectis* sp. nov.; 46. *D. brevicula* sp. nov.; 47. *D. triangulata* sp. nov.; 48. *D. spinibotra* sp. nov. Scale bar = 0.1 mm.



**FIGURES 49–64.** Mid tibiae, anterior view. 49. *D. bifasciata* (Walker); 50. *D. abbreviata* (v. Roser); 51. *D. bisetifera* Liu; 52. *D. peregrina* (Wiedemann). 53. *D. floescens* (Turton); 54. *D. corniculata* sp. nov.; 55. *D. trapezia* sp. nov.; 56. *D. funebris* (Meigen); 57. *D. vecticrassa* sp. nov.; 58. *D. pachycera* (Schmitz); 59. *D. lamella* sp. nov.; 60. *D. taigaensis* Michailovskaya; 61. *D. furcavectis* sp. nov.; 62. *D. brevicula* sp. nov.; 63. *D. triangulata* sp. nov.; 64. *D. spinibotra* sp. nov. Scale bar = 0.1 mm.



Holotype: ♂, Henan, Nanzhao (33°29'N, 112°26'E), 17–Aug–2005, Hong Fang. Paratypes: 1♂, Dalian, Laotie Mountain (38°45'N, 121°11'E), 12–Sep–2009, Jianfeng Wang, Dianxing Feng.

**Remarks.** The species differs from its congeners by hind tibia with 2 hair palisades, 2 anteroventral bristles before apical quarter, lacking anterodorsal bristles; posterior face of hind femur with 2 lamellar process bearing a blunt bristle at tip.

### ***Diplonevra taigaensis* Michailovskaya**

(Figs. 23, 24, 44, 60)

*Diplonevra taigaensis* Michailovskaya, 1990: 697.

Male: Head. Frons black, subshining, with 60–70 scattered hairs. Mean frontal width 0.52 of head width. First row of bristles straight, antials further apart than either is from an anterolateral. Second row of bristles straight, all four bristles are equidistant. Supra-antennal bristles well below antials and close each other. Postpedicel yellow, oval. Palpus yellow brown and 3 times as long as its breadth, with 6 bristles on ventral apex. Proboscis pale yellow. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs dark brown. Front tibia lacking a dorsal bristle and differentiated hairs. Mid tibia with 2 longitudinal hair palisades, anterodorsal one almost straight and extending to 2/5 (0.42) of tibia. Posterior face of hind trochanter with 6–8 bristles, which often curved. Ventral region of posterior face of hind femur with 7–10 bristles, and with a short ascending process bearing two long hairs apically. Hind tibia with 2 hair palisades, lacking anteroventral bristles and anterodorsal bristles. Wing 1.86 mm long. Costal index 0.5. Costal ratios 5.5: 1.75:1. Costal cilia 0.07 mm long. Vein  $M_1$  curved. Axillary ridge with 4 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 8–10 long hairs. Right side of epandrium broad, triangular, with about 18–20 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus yellow brown and stalk of circus brown. Body length 1.7–2.0 mm.

Female. Head similar to male except as follows. Frons black, shining. Postpedicel orange yellow. Proboscis pale yellow, elongate, extending beyond postpedicel. Wing 1.71 mm long. Costal index 0.48–0.51. Costal ratios 6.17: 1.44:1. Costal cilia 0.07 mm long. Abdominal tergites dark brown. Venter brown. Body length 1.80 mm.

**Distribution.** China (Heilongjiang, Jilin, Liaoning, Ningxia); Russia.

**Specimens examined.** 1♂, Liaoning, Xinbin, Douling (41°36'N, 124°59'E), 24–Sep–2009, Tao Li; 1♂1f♂, Liaoning, Wunv Mountain (41°20'N, 125°25'E), 6–Jul–2012, Mengyang; 1♂, Jilin, Changbai Mountain (42°23'N, 129°41'E), 30–Jul–2003, Hong Fang; 1♂, Liaoning, Qianshan (41°01'N, 123°06'E), 8–Jul–2004, Hong Fang.

**Remarks.** The species can be distinguished from other species by a long belt-like ascending process of hind femur and lacking isolated bristles on hind tibia.

### ***Diplonevra furcavectis* sp. nov.**

(Figs. 25, 26, 45, 61)

Male: Head. Frons black, subshining, with 40–50 scattered hairs. Mean frontal width 0.48 of head width. First row of bristles straight, antials further apart than either from an anterolateral. Second row of bristles slightly concave, pre-ocellar bristles closer than either is from a mediolateral. Supra-antennal bristles well below antials and close each other. Postpedicel brown, spherical with pointed tip. Palpus yellow brown and 3 times as long as its breadth, with 4 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs brown. Front tibia lacking dorsal bristle and differentiated hairs; front tarsomere 5 widened. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight and extending to 1/4 (0.27) of tibia. Posterior face of hind trochanter with 4 biforked bristles on ventral region. Posterior face of hind femur with 6–8 bristles and several hairs, with an ascending process bearing 3 long hairs apically. Hind tibia with 2 palisades, lacking anterodorsal bristles. Wing 1.05 mm long. Costal index 0.48. Costal ratios 4.5: 1:1. Costal cilia 0.05 mm long. Vein  $M_1$  curved. Axillary ridge with 4 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 16–18 long hairs. Right side of epandrium broad, with about 18–20 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus pale yellow and stalk of circus yellow brown.

Female. Unknown.

**Distribution.** China (Ningxia).

**Etymology.** The specific epithet refers to the biforked bristles of posterior face of hind trochanter.

Holotype: ♂, Ningxia, Liupan Mountain (35°47'N, 106°17'E), 21–Jun–2008, Hong Fang; paratype: 1 ♂, same data as holotype.

**Remarks.** The species is distinguished from other species of the genus by biforked bristles on posterior face of hind trochanter.

***Diplonevra brevicula* sp. nov.**

(Figs. 27, 28, 46, 62)

Male: Head. Frons black, subshining, with 30–40 scattered hairs. Mean frontal width 0.52 of head width. First row of bristles straight, antial bristles further apart than either is from an anterolateral. Second row of bristles straight, all four bristles are equidistant. Supra-antennal bristles well below antials and close each other. Postpedicel brownish yellow, spherical with pointed tip. Palpus yellow brown and 2.5 times as long as its breadth, with 6 bristles on ventral apex. Proboscis yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs dark brown. Front tibia lacking a near-dorsal bristles and differentiated hairs; front tarsomere 5 widened. Mid tibia 2 longitudinal hair palisades, anterodorsal one extending to 2/5 (0.41) of tibia. Posterior face of hind trochanter with 3–4 curved bristles on lateral region. Posterior face of hind femur with 4 bristles, and several hairs, with a rectangular ascending process, bearing 1–3 long hairs apically. Hind tibia with 2 hair palisades, 2–3 anteroventral bristles, lacking anterodorsal bristles. Wing 1.88 mm long. Costal index 0.45. Costal ratios 7.9: 1.3:1. Costal cilia 0.05 mm long. Vein  $M_1$  curved. Axillary ridge with 2 axillary bristles. All veins brown and membrane yellowish brown. Haltere brown. Abdomen. Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 8–10 long hairs. Right side of epandrium broad, with about 10 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus yellow brown and stalk of circus brown. Body length 2.4–2.8 mm.

Female. Unknown.

**Distribution.** China (Liaoning).

**Etymology.** The specific epithet refers to the short ascending process of posterior face of hind femur.

Holotype: ♂, Liaoning, Laotie Mountain (38°45'N, 121°11'E), 12–Sep–2010, Jianfeng Wang, Dianxing Feng.

**Remarks.** The species is differed from others by a short ascending process of hind femur and without any isolated bristles on hind tibia.

***Diplonevra triangulata* sp. nov.**

(Figs. 29, 30, 47, 63)

Male: Head. Frons dark brown, subshining, with 60–80 scattered hairs. Mean frontal width 0.50 of head width. First row of bristles slightly convex, antials slightly further apart than either is from an anterolateral. Second row of bristles straight, all four bristles are equidistant. Supra-antennal bristles well below antials and close each other. Postpedicel brown, spherical with pointed tip. Palpus yellow brown and 3 times as long as its breadth, with 4 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles, Legs dark brown. Front tibia lacking dorsal bristle and differentiated hairs. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight and extending to 1/3 (0.31) of tibia. Posterior face of hind trochanter with 4–5 bristles on ventral region. Ventral region of posterior face of hind femur with 4–8 bristles, and with a triangular process bearing 1 long hair apically. Hind tibia with 2 hair palisades, lacking anteroventral bristles and anterodorsal bristles. Wing 1.64 mm long. Costal index 0.48. Costal ratios 6.0:1.6:1. Costal cilia 0.06 mm long. Vein  $M_1$  curved. Axillary ridge with 3 axillary bristles. Haltere pale brown. Abdomen. Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 10–12 long hairs. Right side of epandrium broad, with about 18–20 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus yellow brown and stalk of circus brown. Body length 2.4–2.6 mm.

Female: unknown.

**Distribution.** China (Inner Mongolia).

**Etymology.** The specific epithet refers to the triangular ascending process of posterior face of hind femur.

Holotype: ♂, Inner Mongolia, Hohhot, Zhaojun Tomb (40°51'N, 111°49'E), 19–Jul–2004, Hong Fang; Paratypes: 32♂, Inner Mongolia, Hohhot, Zhaojun Tomb (40°51'N, 111°49'E), 19–Jul–2004, Hong Fang.

**Remarks.** The species is similar to *D. spinibotra*, but it is distinguished from the latter by less than 10 bristles of posterior face of hind femur, they are as thick as those on posterior face of hind trochanter.

### ***Diplonevra spinibotra* sp. nov.**

(Figs. 31, 32, 48, 64)

Male: Head. Frons dark brown, subshining, with 40–60 scattered hairs. Mean frontal width 0.46 of head width. First row of bristles slightly convex, antials further apart than either is from an anterolateral. Second row of bristles straight, pre-ocellar bristles farther apart than either is from a mediolateral. Postpedicel brown, spherical with pointed tip. Palpus yellow brown and 3 times as long as its breadth, with 4 bristles on ventral apex. Proboscis pale yellow. Thorax. Scutum and scutellum dark brown, Notopleuron with 3 bristles. Scutellum with 4 bristles. Legs dark brown. Front tibia lacking dorsal bristles and differentiated hairs; front tarsomere 5 widened. Mid tibia with 2 longitudinal hair palisades, anterodorsal one straight and extending to 1/4 (0.28) of tibia. Posterior face of hind trochanter with 4 bristles on ventral region. Posterior face of hind femur with a cluster of 12–15 bristles, and with a triangular process bearing 1–3 fine hairs apically. Hind tibia with 2 palisades, lacking anteroventral bristles and anterodorsal bristles. Wing 2.04 mm long. Costal index 0.48. Costal ratios 5.9: 1.3:1. Costal cilia 0.08 mm long. Vein  $M_1$  curved. Axillary ridge with 4 axillary bristles. All veins brown and membrane yellowish brown. Haltere dark brown. Abdomen. Tergites dark brown Venter dark grey. Hypopygium dark brown. Left side of epandrium narrow with 14–16 long hairs. Right side of epandrium broad, with about 18–20 long hairs toward posterior margin. Hypandrium tomentose, without bristles. Circus pale yellow and stalk of circus yellow. Body length 2.4–2.8 mm.

Female: unknown.

**Distribution.** China (Ningxia).

**Etymology.** The specific epithet refers to the arrangement of bristles of posterior face of hind femur.

Holotype: ♂, Ningxia, Liupan Mountain (49°41'N, 119°51'E), 25–Jun–2008, Lixin Su; Paratypes: 10♂, Ningxia, Liupan Mountain (49°41'N, 119°51'E), 25–Jun–2008, Lixin Su.

**Remarks.** The species is similar to *D. triangulata* but it is different by more than 10 bristles on posterior face of hind femur and they are thinner than those on posterior face of hind trochanter.

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