

Notes on the Genus *Brachyneurina* Mamaev (Diptera: Cecidomyiidae) with Description of Two New Species from China

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Ke-Long Jiao, Yi-Ran Mu, and Wen-Jun Bu (2017) The generic diagnosis of mycophagous *Brachyneurina* is revised to give an adequate description, and an updated key to males of all known *Brachyneurina* species is given for distinguishing from each other. First records of *Brachyneurina* in Asia are provided including two new species, *Brachyneurina hemisphaerica* sp. nov. and *Brachyneurina rhombica* sp. nov. from China are described and illustrated.

Key words: Cecidomyiidae, *Brachyneurina*, *hemisphaerica*, *rhombica*, New species, New record, China.

BACKGROUND

Mamaev (1967) established the genus *Brachyneurina* based on *B. xylophila*, and included another species *B. angulata* in the genus with both species from western Russia. Harris and Evans (1979) described *Brachyneurina peniophorae* from England with detailed biology. Gagné (1994) placed *Brachyneurina* in the supertribe Brachineuridi. Fedotova (2014) reviewed this genus and transferred *Brachyneurina pleiomorpha* Mamaev, 1998 and *Brachineurina pyxidiiformis* Fedotova, 2005 to the genus *Cingola* Fedotova & Sidorenko and the genus *Kovaleviola* Fedotova & Perkovsky respectively. So far, there have been no further records of this genus since Harris & Evans (1979). During our research on Brachineuridi, first records of *Brachyneurina* in Asia as well as in China with two new species were discovered. We revise the generic diagnosis of *Brachyneurina* with focus on distinctions between *Brachyneurina* and

related genera, and describe these two species, and provide the illustrations of them in this paper including an updated key to males of all known *Brachyneurina* species.

MATERIALS AND METHODS

Specimens of the two new species were collected by Malaise traps. Adult specimens were preserved in 90% ethanol in the field immediately after collecting. For morphological observation, some of the ethanol preserved specimens were mounted on slides using Canada balsam. The morphological terminology follows Gagné (1981). The holotypes and other type specimens are deposited in the Institute of Entomology, College of Life Sciences, Nankai University (abbreviated as NKUM), Tianjin, China. All figures in the present article are based on holotypes (slide numbers: NKUCecid. No. BBI001 & BBL001).

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RESULTS

Genus *Brachyneurina* Mamaev, 1967

Brachyneurina Mamaev, 1967: 876.

Type species, *Brachyneurina xylophila* Mamaev (original designation).

Generic Diagnosis: Adult. Male palpus with palpiger and 3 segments, last two segments longer than first one. Antenna with 10 flagellomeres (Fig. 1A), each with shorter neck and only one basal node; female neck distinctly shorter than male one. Wing (Fig. 1B) hyaline, sparsely covered with narrow scales and setose; vein R_1 joining vein C at basal $2/5$; vein R_5 bent a little backward at distal $1/3$, joining vein C slightly anterior to wing apex; vein Cu unforked. Tarsal claw (Fig. 1C) toothed on all legs. Male seventh and eighth tergites both reduced to one strongly sclerotized and linear band. Male genitalia: Gonocoxite with one or two swollen and densely pubescent mediobasal lobes; gonostylus slender and arched variously; cerci with a wider depression forming two lobes with various shapes; hypoproct simple, apically rounded or truncated, or slightly emarginated; aedeagus gradually tapered to apex, sometimes

with constriction or other modifications. Female genitalia: Ovipositor short and not protrusible; cerci separated with two short lobes.

Remarks: The genus *Brachyneurina* is characterized by the unique combination of vein R_5 bent a little backward at distal $1/3$, joining vein C slightly anterior to wing apex (Fig. 1B) and gonocoxite with one or two swollen, unsclerotized and densely pubescent mediobasal lobes (Figs. 2A, 3A) in the *Brachyneurina* group (including *Brachyneurina* Mamaev, *Cingola* Fedotova & Sidorenko, *Undoneura* Fedotova & Sidorenko, *Novocalmonia* Ozdikmen, *Volsatiola* Fedotova & Sidorenko) (Jiao and Bu 2014). And *Brachyneurina* and *Volsatiola* is also distinguishable from *Cingola*, *Undoneura* and *Novocalmonia* by the wing vein R_5 mentioned above, while the three genera above with vein R_5 bent a little forward in the middle, joining vein C distinctly anterior to wing apex, and it is different from *Volsatiola* by vein Cu unforked (Fig. 1B) and gonocoxite with unsclerotized and densely pubescent mediobasal lobe (Figs. 2A, 3A), while *Volsatiola* having vein Cu forked and gonocoxite with a sclerotized and snowman-shaped mediobasal lobe.

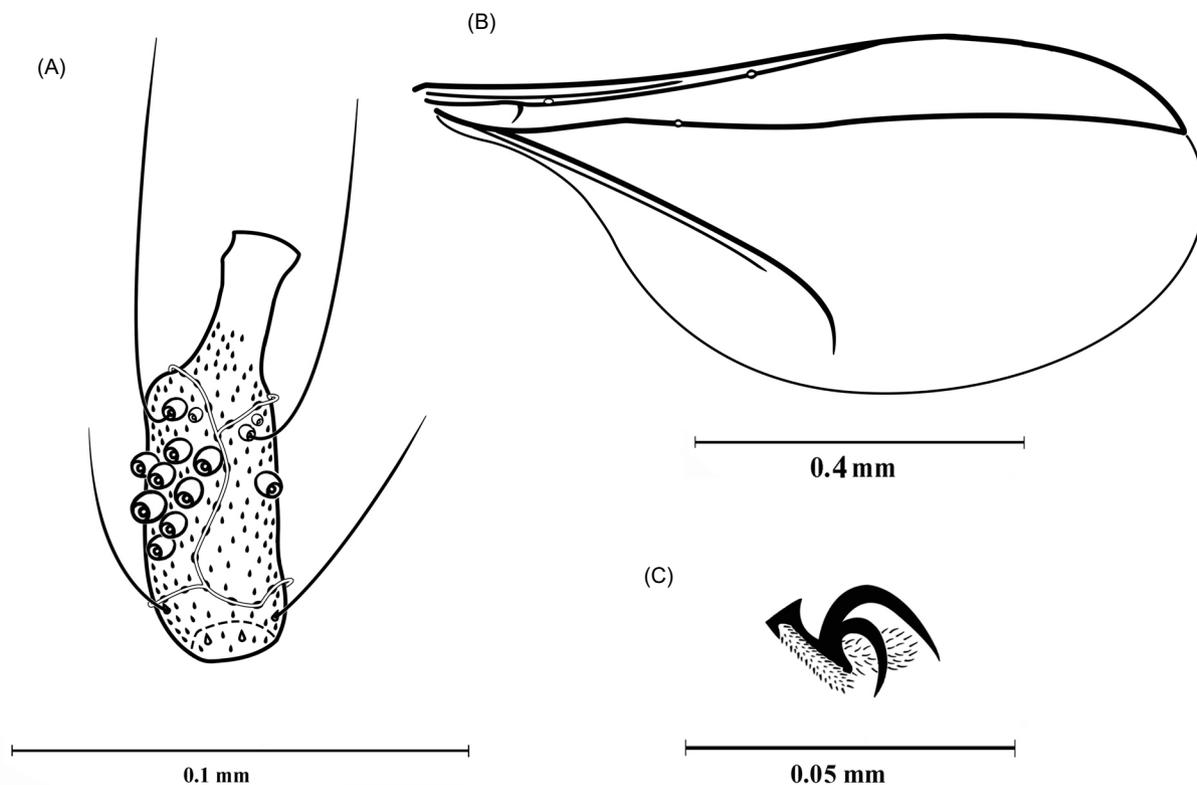


Fig. 1. *Brachyneurina hemisphaerica* sp. nov. Male holotype (NKUCecid. No. BBI001) (A-C): (A), 3rd flagellomere (dorsal view). (B), Wing (dorsal view). (C), Fore acropod (lateral view).

With the description of two new species in this paper, *Brachyneurina* is now consisted of five species all distributed in the Palaearctic region. Fedotova (2014) described *Brachyneurina* and

gave a detailed generic diagnosis. In the present paper, the diagnosis is revised to give an adequate description and some parts of generic diagnosis for male are modified as follows to contain all known

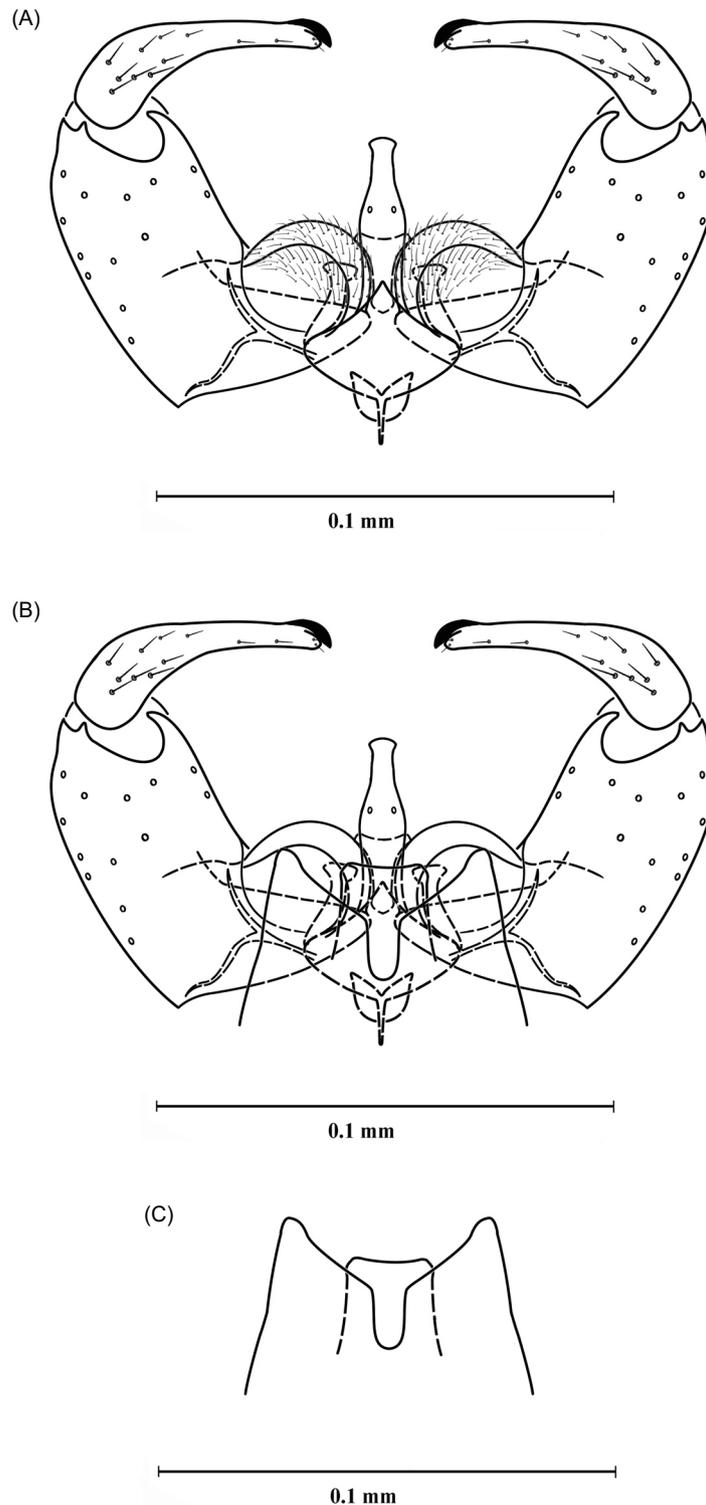


Fig. 2. *Brachyneurina hemisphaerica* sp. nov. Male holotype (NKUCecid. No. BBI001) (A-C): (A), Genitalia (dorsal view, cerci and hypoproct removed). (B), Genitalia (dorsal view). (C), cerci and hypoproct (dorsal view).

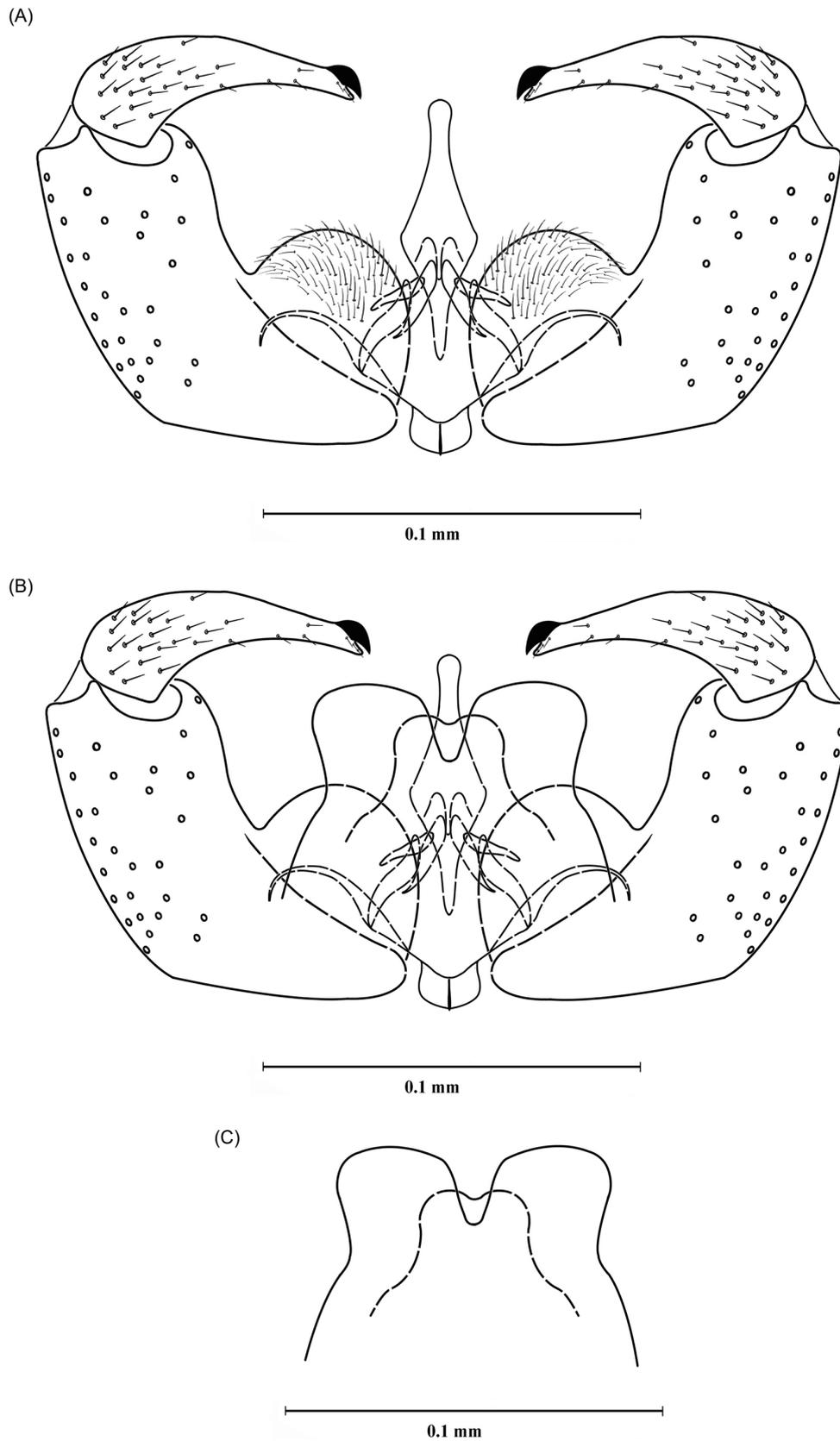


Fig. 3. *Brachyneurina rhombica* sp. nov. Male holotype (NKUCecid. No. BBL001) (A-C): (A), Genitalia (dorsal view, cerci and hypoproct removed). (B), Genitalia (dorsal view). (C), cerci and hypoproct (dorsal view).

Brachyneurina species: gonocoxite with one or two swollen mediobasal lobes; hypoproct apically rounded or truncated, or slightly emarginated; aedeagus gradually tapered to apex, sometimes with constriction or other modifications.

Brachyneurina rhombica sp. nov. is characterized by the uniqueness of aedeagus distinctly constricted in the middle with four pairs of sclerotized prominences surrounding aedeagus and extending downwards on both sides (Fig. 3A), so is *B. hemisphaerica* sp. nov. by hypoproct apically truncated and cerci forming two sub-triangular lobes (Fig. 2C), while *B. angulata* is distinguishable from the other four congeners by gonocoxite with one sub-conical mediobasal lobe.

Brachyneurina hemisphaerica sp. nov. is similar to *B. xylophila* by gonocoxite with two mediobasal lobes, while *B. rhombica* sp. nov. by gonocoxite with only one mediobasal lobe (Fig. 3A). However, *B. hemisphaerica* differs from *B. xylophila* by the dorsal mediobasal lobe distinctly smaller than the ventral one (Fig. 2A), while *B. xylophila* with the dorsal one larger than ventral one.

Key to males of all known *Brachyneurina* species

1. Gonocoxite with two mediobasal lobes (Fig. 2A) 2
 - Gonocoxite with one mediobasal lobe (Fig. 3A) 3
2. Aedeagus with the apex distinctly broadened; hypoproct apically truncated; cerci separated with a U-shaped depression forming two sub-triangular lobes (Fig. 2C)
 - *Brachyneurina hemisphaerica* sp. nov.
 - Aedeagus gradually tapered from base to apex, with the apex not broadened; hypoproct apically rounded; cerci separated with a V-shaped incision forming two semicircular lobes
 - *Brachyneurina xylophila* Mamaev, 1967
3. Gonocoxite with one sub-conical mediobasal lobe
 - *Brachyneurina angulata* Mamaev, 1967
 - Gonocoxite with one sub-hemispheric mediobasal lobe (Fig. 3A) 4
4. Aedeagus distinctly constricted in the middle with four pairs of sclerotized prominences surrounding aedeagus and extending downwards on both sides; gonostylus gradually tapered from base to apex; hypoproct apically slightly emarginated; cerci forming two sub-rhombic lobes (Fig. 3C)
 - *Brachyneurina rhombica* sp. nov.
 - Aedeagus without constriction or any other modifications; gonostylus approximately aequilate from sub-base to middle; hypoproct apically rounded; cerci forming two semicircular lobes
 - *Brachyneurina peniophorae* Harris & Evans, 1979

Brachyneurina hemisphaerica Jiao et Bu, sp. nov.

(Figs. 1-2)

urn:lsid:zoobank.org:act:3ABCAB35-A3BF-4735-8A84-3A49A8355146

Type material: Holotype. ♂, China, Heilongjiang: Shangzhi, Mao'er Mountain, Lüjiaweizi (45.14°N, 127.57°E), 22-24.VII.2003, Jun Li leg., altitude 300 m, Malaise trap, NKUCecid. No. BBI001. Paratypes: 3 ♂♂, same data as holotype, NKUCecid. No. BBI002-004; 1 ♂, China, Heilongjiang, Shangzhi, Mao'er Mountain, Lüjiaweizi (45.16°N, 127.30°E), 25.VII.2003, Jun Li leg., altitude 200 m, catching net, NKUCecid. No. BBI005. All type specimens deposited in NKUM.

Etymology: The specific name *hemisphaerica* means the male gonocoxite with two hemispheric mediobasal lobes.

Diagnosis: Gonocoxite with two hemispheric and densely pubescent mediobasal lobes including a smaller dorsal one and a distinctly larger ventral one; cerci separated with a U-shaped depression forming two sub-triangular lobes; hypoproct apically truncated; aedeagus with the apex distinctly broadened.

Description: Body colour yellow brown. Body length: 1.00-1.10 mm ($n = 5$). Wing length (measured from the base): 0.90-1.00 mm ($n = 5$). Wing width: 0.40-0.50 mm ($n = 5$).

Head (Fig. 1A): Eye bridge 5 facets long in the middle of vertex. Palpus sparsely setose, with palpiger and 3 segments, last two segments longer than first one. Antenna with 10 flagellomeres; pedicel subglobular, smaller than scape, both densely covered with setae ventrally; node of all flagellomeres subcylindrical, a little broadened subbasally, neck of all flagellomeres shorter; each node with 2 horizontal, appressed, band-shaped circumfila, subapically and subbasally respectively linked by two similar longitudinal circumfila, and 2 whorls of long, strong and irregular setae, one subbasal and one subapical; first and second flagellomeres fused; 3rd male flagellomere as in figure 1A, with the node 1.80-1.90 times as long as wide and the neck 2.5-2.6 times as long as wide, 0.54-0.55 times length of node.

Thorax (Figs. 1B, 1C): Wing (Fig. 1B) hyaline, 2.21-2.22 times as long as wide. Vein Sc weak, C, R₁ and R₅ strong; vein R₁ joining vein C at basal 2/5, with two pores respectively at basal 1/4 and distal 1/4; vein R₅ bent a little backward at distal 1/3, joining vein C slightly anterior to wing apex, with one pore at basal 1/3; vein M missing; vein

Cu unforked and bent backward, vein PCu parallel with Cu. Legs densely covered with narrow scales and sparse setae. Tarsal claw (Fig. 1C) toothed on all legs; empodium a little shorter than tarsal claw.

Abdomen: Each tergite and sternite densely covered uniformly with scales. First through sixth tergites developed and strip-shaped, with an irregular but mostly single, posterior row of setae, with several pairs of lateral setae, and with one anterior of trichoid sensilla; first tergite much shorter than second tergite; seventh and eighth tergites both reduced to one strongly sclerotized, latitudinal and linear band with several scattered setae; second through eighth sternites covered with many scattered lateral and central setae, with one anterior pair of closely set trichoid sensilla; second sternite divided latitudinally into two bands, respectively with one single, anterior row of setae and one single, posterior row of setae; third through eighth sternites sub-rectangular with an irregular but mostly single, posterior row of setae; seventh sternite shorter than sixth; eighth sternite much shorter and much narrower than seventh.

Male genitalia (Figs. 2A, 2B, 2C): Gonocoxite slender, with two hemispheric and densely pubescent mediobasal lobes including a smaller dorsal one and a distinctly larger ventral one; gonostylus slender and strongly arched inwardly at basal 1/3, gradually tapering from subbase to the middle, approximately 3/4 length of gonocoxite, covered with a few setae and dense microtrichiae, with one short setae located apically on the inner side, toothed apically; cerci separated with a U-shaped depression forming two sub-triangular lobes with a few long lateral setae; hypoproct sub-rectangular, not sclerotized, a little shorter than cerci, apically truncated with a few short setae; aedeagus gradually tapered to apex, distinctly shorter than gonocoxite, with the apex distinctly broadened, at distal 1/3 with a pair of sensory setae dorsally, without constriction or any other modifications. Female genitalia unknown.

Distribution: China (Heilongjiang).

***Brachyneurina rhombica* Jiao et Bu, sp. nov.**

(Fig. 3)

urn:lsid:zoobank.org:act:83E855BB-5B2E-4103-9E11-47B8FBF4B7AC

Type material: Holotype. ♂, China, Hebei: Pingquan, Guangtou Mountain (41.3°N, 118.4°E), 29.VI.1995, Wen-Jun Bu leg., altitude 1300 m, Malaise trap, NKUCecid. No. BBL001. Paratypes: 3 ♂♂, same data as holotype, NKUCecid. No.

BBL002-004. All type specimens deposited in NKUM.

Etymology: The specific name *rhombica* means the male cerci separated broadly forming two sub-rhombic lobes.

Diagnosis: Gonocoxite with one sub-semicircular, extremely swollen mediobasal lobe; gonostylus gradually tapered from base to apex; cerci forming two sub-rhombic lobes; hypoproct apically slightly emarginated; aedeagus distinctly constricted in the middle with four pairs of sclerotized prominences surrounding aedeagus and extending downwards on both sides.

Description: Body colour dark brown. Body length: 1.20-1.30 mm ($n = 4$). Wing length (measured from the base): 1.20-1.30 mm ($n = 4$). Wing width: 0.50-0.60 mm ($n = 4$).

Head: Eye bridge 3-4 facets long in the middle of vertex. 3rd male flagellomere as *hemisphaerica* in figure 1, with the node 1.45-1.55 times as long as wide and the neck 1.70-1.80 times as long as wide, 0.50-0.51 times length of node. Others as *B. hemisphaerica*.

Thorax: Wing 2.35-2.36 times as long as wide. Others as *B. hemisphaerica*.

Abdomen same as *B. hemisphaerica*.

Male genitalia (Figs. 3A, 3B, 3C): Gonocoxite with one sub-semicircular, extremely swollen and densely pubescent mediobasal lobe; gonostylus slender and arched inwardly at basal 1/4, gradually tapered from base to apex, approximately 3/4 length of gonocoxite; cerci separated broadly forming two sub-rhombic lobes; hypoproct isosceles-trapezoid-shaped, apically slightly emarginated, shorter than cerci; aedeagus gradually tapered from the distal 1/3 to apex, as long as gonocoxite, distinctly constricted in the middle with four pairs of sclerotized prominences surrounding aedeagus and extending downwards on both sides. Others as *B. hemisphaerica*. Female genitalia unknown.

Distribution: China (Hebei).

DISCUSSION

Both of the two new species (*Brachyneurina hemisphaerica* sp. nov. and *B. rhombica* sp. nov.) in the present paper were collected above litter layer in the forest, implying that the feeding habits of larvae may be mycophagous, just like the feeding habits confirmed for the other three congeneric species (Mamaev and Krivosheina 1965; Mamaev 1967; Harris and Evans 1979),

especially *B. peniophorae* is feeding and inducing galls on *Peniophora cinerea* which is an economic important phytopathogenic fungi. Therefore, *Brachyneurina* spp. including the two new species could have value as potential biological control agents to phytopathogenic fungi, just as *Mycodiplosis* spp. (another gall midge group in Cecidomyiidae) have already been performed to control rust fungi (Kaushal et al. 2001; Henk et al. 2011).

Upon to date, only five species of *Brachyneurina* are known from northern Palaearctic region, with known ranges scattered in a vast area, probably due to the lack of extensive collecting as well as little systematic effort in these regions. We believe that the two newly described species, *B. hemisphaerica* sp. nov. and *B. rhombica* sp. nov. will be found further northwards when additional surveys are performed in Far East.

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