Diagnosis of the *Coenosia pedella*-group (Diptera: Muscidae), with descriptions of three new species from China

Ping Wang & Wan-Qi Xue*


The *Coenosia pedella*-group is established and defined by the combination of the following characters: most species have one presutural dorsocentral seta, costa reaching the tip of media vein, abdomen with distinct spots, hind tibia with dorsal setae, lower calypter at least subequal in length to upper calypter, basis of cerci and surstyli of male short, length of cerci at most four times as long as its width, most of cerci enlarged in distal 1/3 and surstyli subtriangular with width of basal part longer than 1/3 of length. Three new species are described: *C. disclambosa* Xue & Wang sp. n., *C. maoershanensis* Xue & Wang sp. n. and *C. sublactepennis* Xue & Wang sp. n. A key to the males of Palearctic Region species of the *Coenosia pedella*-group is given.

P. Wang & W. Q. Xue, Institute of Entomology, Shenyang Normal University, Shenyang 110034, P. R. China, *Corresponding author’s e-mail: xwqfly@sina.com*

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1. Introduction

Meigen (1826) described the genus *Coenosia* for 28 species, and *Musca tigrina* Fabricius, 1775 was subsequently designated as the type species. It is distributed in all zoogeographic regions of the world and comprises about 699 scientific names, about 151 *Coenosia* species in the Palearctic Region and about 105 *Coenosia* species in China.

The study of the genus *Coenosia* was confused earlier. In addition to *Allognota* Pokorny, 1893, there were 17 junior synonyms of the genus *Coenosia* which Pont (1977, 1986) had pointed out in the catalogues of each zoogeographical region. Hennig (1961) revised the Palearctic species of *Coenosia* and divided the genus into *tigrina*-group, *albatella*-group, *tricolor*-group, *intermedia*-group and *pumila*-group. The *pumila*-group was divided into *pumila*-subgroup (including seven species), *perpusilla*-subgroup (including six species), *mollicula*-subgroup (including ten species) and *lineatipes*-subgroup (including 11 species) (Hennig 1961). On the basis of cerci and surstyli of male being short, the length of cerci at most four times as long as its width, most of cerci enlarged in distal 1/3, surstyli subtriangular, and the width of basal part longer than 1/3 of length, we remove *Coenosia pedella* from the *pumila*-subgroup.

In the present paper, we establish the *Coenosia pedella*-group according to the species which have the above characters. The total of 35 species of the *Coenosia pedella*-group from the Palearctic Region is included, including three new species described herein.
2. Material and methods

The specimens examined for this paper were collected by sweeping from brushwood with hand nets. The specimens were examined using a compound light microscope for the external morphological features. For the dissection of terminalia, the end of abdomen was removed and boiled in 10% NaOH solution for 15–20 seconds. After the dissection and study, the abdomen and terminalia were washed and then stored in microvials of glycerine pinned directly underneath the specimens. Illustrations were done in ink and processed using Adobe Photoshop CS.

The type specimens of the three new species are deposited in the Institute of Entomology, Shenyang Normal University, China.

The morphological terminology follows that of McAlpine (1981). Absolute measurements for the body length are given in millimetres. Abbreviations are as follows:

- $fr$: frontal setae
- $acr$: acrostichal setae
- $dc$: dorsocentral setae
- $pra$: prealar setae
- $ial$: intra-alar setae
- $av$: anteroventral setae
- $ad$: anterodorsal setae
- $pd$: posterodorsal setae
- $pv$: posteroverentral setae
- $a$: anterior setae
- $d$: dorsal setae
- $p$: posterior setae
- $r-m$: radial–medial crossvein
- $M$: media vein
- $R_{4+5}$: branch of radius
- $dm-cu$: discal medial–cubital
- millimeter: mm

3. Diagnosis of the Coenosia pedella-group (Fig. 1)

The Coenosia pedella-group is defined by the combination of the following characters: in most species presutural $dc$ 1, costa reaching the tip of M, abdomen with distinct spots, hind tibia with $d$, lower calypter at least subequal in length to upper calypter; basis of cerci and surstyli of male short; length of cerci at most four times as long as its width; most of cerci enlarged in distal 1/3, surstyli subtriangular, width of basal part longer than 1/3 of length.

The C. pedella-group is divided into two subgroups: C. pedella-subgroup and C. pudorosa-subgroup. The surstyli of C. pedella-subgroup are bent forwards, while the surstyli of C. pudorosa-subgroup are bent backwards.

4. Descriptions of new species

4.1. Coenosia disclambosa Xue & Wang sp. n. (Fig. 2)

Type material. Holotype, male, P.R. China: Pianma town, Lushui county, Yunnan Province,
(26.04° N, 98.51° E; 3,153 m), 8.VII.2009, Shu C. Bai leg. Paratypes, 2 males, same data as holotype.

Description. Male. Body length 3.4–3.6 mm.

Head. Eye bare, lower posterior margin not concave; frons about one-third of head width; frontal vitta dark brown, sparsely covered with orange-gray pruinosity, about 2.5 times as wide as fronto-orbital plate; lunule dark orange; frontal triangle reaching front of frons; ocellar setae long, longer than frontal width; inner vertical seta about four times as long as outer vertical seta; two pairs of fr, a pair of upper orbital setae; fronto-orbital plate with orange-gray pruinosity; parafacial and gena with green-gray pruinosity, parafacial about half width of postpedicel; antenna black, the anterior part of pedicel with light gray pruinosity spots, postpedicel about 2.2–2.5 times as long as broad, the tip rounded; arista entirely covered with short hairs, the longest hairs as long as basal diameter of arista; epistoma not projecting; frontal angle situated in front of vibrissal an-
gle; gena about 1/5 of eye in height; genal hairs, and postgenal hairs black; occiput with green-gray pruinosity; prementum black and shining, about 2.5 times as long as broad; palpus black, about 1.2 times as long as prementum; labellum about 1.4 times as long as width of prementum.

Thorax. Ground colour black with green-gray pruinosity; scutum with three black vittae, reaching the posterior half of poststural area of scutum, two rows of hair-like acr; dc 1+3, posthumeral seta 1+0, ial 0+2, without pra; notopleuron bare; both apical and basal scutellar setae developed, lateral surface and ventral surface of scutellum bare; proepisternum and basisternum of prosternum concave in centre; anepimeron, meron and katepimeron bare; proepisternal setae 2, upper proepimeral setae 2; anterior anepisternal seta 1, both anterior and posterior spiracles small and orange; katepisternal setae placed as an isosceles triangle.

Wings. Hyaline, veins orange; basicosta dark brown; costa reaching tip of M; costal spine subequal in length to r–m; calypters yellowish, lower calypter about 1.4 times as long as upper one; haltere yellowish.

Legs. Coxae, tarsi, fore femur, distal 2/5 of mid femur and distal 1/3 of hind femur black-brown, the remaining parts of legs yellow; fore tibia with 1 submedial p which is strong and long, about 2/5 of fore tibia in length; mid femur with 4–5 av in basal half, basal 2/3 with pv row, 2 preapical pd; mid tibia with 1 submedial pd, without ad and pv; hind femur with complete av row which is irregular, pv row in basal 2/5, about 4–5; hind tibia with 1 submedial av, 1 median ad, 1 preapical d, without apical pv; distal part of tarsi not widened; tarsi longer than tibiae; claws subequal in length to pulvilli, about 3/4 of fifth tarsomere in length.

Abdomen. Long-oval in dorsal view, ground colour black with gray to blue-gray pruinosity; tergites 1+2–5 each with a pair of large black-brown lateral spots, without median vitta, posterior marginal setae of each tergite weak, 1–2 pairs of discal setae which are strong; sparsely covered with hairs; sternite 1 bare.

Female. Unknown

Etymology. The species name refers to male characters similar to C. clambosa Wei & Yang, 2007 and Latin word “dis-” means “un-”.

Remarks. This new species resembles C. clambosa Wei & Yang, 2007, but can be distinguished from the latter by the tip of postpedicel rounded; arista entirely covered with short hairs, the longest hairs as long as basal diameter of arista; thorax ground colour black; scutum with three black vittae; costal spine subequal in length to r–m; coxae and fore femur black-brown; abdomen ground colour black.

4.2. Coenosia maoershanensis Xue & Wang sp. n. (Fig. 3)

Type material. Holotype, male, P.R. China: Mt. Maoer, Guangxi Province, (25.49° N, 111.03° E; 2,000 m), 14.V.2004, Dong Zhang leg. Paratypes, 7 males and 3 females, same data as holotype.

Description. Male. Body length 5.4–5.6 mm.

Head. Eye bare, lower posterior margin not concave; frons about 0.27–0.30 of head width; frontal vitta black, with orange-gray pruinosity, about 3.5–4.0 times as wide as fronto-orbital plate; frontal triangle with brown-gray pruinosity, reaching upper 2/5 of frons; ocellar setae large and strong, subequal to the frons width; lower calypter about 1.4 times as long as upper one; haltere yellowish.

Wings. Hyaeline, veins orange; basicosta dark brown; costa reaching tip of M; costal spine subequal in length to r–m; calypters yellowish, lower calypter about 1.4 times as long as upper one; haltere yellowish.

Legs. Coxae, tarsi, fore femur, distal 2/5 of mid femur and distal 1/3 of hind femur black-brown, the remaining parts of legs yellow; fore tibia with 1 submedial p which is strong and long, about 2/5 of fore tibia in length; mid femur with 4–5 av in basal half, basal 2/3 with pv row, 2 preapical pd; mid tibia with 1 submedial pd, without ad and pv; hind femur with complete av row which is irregular, pv row in basal 2/5, about 4–5; hind tibia with 1 submedial av, 1 median ad, 1 preapical d, without apical pv; distal part of tarsi not widened; tarsi longer than tibiae; claws subequal in length to pulvilli, about 3/4 of fifth tarsomere in length.

Abdomen. Long-oval in dorsal view, ground colour black with gray to blue-gray pruinosity; tergites 1+2–5 each with a pair of large black-brown lateral spots, without median vitta, posterior marginal setae of each tergite weak, 1–2 pairs of discal setae which are strong; sparsely covered with hairs; sternite 1 bare.

Female. Unknown

Etymology. The species name refers to male characters similar to C. clambosa Wei & Yang, 2007 and Latin word “dis-” means “un-”.

Remarks. This new species resembles C. clambosa Wei & Yang, 2007, but can be distinguished from the latter by the tip of postpedicel rounded; arista entirely covered with short hairs, the longest hairs as long as basal diameter of arista; thorax ground colour black; scutum with three black vittae; costal spine subequal in length to r–m; coxae and fore femur black-brown; abdomen ground colour black.
with green-gray pruinosity; scutum with orange pruinosity, along the row of acr and the row of dc with three brown vittae, median vitta reaching scutoscutellar suture; spacing between the two rows of acr narrow, acr as hairs; dc 1+3, iad 0+2, without pra, posthumeral seta 1+0; notopleuron bare; both apical and basal scutellar setae developed, lateral surface and ventral surface of scutellum bare; proepisternum and basisternum of proepisternum concave in centre; anepimeron, meron and katepimeron bare; proepisternal setae 2 (one of them short); proepimeral setae 2 (the lower one downcurved); anterior anepisternal seta 1; anterior and posterior spiracles small and orange; katepisternal setae placed as an isosceles triangle.

Wings. Hyaline, slender and long, veins orange; basicosta orange-yellow, costal spine distinct; costa reaching the tip of M; R₄/₅ and M straight, nearly parallel; dm–cu straight; calypters yellowish, lower calypter projecting, about 1.8 times as long as upper one; haltere yellowish.

Legs. Trochanters and tibiae yellow, distal 2/3–4/5 of mid and hind tibiae orange or orange-yellow, basal and distal parts of fore femur with a little yellow colour, basal 1/6 of mid femur yellow, basal 1/5–1/4 of hind femur yellow, the remaining parts of legs dark black; fore tibia with 1 submedial p which is thin, without ad; mid femur with a row of av, 3 strong pv in basal half; mid tibia without submedial ad (one specimen with 1 ad on one side), 1 median pd; hind femur sparsely with an irregular row of av and pv, preapical, submedial and supermedial av long and large, subbasal, submedial, supermedial, preapical pv long and large; hind tibia with 1 submedial av, 1 submedial ad, as long as 2/7 of tibia in length, 1 preapical d, without pd, p and apical pv; apical part of tarsi not widened; tarsi slightly longer than tibiae; claws longer than pulvilli, claws about 4/5 of fifth tarsomere in length.

Abdomen. Ground colour black, slender, the dorsal part slightly bent, with green-gray pruinosity; tergites 1+2–5 each with a pair of brown
lateral spots, discal setae slightly strong, the row of posterior marginal setae incomplete; sternite 1 bare, sternites 2–4 slender, posterior margin of sternites 2–4 each with a pair of setae, sternite 5 dark orange, lateral lobes slightly broad.

Female. Body length 5.6–5.8 mm. Ocellar setae slightly longer than frontal width; mid tibia with 1 submedial ad; abdomen oval, lateral spots of tergites 3–5 not as distinct in male; other characters as male.

**Etymology.** The species name refers to its type locality.

**Remarks.** This new species resembles *C. grandis* Xue & Zhao, 1998, but can be distinguished from the latter by frontal triangle reaching upper 2/5 of frons; ocellar setae large and strong, subequal to frons width; anterior lower margin of postpedicel as an obtuse angle; arista entirely covered with short hairs; gena about 1/6 of eye in height; costal spine distinct; tergites 1+2–5 each with a pair of brown lateral spots.

### 4.3. Coenosia sublacteipennis Xue & Wang, sp. n. (Fig. 4)

**Type material.** Holotype, male, P.R. China: Mt. Maoer, Guangxi Province, (25.49° N, 111.03° E; 350–2,100 m), 29.IV.–4.V.2009, Chun T. Zhang leg. Paratypes, 2 males, same data as holotype.

**Description.** Male. Body length 4.5–4.7 mm.

Head. Eye bare, lower posterior margin not concave; lateral margins of frons parallel, about 0.40–0.42 of head width; frontal vitta dark black,
with dark gray pruinosity, about 2.8–3.0 times as wide as fronto-orbital plate; frontal triangle with light orange pruinosity, reaching lower 3/4 of frons; ocellar setae shorter than width of frons; inner vertical seta about 2.0–2.4 times as long as outer vertical seta; three pairs of fr, the middle pair slightly weak; a pair of upper orbital setae; fronto-orbital plate, parafacial and gena with grayish pruinosity; parafacial about half of postpedicel width; antenna black, postpedicel about 3.5 times as long as broad; arista entirely covered with short hairs, the longest hairs as long as basal diameter of arista; distance between apical part of antenna and epistoma about 1/3 of postpedicel length; anterior part of pedicel with grayish pruinosity, apical margin yellow; epistoma not projecting; frontal angle situated in front of vibrissal angle; gena about 1/7 of eye in height; genal hairs and postgenal hairs black, occiput with green-gray pruinosity; prementum black and shining, about three times as long as broad; palpus black, slightly shorter than prementum; labellum small, about 1.3 times as long as width of prementum.

Thorax. Ground colour black, lateral surface with green-gray pruinosity; middle part of scutum with orange-gray pruinosity, along the row of acr and the row of dc each with a dark brown vitta, 1–2 irregular rows of acr, dc 1+3, ial 0+1, without pra; notopleuron bare; both basal and apical scutellar setae developed; lateral surface and ventral surface of scutellum bare; proepisternum and basisternum of prosternum concave in centre; anepimeron, meron and katepimeron bare; proepisternal setae 2, the length of them not equal; proepimeral setae 2 (one of them short and decurved), without anterior anepisternal seta; both anterior and posterior spiracles small and brown; katepisternal setae placed as an isosceles triangle.

Wings. Slightly hyaline, veins brown-yellow; basicosta dark brown, tegula yellow; costal spine small; costa reaching the tip of M; R4+5 and M straight, parallel; calypters yellowish, lower calyptr slender, about 1.8 times as long as upper one; haltere yellowish.

Legs. Tarsi and distal 1/4 of femora in dorsal surface (distal 3/5 of fore femur) brown, the remaining parts of legs yellow; fore tibia with 1 submedial pv, 1 preapical d; mid femur with 2–3 av in basal 1/3, 2 preapical pd, 3–4 pv in basal 2/3; mid tibia with 1 submedial p, without ad; hind femur with 4 av (the subbasal one small), spacing between them equal, middle part with 3 pv, 1 preapical pd; hind tibia with 1 submedial av, 1 median ad, 1 preapical d, without pd and apical pv; tarsi slightly longer than tibiae; claws subequal in length to pulvilli, claw of fore leg long, about 4/5 of fifth tarsomere in length, claws of mid and hind legs about 3/5 of fifth tarsomere in length.

Abdomen. Ground colour black; long-conical in dorsal view, with dark to green-gray pruinosity; sparsely covered with hairs; posterior marginal setae of tergites 1+2–4 weak, each with a distinct lateral seta; tergites 1+2–5 each with a pair of bar dark brown spots, tergite 6 and sternite 1 without hairs, sternites 2–4 rectangular, lateral lobes of sternite 5 broad, distal part of lateral lobes with 3–5 long setae.

Female. Unknown.

Etymology. The species name refers to male terminalia similar to C. lacteipennis (Zetterstedt, 1845) and Latin word “sub” means “similar”.

Remarks. This new species resembles C. lacteipennis (Zetterstedt, 1845), but can be distinguished from the latter by parafacial about half of postpedicel width; postpedicel about 3.5 times as long as broad; dc 1+3; distal 1/4 of femora in dorsal surface (distal 3/5 of fore femur) brown, the remaining parts of legs yellow; mid tibia without ad.

5. A key to the males of Palaearctic Region species of the Coenosia pedella-group

1. dc 2+3 C. lacteipennis (Zetterstedt, 1845)
   – dc 1+3 2
2. Costa slightly beyond R4+5 3
   – Costa reaching the tip of M 4
3. Proepisternal seta 1; mid femur and mid tibia yellow, hind femur and hind tibia black-brown C. connectens (Hennig, 1961)
   – Proepisternal setae 2; mid and hind legs black C. oligochaeta Hennig, 1961
4. Abdomen without spots 5
   – Abdomen with distinct spots 8
5. Hind tibia without d C. amplicauda Xue & Zhu, 2006
– Hind tibia with \( d \) 6
6. Lower calypters at least subequal in length to upper calypters \( C. \) parva Xue \\& Cui, 2001
– Lower calypter shorter than upper calypter 7
7. Tibiae and first to fourth tarsomeres of fore leg yellow \( C. \) sparagmocerca Zheng et al., 2004
– Distal and basal parts of tibiae yellow, tarsi black \( C. \) forcipiungula Xue \\& Zhang, 2011
8. Hind tibia without \( d \) 9
9. Lower calypters at least subequal in length to upper calypters 10
10. Fore femur with black or black-brown colour 11
– Fore femur entirely yellow 12
11. Tibiae yellow \( C. \) carinata Cui \\& Li, 1996
– Tibiae black \( C. \) latisponsa Xue \\& Zhang, 2011 13
12. Mid tibia without \( ad \) or \( pd \), hind tibia without \( ad \) \( C. \) flavescentis Wei \\& Yang, 2007
– Mid tibia with \( ad \) and \( pd \), hind tibia with \( ad \) \( C. \) subflaviseta Xue \\& Cui, 2001 14
13. Lower calypters subequal in length to upper calypters 15
– Lower calypters distinctly projecting, longer than upper calypters 15
14. Femora yellow \( C. \) subcarinata Xue \\& Zhu, 2008
– Femora black \( C. \) peniculicauda Xue \\& Wang, 2008 16
15. Proepisternal setae 1 16
– Proepisternal setae 2 17
16. Flagellomere 1 with cone-like process at apex \( C. \) grisella Hennig, 1961
– Flagellomere 1 without cone-like process at apex \( C. \) xanthocera Hennig, 1961 18
17. Tibiae black 18
– Tibiae with yellow colour 19
18. Mid tibia with 1 \( ad \), mid femur with a complete row of \( pv \) \( C. \) appendimembrana Xue \\& Zhu, 2008
– Mid tibia without \( ad \), mid femur with 2–3 \( pv \) \( C. \) octosignata Rondani, 1866 19
19. At least basal parts of mid and hind femora yellow 20
– Femora entirely dark brown \( C. \) longiquadrata Xue \\& Wang, 1992 20. At least basal 2/3 of fore femur dark brown 21
– Basal part of fore femur with yellow colour 26
21. Mid and hind femora yellow \( C. \) monticola Xue \\& Zhao, 1998
– At least distal 1/4 of mid and hind femora with dark colour 22
22. Mid tibia without \( ad \) 23
– Mid tibia with \( ad \) 24
23. Fore tibia entirely black-brown, mid tibia without \( p \) \( C. \) disclambosa Xue \\& Wang sp. n.
– Distal part of fore femur yellow, mid tibia with \( p \) \( C. \) clambosa Wei \\& Yang, 2007 24
24. Tarsi black, the remaining parts of legs yellow \( C. \) campestris (Robineau-Desvoidy, 1830)
– Legs colour not as above 25
25. Distal half of mid and hind femora black; first tarsomere of fore leg yellow, first tarsomere of other legs dark brown or black \( C. \) verralli Collin, 1953 26
26. Antenna black or black-brown 28
– Antenna with yellow or orange colour 27
27. Basal 1/6 of mid femur yellow, basal 1/5–1/4 of hind femur yellow, remaining parts of femora dark black \( C. \) maoershanensis Xue \\& Wang sp. n.
– Distal 1/3 of mid and hind femora dark yellow to light brown, remaining parts of femora yellow \( C. \) pudorosa Collin, 1953 28
28. Scutum without spots 33
– Scutum with spots 29
29. Palpus dark yellow \( C. \) nigrifrons Cui \\& Li, 1996
– Palpus black or black-brown 30
30. Tarsi brown or black-brown 31
– Tarsi yellow 32
31. Tibiae yellow \( C. \) sublacteipennis Xue \\& Wang sp. n.
– Basal 1/4 of tibiae yellow, remaining parts of tibiae light orange to orange \( C. \) grandis Xue \\& Zhao, 1998 32
32. Hind tibia without \( pd \) 34
– Hind tibia with \( pd \) \( C. \) luteipes Ringdahl, 1930 33
33. Palpus black or black-brown 34
– Basal half of palpus orange-yellow, distal half dark brown \( C. \) mandschurica Hennig, 1961
34. Apical scutellar seta distinctly shorter than the basal one (basal part of surstyli broad, distal part narrow) — *C. pedella* (Fallén, 1825) 
   − Apical scutellar seta subequal in length to the basal one (basal part of surstyli narrow, distal part broad) — *C. spatuliforceps* Xue & Zhao, 1998

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References


