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New Records of some Filth Flies Species (Diptera: Milichiidae) in Southwest Saudi Arabia

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Abstract

A Malaise trap was used during different time periods between 2002 and 2006, in the Asir province of Saudi Arabia at different localities. Nine known species of Milichiidae (some of them of medical importance) have been identified. These are: ***Desmometopa m-nigrum*** (Zetterstedt, 1848); ***D. varipalpis*** Malloch 1927; ***D. singaporensis*** Kertesz 1899; ***Leptometopa rufifrons*** Becker 1903; ***L. latipes*** (Meigen 1830); ***L. nilssoni*** Sabrosky, 1987; ***Milichia pubescens*** Becker 1907; ***Milichiella lacteipennis*** (Loew 1866); ***Enigmilichia dimorphica*** Deeming, 1981, from South-Western Saudi Arabia, the last seven species of the above are recorded for the first time. Biological information and distribution of these species are included. The fauna of Milichiidae found in this study is much more of Afrotropical than Palaearctic origin.

Key words: New records, Milichiidae, filth flies, southwest Saudi Arabia, taxonomic remarks.

Introduction

The family Milichiidae (filth flies) is a member of the superfamily Chloropoidea along with groups such as Tethinidae, Canacidae and Chloropidae within the Diptera order (Colless and McAlpine 1991). The species of Milichiidae can be recognized as they are minute or small usually blackish flies, have large wings and have two costal breaks (Chinery 1986). It is a moderately large family found in all major zoogeographical regions through human agency (Ferrar, 1987). Little is known about the biology of the family and the immature stages of only a few species have been described. Males of some species have silvery abdomens that flash brilliantly in the sun as they dance in swarms. Larvae are saprophagous in organic matter in a variety of niches, in wet media such as rotting fish, in the soil in rotting wood, snails, insect pupae, decaying vegetable matter and many types of dung, and dry media such as grain and birds nests detritus or ants nests, wood detritus and dry guano (Ferrar, 1987). Some species of filth flies breed in dung and act as potential vectors of faecal-borne diseases by contaminating milk in dairies and food, and therefore it is of medical importance to humans (Bohart and Gressit,1951). In Hungary, it was found that *Desmometopa microps* Lamb sucking flower nectar of eryngo (*Eryngium*) (Papp and Wheeler,1998). Adults of some species of Milichiidae are phoretic commensals on predatory insects, riding on them and sucking juices that exude from the victims.

With the exception of the genus *Desmometopa* the tropical fauna of Milichiidae has been almost totally neglected. Few studies been published on the Milichiidae of the Arabian Peninsula (Saudi Arabia, Kuwait, Qatar, United Arab Emirates, Oman and Republic of Yemen). For example, Deeming (1998) recorded thirteen species of Milichiidae from the Arabian Peninsula with a further five species of which there was inadequate material for taxonomic treatment. Al-Ahmadi and Salem (1999) recorded one species only, *Desmometopa m-nigrum* (Zetterstedt), from Saudi Arabia. Al-Houty

(1989) recorded no species of Milichiidae in Kuwait. The objective of the present study is to report on our investigation of the Milichiidae in south-western Saudi Arabia, together with new records, some biological aspects, world-wide distribution, some taxonomic remarks and to summarize all the available literature about Milichiidae of Saudi Arabia. This study was carried out as part of a wide study of the biodiversity of insects in Saudi Arabia and in particular in the southwest because of its location in the Afrotropical zone of the Arabian Peninsula.

Material and Methods

Collection of flies

A Malaise trap was set up by the authors and operated during different time periods of 2002, 2003 and 2006 in the Asir province of Saudi Arabia at three localities: a farm located in a village in Asir, Abha, Madenate Al-Ameer Sultan, Hay Al-Sed (15 km. east of Abha; 18˚ 13' N´42˚ 40' E, 2150 m) from 25.ii.-25.v.2003; Al-Hudaithy fruit farm in Maraba (60 km. south of Abha: 17˚ 54' N´42˚ 23' E,80 m) from 117-.vi.2003 and Al-Ethrebany fruit farm in Keratha (38 km. south of Abha: 18˚ 03' N´42˚ 30' E,90m). The farms were visited weekly to collect the insects and replenish alcohol in the collecting container.

Identification of flies

Insects were identified at the National Museum and Galleries of Wales, Cardiff (NMGWC). Specimens were identified to species level using Deeming (1998) and Hennig (1937) and also by comparison with reliably identified specimens in NMGWC. Where necessary genitalia dissection was made to establish identity. These parts after preparation were stored with individual specimens.

Deposition of the specimens

Voucher specimens of all species encountered have been deposited in the National Museum and Galleries of Wales, Cardiff (NMGWC). Specimens were also deposited in the Natural History Museum, College of Science, King Khalid University (NHMCS).

Distribution and nomenclature

The distribution sections and nomenclature of the species are based on Catalogue of the Diptera of the Afrotropical region (Sabrosky, 1980). When the species were not present in the above catalogue, the Catalogue of Palaearctic Diptera (Papp, 1984) was used.

Biology of the flies

Information on the biology of each specie was obtained from Hennig, (1937), Sabrosky (1983) and Ferrar (1987) or other references given. In some cases, the biological information is mentioned on the generic level because of the lack of information on the individual species. No illustrations were included in this study because all the recorded species were described and illustrated by the describers.

Results

Nine known species of Milichiidae (some of them of medical importance) are identified namely: (***Desmometopa m-nigrum*** (Zetterstedt, 1848); ***D. varipalpis*** Malloch 1927; ***D. singaporensis*** Kertesz 1899; ***Leptometopa rufifrons*** Becker 1903; ***L. latipes*** (Meigen 1830); ***L. nilssoni*** Sabrosky, 1987; ***Milichia pubescens*** Becker 1907; ***Milichiella lacteipennis*** (Loew 1866); ***Enigmilichia dimorphica*** Deeming, 1981) and recorded from South-Western Saudi Arabia, the last seven species of the above are recorded for the first time. Biological information and distribution of these species are included. The fauna of Milichiidae found in this study is much more of Afrotropical than Palaearctic origin (Table 1)

Table 1. List of Millichiidae species recorded from Saudi Arabia: (A = Afrotropical; Aust. = Australasian; Cosm. = Cosmopolitan; N. = Nearctic; A. = Afrotropical; O. = Oriental; P. = Palaearctic)

Species	References	Origin
Desmometopa m-nigrum	Dabbour, 1979a,b; Buttiker et al., 1979; Dabbour and El-Dawy, 1981	Cosm
Desmometopa varipalpis Malloch	Deeming, 1998	A. P. O. Aust.
D. singaporensis Kertesz	This study	A. P. O.
Leptometopa rufifrons Becker	This study	A. P. O.
L. latipes (Meigen)	This study	A. P. N.
Leptometopa nilssoni Sabrosky	This study	A. P.
Milichia pubescens Becker	This study	A. P.

Milichiella lacteipennis (Loew)	This study	A. N.
Enigmilichia dimorphica Deeming	This study	A. P.

Subfamily Madizinae

Genus ***Desmometopa*** Loew, 1866

Desmometopa Loew, 1866. Berl.ent. Z. 9 (1865): 184-185.

Type species: ***Agromyza m-atrum*** Meigen, 1830 (= ***Madiza sordida*** Fallén, 1820), by designation of Hendel (1903: 251). Synonym of ***Desmometopa*** species were given by Sabrosky (1983).

Biology: The life-habits of the *Desmometopa* species of the world were reviewed by Sabrosky (1983). Adults of *Desmometopa* are recorded as visiting flowers. Rearing records of *Desmometopa* show feeding on a wide variety of spoiled, decaying, or rotten plant material, with rare exceptions. Also, there is a number of records of adult *Desmometopa* being collected on ships and planes, which indicates how some species were distributed widely in commerce. Adults are sometimes attracted to the odour-producing glands of bugs, to the gore of insects being eaten by predaceous arthropods (Deeming, 1998), to the nectaries of certain plants and flowers. Another interesting habit of the adults is the phoretic relationships that have been observed with predacious insects and spiders.

Desmometopa m-nigrum (Zetterstedt, 1848)

Agromyza m-nigrum Zetterstedt, 1848: *Dipt. Scand. disposita et descripta* (part). 7: 2743.

niloticum Becker, 1903: *Mitt. Zool. Mus. Berl.*, 2: 188. Egypt (Nile Valley).

Specimens examined: Saudi Arabia: 1f, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: It was reared from the plant *Campanula* in Europe (Hennig, 1937), from rotting cow-pea seeds in Fiji (Bezzi, 1928), from dung of various animals (droppings, manure, heaps, and stables) and from water in bracts of decaying inflorescences of *Heliconia* (Heliconiaceae) (Sabrosky, 1983; Papp and Wheeler, 1998). Frey (1936) records the species from Gran Canaria, Tenerife, Palma and Gomera. Gadallah and Bosly (2006) reported that this species, a) found around the camel dung, feeding on other insects, b) can not capture its prey but depending on asilid fly attaching itself to it and sharing food with asilid when captures its prey.

Distribution: Previously recorded from Saudi Arabia by Dabbour, (1979a,b); Büttiker et al., 1979; Dabbour and Mousa, 1981; Dabbour and El-Dawy (1981). This species was described from Sweden (further records are from southern Europe, especially the Mediterranean subregion), and has been found in all continents apart from Antarctica, widespread in the **Afrotropical region** including Cape Verde Island, Madagascer, Rodriguez, St. Helena, Seychelles, Yemen, Egypt and Oman. Nearctic: in North America it is recorded from Iowa and Michigan to New York and New Hampshire, south through the atlantic and Gulf Coast states to Texas and from Arizona and California, as well as Bermuda. **Neotropical** records are scattered but significant: Mexico, Cuba, Dominica, Barbados, Ecuador and Chile, Oriental region India (Assam), Sri Lanka, Pakistan and Australia. (Sabrosky, 1980, 1983; Deeming, 1998). *D. m-nigrum* is virtually cosmopolitan, probably having been spread around the world by commerce (Sabrosky, 1983).

Desmometopa varipalpis Malloch 1927

Desmometopa varipalpis Malloch 1927: Proc. Linn. Soc. N.S. W. **52: 7.**

niloticum de Meijere (1906), not Becker (misident.).

singaporensis, authors, not Kertész (misident.).

tarsalis, authors, not Loew (misident.).

Specimens examined: Saudi Arabia: 2m, 1f, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC; 1m, Aseer, Keratha, Malaise trap, 15.v.-2.vi.2006, H.A. Dawah & M.A. Abdullah.

Biology: It was reared from insect culture media, septic tanks, sewage beds, fungus growing on dried sheep hearts, and a variety of rotting vegetable substances. It was reported that *D. varipalpis* could be very annoying and hovering around the faces and getting into the eyes. *D. varipalpis* shows attraction to odours. They were found in a hospital operating room and in a dairy cheese room (Sabrosky 1983; Ferrar, 1987).

Distribution: Previously recorded from Saudi Arabia (see Deeming, 1998). It was described from New South Wales, Australia. It is widespread in the **Afrotropical Region** from Ghana to north east Africa: east Africa, Zaire and Ascension 1. **Palaearctic**: widespread in the Middle East, Yemen, Iraq and Saudi Arabia. **Oriental**; Hawaii; North America; South America (Sabrosky 1980; Deeming, 1998). It was found in Australia on board a ship that had sailed from Kuwait (Sabrosky, 1983).

D. singaporensis Kertesz 1899
D. singaporensis Kertesz 1899: 194. *Termeszetr. Fuz.* **22:** 194.

Specimens examined: Saudi Arabia: 1m, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: Sabrosky (1983) gave a good account of the biology and records of *D. singaporensis.* It was reared from larvae in Fiji from onions imported from Australia. It was reared in Guam (Bohart and Gressitt, 1951) from a dead cat, poultry, a variety of rotting vegetable materials: rotten onions, rotten pawpaw stem, larvae feeding on decaying inflorescence of *Areca catechu,* decaying leaves of *Brassica oleracea,* rotten *Solanum tuberosum*, decaying banana skins. This species may cause annoyance. records and more details are in Sabrosky (1983).

Distribution: This is the first record for Saudi Arabia. Described from Singapore and further recorded from the **Afrotropical Region:** Ivory coast, Nigeria, Seychelles, Uganda. It is widespread in the **Oriental region** and Pacific Islands (Sabrosky, 1980). In the NMGWC collection there are specimens collected from Cape Verde Island, Mauritius and United Arab Emirates (Sharjah).

Genus ***Leptometopa*** Becker, 1903 *Mitt. Zool. Mus. Berl.* **2:** 67-195.

Leptometopa Becker, 1903. *Mitt. zool. Mus. Berl.* 2 (30: 188).

Type species: ***Leptometopa rufifrons*** Becker, 1903, by monotypy.

Biology: Little is known about the biology of ***Leptometopa***

Leptometopa rufifrons Becker 1903
Leptometopa rufifrons Becker 1903: *Mitt. Zool. Mus. Berl.* 2: 188.

Specimens examined: Saudi Arabia: 1m, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: Unknown
Distribution: This is the first record for Saudi Arabia. Described from Egypt and further recorded from the **Afrotropical Region:** Namibia, South Africa. **Palaearctic:** Oman Yemen, Canary Islands. It is widespred in the Mediterranean subregion and Central Asia (Sabrosky, 1980, Deeming, 1998).

L. latipes (Meigen 1830)
Agromyza latipes Meigen, 1830. *Systematische Beschreibung der bekannten europaischen zweiflügeligen Insekten*: Pp. 177.

Specimens examined: Saudi Arabia: 1m, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: It was reared from human dung in North America, cesspits and bird's nests in Europe (Hennig, 1937), from barn-owl nests in USA (Ryckman, 1953).

Distribution: This is the first record for Saudi Arabia. Described from Germany and further recorded from the **Afrotropical Region:** Cape Verde Island, South Africa, Sudan, Yemen. It is widespread the **Palaearctic** and **Nearctic** regions (Sabrosky, 1980). There are some specimens in NMGWC collected from Bahrain, Nigera and Oman.

Leptometopa nilssoni Sabrosky, 1987
Leptometopa nilssoni Sabrosky, 1987. *Proc. Ent. Soc. Wash.* 89 (2); 242.

Specimens examined: Saudi Arabia: 1m, Madenate Al-Ameer Sultan, Malaise Trap, 25.ii.-25.v.2002, H.A.Dawah & M.A. Abdullah, NMGWC.

Biology: The type series was found pollinating flowers of *Ceropegia albisepta* (Asclepiadaceae).

Distribution: This is the first record for Saudi Arabia. Described from females only from Madagascar by Sabrosky (1987) and further recorded from the **Afrotropical Region**: Cape Verde Island, the Republic of Benin. Palaearctic: Yemen (Sabrosky, 1980). The male was described by Deeming, (1998). There are some specimens in NMGWC collected from Mauritius and Seychelles.

Subfamily Milichiinae

Genus ***Milichia*** Meigen, 1830: 131. Type-species: ***Milichia speciosa*** Meigen, 1830, by designation of Westwood (1840: 151).

Biology: Species of *Milichia* are reported as being reared from rotting animal material (e.g., dead fish) (Colless and McAlpine, 1991), plant matter (e.g., rotten yam tubers) (Deeming, 1981), larvae in a seeping wound on a tree (Farquharson, 1922), drying debris including seeds (Hardy and Delfinado, 1980), dung (Ferrar, 1987). Some species are scavenger in nests of ants (Donisthorpe, 1927; O'Toole, 1978). See Ferrar (1987) for more on the biology of *Milichia.*

Milichia pubescens Becker 1907
Milichia pubescens Becker 1907: *Annls. Hist.-nat. Mus. Natn. Hung.* **5**: 509.
mediocris Sabrosky 1958: Stuttg. Beitr. Naturk. **4:** 1.

Specimens examined*:* Saudi Arabia: 1m, 2f, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: It was reared from latrines (Deeming and Baez, 1985).

Distribution: This is first record for Saudi Arabia. It has been recorded from the **Palaearctic Region:** Canary Island (Gran Canaria), Egypt, Tenerife, Formosa. **Afrotropical:** Sudan. There are some specimens of *M. pubescens* collected from Nigera, United Arab Emirated and Yemen in NMGWC.

Milichiella lacteipennis (Loew 1866)
Lobioptera lacteipennis Loew 1866: *Berl. ent. Z.* 9 (1865): 158.

Specimens examined: Saudi Arabia: 1m, Abha, Madenate Al-Ameer Sultan, Malaise trap, 25.ii.-25.v.2002, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: Bezzi (1928) reported *M. lacteipennis* reared from heaps of stable manure and rotting cow-pea seeds in Fiji. (Bohart and Gressitt, 1951) reared this species from dung of various animals (cow, horse, chicken, guinea pig) and from decaying aquatic vegetation. This species is tropically almost cosmopolitan. *M. lacteipennis* because it breeds in dungs play a role in contaminating milk in daires with fecal pathogens (Bohart and Gressitt, 1951: 98).

Distribution: This is the first record for Saudi Arabia. It was also recorded from Cuba. It is widespread in the **Afrotropical Region:** Ascencion I, Cape Verde Islands, Madagascar, Reunion, St. Helena, Seychelles, Nigeria (Sabrosky, 1980). There are some specimens of this species in the NMGWC collected from Kenya, Mali, Oman and Zambia

Enigmilichia dimorphica Deeming, 1981 (Figure 4)
Enigmilichia dimorphica Deeming, 1981: 162. *Zool. J. Linn. Soc.,* 71: 162.

Specimens examined: Saudi Arabia: 1f, Aseer, Maraba, Malaise trap, 117-.vi.2003, H.A. Dawah & M.A. Abdullah, NMGWC.

Biology: It was bred from rotting plant matter e.g., rotten yam tubers in Nigeria (Deeming, 1981).

Distribution: This is first record for Saudi Arabia. This species was first described from Nigeria. This is the only species recorded from this genus by Deeming (1981). There are some specimens from Madagascer, Botswana and Yemen in NMGWC.

Discussion

Very little information is available up to now concerning

the Milichiidae of Saudi Arabia, although some species of this family are of economic importance. This is attributed to the lack of research on this important group of insects.

In the course of a survey of the Milichiidae of the southwest of Saudi Arabia, nine species were found, of which seven species are recorded for the first time. Nine species of Milichiidae are currently known to occur in Saudi Arabia (Table 1). In order to discover and protect the natural environment it is important for investigators to investigate the local fauna to get the most reliable information for researchers to deal with rare and extinct species. We believe that this work considered as an important effort in this direction and add a new record which will enrich the natural history of Saudi Arabia. In the case of Milichiidae of Saudi Arabia, however, there is a need for extensive taxonomic research. This should embrace not only those species which appear to have some economic importance, but also those species which are in danger. The number of species of Milichiidae listed in this study is expected to increase if further intensive and careful collections are made. Studies on the distribution, taxonomy, ecology, biology, behaviour, diurnal activity, biotic and abiotic factors influencing the phenology etc. of Milichiidae will reveal a great deal of knowledge and will provide the necessary guidelines for management of this group of flies.

The Arabian Peninsula is the meeting point of three zoogeographical regions, namely Afrotropical Region (Ethiopian), in the Southwest (separated from Eritrea by the narrow Red Sea), and to a lesser extent the Oriental Region in the Southeast, touching the Palaearctic Region in the North (at the border with Jordan), which have an almost unknown pattern of overlapping.

The present study is interesting from a biogeographical point of view as the fauna of Milichiidae found in this study is much more of Afrotropical than Palaearctic origin (Table 1). Furthermore, it is obvious that zoogeographical studies of the Arabian peninsula and neighbouring regions will benefit from the results of this research. From this point of view, knowledge of the fauna of Saudi Arabia is also of more general interest for zoologists studying the fauna of Africa, Europe and Asia.

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تسجيل انواع جديدة من ذبابة *Milichiidae* من جنوب غرب المملكة العربية السعودية

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الملخص

أُستَعملت مصائد الملايز لجمع الذباب خلال اوقات مختلفة بين 2002-2006 من اماكن متفرقة في منطقة عسير، تم جمع تسعة انواع من ذبابة Milichiidae (بعضها ذو اهمية طبية) وهذه الانواع هي:

Desmometopa m-nigrum (Zetterstedt, 1848); *D. varipalpis* Malloch 1927; *D. singaporensis* Kertesz 1899; *Leptometopa rufifrons* Becker 1903; *L. latipes* (Meigen 1830); *L. nilssoni* Sabrosky, 1987; *Milichia pubescens* Becker 1907; *Milichiella lacteipennis* (Loew 1866); *Enigmilichia dimorphica* Deeming, 1981.

السبعة الأنواع الأخيرة تسجل لأول مرة من جنوب غرب المملكة العربية السعودية. كما تم تدوين المعلومات البيولوجية والانتشار لتلك الأنواع.