Taxonomy of the Muscidae (Diptera) of Namibia: A Key to Genera, Diagnoses, New Records and Description of a New Species

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Taxonomy of the Muscidae (Diptera) of Namibia: a key to genera, diagnoses, new records and description of a new species

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ABSTRACT

The Muscidae (Diptera) of Namibia were previously known to comprise 42 species in 16 genera. The study of material from the Namibia National Insect Collection, National Museum of Namibia and the Albany Museum (South Africa) loaned to the authors enabled this paper to be written, in which three new generic records and 14 new species records are provided and one new species is described. With the present contribution, the muscid fauna of Namibia is now known to comprise 57 species in 19 genera, with Musca L. being the most species-rich genus. A key to the identification of all recorded genera is provided and diagnoses of the genera and species found in the material studied are provided when pertinent. Musca fragilis sp. n. is described from the Khorixas District.

KEY WORDS: Afrotropical, Namibia, Diptera, Muscidae, diversity, identification key, new species.

INTRODUCTION

The muscid fauna of the Afrotropical Region was last catalogued by Pont (1980). More recent contributions include those by Deeming (1987) and Dike (1989, 1990) for Afrotropical Atherigona Rondani, and Couri et al. (2006), with a partial revision of the muscid fauna of Madagascar. Forty-two muscid species in 16 genera are recorded from Namibia in the published literature. Pont (1980) specifically cited only five species for Namibia—Atherigona falcata (Thomson, 1869); Musca lasiophthalma Thomson, 1869; M. transvaalensis Zielke, 1971; Lispe barbipes Stein, 1908; and Spilogona aristalis Zielke, 1971—as individual countries were only cited in the Afrotropical Catalogue if distribution was limited. The other records from Namibia are covered in the catalogue collectively as “Eastern to southern Africa”, “Congo Basin to South Africa”, etc.

This study is based on material loaned from the Namibian National Insect Collection, National Museum of Namibia (Windhoek, Namibia) and the Albany Museum (Grahamstown, South Africa). As a result of the study the number of recorded species is raised to 57 species in 19 genera. The present paper also provides a key for the identification of genera, diagnoses of genera and species when pertinent and the description of one new species.

MATERIAL AND METHODS

This review is largely based on material from Namibia deposited in the National Museum of Namibia, Windhoek, Namibia (NMNW) and the Albany Museum, Grahamstown, South Africa (AMGS), kindly loaned at different periods to MSC and CJBC by Ashley H. Kirk-Spriggs (now National Museum, Bloemfontein, South Africa). Some
specimens are deposited in the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ) and Pe. Jesus Santiago Moure Entomological Collection in Curitiba, Paraná, Brazil (DZUP).

Dissected terminalia have been placed in glycerine in microvials pinned beneath the respective specimens.

Terminology follows McAlpine (1981), and for the special characters of Atherigona, such as the trifoliate process, Pont (1986) and Pont & Magpayo (1995). “Postpedicel” is used for “antennal flagellomere”, following Stuckenberg (1999).

Data on the distributions of the species are mainly taken from the Afrotropical catalogue (Pont 1980). Genera, and species within genera, are listed alphabetically. Comments on genera or species are added when pertinent. Material examined sections are arranged alphabetically by region.

TAXONOMY

Key to the genera of Muscidae from Namibia (modified from Couri et al. 2006)

1. Proboscis adapted for piercing: elongate, strongly sclerotised and non-retractile, tapering from a broad base to a slender apex, with labella atrophied ...............2
   - Proboscis not adapted for piercing: moderately or weakly sclerotised and retracted into head, not tapering strongly to apex, with labella well developed, often fleshy

2. Palpus shorter than half length of proboscis; 1 species ........... Stomoxys Geoffroy
   - Palpus about as long as proboscis .................................................................3

3. Arista with dorsal branches only; notopleuron without setulae; 1 species ........... Haematobia Le Peletier & Serville
   - Arista with dorsal and ventral branches; notopleuron setulose; 1 species ........... Haematobosca Bezzi

4. Head angular in profile, with long face and postpedicel; antenna long, inserted above mid level of eye; presutural dorsocentral setae very short and fine, almost indistinct from ground setulae; 11 species ............................................................... Atherigona Rondani
   - Head shape not as above; antenna short or long, inserted below mid level of eye; presutural dorsocentral setae well developed, very rarely not differentiated from ground setulae ................................................................. 5

5. Anepimeron setulose .................................................................................. 6
   - Anepimeron bare ................................................. 12

6. Lower calypter of the Musca-type, i.e., inner margin at first following margin of scutellum then diverging abruptly outward into more-or-less broadly truncated apical margin ........................................................................................................... 7
   - Lower calypter of the Phaonia-type, i.e., inner margin diverging immediately and at right-angles from supra-squamal ridge; tongue-like in shape .................. 10

7. Body black or bluish black, not metallic shiny green or blue; mid tibia without ventral seta ......................................................... 8
   - Body shiny metallic green or blue; mid tibia with strong ventral seta ........... 9

8. Vein M with an angular forward bend towards vein R_{4+5}; 18 species .................. Musca Linnaeus

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Vein M with a smoothly rounded forward curve towards vein R_{4+5}; 1 species... 

Morellia Robineau-Desvoidy

9 Suprasquamal ridge setulose (Fig. 2); greater ampulla setulose; 2 species 

Neomyia Walker

Suprasquamal ridge bare; greater ampulla bare; 3 species 

Pyrellia Robineau-Desvoidy

10 Palpus greatly enlarged in apical part, spoon-like; parafacial with setulae; prosternum bare; all wing veins bare; 4 species... Lispe Latreille 

Palpus not enlarged, narrow; parafacial bare; prosternum setulose or, if bare, base of vein R_{4+5} with setulae on lower wing surface ......... 11

11 Prosternum bare; 3 or 4 pairs of postsutural dorsocentral setae; acrostichals 3:3, strongly developed; 1 species... Pseudohelina Vockeroth 

Prosternum setulose; 2, 3 or 4 pairs of postsutural dorsocentral setae; acrostichals 1:2, developed; 2 species ... Dichaetomyia Malloch

12 Wing with subcosta running in smooth even curve from humeral cross-vein to costa; body colour metallic black or blue; gena with a strong differentiated upcurved seta; ♀ ocellar triangle shiny, long or short, almost reaching lunule; ♀ frons with one pair of proclinate orbital setae and one pair of inclinate interfrontal setae; 2 species .... Hydrotaea Robineau-Desvoidy 

Wing with subcosta with a slightly sinuous course from humeral cross-vein to costa, not smoothly bowed; body colour not metallic black or blue; gena without a differentiated upcurved seta; ♀ ocellar triangle short and dusted; ♀ frons without proclinate orbital or inclinate interfrontal setae ... 13

13 Wing with at least 1 setula on ventral surface of Rs node or base of R_{4+5} ....... 14

Wing without setulae on ventral surface of Rs node and on base of vein R_{4+5} .... 16

14 Prosternum with many lateral setulae; proboscis with labella reduced; prealar seta absent; anterior katepisternal seta present; 4 species ...... Limnophora Robineau-Desvoidy 

Prosternum bare or only with 1–2 setulae on either side; proboscis with labella developed; prealar seta present or absent; katepisternal seta present or absent... 15

15 Anterior katepisternal seta absent; lower calypter broad and truncated, of the Musca-type (see couplet 6 for description); vein R_{4+5} without dorsal setulae; 1 species...... Graphomya Robineau-Desvoidy 

Anterior katepisternal seta present; lower calypter not broad and truncated, tongue-shaped, of the Phaonia-type (see couplet 6 for description); R_{4+5} with a few dorsal setulae basally [other characters: veins Sc, Rs and M setulose, usually as follows: vein R before humeral cross-vein, on both surfaces; basal part of Sc, on both surfaces; ventral surface of R_{4+5} almost to cross-vein r–m; both surfaces of M to beyond cross-vein dm–cu; ventral surface of Cu]; 1 species........ Dimorphia Malloch

16 Proboscis with labella not reduced and prestomal teeth barely developed, and prementum dusted; prealar seta present; katepisternal setae not 1:1:1 ............ 17 

Proboscis with labella usually reduced and/or prestomal teeth strongly developed, and prementum shiny, undusted; prealar seta absent; katepisternal setae 1:1:1, placed at the angles of an imaginary equilateral triangle ........ 19
17 Hind tibia with 1 strong posterodorsal seta (calcar) in apical third; anterior postsutural intra-alar seta placed behind level of supra-alar seta; 1 species.................................
   – Hind tibia without calcar; anterior postsutural intra-alar seta placed differently...18
18 Arista bare; sternite 1 with row of setulae along posterior margin; prealar seta absent; ♂ eye large in profile, occupying most of head; 1 species.................................
   – Arista plumose, with longest individual branches longer than width of postpedicel; sternite 1 bare; ♂ eye in profile not markedly large; 4 species .........................
19 Katepisternal setae 1+1–3; ovipositor of Mydaea-type, short, with spine hypoproct; 1 species ........................................Spilogona Schnabl
   – Katepisternal setae 1:1:1, placed at angles of imaginary equilateral triangle; ovipositor elongated, with setulose hypoproct; 1 species .................................Coenosia Meigen

Fifteen species of Muscidae are added to the 42 species previously recorded from Namibia, including one new species. The Namibian muscid fauna is now known to contain 57 species and subspecies assigned to 19 genera (Appendix).

Genus Atherigona Rondani, 1856

Atherigona (see Couri et al. 2006, for diagnosis) contains 126 species in the Afrotropical Region, 14 in the subgenus Acritochaeta Grimshaw, 1901 and 112 in the subgenus Atherigona s.str. (Pont 1980). Deeming (1971, 1979) studied the species from Nigeria and Comoros Archipelago, respectively. Dike (1989) presented a key for the identification of the Afrotropical species and described new species from Africa. One year later (Dike 1990) described two new species from Nigeria and presented a key for the Afrotropical species of the subgenus Acritochaeta. More recently, Couri et al. (2006) described three new species of the subgenus Atherigona and presented two new records, one of each subgenus from Madagascar.


Among the studied material, only one species was found, A. mitrata, which represents a new record for Namibia.

Atherigona mitrata Séguy, 1955

Diagnosis: Frons strongly projecting; markedly yellow; palpus pale yellow; pedicel yellow, postpedicel grey pollinose, scutum grey; postpronotum and legs yellow, except fore femur brown on apical third of dorsal and anterior surfaces, fore tibia and tarsus light brown.

Distribution: Cameroun, Namibia, Nigeria, Zimbabwe and Zambia.

Genus Coenosia Meigen, 1826

Coenosia is the largest muscid genus occurring in the Afrotropical Region, with 110 described species (Pont 1980). Couri et al. (2006) recently described a new species from Madagascar and Pont (2009) described a new species from the Seychelles. See Couri et al. (2006) for generic diagnosis. Coenosia strigipes Stein, 1916 is the only species recorded from Namibia (Emden 1958: 7, “S. W. Africa”). This species was found in the material examined.

Coenosia strigipes Stein, 1916

Diagnosis: Legs yellow, including coxae; arista extremely short, plumose; postpedicel black (yellow in some ♀); small species, <4 mm in length.


Distribution: Widespread in Afrotropical Region (including Aldabra, Astove, Cape Verde and Madagascar Is.), Namibia and the Palaearctic Region.

Genus Dichaeotomia Malloch, 1921

Dichaeotomia is a species-rich genus in the Afrotropical Region, with 35 species in the subgenus Dichaeotomia s.str. and 30 in the subgenus Panaga Curran, 1928 (Pont 1980; Couri et al. 2006). Both subgenera are widespread in the Afrotropical Region, and Panaga is restricted to it. The subgenus Panaga can be distinguished by the presence of setulae or stiff setulae on the greater ampulla (infra-alar bulla), which is bare in the subgenus Dichaeotomia. See Couri et al. (2006) for generic diagnosis. Dichaeotomia cuthbertsoni Emeden, 1942 was recorded by Zielke (1971a: 176, Otjiwarongo, Farm Abechaus), whilst D. luteiventris (Rondani, 1873) represents a new record for Namibia.

Dichaeotomia luteiventris (Rondani, 1873)

Diagnosis: Scutum grey pollinose, scutellum and abdomen dark yellow; dorsocentral setae 2+3; scutellum with setulae on lateral wall; fore tibia without median posterior seta.


Distribution: Widespread continental Afrotropical Region, Oriental Region to Indonesia (Java, Sumatra and Sulawesi).
Genus *Dimorphia* Malloch, 1922

Known only from the Afrotropical Region, with five recorded species (Pont 1980). *Dimorphia tristis* (Wiedemann, 1819) was recorded from Namibia by Zielke (1971a: 180, “Südwestafrika, Port Elizabeth”) but this is clearly erroneous as Port Elizabeth is in the Eastern Cape Province of South Africa. No species of *Dimorphia* was found among the studied material.

Genus *Graphomya* Robineau-Desvoidy, 1830

Thirteen species of *Graphomya* have been recorded from the Afrotropical Region. See Couri *et al.* (2006) for generic diagnosis. The genus and the species *G. maculata* (Scopoli, 1763) represent new records for Namibia.

*Graphomya maculata* (Scopoli, 1763)

Diagnosis: With characteristic pattern on scutum different in each sex. Male scutum dark brown, including median area, with 2 silvery white vittae along dorsocentral rows of setae and 2 silvery white lateral vittae; scutellum with median triangular brown macula, wider at base, with grey pollinose areas laterally; abdomen predomenantly yellow, with brown median marks and brown tergite 5. Female scutum with silver areas more extensive than in ♀ including median area; abdomen grey with brown median and lateral marks.


Distribution: Widespread in the Afrotropical, Neotropical, Oriental, Australasian-Pacific and Palaearctic Regions.

Genus *Gymnodia* Robineau-Desvoidy, 1863

Twenty-two species are recorded from the Afrotropical Region (Pont 1980). *Gymnodia flexa* (Wiedemann, 1830), was recorded from Namibia by Pont (1977: 367, Omaruru), but was not found among the studied material.

Genus *Haematobia* Le Peletier & Serville, 1828

Represented by six species in the Afrotropical Region. The genus and one species are here recorded from Namibia for the first time. Zumpt (1973) revised the Afrotropical fauna.

Diagnosis: General colouration dark greyish, with yellowish tinge; head 1.25× as wide as high; arista plumose only on dorsal surface; palpus spatulate, slightly narrowed in basal ¼ to ½, reaching tip of haustellum when proboscis flexed; prosternum setulose; proepisternal depression and postalar wall bare; prealar seta differentiated or vestigial; lower calypter ca 2× as long as upper calypter.

*Haematobia throuxi* (Roubaud, 1906)

Diagnosis: Overall length 2–3.5 mm; prosternum bare; anal vein short, ending abruptly about half distance to wing margin; palpus club-shaped; fore tibia without submedian ventral seta.

Distribution: Widespread continental Afrotropical and southern Palaearctic regions.

**Genus Haematobosca** Bezzi, 1907

Eleven species of *Haematobosca* are recorded from the Afrotropical Region. A key to world species was provided by Pont & Dsouli (2009). The genus and one species are recorded from Namibia for the first time.

Diagnosis: General coloration dark; palpus long, as long as proboscis, grooved internally and dilated apically; arista with setulae on dorsal and ventral surfaces.

*Haematobosca uniseriata* (Malloch, 1932)

Diagnosis: Overall length 3–5 mm; wing veins without setulae; meron and proepisternal depression bare; prosternum with lateral setulae.


Distribution: Southern Africa.

**Genus Helina** Robineau-Desvoidy, 1830

*Helina* is one of the most species-rich genera of Afrotropical Muscidae, with 99 species (Pont 1980; Couri et al. 2006). See Couri et al. (2006) for generic diagnosis. Two species are recorded from Namibia: *H. coniformis* (Stein, 1903) (Lindner 1976: 79, Ongeama) and *H. lucida* (Stein, 1913) (Lindner 1976: 79, Krumhuk). Both species were found among the material examined, and *H. icterica* (Séguy, 1937) and *H. usitata* Emeden, 1951 represent new records for Namibia.

**Helina coniformis** (Stein, 1903)

Diagnosis: Femora predominantly yellow, tibiae yellow, tarsi brown; fore tibia with posterior seta; mid tibia with 3 posterior setae, without anterodorsal setae; hind tibia with 3 anterodorsal setae, 2 anteroventral, with short posterodorsal setae in apical ¼; wing without maculae.


Distribution: Widespread in East and central Africa to southern Africa, Annobon I., eastern Mediterranean and South Yemen.

**Helina icterica** (Séguy, 1937)

Diagnosis: 1 postsutural intra-alar; meron with short setulae on dorsal part; legs yellow, tarsi brown; fore tibia with posterior seta; mid tibia with 2 posterior setae, without
anterodorsal setae; hind tibia with 2 anterodorsal, 1 or 2 anteroventral, without posterodorsal setae; wing with brown maculae on crossveins r–m and dm–cu.


Distribution: Cameroun, Namibia and Nigeria.

**Helina lucida** (Stein, 1913)

Diagnosis: Scutum with an *Anthomyia*-pattern, with a transverse brown band just behind suture, partially or entirely interrupted by grey dust along the dorsocentral rows of setae; fore tibia with posterior seta; mid tibia with 2 posterior setae, without anterodorsal setae; hind tibia without posterodorsal setae; wing hyaline, without brown maculae.


Distribution: Cameroun, Namibia and Nigeria.

**Helina usitata** Emden, 1951

Diagnosis: Antenna, palpus and femora brown; tibiae predominantly yellow; fore tibia without posterior seta; mid tibia with 2 posterior setae, without anterodorsal setae; hind tibia with 2 anterodorsal, 1 anteroventral and posterodorsal setae; wing with brown maculae on crossveins r–m and dm–cu.


Distribution: East Africa to southern Africa.

**Genus Hydrotaea** Robineau-Desvoidy, 1830

Represented by 22 species in the Afrotropical Region, one of which has been recorded from Namibia. For generic diagnosis, see Couri *et al.* (2006). *Hydrotaea capensis* (Wiedemann, 1818) was recorded from Namibia by Emden (1948: 170, Windhoek); Zielke (1971a: 176, Otjiwarongo, Farm, Abecchaus); and Lindner (1976: 79, Ongeama) and was also found among material examined here. *Hydrotaea jeanneli* Séguy, 1938 represents a new record for Namibia.

**Hydrotaea capensis** (Wiedemann, 1818)

Diagnosis: Body with strong bluish gloss; eye emarginate at middle of posterior margin; lower calypter white, with whitish border; male fore tarsi entirely black; mid femur with 1 or 2 setae near base.


Distribution: Widespread in Afrotropics (incl. Fernando Póo, St Helena and Socotra Is.); Palaearctic Region to China, India, Sri lanka; USA; Chile, Argentina and Brazil.
Hydrotaea jeanneli Séguy, 1938

Diagnosis: Eye bare; acrostichal setulae forming 2 rows; prealar seta absent; male fore femur concave at anteroventral apex; mid tibia with anteroventral seta near apical third; hind tibia without distinct posterodorsal seta; abdominal syntergite 1+2 grey-dusted in posterior half.


Distribution: Cameroon, Democratic Republic of Congo, Kenya, Namibia, Tanzania, Uganda and Zimbabwe.

Genus Limnophora Robineau-Desvoidy, 1830


None of the three recorded species was found among the studied material. Limnophora obsignata (Rondani, 1866) is newly recorded for Namibia.

Limnophora obsignata (Rondani, 1866)

Diagnosis: Male holoptic; arista plumose, with individual branches longer than width of postpedicel; scutum with postsutural transverse brown fascia, not extending back medially as brown vitta that reaches scutellum, scutellum pale-dusted at apex; postsutural dorsocentrals 4; mid tibia with 2 or 3 posterior setae.


Distribution: Widespread throughout Africa, including Madagascar and Socotra I.; and southern Europe, east to Iran.

Genus Lispe Latreille, 1797

Lispe is represented by 50 species in the Afrotropical Region, four of which have been recorded from Namibia: L. barbipes Stein, 1908 (Zielke 1974: 43, 10 miles SE Namutoni and 10 miles N Marienthal, Hardap Dam); L. irvingi Curran, 1937 (Lindner 1976: 79, Windhoek, identification queried by the author); L. leucospila (Wiedemann,
Diagnosis: Frontal triangle reaching lunule; palpus yellow; dorsocentral setae 1+3; crossvein dm–cu straight; femora brownish grey, tibiae yellow; fore tibia with posteroventral seta; mid tibia with 1 postero-dorsal seta; hind tibia with 1 or 2 anteroventral setae; abdomen with dark brown lateral maculae, strongly grey-pollinose on median vitta and laterally, around the maculae.


Distribution: Widespread in the Afrotropical Region (including Cape Verde, Socotra Is., South Yemen), Mediterranean subregion, Oriental Region and New Guinea.

Genus Morellia Robineau-Desvoidy, 1830

Sixteen species of the genus are recorded from the Afrotropical Region (Pont 1980, 2006). Morellia nilotica (Loew, 1856) was recorded from Namibia by Zielke (1971c: 68, “Süd-West-Afrika”), but was not included in the material examined.

Genus Musca Linnaeus, 1758


The following species are new for Namibia: M. crassirostris, M. hugonis, M. patersoni, M. ventrosa and M. fragilis sp. n. No specimens of M. alpesa, M. confisca, M. domestica domestica or M. freedmani were included in the material examined.

Musca albina Wiedemann, 1830

Diagnosis: Eye bare; anterior spiracle white; postalar ridge without setulae; proepisternal depression bare; dorsocentral setae 0+1; katepisternal setae absent; fore tibia without posterior seta in apical half, mid tibia with 2 or 3 posterior setae.


Distribution: In xeric areas of the Afrotropical and southern Palaeartic regions and the Indian subregion.

Musca conducens Walker, 1859

Diagnosis: Eye bare; scutum brown with grey pollinosity, with four dark brown vittae; dorsocentral setae 2+4; proepisternal depression bare; anterior spiracle white; legs dark brown; fore tibia with posterior seta; mid tibia with about 4 posterior setae.

Distribution: Widespread in the Afrotropical and Oriental regions, Middle East, eastwards to China and Melanesia.

*Musca crassirostris* Stein, 1903

Diagnosis: Eye bare; proboscis swollen, boat-shaped, with strongly developed pre stomal teeth; palpus yellow; anterior spiracle dark brown; postalar ridge without setulae; proepisternal depression bare; scutum brown, with grey pollinosity and 4 dark brown vittae behind suture; dorsocentral setae 2+4; fore tibia without posterior seta in apical half; mid tibia with strong anteroventral seta on middle third.


Distribution: Widespread in the Afrotropical Region (including Cape Verde and Socotra Is.); North Africa, Middle East; Oriental Region to Taiwan and Lombok.

*Musca domestica calleva* Walker, 1849

Diagnosis: *Musca domestica* L., 1758, *sensu lato*, differs from all other species recorded from Namibia in having fine setulae on the proepisternal depression. The subspecies *M. d. calleva* differs from *M. d. domestica* and *M. d. curviforceps* Saccà & Rivosecchi, 1956, by having the presutural and first few postsutural dorsocentral setae reduced and barely half the length of the posterior two pairs of postsutural dorsocentral setae.


Distribution: Widespread and common in the Afrotropics (incl. Aldabra, Astove, Madagascar, Seychelles and Socotra Is.), North Africa and Middle East, Azores, Canary Is.

*Musca fragilis* sp. n.

Figs 1–5

Etymology: From Latin *fragilis* (fragile).
Diagnosis: *Musca fragilis* sp. n. is very small with a shiny brown scutum, contrasting markedly with the shiny translucent yellow abdominal tergites 1+2–4.

Description (based on holotype):

Overall length: 3.8 mm.

**General colouration:** Scutum shiny brown, abdomen shiny yellow, with translucent tergites 1+2–4, tergite 5 brown, with grey pollinosity; fronto-orbital plate and parafacial brown, silver pollinose from certain angles; lunule reddish brown; antenna, arista and palpus dark brown; anterior spiracle brown; calypters whitish; haltere with yellow knob. Wing hyaline. Legs uniformly brown, pulvilli white.

**Head:** Eyes well developed, closely approximated, separated at vertex by distance slightly wider than diameter of ocellar triangle. Fronto-orbital plate narrow. Vertical setae more distinct. Antenna inserted below mid level of eye; postpedicel about 1.8× as long as pedicel. Arista with long plumes. Palpus filiform, of equal diameter throughout its length.

**Thorax:** Acrostichals 0+1; dorsocentrals 2+4, first two postsutural setae short, last long; 2 postpronotals; 1 presutural; 2 intra-alars; 1 supra-alar; prealar absent. Notopleuron with 2 setae, similar in size, disc without setulae. Postalar ridge bare. Scutellum with

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Figs 1–5. *Musca fragilis* sp. n., male: (1) sternite 5; (2, 3) cercal plate and surstyli, dorsal (2) and lateral (3) views; (4, 5) phallic complex, dorsal (4) and lateral (5) views.
basal and apical pair of long setae and short preapical pair. Anepisternum with series of 5 fine setae. Katepisternals 1+2, all of similar size; disc of katepisternum with some fine setulae. Anepimeron setulose; meron bare. Lower calypter of the Musca-type. Wing veins bare. Fore femur with complete rows of posterodorsal and posteroventral setae; fore tibia without posterior median seta. Mid femur with 1 anterior median seta; 1 ventral seta in basal third and 2 subapical posterior setae; mid tibia with 2 posterior setae on mid third and one strong apical ventral seta. Hind femur with complete rows of setae on anterodorsal and anteroventral surfaces, the setae on anteroventral row are stronger on apical half than on basal half; hind tibia with long dorsal preapical seta.

**Abdomen:** All tergites clothed in fine setae, the setae are a little longer on marginal rows and on discal row of tergite 5.

**Terminalia:** Cercal plate as high as wide; surstylus large (Figs 2, 3). Aedeagus as in Figs 4, 5.

**Musca hugonis** Pont, 1980

Diagnosis: Eye bare; postalar ridge without setulae; proepisternal depression bare; scutum brown with grey pollinosity and 4 dark brown vittae; fore tibia with 1 posterior seta in apical ½; mid tibia with anteroventral setae in apical half.


Distribution: Botswana, Namibia and South Africa.

**Musca lasiophthalma** Thomson, 1869

Diagnosis: Eye densely hirsute; scutum brown, with grey pollinosity and 4 dark brown vittae; presutural dorsocentral setae absent or setula-like, postsutural setae 1 pair; proepisternal depression bare; anterior spiracle white; legs dark brown; fore tibia with posterior seta; mid tibia with ca 4 posterior setae.


Distribution: Democratic Republic of Congo, Nigeria, eastern and southern Africa, Yemen.

**Musca lusoria** Wiedemann, 1824

Diagnosis: Eye bare; fronto-orbital plate and gena silvery pollinosy; anterior spiracle white; dorsocentral setae 2+4; proepisternal depression bare; scutum dark brown, with grey pollinosity and 4 dark brown vittae; dorsocentral setae 2+4; vein R₄₊₅ with row of ventral setulae extending at least to r–m crossvein; fore tibia without posterior seta in apical half.

**Distribution:** Widespread in the continental Afrotropical Region, Indian subregion, Egypt and Iran.

*Musca patersoni* Zielke, 1971

Diagnosis: Eye bare; anterior spiracle white; postalar ridge without setulae; proepisternal depression bare; scutum dark brown with grey pollinosity and 4 dark brown vittae; dorsocentral setae 2+4; vein R₄₊₅ with 1 ventral seta at base; fore tibia without posterior seta in apical half.


**Distribution:** Democratic Republic of Congo, Namibia and Rwanda.

*Musca sorbens* Wiedemann, 1830

Diagnosis: Eye bare; postalar ridge without setae; proepisternal depression bare; scutum brown with grey pollinosity and 2 dark brown vittae behind suture; dorsocentral setae 2+4; meron setulose below spiracle; anterior spiracle white or pale yellow; fore tibia without posterior seta in apical half; mid tibia with ca 4 posterior setae.


Distribution: Widespread and abundant in the Afrotropical Region (incl. Aldabra, Astove, Coetivy, Cosmoledo, Madagascar, Mauritius, Réunion, Seychelles, Socotra Is.), the southern Palaearctic and Oriental regions.

**Musca tempestatum** (Bezzi, 1908)

Diagnosis: Eye bare; proboscis with long labella; *ca* 7 pairs of frontal setae; anterior spiracle dark brown; dorsocentral setae 1+3; postalar ridge without setulae; proepisternal depression bare; scutum brown with grey pollinosity and 2 dark brown vittae behind suture; dorsocentral setae 1+3; fore tibia with 1 posterior seta in apical half.


Distribution: Widespread in continental Afrotropical Region, except Congo Basin.

**Musca ventrosa** Wiedemann, 1830

Diagnosis: Eye bare; *ca* 13 pairs of frontal setae; anterior spiracle white; postalar ridge without setae; proepisternal depression bare; scutum dark brown, with grey pollinosity and 4 dark brown vittae; dorsocentral setae 2+4; fore tibia without posterior seta in apical half; abdomen predominantly orange-red.


Distribution: Throughout the continental Afrotropical Region, Oriental Region, east to Melanesia, Australia and Vanuatu.

**Musca xanthomelaena** Wiedemann, 1824

Diagnosis: Eye bare; anterior spiracle white; postalar ridge without setulae; proepisternal depression bare; scutum dark brown with grey pollinosity and 4 dark brown vittae; dorsocentral setae 4+5; vein *R*$_{4+5}$ with *ca* 4 ventral setulae at base; fore tibia without posterior seta on apical half; abdominal sternites orange.


Distribution: Widespread in the Afrotropical Region (including Cape Verde, Comoros, Madagascar, Mauritius, Réunion and Rodriguez Is.); Palaearctic Region (Egypt).
Genus *Muscina* Robineau-Desvoidy, 1830

Two species are known from the Afrotropical Region (Pont 1980). *Muscina stabulans* (Fallén, 1817) was recorded from Namibia by Bezzi (1908: 191, Rooibank in the hinterland of Walvischbay) and Lindner (1976: 78, Swakopmund). The species was not found among the material examined.

Genus *Neomyia* Walker, 1859

Forty-three species of the genus are recorded from the Afrotropical Region (Pont 1980), only one is recorded from Namibia: *N. splendidida* (Adams, 1905) (Bezzi 1908: 191, Kubub and Aar, as *Pyrellia boersiana* (Bigot, 1877); Zielke 1971a: 175, Otjiwarongo, Farm Abechaus). For generic diagnoses see Couri *et al.* (2006), Emden (1939) and Zielke (1971c). *Neomyia splendidida* was found among the material examined here.

*Neomyia splendidida* (Adams, 1905)

Diagnosis: Overall length ca 6–7 mm; anterior pair of presutural dorsocentral setae setula-like; wing membrane with at least basal part of discal cell without microtrichiae; abdominal tergite 5 pollinose or not.


Distribution: Widespread in the continental Afrotropical Region.

Genus *Pseudohelina* Vockeroth, 1972

An Afrotropical genus containing nine species (Pont 1980). *Pseudohelina rufina* (Stein, 1906) was recorded from Namibia by Zielke (1974: 35–36, 12 miles NW Namutoni), but was not found among the material examined.

Genus *Pyrellia* Robineau-Desvoidy, 1830


*Pyrellia natalensis* Paterson, 1958

Diagnosis: Prescutum with median white pollinose vitta; anterior spiracle dark brown; greater ampulla bare; mid tibia with 4–6 posterior setae, 1 strong ventral apical seta, without apical anterodorsal seta; vein $R_{4+5}$ almost bare with few setulae only at base.


Distribution: Namibia and South Africa.
Pyrellia spinthera (Bigot, 1878)

Diagnosis: Prescutum without median white pollinose vitta; anterior spiracle dark brown; greater ampulla bare; mid tibia with 4 posterior setae and 1 long posteroventral seta.


Distribution: Cameroun, Democratic Republic of Congo, Mozambique, Namibia, South Africa, Tanzania and Uganda.

Genus Spilogona Schnabl, 1911

Seventeen species are known from the Afrotropical Region (Pont 1980). Spilogona aristalis Zielke, 1971 was described from Namibia (Zielke 1971b: 294, Walvis Bay and Windhoek), but was not found among material studied here.

Genus Stomoxys Geoffroy, 1762

Fourteen species are known from the Afrotropical Region, but this is the first record of the genus from Namibia. Emden (1939) studied Afrotropical material and Zumpt (1973) revised the Afrotropical species. For generic diagnosis see Couri et al. (2006). Bezzi (1908: 191) recorded S. korogwensis Grünberg, 1906 from Rooibank in the hinterland of Walfischbay, but S. korogwensis is a junior synonym of Stomoxys calcitrans (Linnaeus, 1758) and it appears certain that Bezzi’s specimens must represent S. niger Macquart, 1851.

Stomoxys niger Macquart, 1851

Diagnosis: Frons subparallel in posterior half; width of ♀ frons at narrowest point about quarter or less than eye-length; width of ♂ frons <0.5 of eye length; abdomen with dark brown transverse band on hind margin of syntergite 1+2, and transverse band on posterior third of tergites 3 and 4, abutting posterior margin; median dark maculae on basal half of tergites 3–5.


Distribution: Widespread in the Afrotropical Region, including Cape Verde, Madagascar, Mauritius, Réunion, Rodriguez, Seychelles Is. and South Yemen.

ACKNOWLEDGEMENTS

The authors are very grateful to Ashley Kirk-Spriggs (National Museum, Bloemfontein, South Africa) for the loan of the material; to John Irish (Windhoek, Namibia) who kindly checked some localities in Namibia; to Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq, processes 3013012007-7 and 300873/2008-5, respectively) for research grants and financial support; and to Kiany Tomita de Mira (Universidade Federal do Paraná, Brazil) for laboratory support.
REFERENCES


Appendix. List of genera and species of Muscidae recorded from Namibia. New records for Namibia are indicated with an asterisk (*).

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<th>Species</th>
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<td><em>A. hyalinipennis</em> Emden, 1959</td>
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<td><em>A. lineata</em> ssp. <em>ugandae</em> Emden, 1940</td>
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<td><em>A. mitrata</em> Séguy, 1955*</td>
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<td><em>A. naqvii</em> Steyskal, 1966</td>
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<td><em>A. orientalis</em> Schiner, 1868</td>
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<td><em>A. rubricornis</em> Stein, 1913</td>
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<td><em>A. tetrastigma</em> Paterson, 1956</td>
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<td><em>A. theodori</em> Hennig, 1963</td>
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<td><em>Coenosia</em> Meigen, 1826</td>
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<td><em>D. cuthbertsoni</em> Emden, 1942</td>
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