

## Description of females of *Fannia imperatoria* Nishida and *Phaonia vagata* Xue & Wang (Diptera: Muscoidea)

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The females of *Fannia imperatoria* Nishida and *Phaonia vagata* Xue & Wang are recorded for the first time. Detailed descriptions of the females of these two species are provided based on the newly found specimens. The specimens studied are deposited in the Institute of Entomology, Shenyang Normal University.

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### 1. Introduction

Muscoidea, a large dipteran superfamily, occurs in all zoogeographic regions of the world and constitutes approximately 5% of the described dipteran diversity (Kutty *et al.* 2008). According to present knowledge, approximately 7,000 described species are recorded worldwide (Kutty *et al.* 2008) in four families, Muscidae, Fanniidae, Anthomyiidae and Scathophagidae.

Faunistic studies that include adult flies of Muscoidea tend to focus on males in China (e.g. Fan 1992, Xue & Chao 1998), with the tacit assumption that they represent all the sampled species at the locality. Because many species have been described from males only, and even described females are often difficult or impossible to identify, the latter have suffered a general lack of taxonomic attention. Consequently, the focus on males in species inventories of adult flies of Muscoidea is understandable and not easily overcome. Nevertheless, recognising females in this group is very important, and is convenient not

only for identifying species but for further phylogenetic studies.

During recent years, we have been engaged in faunal studies of this group in China. While sorting and identifying Muscidae and Fanniidae from materials on loan from Shenyang Normal University, we found female specimens of *Fannia imperatoria* and *Phaonia vagata* from Liaoning and Shanxi respectively, which enables the first description of the females of these species in the present work. In addition, further morphological information of the females of the genera *Fannia* and *Phaonia* is provided.

### 2. Material and methods

The specimens were examined, illustrated and measured using a stereoscopic microscope Olympus SZX16 with ocular micrometer. Photographic methods are as described by Rognes (2009). A series of photographs of continuous sequences were taken by a Cannon 500D digital

camera coupled with the stereoscopic microscope and fed into Helicon Focus for Windows, to compose images with more field depth. The digital images were analyzed and labeled on a standard Windows XP platform by Adobe Photoshop CS2 for Windows.

Morphological terms follow McAlpine (1981), except the “postpedicel” for first antennal flagellomere following Stuckenberg (1999). Absolute measurements are used for body length in millimetres (mm).

Abbreviations used for characters include: *a* = anterior seta, *acr* = acrostichal seta, *ad* = anterodorsal seta, *av* = anteroventral seta, *d* = dorsal seta, *dc* = dorsocentral seta, *ia* = intra-alar seta, *p* = posterior seta, *pd* = posterodorsal seta, *pra* = prealar seta, *pv* = posteroventral seta, and *v* = ventral seta.

All specimens studied are deposited in the Institute of Entomology, Shenyang Normal University (IESNU), Shenyang, China.

### 3. Taxonomy

#### 3.1. *Phaonia vagata* Xue & Wang in Xue, Wang & Zhao, 1985 (Fig. 1)

*Phaonia vagata* Xue & Wang in Xue, Wang & Zhao, 1985: 99, figs 1–3. Type-locality: China (Shanxi).

*Phaonia vagata* Xue & Wang: Fan, 1992: 449; Xue & Chao, 1998: 1288.

*Material examined.* 2♀, 1♂, CHINA: Shanxi, Youyu, Shahukou (40°6'N, 112°18'E), 13.V. 1978, M.F. Wang leg.

*Description.* Female. Body length 5.0 mm. Eye with sparse ciliae; fronto-orbital plate and parafacial brown, with dense silvery-gray pruinosity; the median part of frons about 1/3 of the width of head, about 3.3 times as wide as the distance between outer margins of posterior ocelli; frontal vitta black, with dense brownish-gray pruinosity, the median part about 2.0 times as wide as fronto-orbital plate; frontal setae 2, stout and long, some short setae between them; orbital setae 2; parafacial bare, about equal to postpedicel width at middle part; antenna blackish-brown, postpedicel about 3.0 times as long as wide, arista brown, distinctly swollen in basal 1/4, haired, the longest hair slightly longer than postpedicel width; epistoma not projecting beyond vibrissal angle, vibrissal angle beyond frontal angle in profile; subvibrissal setulae in one row; gena with greyish pruinosity; gena and genal dilation with black hairs, upper margin of gena without upcurved setae; proboscis long, prementum with greyish-yellow pruinosity, its length about 2.5 times as long as its width, palpus brown, claviform, about 1.4 times as long as prementum.

Thorax ground-colour brown, scutum with dark brown pruinosity; *acr* 0+1, *dc* 2+3, *ia* 0+2, *pra* 1, about 2.3 times as long as the length of posterior notopleural seta; notopleuron without setulae; proepisternal setae 1, proepimeral seta 1, adjacent part with 4 fine hairs; basisternum, proepisternum, anepimeron, meron and katepimeron

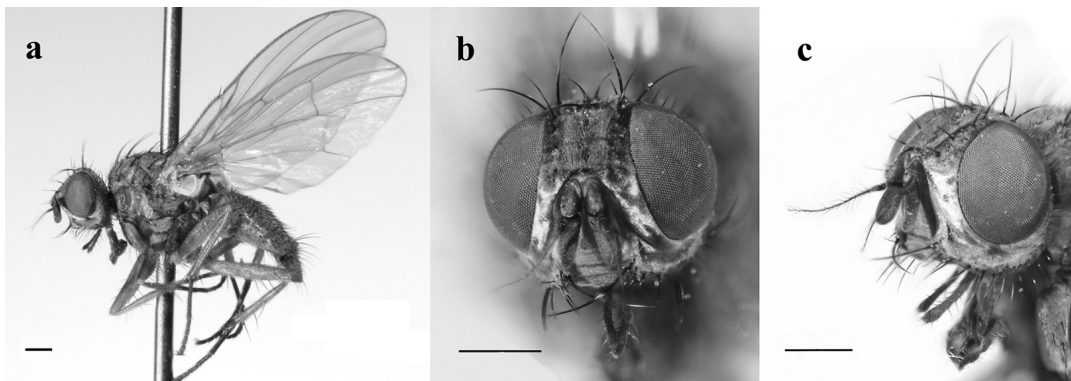


Fig. 1. *Phaonia vagata* Xue & Wang, 1985, female. – a. Body, lateral view. – b. Head, anterior view. – c. Head, anterolateral view. Scale bars = 0.5 mm.

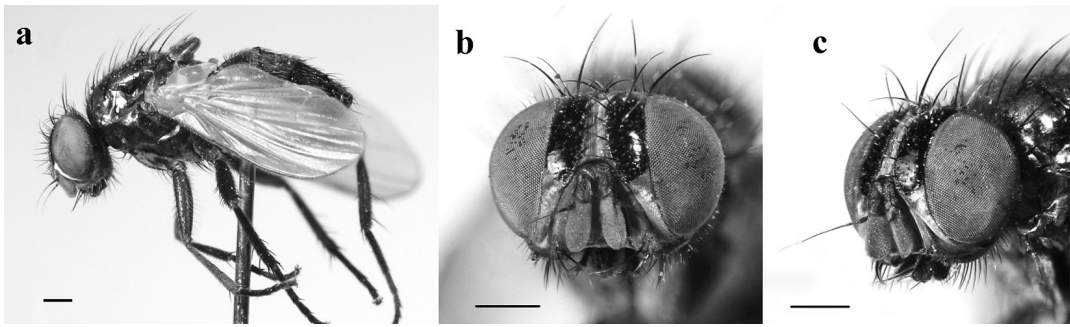


Fig. 2. *Fannia imperatoria* Nishida, 2002, female. – a. Body, lateral view. – b. Head, anterior view. – c. Head, anterolateral view. Scale bars = 0.5 mm.

bare; katepisternal setae 1:2; spiracles brown; calypters yellowish, lower one projecting beyond upper one.

Wing brownish; veins brownish-yellow; tegula brown; basicosta brownish-yellow; costal spine conspicuous; node of Rs bare on ventral and dorsal surfaces; vein  $R_{4+5}$  slightly curved at apex; veins  $R_{4+5}$  and M parallel to each other distally; crossvein r-m slightly stout, m-m slightly sinuous, crossveins without obvious cloud; halter brownish-yellow.

Legs yellow, except fore femur brown and tarsi black; fore tibia without median *p*; mid femur without *av* row, *pv* row only conspicuous on basal half; mid tibia with 2 *pd*; hind coxa bare on posterior surface; hind femur with 2 or 3 long *av* on distal part, the longest one about 1.3 times as long as femoral width, *ad* row complete, without *pv*; hind tibia with 2 *av*, 1 *ad*, and 1 *pd* (calcar) in apical 1/3.

Abdomen oval, with dense grey pruinosity; each tergite without distinct stripe; sternite 1 bare.

*Distribution.* China (Shanxi).

*Discussion.* *Phaonia* is a large and diverse genus of Muscidae, represented by over 500 solitary species on all continents. There are currently over 300 species of *Phaonia* known from China. Except for forty-one species, which are known from males and females, all Chinese species currently included in the genus are known only from males (Ma *et al.* 2002). This situation prevents a difficult understanding of the phylogenetic position of the genus, since the female copulatory apparatus is one of the main sources of phylogenetic characters in muscids.

*Phaonia vagata* was described by Xue &

Wang based on two males collected in Shanxi, China (Xue *et al.* 1985). It is similar with *Phaonia vagans* (Fallén, 1825), but differs from the latter in *dc* 2+3, crossveins without obvious cloud, costal spine conspicuous, mid tibia without *ad*, and hind tibia with 1 *ad*. Since then, no collection record of this species has been available. During a recent faunistic inventory in northwestern China, a male of *P. vagata* was sorted along with a similar, undescribed female specimen. The general similarity of morphological characters between the specimens, as well as the fact that both were collected in the same locality, led us to the conclusion that they are conspecific. Hence, in this study we describe and illustrate the female of *P. vagata* for the first time.

### 3.2. *Fannia imperatoria* Nishida, 2002 (Fig. 2)

*Fannia imperatoria* Nishida, 2002: 174, figs 1–3. Type-locality: Japan (Honshu).

*Fannia imperatoria* Nishida: Su & Wang, 2004: 111; Wang *et al.*, 2004: 136; Wang *et al.* 2009: 39.

*Material examined.* 1♀, 2♂, CHINA: Liaoning, Xifeng, Mt. Chengzi (42°42', 124°42'E), 4.VI. 1978, Z.Y. Ma leg.

*Description.* Female. Body length 5.2 mm. Eye with sparse ciliae, facets slightly enlarged on anterior margin in upper part; postocular setae stout, in one row; occipital setae behind the postocular setae on vertex in one shorter row; fronto-orbital plate shining black; the median part of frons about 1/3 of the width of head; frontal

vitta black, with thin yellow pruinosity, the median part about 2/3 of the width of fronto-orbital plate; frontal setae 5, stout and long, some short setae between them; orbital setae 2; parafacial bare, with greyish-white pruinosity, about half as wide as postpedicel width at middle part; antenna black, postpedicel slightly wider towards apex, 2.3 times as long as wide, arista black, distinctly swollen in basal 1/4, haired, the longest hair about equal to arista base; epistoma not projecting beyond vibrissal angle, vibrissal angle beyond frontal angle in profile; subvibrissal setulae in one row, outside with one short row of setae; gena with greyish pruinosity; gena and genal dilation with black hairs, upper margin of gena without upcurved setae; proboscis short, prementum with greyish-brown pruinosity, palpus black.

Thorax ground-colour black, scutum with greyish-brown pruinosity, without distinct vitta; presutural *acr* triserial, hair-like, only prescutellar pairs slightly stronger, the distance between two outer *acr* rows equal to the distance between *acr* row and *dc* row; *dc* 2+3, *ia* 0+2, *pra* 1, about 2/3 the length of posterior notopleural seta; notopleuron without setulae; proepisternal setae 2, proepimeral seta 1, adjacent part with 4 fine hairs; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; spiracles brown; calypters yellowish, lower one projecting beyond upper one.

Wing brownish; veins brown; tegula black; basicosta brownish-yellow; costal spine inconspicuous; node of Rs bare on ventral and dorsal surfaces; vein  $R_{4+5}$  straight; veins  $R_{4+5}$  and M parallel to each other distally; crossveins without obvious cloud; halter brownish.

Legs entirely black; fore tibia without *ad* and median *p*, fore first tarsomere with 1 or 2 longish setae on ventral surface; mid coxa without any hooked spines or spine-like setae on lower and outer margins; mid femur without *av* row, *pv* row only conspicuous on basal part; mid tibia slightly swollen at distal half, with 2 *ad*, 2 or 3 *pd*, 1 *v*, without slender hairs on ventral surface; mid first tarsomere without basal tooth-like spines on ventral surface; hind coxa bare on posterior surface; hind femur with 3 long *av* on distal part, the longest one slightly longer than femoral width, *ad* row complete, especially distal 6 or 7 long and

stout, without *pv*; hind tibia with 2 *av*, 3 *ad*, 1 median *d* and 1 preapical *d*.

Abdomen long, depressed and flattened, black in ground colour, slightly shining, with light gray pruinosity; each tergite without median vitta.

*Distribution.* China (Liaoning), Japan (Honshu).

*Discussion.* *Fannia* is the largest genus in the family Fanniidae. Members of this genus are easily recognized, but the sexual dimorphism exhibited in most species makes it difficult to recognize the male and the female of each. *Fannia imperatoria* was reported by Nishida (2002) from Japan, and was known only from male. While sorting and identifying Fanniidae from Liaoning, China, we found two male and one female specimens of *F. imperatoria* which enabled the first description of the female in the present work.

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