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The Muscini flies of the world (Diptera, Muscidae): identification key and generic diagnoses

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Abstract

Flies of the tribe Muscini (Diptera, Muscidae) are worldwide in distribution and are represented by some 350 species in 18 genera. The present study provides an identification key and diagnoses for all the genera of world Muscini: *Biopyrellia* Townsend, *Curranosia* Paterson, *Dasyphora* Robineau-Desvoidy, *Deltotus* Séguy, *Hennigmyia* Peris, *Mesembrina* Meigen, *Mitroplatia* Enderlein, *Morellia* Robineau-Desvoidy, *Musca* Linnaeus, *Myiophaea* Enderlein, *Neomyia* Walker, *Neorypellia* Pont, *Polietes* Rondani, *Polietina* Schnabl & Dziedzicki, *Pyrellia* Robineau-Desvoidy, *Pyrellina* Malloch, *Sarcopromusca* Townsend, *Ziminellia* Nihei & de Carvalho. Most infrageneric taxa are also represented, namely, the subgenera of *Dasyphora* and *Morellia*. Comments on phylogeny support (whenever pertinent) and the major references containing revisions and regional identification keys to species are provided for each genus and subgenus.

Key words: Muscini, taxonomy, systematics, identification key, diagnosis

Introduction

Worldwide in distribution, the tribe Muscini comprises, together with the Stomoxyini, the subfamily Muscinae, which is considered to be among the basal groups within the family (de Carvalho 1989; Couri & de Carvalho 2003).

The classification and definition of Muscini have changed over time, as is the case throughout the muscoid taxa at the family and subfamily levels. The first definition for the Muscinae sensu lato was given by Schiner (1862): M vein bent forward towards vein R_{4+5}, plumose arista, short and oval abdomen without strong setae, and relatively short legs. Subsequent authors gave different definitions of the group according to their own interpretation of the characters (Girschner 1893; Bezzi & Stein 1907; Schnabl & Dziedzicki 1911; Malloch 1924; Ringdahl 1929; Hennig 1963a, 1965; Skidmore 1985; de Carvalho 1989). However, most of the characters previously used to characterize the Muscinae (and consequently the Muscini) are now generally accepted as being the result of independent evolutionary processes (homoplasies), as is the case, for example, for the shape of the lower calypter (enlarged posteriorly), or the bend of vein M toward vein R_{4+5} (de Carvalho 1989; Couri & de Carvalho 2003; Nihei & de Carvalho 2007a).

Hennig (1965) performed the first comprehensive phylogenetic study of the Muscidae. However, he used an explanatory and intuitive approach, which was restricted to presenting and discussing the major characters shared by the higher-level groups and genera. More recently, Nihei and de Carvalho (2007a) performed a formal cladistic analysis of the 21 genera recognized within the tribe. Their results can be summarized as follows: 1) synonymy of *Parapyrellia* Townsend, *Trichomorellia* Stein and *Xenomorellia Malloch* with *Morellia*

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Robineau-Desvoidy, and a new classification into four subgenera (*Morellia* s.s., *Parapyrellia*, *Trichomorellia* and *Xenomorellia*); 2) synonymy of *Eudasyphora* Townsend with *Dasyphora* Robineau-Desvoidy and a new classification into three subgenera (*Dasyphora* s.s., *Eudasyphora* and *Rypellia* Malloch); 3) indication of two groups to be removed from *Morellia* (the *simplex* and *nigricosta* groups); and 4) the non-monophyly of *Curranosia* Paterson and *Polietes* Rondani.

The Muscini are a monophyletic group (Nihei & de Carvalho 2007a) and, following our new classification, now includes 18 genera with 351 species. The following characters are shared by its members: plumose arista (Figs. 1, 3), female usually with a proclinate fronto-orbital seta (Figs. 1–2, 4), female parafrontalia setulose on the upper half or on its entire length, retractile and flexible proboscis, sinuous subcostal vein, apical portion of vein M usually curved towards vein R_{4+5}, glossiform (Fig. 12) or posteriorly enlarged lower calypter (Figs. 10, 13, 14), setulose anepimeron (Fig. 10), and calcar (posterodorsal seta on hind tibia) usually present.

The present study is a taxonomic contribution intended to facilitate the identification of the world genera of Muscini. Other similar contributions have already been published for other higher-level groups of Muscidae, such as the Mydaeinae (Vockeroth 1972) and Coenosiini (Couri & Pont 1999). As regards the Muscini, other studies dealing with members of the tribe are restricted to local faunas. The most recent contributions are on Australasian (Pont 1973), Nearctic (Huckett & Vockeroth 1987), Neotropical (de Carvalho & Couri 2002), Palaearctic (Gregor et al. 2002), and Afrotropical species (Zielke 1971; Couri 2007), and several national contributions.

TABLE 1. Distributional account of Muscini genera, with numbers of species by biogeographic region.

Genera	AF	AND	AUS	NE	NT	OR	PA	Total species
Biopyrellia					1			1
Curranosia	7							7
Dasyphora	1			4		10	23	33
Deltotus	3							3
Hennigmyia	3							3
Mesembrina				2	1	5	9	13
Mitroplatia	9					6		15
Morellia	14			3	30	14	7	65
Musca	39	1	10	2	2	37	26	67
Myiophaea			1					1
Neomyia	43		10	1	1	18	11	75
Neorypellia					1			1
Polietes				2		2	8	11
Polietina				1	15			15
Pyrellia	13		2			7	7	25
Pyrellina	12							12
Sarcopromusca					2			2
Ziminellia			1			2	3	3
Total: 18	143	1	24	15	53	101	94	351

Abbreviations: AF, Afrotropical; AND, Andean; AUS, Australasian; NE, Nearctic; NT, Neotropical; OR, Oriental; PA, Palaearctic.

The aim of the present study is to provide an identification key to the world genera of Muscini, as well as a morphological characterization (diagnosis) for each of the 18 recognized genera in the tribe. Also, the sub-

genera of *Morellia* and *Dasyphora* are keyed and diagnosed; whereas the subgenera of *Musca* were not included as the phylogeny of Muscini did not support their monophyly and taxonomic validity. For each genus and subgenus, the major references (revisions/diagnoses/descriptions and keys to the species) are listed for each biogeographical region. Table 1 summarizes the number of species in each genus and diversity over the regions.

Material and methods

This study was developed through the examination of a large amount of material deposited in the following institutions (respective curators in brackets): Australian National Insect Collection, CSIRO, Canberra, Australia (Graham Crompton); California Academy of Sciences, San Francisco, USA (Charles Griswold); Colección Boliviana de Fauna, La Paz, Bolivia (Jaime Sarmiento); Colección Instituto Alexander von Humboldt, Bogotá, Colombia (José Enrique Castillo); Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil (Claudio J.B. de Carvalho); Entomology Section, University of Colorado Museum, Boulder, Colorado, USA (Virginia Scott); Hope Entomological Collections, Oxford University Museum of Natural History, Oxford, United Kingdom (Adrian C. Pont); Insect Research Collection, University of Wisconsin, Madison, Wisconsin, USA (Steven Krauth); Instituto de Biociências, Universidade Federal do Mato Grosso, Cuiabá, Mato Grosso, Brazil (Rosina D. Miyazaki); Instituto Miguel Lillo, Universidad Nacional de Tucuman, Tucuman, Argentina (Guillermo L. Claps); Instituto Nacional de Biodiversidad, Costa Rica (Manuel Zumbado); Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil (Augusto Henriques); Maurice T. James Entomological Collection, Washington State University, Pullman, Washington, USA (Richard Zack); Museo Entomologico, Leon, Nicaragua (Jean-Michel Maes); Museo de Historia Natural "Noel Kempff Mercado", Santa Cruz de la Sierra, Bolivia (María Julieta Ledezma); Museu de Ciências Naturais, Fundação Zoobotânica do Rio Grande do Sul, Porto Alegre, Brazil (Hilda A.O. Gastal); Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (Márcia S. Couri); Museu Paraense Emílio Goeldi, Belém, Pará, Brazil (Ana Y. Harada); Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil (Carlos J.E. Lamas); Museum für Naturkunde, Humboldt-Universität, Berlin, Germany (Joachim Ziegler); Natal Museum, Pietermaritzburg, South Africa (Mikhail Mostovski); The Natural History Museum, London, United Kingdom (Nigel Wyatt).

The morphological terminology follows mainly McAlpine (1981) with some exceptions as presented and justified in Nihei and de Carvalho (2007a). In the biogeographic terminology, the Andean Region was recognized herein following the classification scheme proposed by Morrone (2001, 2004).

Results

Key for the identification of the world genera of Muscini

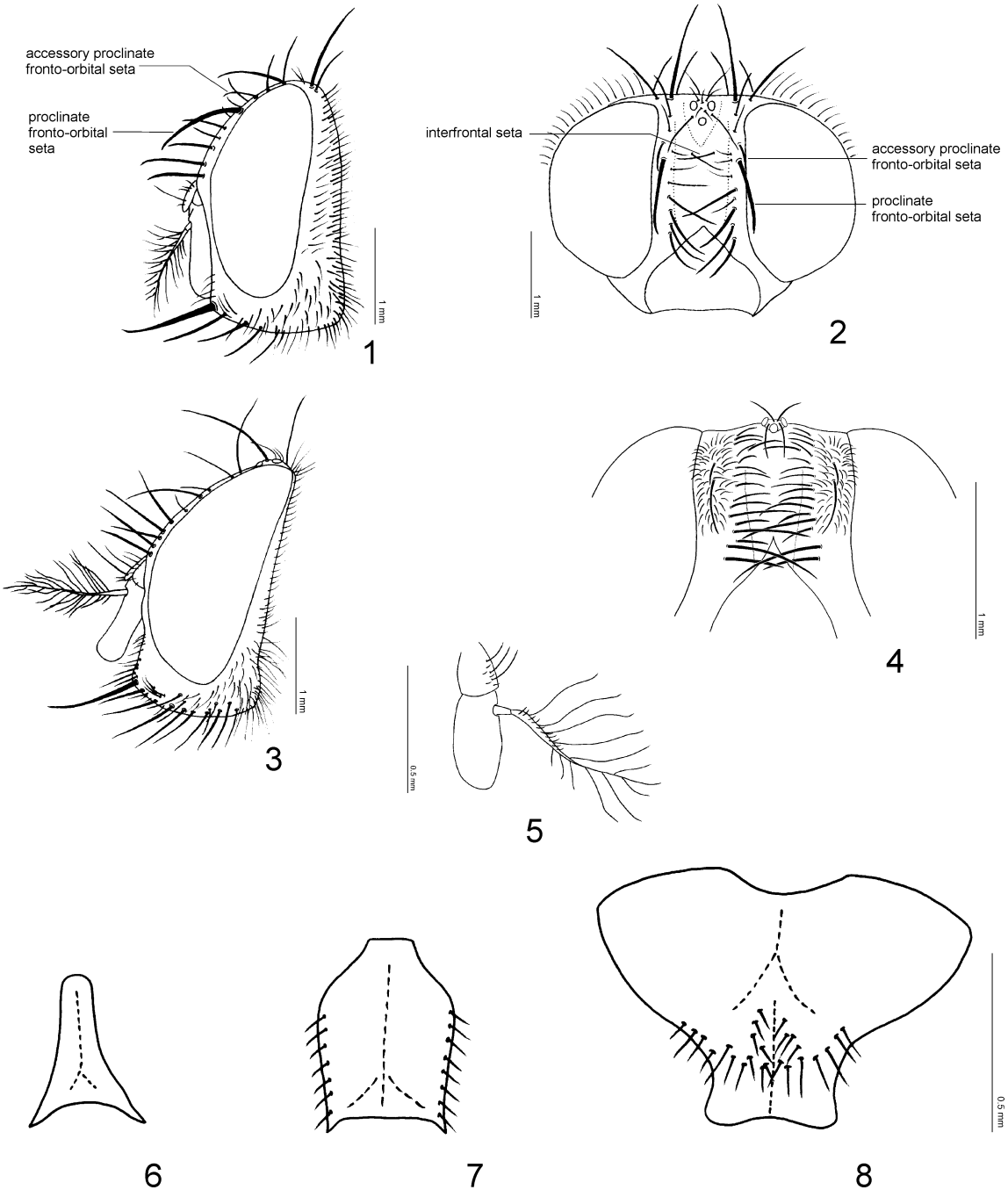
1. Lower calypter glossiform (Fig. 12) 2
   Lower calypter posteriorly enlarged (Figs. 13–14) 10
2. Postalar wall setulose (Fig. 12); prosternum setulose 3
   Postalar wall bare (Figs. 13–14); prosternum usually bare 5
3. Notopleurals 3 (an extra weak median seta, shorter than the two setae usually present); katepisternals 1+2; vein M setulose ventrally between r-m and dm-cu crossveins; vein M straight, subparallel to R_{4+5}; female with interfrontal seta (Fig. 2) (15 species; distribution: Neotropical, Nearctic) .....
   .....*Polietina* Schnabl & Dziedzicki
   Notopleurals 2; katepisternals 1+3; vein M bare or setulose ventrally between r-m and dm-cu; vein M bent forward towards R_{4+5} (Fig. 11); female without interfrontal seta 4

4. Dorsocentrals 2+2; vein M bare ventrally; vein R_1 setulose dorsally and bare ventrally (3 species; distribution: Afrotropical – Madagascar) ..... *Deltotus* Séguy
   Dorsocentrals 2+4; vein M setulose ventrally between r-m and dm-cu crossveins; vein R_1 bare dorsally and setulose ventrally (12 species; distribution: Afrotropical)..... *Pyrellina* Malloch (in part)
5. Vein R_1 setulose ventrally (12 species; distribution: Afrotropical) ..... *Pyrellina* Malloch (in part)
   Vein R_1 bare ventrally 6
6. Vein M straight, subparallel to R_{4+5}; female with interfrontal seta (Fig. 2) 7
   Vein M bent forward towards R_{4+5} (Fig. 11); female without interfrontal seta 8
7. Vein R_1 setulose dorsally; intrapostalar present (Fig. 9); mid tibia without an anterodorsal submedian seta; first abdominal sternite bare (3 species; distribution: Afrotropical) ..... *Hennigmyia* Peris
   Vein R_1 bare dorsally; intrapostalar absent; mid tibia with an anterodorsal submedian seta; first abdominal sternite setulose (11 species; distribution: Nearctic, Oriental, Palaearctic) ..... *Polietes* Rondani
8. Presutural acrostichals and dorsocentrals not developed; posterior spiracle bare on posterior margin; calcar weak (shorter than tibial width) (1 species; distribution: Neotropical) ..... *Neorypellia* Pont
   Presutural acrostichals and dorsocentrals developed; posterior spiracle setulose on posterior margin; calcar strong (*Morellia* Robineau-Desvoidy, in part)..... 9
9. Apical portion of stem-vein dorsally with a strong reclinate seta; subcostal sclerite setulose ventrally (2 species; distribution: Neotropical) .....*Morellia*, subgenus *Xenomorellia* Malloch
   Apical portion of stem-vein bare dorsally; subcostal sclerite bare (8 species; distribution: Neotropical) ... .*Morellia*, subgenus *Trichomorellia* Stein
10. Laterobasal membrane connecting the bases of upper and lower calypters absent, giving the appearance that the lower calypter is much larger than the upper at base; colouration metallic black and body with dense ground setulosity; calypters and basal portion of wing notably yellowish (or blackish in *Mesembrina nigribasis* Kuchta & Savage); wing with bare veins (13 species; distribution: Nearctic, Neotropical, Oriental, Palaearctic) ..... *Mesembrina* Meigen
    Laterobasal membrane connecting the bases of upper and lower calypters present (Fig. 10); other characters not as above 11
11. Mid tibia with a strong submedian seta on ventral to posteroventral surface (Fig. 15); posterior katepisternals 2 or 3 (rarely 1) 12
    Mid tibia bare on ventral to posteroventral surface (Figs. 16, 18); posterior katepisternals 1 or 2 (rarely absent) 18
12. Greater ampulla setulose (Fig. 10); anatergite usually setulose; apical portion of stem-vein bare dorsally (75 species; distribution: Afrotropical, Australasian, Oriental, Nearctic, Neotropical, Palaearctic) ....*Neomyia* Walker
    Greater ampulla bare; anatergite bare; apical portion of stem-vein setulose dorsally 13
13. Posterior portion of suprasquamal ridge setulose (Fig. 14) 14
    Posterior portion of suprasquamal ridge bare 15
14. Fifth abdominal tergite with golden colouration or pruinosity; first abdominal sternite widely setulose; meron finely setulose; subcostal sclerite bare (2 species; distribution: Neotropical) .... *Sarcopromusca* Townsend
    Fifth abdominal tergite not golden; first abdominal sternite setulose only on lateral margins; meron bare; subcostal sclerite setulose ventrally (7 species; distribution: Afrotropical) ..... *Curranosia* Paterson
15. Vein R_1 bare dorsally; vein R_{4+5} setulose ventrally at most until the crossvein r-m; 1 postsutural intra-alar (25 species; distribution: Afrotropical, Australasian, Oriental, Palaearctic) . *Pyrellia* Robineau-Desvoidy
    Vein R_1 setulose dorsally; R_{4+5} setulose ventrally almost until the apex; 2 postsutural intra-alars ....(*Dasyphora* Robineau-Desvoidy)... 16

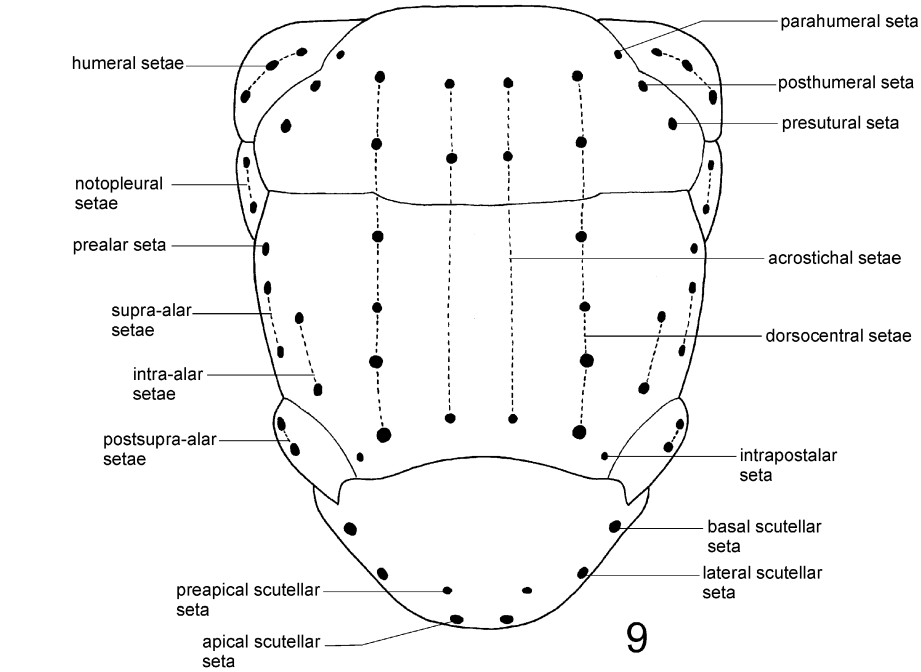
16. Vein R_1 setulose ventrally (17 species; distribution: Oriental, Palaearctic) .... *Dasyphora*, subgenus *Dasyphora* s.s.
Vein R_1 bare ventrally 17
17. Mid tibia with an anterodorsal submedian seta; antennae black (10 species; distribution: Nearctic, Oriental, Palaearctic) ..... *Dasyphora*, subgenus *Eudasyphora* Townsend
Mid tibia without an anterodorsal submedian seta; second antennal segment yellow (6 species; distribution: Oriental, Palaearctic) ..... *Dasyphora*, subgenus *Rypellia* Malloch
18. Male with anterointernal ommatidia strongly enlarged, with the same size as anterior ocellus; katepisternals 0+1 (the lower posterior seta weakly developed); prosternum notably narrowed anteriorly and bare (Fig. 6) (1 species; distribution: Neotropical) ..... *Biopyrellia* Townsend
Male with anterointernal ommatidia normally developed, at most the same size as posterior ocelli; katepisternals 1+2 (rarely 0+0 or 1+1); prosternum not narrowed, usually with parallel lateral margins, and setulose or bare 19
19. Lower calypter enlarged posteriorly, but not extending below base of scutellum (Fig. 13); subcostal sclerite setulose ventrally; veins R_1 and R_{4+5} setulose dorsally and ventrally; prosternum bare (1 species; distribution: Australasian) ..... *Myiophaea* Enderlein
Lower calypter enlarged posteriorly and extending below base of scutellum (Figs. 10, 14); subcostal sclerite bare; the remaining characters variable 20
20. Colouration non-metallic; calcar absent; costal vein bare ventrally or setulose until Sc; arista curved, this appearance due to a enlargement at base followed by a median concavity (Fig. 5) (67 species; distribution: all biogeographic regions) ..... *Musca* Linnaeus
Colouration metallic; calcar present (absent in *Morellia nigricosta*-group); costal vein setulose ventrally almost to the apex; arista nearly straight (Figs. 1, 3) 21
21. Prosternum bare; basal portion of stem-vein setulose ventrally (*Morellia* Robineau-Desvoidy, in part) 22
Prosternum setulose (Figs. 7–8); basal portion of stem-vein ventrally setulose or bare 23
22. Apical portion of stem-vein bare dorsally; proepisternum bare (52 species; distribution: Afrotropical, Nearctic, Neotropical, Oriental, Palaearctic) ..... *Morellia*, subgenus *Morellia* s.s.
Apical portion of stem-vein setulose dorsally; proepisternum setulose (bare in *M. humeralis* (Stein) which has humeral callus yellow and the wings spotted) (3 species; distribution: Neotropical) ..... *Morellia*, subgenus *Parapyrellia* Townsend
23. Basal portion of stem-vein setulose ventrally; male mid femur without a dorsal preapical protuberance bearing a set of setulae; vein R_1 setulose or bare dorsally (3 species; distribution: Australasian, Oriental, Palaearctic) ..... *Ziminellia* Nihei & de Carvalho
Basal portion of stem-vein bare ventrally (setulose in some few species); male mid femur with or without dorsal preapical protuberance bearing a set of setulae; vein R_1 always bare dorsally 24
24. Apical portion of stem-vein setulose dorsally; male mid femur with a dorsal preapical protuberance bearing a set of modified (hook-like) setulae; male mid tibia with a row of backwardly-directed setae on anterodorsal surface; calcar strong (2 species; distribution: Neotropical) .... *Morellia*, subgenus *Morellia* s.s. (*basalis*-group)
Apical portion of stem-vein bare dorsally; male mid femur without a dorsal preapical protuberance bearing setulae; male mid tibia without a row of backwardly-directed setae on anterodorsal surface; calcar strong or absent 25
25. Prosternum with parallel lateral margins and slightly narrowed anteriorly (Fig. 7); calcar absent (2 species; distribution: Neotropical) ..... *Morellia* s.l. (*nigricosta*-group)*
Prosternum trapezoid, the width of anterior margin about twice the posterior margin (Fig. 8); calcar strong (15 species; distribution: Afrotropical, Oriental) .....*Mitroplatia* Enderlein

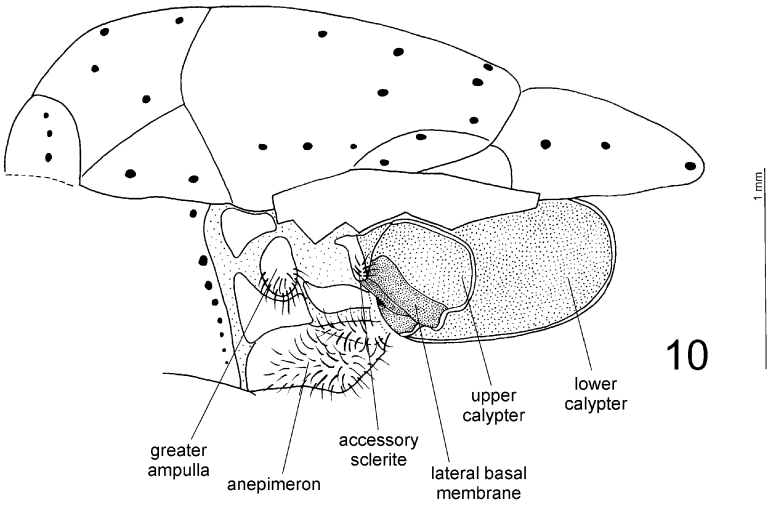
[* Here the *nigricosta*-group has been conservatively placed within Morellia, as the cladistic analysis of *Muscinia* per-

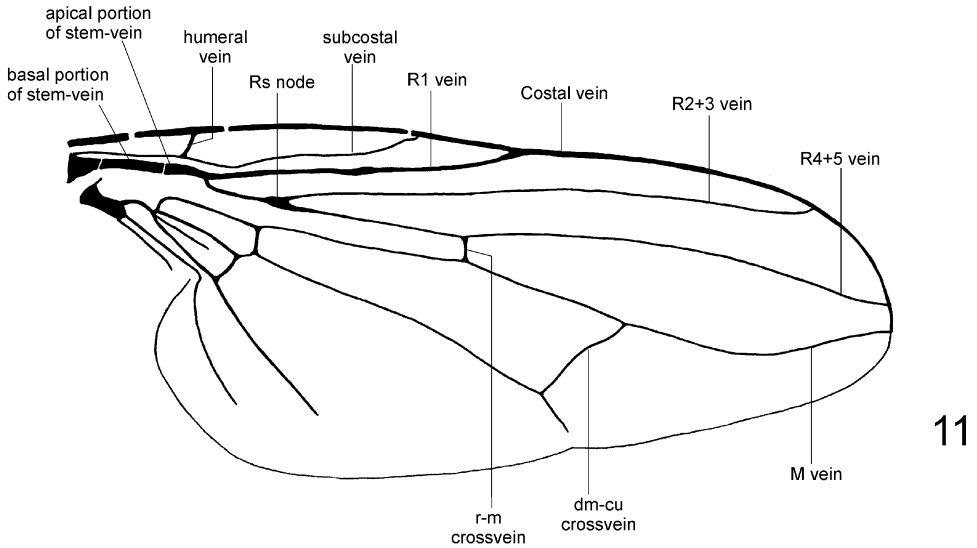
formed by Nihei and de Carvalho (2007a) indicated this group as a genus-ranked taxon. For more details, see discussion under *Morellia nigricosta*-group.]



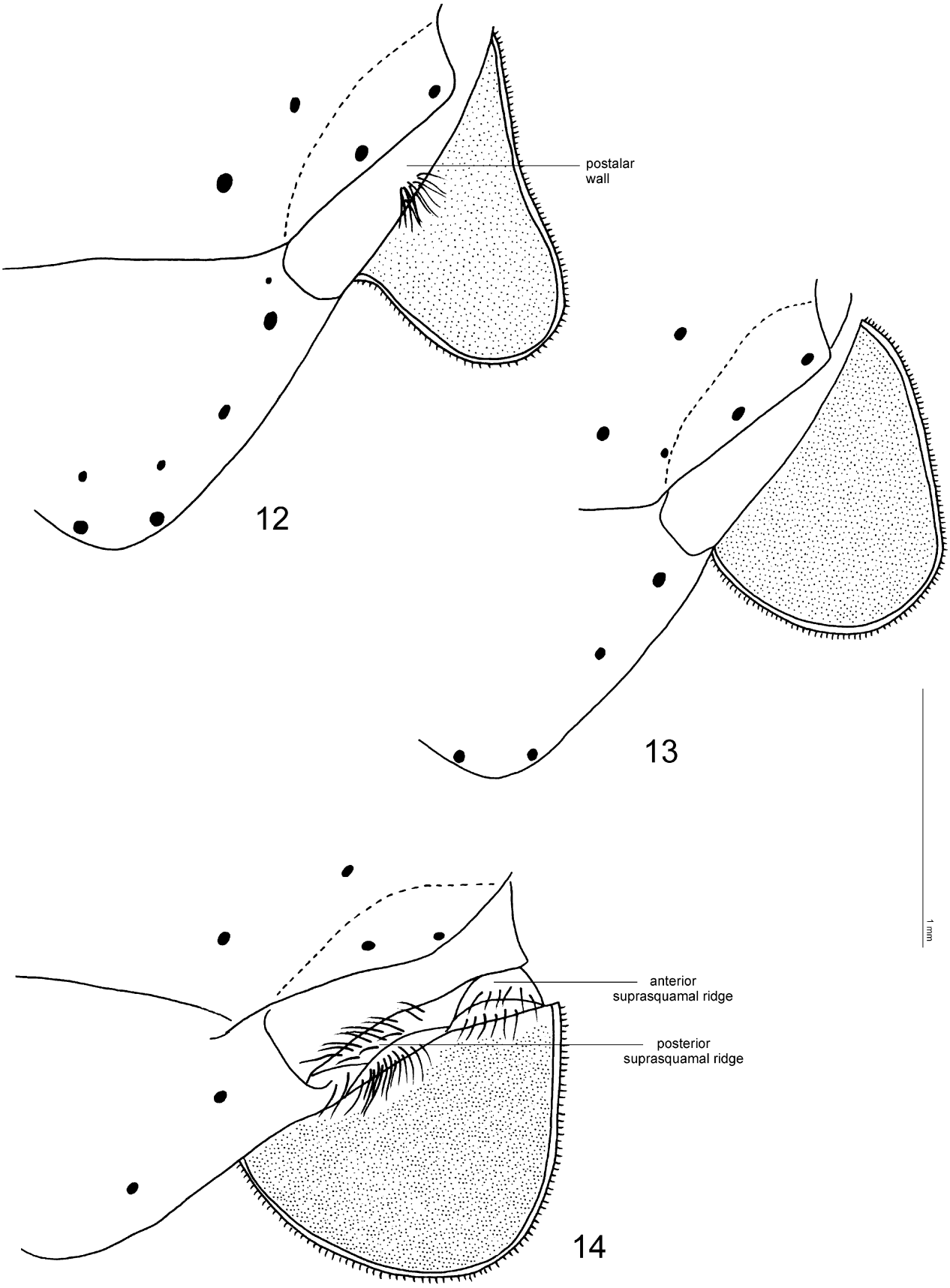
FIGURES 1–8. 1. Head, *Polietina orbitalis* (Stein), female, lateral view. **2.** Same, upper frontal view. **3.** Head, *Polietina major* (Albuquerque), male, lateral view. **4.** Head, *Morellia* (*Xenomorellia*) undescribed sp., female, frontal view. **5.** Antenna, *Pyrellia albocuprea* Villeneuve, inner lateral view. **6.** Prosternum, *Biopyrellia bipuncta* (Wiedemann), anteroventral view. **7.** Prosternum, *Morellia nigricosta* Hough, anteroventral view. **8.** Prosternum, *Mitroplatia smaragdina* (Séguy), anteroventral view. Figures 1–2 and 5 after Nihei and de Carvalho (2007a); Figure 3 after Nihei (2002). Figures 6–8 on same scale.



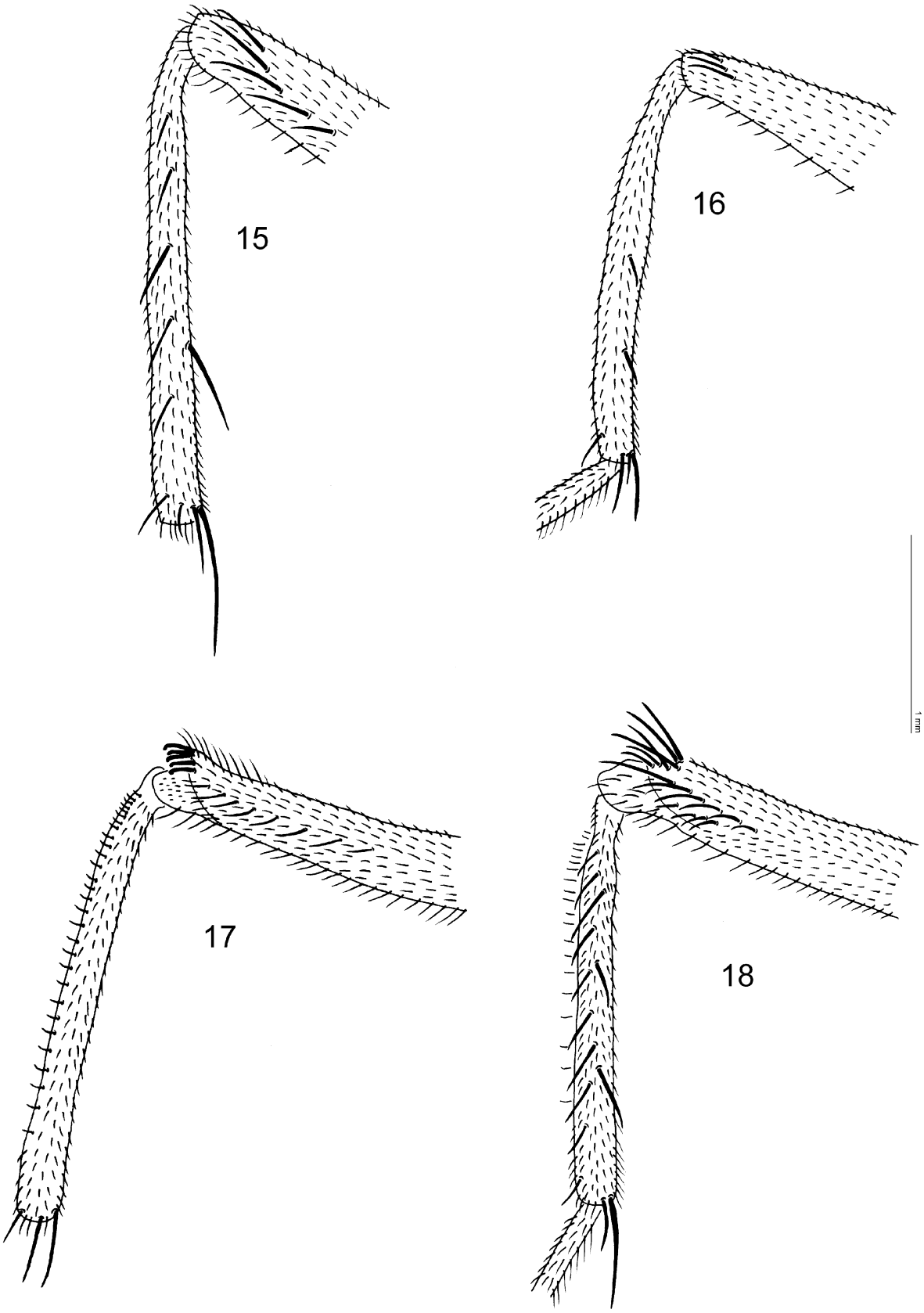




FIGURES 9–11. 9. Schematic presentation of Muscidae thorax, dorsal view. **10.** Thorax (partial), *Neomyia cornicina* (Fabricius), lateral view. **11.** Wing, *Morellia podagrica* (Loew). Figures 9–11 after Nihei and de Carvalho (2007a).



FIGURES 12–14. Posterolateral portion of thorax and lower calypter: **12.** *Polietina flavithorax* (Stein), dorsolateral view. **13.** *Myiophaea spissa* (Walker), dorsolateral view. **14.** *Neomyia cornicina*, oblique dorsolateral view. All figures on same scale.



FIGURES 15–18. Apex of mid femur and tibia: **15.** *Pyrellina distinct* (Walker), female, posterior view. **16.** *Biopyrellia bipuncta*, male, posterior view. **17.** *Morellia* (*Parapyrellia*) *maculipennis* (Macquart), male, anterior view. **18.** *Morellia podagrica*, male, posterior view. Figures 15–18 after Nihei and de Carvalho (2007a). All figures on same scale.

Diagnoses of the genera of Muscini

Biopyrellia Townsend, 1932

Biopyrellia Townsend, 1932: 105. Type species: *Musca bipuncta* Wiedemann, 1830.

Diagnosis. Colouration metallic dark-blue; thorax surface with fine pilose punctuation; wing with maculae on humeral vein and on apex of Sc and R_1. Male with anterointernal ommatidia strongly enlarged, with same size as anterior ocellum. Vibrissa reduced and inserted above the level of oral margin. Female without proclinate fronto-orbital seta; parafrons weakly setulose on upper half; interfrontal seta absent. Dorsocentrals 0+1. Posthumeral, parahumeral, postsutural intra-alars and intrapostalar seta absent. Prosternum notably narrowed anteriorly and bare (Fig. 6). Katepisternals 0+1. Meron and katepimeron bare. Posterior spiracle bare on posterior margin. Wing with the apical portion of stem-vein setulose ventrally; Rs node setulose dorsally and ventrally; R_{4+5} bare dorsally and ventrally; M bent forward towards R_{4+5}; some portions of the membrane not covered by microtrichiae. Subcostal sclerite bare. Lower calypter enlarged posteriorly, extending under base of scutellum. Mid tibia with two weak posteroventral setae, one supramedian and another at apical third (Fig. 16). Calcar weak.

Distribution (1 species). Neotropical.

References. Pamplona (1986), de Carvalho and Couri (2002).

Curranosia Paterson, 1957

Curranosia Paterson, 1957: 445. Type species: *Orthellia pilarara* Snyder, 1951 [=*Lucilia spekei* Jaennicke, 1867].

Diagnosis. Colouration shining metallic blue or green; wing without maculae. Female with proclinate fronto-orbital seta undeveloped; interfrontal seta absent. Dorsocentrals 2+3-4. Posthumeral present; intrapostalar present. Prosternum setulose or not. Greater ampulla bare. Katepisternals 1+2 or 1+3. Katepimeron setulose. Posterior portion of suprasquamal ridge setulose. Wing with the apical portion of stem-vein setulose dorsally and usually setulose ventrally; R_{4+5} setulose dorsally and ventrally; Rs node setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite setulose ventrally. Mid tibia with a strong submedian seta on ventral to posteroventral surface. Calcar strong. First abdominal sternite setulose only on lateral margins.

Comments. Cladistic analysis of Muscini (Nihei & de Carvalho 2007a) corroborated the division of the genus into two species-groups: *gemma* and *spekei*. However the genus was not supported as monophyletic, with the *gemma*-group placed outside and, therefore, treated therein as a genus-ranked taxon. The main differences between both groups concern the presence/absence of a marginal spined process on male cercal plate and presence/absence of anteroventral setulae on wing subcostal sclerite (Nihei & de Carvalho 2007a). A distinction of a species-group in *Curranosia* was earlier considered by Zielke (1973, 1974) with his *pilarara*-group (now known as *spekei*-group), contrasting with an unnamed group which included *C. gemma* (Bigot) and *C. prima* (Curran) (this group named as *gemma*-group by Nihei & de Carvalho 2007a).

Distribution (7 species). Afrotropical.

References. Peris (1967), Zielke (1971).

Dasyphora Robineau-Desvoidy, 1830

Dasyphora Robineau-Desvoidy, 1830: 409. Type species: *Musca agilis* Meigen *sensu* Robineau-Desvoidy, 1830 [misidentification, =*Musca pratorum* Meigen, 1826].

Diagnosis. Colouration purplish-blue, greenish-blue or blackish-blue, usually with silver pruinosity; wing with at most a macula on humeral vein. Female with proclinate fronto-orbital seta; parafrons entirely setulose or only on upper half; interfrontal seta absent. Dorsocentrals 2+4 or 3+4. Postsutural intra-alars 2; intrapostalar present. Prosternum setulose or bare. Katepisternals 1+3. Meron setulose. Wing with basal portion of stem-vein setulose or not dorsally; apical portion of stem-vein setulose dorsally and ventrally; R_1 setulose dorsally, and setulose also ventrally in *Dasyphora* s.s.; Rs node and R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite setulose ventrally. Mid tibia with a strong submedian seta on ventral to posteroventral surface. Calcar strong. First abdominal sternite widely setulose or with setulae only on lateral margins.

Comments. *Dasyphora* was recently redefined to include three subgenera: *Dasyphora* s.s., *Eudasyphora* and *Rypellia*; the last two synonymized with and re-instated as subgenera of *Dasyphora* s.l. by Nihei and de Carvalho (2007a).

Distribution (33 species). Nearctic, Oriental and Palaearctic.

References. See under each subgenus.

Subgenus *Dasyphora* s.s.

Dasyphora Robineau-Desvoidy, 1830: 409 (as genus). Type species: *Musca agilis* Meigen *sensu* Robineau-Desvoidy, 1830 [misidentification, =*Musca pratorum* Meigen, 1826].

Diagnosis. Colouration metallic purplish-blue to blackish-blue; wing without maculae. Eye densely setulose. Female with the parafrons entirely setulose or only on upper half. Dorsocentrals 3+4. Prosternum setulose or bare. Wing with basal portion of stem-vein setulose or not dorsally; R_1 setulose dorsally and ventrally. First abdominal sternite widely setulose.

Distribution (17 species). Oriental and Palaearctic.

References. Oriental species: Emden (1965), Xue and Chao (1998); Palaearctic: Hennig (1963b, 1964a), Peris and Llorente (1963), Zimin and Elberg (1988), Xue and Chao (1998), Gregor et al. (2002).

Subgenus *Eudasyphora* Townsend, 1911

Eudasyphora Townsend, 1911: 170 (as genus). Type species: *Lucilia lasiophthalma* Macquart, 1834 [=*Musca cyanella* Meigen, 1826].

Diagnosis. Colouration metallic purplish-blue to greenish-blue with silver pruinosity; wing at most with a macula on humeral vein. Female with the parafrons weakly setulose on upper half. Dorsocentrals 3+4. Prosternum bare. Wing with basal portion of stem-vein bare dorsally. First abdominal sternite widely setulose or with setulae only on lateral margins.

Comments. Nihei and de Carvalho (2007a) did not support the monophyly of *Eudasyphora*, as *Dasyphora* s.s. is nested within *Eudasyphora*. Further studies are needed to verify this condition in order to preserve this subgenus or to merge it with *Dasyphora* s.s.

Distribution (10 species). Nearctic, Oriental and Palaearctic.

References. Nearctic species: Cuny (1980); Oriental: Emden (1965), Cuny (1980), Xue and Chao (1998); Palaearctic: Hennig (1963b, 1964a), Peris and Llorente (1963), Cuny (1980), Gregor et al. (2002), Shinonaga (2003).

Subgenus *Rypellia* Malloch, 1931

Rypellia Malloch, 1931: 190 (as genus). Type species: *Rypellia flavipes* Malloch, 1931.

Diagnosis. Wing without maculae. Female with the parafrons weakly setulose on upper half. Dorsocentrals 2+4. Prosternum bare. Wing with basal portion of stem-vein bare dorsally. First abdominal sternite widely setulose.

Distribution (6 species). Oriental and Palaearctic.

References. Hennig (1963b), Cuny (1980).

Deltotus Séguy, 1935

Deltotus Séguy, 1935: 99. Type species: *Deltotus facetus* Séguy, 1935.

Diagnosis. Colouration dark-brown to bluish-green or purplish, legs brown to yellow; wing without maculae. Female with proclinate fronto-orbital seta; parafrons weakly setulose on upper half; interfrontal seta absent. Dorsocentrals 2+2. Presutural acrostichals developed; one postsutural pair. Postsutural intra-alars 2; intrapostalar present. Prosternum enlarged anteriorly and widely setulose. Katepisternals 1+3. Meron and katepimeron bare. Anatergite setulose. Postalar wall setulose. Anterior suprasquamal ridge setulose. Wing with R_1 setulose dorsally; Rs node and R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter glossiform. Subcostal sclerite densely setulose ventrally. Calcar strong. First abdominal sternite setulose on lateral margins.

Comments. *Deltotus* is one of the three genera with a setulose postalar wall. This character groups the clade (*Deltotus* + (*Pyrellina* + *Polietina*)) (Nihei & de Carvalho 2007a), with the former two genera Afrotropical in distribution and the latter Neotropical.

Distribution (3 species). Afrotropical (Madagascar).

References. Peris (1967), Zielke (1972), Couri et al. (2006).

Hennigmyia Peris, 1967

Hennigmyia Peris, 1967: 24. Type species: *Hennigmyia ortizi* Peris, 1967.

Diagnosis. Colouration yellowish-brown; wing without maculae. Male with anterointernal ommatidia strongly enlarged. Female with proclinate fronto-orbital seta; parafrons bare; interfrontal seta present. Dorsocentrals 2+3. Presutural acrostichals developed; 4 postsutural pairs. Posthumeral present; parahumeral absent; postsutural intra-alars 2; intrapostalar present. Prosternum with the lateral margins subparallel, and bare. Katepisternals 1+2. Proepisternum and meron bare. Posterior spiracle bare on posterior margin. Wing with the basal portion of stem-vein bare; apical portion of stem-vein setulose dorsally; R_1 setulose dorsally; Rs node and R_{4+5} setulose dorsally and ventrally; M not bent forward towards R_{4+5}. Lower calypter glossiform. Subcostal sclerite bare. Calcar strong. First abdominal sternite bare.

Distribution (3 species). Afrotropical.

References. Peris (1967).

Mesembrina Meigen, 1826

Mesembrina Meigen, 1826: 10. Type species: *Musca meridiana* Linnaeus, 1758.

Diagnosis. Colouration metallic black; gena and parafacial with dense golden pruinosity; body with dense ground setulosity; basal third of wing and calypters notably yellow (or blackish in *M. nigribasis* from Costa Rica). Vibrissa developed, although sometimes confused with the developed subvibrissals. Female with proclinate fronto-orbital seta; parafrons densely setulose along its whole length; interfrontal seta absent; frontal vitta densely setulose on upper half or along its whole length. Presutural acrostichals developed or not; 3 postsutural setae. Dorsocentrals 1-3+4-5 (0+2 in *M. nigribasis*). Postsutural intra-alars 2; intrapostalar absent. Notopleurals 2-3 (usually 2 notopleurals but some species with an additional seta posteriorly). Prosternum bare. Anterior katepisternal absent or present. Meron and katepimeron bare. Posterior spiracle bare on posterior margin. Suprasquamal ridge bare. Scutellum half-moon shaped. Wing with the veins bare; costal vein setulose ventrally until Sc; Rs node and R_{4+5} bare dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Mid tibia with an anterodorsal submedian seta. Calcar strong.

Comments. Recently, *M. nigribasis* Kuchta & Savage was described from Costa Rica (referred to as *Mesembrina* sp. 1 in the cladistic analysis of Nihei and de Carvalho 2007a). The Holarctic Region was probably the ancestral area of this genus, and the Neotropical and Oriental occurrences are due to subsequent expansion of distribution range followed by local speciations.

Distribution (13 species). Nearctic, Neotropical, Oriental, Palaearctic.

References. Nearctic species: Huckett (1965), Kuchta & Savage (2008); Oriental: Emden (1965), Xue and Chao (1998), Kuchta & Savage (2008); Palaearctic: Hennig (1963b), Peris and Llorente (1963), Zimin and Elberg (1988), Xue and Chao (1998), Gregor et al. (2002), Shinonaga (2003), Kuchta & Savage (2008); Neotropical: Kuchta & Savage (2008).

Mitroplatia Enderlein, 1935

Mitroplatia Enderlein, 1935: 236. Type species: *Mitroplatia pygmaea* Enderlein, 1935.

Diagnosis. Colouration metallic blue to violaceous; wing without maculae. Female with proclinate fronto-orbital seta developed or not; parafrons weakly setulose on upper half; interfrontal seta absent. Acrostichals 0+1. Posthumeral present; postsutural intra-alars 1; intrapostalar present. Prosternum bare and conspicuously enlarged anteriorly, with a trapezoid shape (Fig. 8). Katepisternals 1+2 (sometimes 1+1). Wing with the Rs node setulose dorsally and ventrally; R_{4+5} setulose dorsally and usually ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Calcar strong. First abdominal sternite widely setulose.

Distribution (15 species). Afrotropical and Oriental.

References. Afrotropical species: Peris (1961, 1967), Zielke (1971); Oriental: Emden (1965), Xue and Chao (1998). [Most references include the *Mitroplatia* species in *Morellia*. See the Afrotropical and Oriental catalogues (Pont 1977, 1980).]

Morellia Robineau-Desvoidy, 1830

Morellia Robineau-Desvoidy, 1830: 405. Type species: *Morellia agilis* Robineau-Desvoidy, 1830 [= *Musca hortorum* Fallén, 1817].

Diagnosis. Colouration metallic bluish-black to violaceous; wing with or without maculae. Female with proclinate fronto-orbital developed or not; interfrontal seta absent. Prosternum setulose or bare. Wing with Rs node setulose dorsally and ventrally; R_{4+5} usually setulose dorsally (bare in the subgenus *Xenomorellia*); vein M bent forward towards R_{4+5} (Fig. 11). Subcostal sclerite bare (setulose ventrally in subgenus *Xenomorellia*).

Lower calypter enlarged posteriorly (extending under base of scutellum) or glossiform. Calcar varying from weak to strong.

Comments. *Morellia* was redefined by Nihei and de Carvalho (2007a) and now includes the Neotropical *Parapyrellia*, *Trichomorellia* and *Xenomorellia* as subgenera, as well as *Morellia* s.s.; and three species were transferred to *Ziminellia*.

Distribution (65 species). Afrotropical, Nearctic, Neotropical, Oriental and Palaearctic.

References. See under each subgenus.

Subgenus *Morellia* s.s.

Morellia Robineau-Desvoidy, 1830: 405 (as genus). Type species: *Morellia agilis* Robineau-Desvoidy, 1830 [= *Musca hortorum* Fallén, 1817].

Diagnosis. Colouration metallic bluish-black to violaceous; wing without maculae, but with maculae in several Neotropical species. Female with proclinate fronto-orbital usually developed; parafrons setulose on upper half; interfrontal seta absent. Postsutural intra-alars 1; intrapostalar present. Prosternum setulose or bare. Katepisternals 1+2. Wing with the basal portion of stem-vein setulose ventrally (bare in *basalis*-group); R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5} (Fig. 11). Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Male mid femur of some species with a dorsal preapical protuberance bearing a dense set of setulae (Fig. 18). Calcar weak or strong.

Comments. The monophyly of *Morellia* s.s. was not supported by Nihei and de Carvalho (2007a). A comprehensive phylogenetic study of *Morellia* s.l. is required to clarify the composition of *Morellia* s.s., as well as its relationship with other subgenera.

Note on *basalis*-group: This species-group was indicated as monophyletic by Nihei and de Carvalho (2007a) and is composed so far of two Neotropical species, namely, *M. basalis* (Walker) and *M. paulistensis* Pamplona & Mendes.

Distribution (50 species). Afrotropical, Nearctic, Neotropical, Oriental and Palaearctic

References. Afrotropical species: Peris (1961), Zielke (1971), Couri et al. (2006); Australasian: Pont (1973); Nearctic: Huckett (1965); Neotropical: Pamplona and Couri (1995), de Carvalho and Couri (2002); Oriental: Emden (1965), Xue and Chao (1998); Palaearctic: Zimin (1951), Hennig (1964a), Peris and Llorente (1963), Zimin and Elberg (1988), Xue and Chao (1998), Gregor et al. (2002), Shinonaga (2003).

Subgenus *Parapyrellia* Townsend, 1915

Parapyrellia Townsend, 1915: 97 (as genus). Type species: *Musca violacea* of authors *nec* Fabricius [misidentification, =*Pyrellia maculipennis* Macquart, 1846].

Diagnosis. Colouration metallic greenish-blue to violaceous-blue with silver pruinosity; wing with maculae on humeral vein, on apex of Sc and R_1, on apex of R_{2+3} and on r-m and dm-cu crossveins. Female with proclinate fronto-orbital seta undeveloped; parafrons setulose on upper half; interfrontal seta absent. Dorsocentrals 2+4, but they can be reduced to 0+2 in *M. oportuna* (Albuquerque & Lopes, 1979). Intrapostalar absent. Prosternum bare. Katepisternals 1+2. Proepisternum setulose (bare in *M. humeralis*). Meron bare. Wing with the basal portion of stem-vein setulose ventrally; apical portion of stem-vein setulose dorsally; R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Male mid femur with a dorsal preapical protuberance bearing a set of modified (hook-like) setulae (Fig. 17). Calcar strong.

Distribution (3 species). Neotropical.

References. Albuquerque and Lopes (1979), de Carvalho and Couri (2002).

Subgenus *Trichomorellia* Stein, 1918

Trichomorellia Stein, 1918: 204 (as genus). Type species: *Trichomorellia boliviana* Townsend, 1931 [=*Dasymorellia trichops* Malloch, 1923].

Diagnosis. Colouration metallic blackish-blue to dark greenish-blue with silver pruinosity; wing usually with maculae on humeral vein and on apex of Sc and R_1. Eye densely setulose, particularly the males. Female with proclinate fronto-orbital seta; interfrontal seta absent; frontal vitta bare or densely setulose on upper half. Presutural acrostichals developed; 2 or 3 postsutural pairs. Dorsocentrals 2+4. Posthumeral present; postsutural intra-alars 2; intrapostalar present. Prosternum bare. Katepisternals 1+2. Wing with the basal portion of stem-vein setulose ventrally; R_{4+5} setulose dorsally and usually also ventrally; M bent forward towards R_{4+5}. Lower calypter glossiform. Subcostal sclerite bare. Male mid femur with a dorsal preapical protuberance bearing a set of modified (hook-like) or non-modified setulae. Calcar strong.

Comments. For a long time, the name *Dasymorellia* Malloch was used instead of the earlier *Trichomorellia*. This confusion was clarified and the name usage corrected by Pont et al. (2005).

Distribution (8 species). Neotropical.

References. Pamplona (1983, as *Dasymorellia*), de Carvalho and Couri (2002, as *Dasymorellia*), Pont et al. (2005).

Subgenus *Xenomorellia* Malloch, 1923

Xenomorellia Malloch, 1923: 524 (as genus). Type species: *Xenomorellia holti* Malloch, 1923.

Diagnosis. Colouration metallic blackish-blue with silver pruinosity; wing without maculae, but some infuscation on humeral vein and on apex of Sc and R_1. Female with proclinate fronto-orbital seta (Fig. 4); parafrons setulose (Fig. 4); interfrontal seta absent. Dorsocentrals 2+4. Posthumeral present; postsutural intra-alars 2; intrapostalar absent or present. Prosternum bare. Katepisternals 1+2. Meron bare. Anterior suprasquamal ridge setulose. Wing with the basal portion of stem-vein setulose ventrally; apical portion of stem-vein dorsally with a strong reclinate setula; R_{4+5} bare dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter glossiform. Subcostal sclerite setulose ventrally. Male mid femur with a dorsal preapical protuberance bearing a set of modified (hook-like) setulae. Calcar strong.

Comments. This subgenus includes two species, *X. holti* Malloch (from Peru and SE Brazil) and *X. montanhesa* Albuquerque (SE Brazil).

Distribution (2 species). Neotropical.

References. Albuquerque (1952), de Carvalho and Couri (2002).

***Morellia nigricosta*-group**

Description. Colouration metallic violaceous blue; wing with maculae. Female with proclinate fronto-orbital seta undeveloped; parafrons almost entirely setulose; interfrontal seta absent. Humerals 3; posthumerals developed or not; parahumeral undeveloped; presutural strong; intra-alar 1; intrapostalar present. Presutural acrostichals undeveloped; one postsutural pair. Prosternum setulose (Fig. 7). Katepisternals 1+2. Postalar wall bare; anterior and posterior suprasquamal ridges bare. Anepimeron and katepimeron setulose. Metakatepisternum setulose above coxa. Greater ampulla, proepisternum and meron bare. Posterior spiracle setulose on pos-

terior margin. Wing with the basal portion of stem-vein bare dorsally and ventrally; apical portion of stem-vein bare dorsally and ventrally; Rs node setulose dorsally and ventrally; R_{4+5} setulose dorsally, and ventrally bare or setulose; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Fore tibia bare on posteroventral surface. Male mid femur without a preapical protuberance with setae on dorsal surface; without row of developed setae at mid third of anterior surface. Mid tibia bare on anterodorsal surface. Calcar absent. First abdominal sternite setulose. Male terminalia: cercal plate with the median and marginal spined processes on ventral surface; distiphallus without spinules.

Included species: *M. nigricosta* (Hough), *M. xanthoptera* (Pamplona).

Comments. At least two Neotropical species have been recognized as belonging to this group: *M. nigricosta* (Hough) and *M. xanthoptera* (Pamplona). This species-group was regarded as a genus-ranked taxon in the Muscini phylogeny (Nihei & de Carvalho, 2007a), placed far from the large *Morellia* clade and more closely related to *Ziminellia* and *Mitroplatia*, with which it composes the base of the clade giving rise to *Musca*, *Neomyia*, *Curranosia*, *Pyrellia*, *Sarcopromusca* and *Dasyphora*. The phylogenetic characters supporting the *nigricosta*-group as a clade were the following (fig. 50 of Nihei & de Carvalho 2007a): katepimeron setulose; brown macula on humeral vein, apex of Sc and R_1, apex of R_{2+3}, and crossvein r-m; male mid femur without series of developed setae on median third of the anterior surface; and cercal plate with marginal spined process on ventral face. Here, a formal description of the *nigricosta*-group as a new genus is not provided as we consider it a premature proposal, at least until more detailed studies support and corroborate it as a valid generic taxon. Interestingly, the molecular analysis of Schuehli et al. (2007) indicated the non-monophyly of *Morellia* as its two terminal representatives [*M. xanthoptera* and *M. ochricornis* Wiedemann (as *obscuripes* Bigot)] were not closely related.

Distribution (2 species). Neotropical.

References. Pamplona and Couri (1995), de Carvalho and Couri (2002), Nihei and de Carvalho (2007a). [Note: No mention is made of a *nigricosta*-group in these references, although taxonomic information and/or keys including *M. nigricosta* and *M. xanthoptera* are provided.]

Musca Linnaeus, 1758

Musca Linnaeus, 1758: 589. Type species: *Musca domestica* Linnaeus, 1758.

Diagnosis. Colouration pale black with dense silver pruinosity; wing without maculae. Female without proclinate fronto-orbital seta; parafrons setulose on its entire length; interfrontal seta absent. Posthumeral usually present; postsutural intra-alars usually 1; intrapostalar present. Prosternum setulose. Proepisternum bare (but setulose in *M. domestica*). Katepisternals usually 1+2. Anepimeron with the uppermost setulae strongly developed (bristle-like). Suprasquamal ridge setulose or bare. Wing with the basal portion of stem-vein setulose dorsally or bare; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Calcar absent. First abdominal sternite bare or setulose only on lateral margins.

Comments. Large in number of species, this genus has proven to be monophyletic (Nihei & de Carvalho 2007a), although the subgeneric classification has not been supported. *Musca* includes the best known species of Muscidae, although this popularity is mainly due to their damaging 'skills', as *Musca domestica* Linnaeus, *Musca autumnalis* De Geer and *Musca vetustissima* Walker (Pont 1973). On the other hand, several species also have been reported as anthophilous or pollinators (e.g., Pont 1993, Proctor et al. 1996). This is the only genus of Muscini occurring west of the Andes (record for *M. domestica*, spread by man).

Distribution (67 species). Afrotropical, Andean, Australasian, Nearctic, Neotropical, Oriental and Palaearctic.

References. Afrotropical species: Patton (1936), Emden (1939), Peris (1967), Zielke (1971), Couri et al. (2006); Australasian: Pont (1973); Andean, Nearctic and Neotropical: de Carvalho and Couri (2002); Oriental: Awati (1917), Patton (1937), Emden (1965), Xue and Chao (1998), Shinonaga and Thinh (1999); Palaearctic: Patton (1933), Hennig (1964a, 1964b), Peris and Llorente (1963), Zimin and Elberg (1988), Pont (1991), Xue and Chao (1998), Gregor et al. (2002), Shinonaga (2003).

Myiophaea Enderlein, 1935

Myiophaea Enderlein, 1935: 240. Type species: *Myiophaea ralumensis* Enderlein, 1935 [=*Bengalia spissa* Walker, 1858].

Diagnosis. Colouration yellowish-brown; abdomen dark-brown but lighter on laterals and on fifth tergite; thorax and abdomen with golden pruinosity; wing without maculae, but the membrane tinged with yellow, especially the base and along the anterior margin. Female with proclinate fronto-orbital; parafrons setulose on upper half; interfrontal seta absent. Presutural acrostichals undeveloped; one postsutural pair. Dorsocentrals 2+5. Posthumeral present; parahumeral absent; postsutural intra-alars 1; intrapostalar present. Prosternum bare. Katepisternals 1+2. Meron bare. Wing with the basal portion of stem-vein setulose ventrally; apical portion of stem-vein bare; R_1, Rs node and R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, but not extending below base of scutellum (Fig. 13). Subcostal sclerite setulose ventrally. Calcar weak.

Comments. This is the only yellowish-brown taxon within the Australasian Muscini fauna (although some specimens may have a more blackish colour on thorax; Pont 1967); the other representatives possess a metallic or dull colouration.

Distribution (1 species). Australasian (Papuan subregion).

References. Pont (1967, 1973).

Neomyia Walker, 1859

Neomyia Walker, 1859: 138 (as subgenus of *Musca*). Type species: *Musca gavisa* Walker, 1859.

Diagnosis. Colouration metallic blue, purple to green, wing without maculae (except for some Afrotropical species). Male with anterointernal ommatidia normally developed (except for some Afrotropical species, with strongly enlarged ommatidia). Female with proclinate fronto-orbital developed or not; parafrons setulose along its entire length; interfrontal seta absent. Dorsocentrals 0-2+2-4. Posthumeral developed or not; intrapostalar usually present. Prosternum setulose. Katepisternals 1+2 or 1+3 (rarely 0+1). Greater ampulla setulose (Fig. 10). Anatergite usually setulose below lower calypter. Anterior suprasquamal ridge setulose or not; posterior suprasquamal ridge always setulose (Fig. 14). Wing with the basal portion of stem-vein with a curved posterior setulae at the basal third of dorsal surface; apical portion of stem-vein setulose ventrally; Rs node and R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum (Figs. 10, 14). Subcostal sclerite setulose ventrally. Accessory sclerite (at the base of upper calypter) setulose (Fig. 10). Mid tibia with a strong submedian seta on ventral to posteroventral surface. Hind coxa usually setulose on posterior surface. Calcar absent, weak or strong.

Distribution (75 species). Afrotropical, Australasian, Nearctic, Neotropical, Oriental, Palaearctic.

References. Afrotropical species: Snyder (1951), Peris (1967), Zielke (1971), Couri et al. (2006); Australasian: Pont (1973); Nearctic: Huckett (1965); Neotropical: de Carvalho and Couri (2002); Oriental: Emden

(1965), Xue and Chao (1998), Shinonaga and Thinh (1999); Palaearctic: Hennig (1963b), Zimin and Elberg (1988), Pont (1991), Xue and Chao (1998), Gregor et al. (2002), Shinonaga (2003).

Neorypellia Pont, 1972

Neorypellia Pont, 1972: 10. Type species: *Neopyrellia neglecta* Townsend, 1939.

Diagnosis. Colouration shining metallic dark-green; wing with maculae on apex of Sc and R_1, and on apex of R_{2+3}. Female with proclinate fronto-orbital seta; parafrons setulose on upper half; interfrontal seta absent. Presutural acrostichals undeveloped; one postsutural pair. Dorsocentrals 0+2. Posthumeral and parahumeral present; postsutural intra-alars 2; intrapostalar present. Prosternum bare. Katepisternals 1+2. Meron bare. Posterior spiracle bare on posterior margin. Suprasquamal ridge bare. Wing with the basal portion of stem-vein setulose ventrally; apical portion of stem-vein setulose dorsally; R_1 and R_{4+5} bare; Rs node setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter glossiform. Subcostal sclerite bare. Calcar weak.

Comments. A small-bodied bluish metallic muscine with glossiform lower calypter and weak calcar, with a single species (*N. neglecta*) recorded from Brazil and Paraguay.

Distribution (1 species). Neotropical.

References. Albuquerque (1955), de Carvalho and Couri (2002).

Polietes Rondani, 1866

Polietes Rondani, 1866: 71. Type species: *Musca lardaria* Fabricius, 1781.

Diagnosis. Colouration blackish with dense silver pruinosity; wing without maculae. Female with proclinate fronto-orbital seta; parafrons setulose along its entire length; interfrontal seta present; frontal vitta setulose on upper half. Presutural acrostichals developed; 3 postsutural pairs. Dorsocentrals 3+4. Postsutural intra-alars 2-3; intrapostalar absent. Notopleurals 2 (there is an additional posterior seta in *P. domitor* (Harris), as in some *Mesembrina* spp.). Prosternum setulose or bare. Katepisternals 1+1-3. Posterior spiracle usually bare on posterior margin. Vein R_{4+5} setulose or not dorsally and usually bare ventrally; M straight forward, subparallel to R_{4+5}. Lower calypter glossiform. Subcostal sclerite bare. Calcar strong.

Comments. The monophyly of *Polietes* was not supported by Nihei and de Carvalho (2007a). Except for *Mesembrina*, all Muscini genera were nested within *Polietes*. This genus is traditionally diagnosed and recognized as the only Holarctic genus with glossiform lower calypter and vein M running straight toward the apex of wing, but these are two plesiomorphic non-grouping characters (Nihei & de Carvalho 2007a) that are present in other Muscini genera outside the Holartic Region. A revision and examination of all *Polietes* species is required before considering the break up of the genus into smaller monophyletic units.

Distribution (11 species). Nearctic, Oriental and Palaearctic.

References. Oriental species: Emden (1965), Xue and Chao (1998); Palaearctic: Hennig (1963a, 1963b), Peris and Llorente (1963), Xue and Chao (1998), Gregor et al. (2002), Shinonaga (2003).

Polietina Schnabl & Dziedzicki, 1911

Polietina Schnabl & Dziedzicki, 1911: 218. Type species: *Aricia pruinosa* Macquart, 1846 [preocc. *Aricia pruinosa* Zetterstedt, 1845; =*Mydaea concinna* Wulp, 1896].

Diagnosis. Colouration yellowish-brown to blackish-brown with silver pruinosity; wing with maculae or infuscate on apex of Sc and R_1, on apex of R_{2+3}, and on r-m and dm-cu crossveins. Female with proclinate fronto-orbital seta (Figs. 1–2); parafrons weakly setulose on upper half; interfrontal seta present (Fig. 2). Dorsocentrals 2+3-4. Postsutural intra-alars 2; intrapostalar absent. Notopleurals 3 (one additional median, shorter than the usual two setae). Prosternum setulose. Katepisternals 1+2. Meron setulose. Postalar wall setulose (Fig. 12). Anterior suprasquamal ridge usually setulose. Wing with the apical portion of stem-vein usually setulose dorsally and ventrally; R_1 setulose dorsally; Rs node and R_{4+5} setulose dorsally and ventrally; M setulose ventrally between r-m and dm-cu crossveins; M straight, subparallel to R_{4+5}. Lower calypter glossiform (Fig. 12). Subcostal sclerite setulose ventrally. Calcar strong. Mid tibia with a strong submedian seta on ventral to posteroventral surface.

Comments. A cladistic analysis supporting the monophyly and indicating the phylogenetic relationships among the species of *Polietina* was performed by Nihei and de Carvalho (2007b). Furthermore, its monophyly and the major relationships were recovered by the multi-gene analyses of Schuehli et al. (2007).

Distribution (15 species). Nearctic (southern USA) and Neotropical.

References. Albuquerque (1956), Couri and de Carvalho (1997), de Carvalho and Couri (2002), Nihei (2004), Nihei and de Carvalho (2007b).

Pyrellia Robineau-Desvoidy, 1830

Pyrellia Robineau-Desvoidy, 1830: 462. Type species: *Pyrellia vivida* Robineau-Desvoidy, 1830.

Diagnosis. Colouration metallic green to shining violaceous; wing without maculae. Female with proclinate fronto-orbital seta; parafrons setulose; interfrontal seta absent. Posthumeral present; postsutural intra-alars 1; intrapostalar present. Prosternum usually bare. Katepisternals 1+3. Wing with the apical portion of stem-vein setulose dorsally; Rs node and R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}; vein C setulose ventrally until Sc. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite setulose ventrally. Mid tibia with a strong submedian seta on ventral to posteroventral surface. Calcar strong.

Distribution (25 species). Afrotropical, Australasian, Oriental and Palaearctic.

References. Afrotropical species: Peris (1967), Zielke (1971), Couri et al. (2006), Pont and Baldock (2007); Australasian: Pont (1973); Palaearctic: Hennig (1963b), Peris and Llorente (1963), Zimin and Elberg (1988), Xue and Chao (1998), Gregor et al. (2002), Shinonaga (2003); Oriental: Emden (1965).

Pyrellina Malloch, 1923

Pyrellina Malloch, 1923: 525. Type species: *Lucilia inventrix* Walker, 1861.

Diagnosis. Colouration metallic violaceous-blue; wing without maculae. Female with proclinate fronto-orbital seta; parafrons setulose; interfrontal seta absent. Dorsocentrals 2+4 (but 0+2 in *P. bicolor* (Stein)). Posthumeral, parahumeral and presutural developed; postsutural intra-alars 2; intrapostalar present. Prosternum setulose. Katepisternals 1+3. Meron setulose. Wing with the apical portion of stem-vein setulose or not on both dorsal and ventral faces; R_1 setulose or bare dorsally, and setulose ventrally; Rs node and R_{4+5} setulose dorsally and ventrally; M setulose ventrally between r-m and dm-cu crossveins, and bent forward towards R_{4+5}. Lower calypter glossiform. Subcostal sclerite bare. Mid tibia with a strong submedian seta on ventral to posteroventral surface (Fig. 15). Calcar strong. First abdominal sternite widely setulose.

Distribution (12 species). Afrotropical.

References. Curran (1935), Peris (1967), Zielke (1971).

Sarcopromusca Townsend, 1927

Sarcopromusca Townsend, 1927: 209. Type species: *Sarcopromusca arcuata* Townsend, 1927 [=*Orthellia pruna* Shannon & Del Ponte, 1926].

Diagnosis. Colouration metallic black with dense silver pruinosity, except for the fifth abdominal tergite which is strikingly golden; wing without maculae, at most the membrane tinged with brown. Female with proclinate fronto-orbital seta; parafrons setulose on upper half; interfrontal seta absent. Acrostichals 0+1. Postsutural dorsocentrals 3. Posthumeral present, postsutural intra-alars 1; intrapostalar present. Prosternum setulose. Katepisternals 1+3. Meron setulose. Posterior suprasquamal ridge setulose. Wing with the apical portion of stem-vein setulose dorsally and ventrally; R_1 bare; Rs node and R_{4+5} setulose dorsally and ventrally; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Mid tibia with a strong submedian seta on ventral to posteroventral surface. Calcar strong.

Comments. Nihei (2005) gave a key to distinguish the two species – *S. sarcophagina* (Wulp) and *S. pruna* (Shannon & Del Ponte), and drew attention to doubts about their distribution because of past misidentifications.

Distribution (2 species). Neotropical.

References. Pamplona (1992), de Carvalho and Couri (2002), Nihei (2005).

Ziminellia Nihei & de Carvalho, 2007

Ziminellia Nihei & de Carvalho, 2007a: 523. Replacement name for *Dasysterna* Zimin, 1951 (preocc. *Dasysterna* Dejean, 1833). Type species: *Cyrtoneura simplex* Loew, 1857.

Diagnosis. Colouration dark brown to black with silver pruinosity; wing without maculae. Female with proclinate fronto-orbital seta developed; parafrons setulose on upper half; interfrontal seta absent. Presutural acrostichals developed or not; 1 or 2 postsutural pairs. Posthumeral developed; intra-alar 1; intrapostalar present. Prosternum setulose. Katepisternals 1+2. Proepisternum bare. Meron bare. Posterior spiracle setulose on posterior margin. Wing with the basal portion of stem-vein bare dorsally and setulose ventrally; apical portion of stem-vein bare dorsally and ventrally; R_1 setulose or bare dorsally; R_{4+5} setulose dorsally and ventrally before crossvein r-m; M bent forward towards R_{4+5}. Lower calypter enlarged posteriorly, extending under base of scutellum. Subcostal sclerite bare. Calcar strong. Male mid femur without a dorsal preapical protuberance bearing modified hook-like setulae. Male terminalia: cercal plate without spined processes on ventral face; distiphallus without spinules.

Comments. This taxon was removed from *Morellia* by Nihei and de Carvalho (2007a). Pont (1973) defined three species-groups within *Morellia*: *hortorum*-group, *pyrellioides*-group and *simplex*-group. In the analysis by Nihei and de Carvalho (2007a), the *hortorum*-group was maintained in *Morellia*; the *pyrellioides*-group, which had been previously described as a new genus *Weyerellia* Zielke, 1971 (=*Mitroplatia* Enderlein, 1935), was confirmed as a valid genus; and the *simplex*-group, which had been previously described as the subgenus *Dasysterna* of *Morellia*, was confirmed as a genus-ranked taxon in the cladistic analysis. So far, only three species have been included in *Ziminellia* (Nihei & de Carvalho, 2007a): *Z. simplex* (Loew) (type species), *Z. hortensia* (Wiedemann) and *Z. asetosa* (Baranoff). It is expected that new transfers will occur after careful examination of the species of *Morellia*.

Distribution (3 species). Australasian, Oriental and Palaearctic.

References. Zimin (1951; description of *Dasysterna* as subgenus of *Morellia*), Pont (1973; Australasian keys, definition of species-groups in *Morellia* and redescription of *Z. hortensia*), Emden (1965; Oriental keys and redescription of *Z. hortensia*), Hennig (1964a; Palaearctic keys and redescriptions of *Z. simplex* and *Z. hortensia*), Shinonaga (2003; Japanese keys and redescriptions of *Z. asetosa* and Z. hortensia), Nihei and de Carvalho (2007a; ranking of *Dasysterna* as genus and new replacement name).

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