

## FIRST RECORDS OF FAMILIES AND SPECIES OF DIPTERA (INSECTA) FROM MOROCCO

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**Abstract:** The following six families of Diptera are recorded for the first time from Morocco: Atelestidae, Aulacigastridae, Clusiidae, Dryomyzidae, Pallopteridae and Psilidae. Three of these, namely Aulacigastridae, Clusiidae and Dryomyzidae, are recorded for the first time from North Africa, thus highlighting how little studied the North African fauna is. A total of 156 species in 43 families are first records. These data are based largely on material sampled by the authors in recent years.

**Key words:** Diptera, faunistics, new records, North Africa, Morocco.

### Primeras citas de familias y especies de Diptera (Insecta) de Marruecos

**Resumen:** Las siguientes seis familias de dípteros son registradas por primera vez de Marruecos: Atelestidae, Aulacigastridae, Clusiidae, Dryomyzidae, Pallopteridae y Psilidae. Tres de éstas, Aulacigastridae, Clusiidae y Dryomyzidae, se citan por primera vez del norte de África, hecho que amplía significativamente su distribución conocida y, al mismo tiempo, resalta lo poco estudiada que está la fauna de esta región. Un total de 156 especies de 43 familias son primeras citas para Marruecos. Los datos provienen en gran parte del material recolectado en la región por los autores en los últimos años.

**Palabras clave:** Diptera, faunística, citas nuevas, norte de África, Marruecos.

### Introduction

In the course of preparing for publication a Catalogue of the Diptera of Morocco, listing almost 3000 species, it became apparent to us that a few families and a significant number of species collected recently were not previously published. They are listed in this article with the relevant data to facilitate their later inclusion in the catalogue as well as to draw attention to the large number of new records that significantly extend the geographical range of some families and several species within them.

Numerous publications give records of Diptera from Morocco, but very few are revisionary works giving a comprehensive overview of individual families. It is beyond the scope of this article to review and list the entire literature, although this has been consulted before concluding that any family or species listed here is new to the country. In most cases, our starting point was the Catalogue of Palearctic Diptera (Soós & Papp, 1984–1993), followed by Dakki (1997) and Mouna (1998) and any subsequent published checklists of families or genus revisions where Morocco was included.

Notwithstanding previous studies and numerous excursions to the country by many dipterists, even in recent years, we discovered a significant number of species and several families that were not previously published. This is an indication of how much more field work is still required before a comprehensive knowledge of the fly fauna of Morocco is acquired.

Mouna (1998) listed the invertebrates of Morocco based mainly on literature records and some specimens in the collections at the Scientific Institute in Rabat, Morocco. However, it was not possible for him to check all the identifications nor the provenance of some specimens. Several specialists

working on their own families of Diptera, whether or not their primary interest is the Moroccan fauna, are collaborating with KK in the compilation of the catalogue by reviewing sections of her work and contributing records and literature. This paper makes some use of this information by 1) cross checking that the new records listed here are, as far as can be ascertained, indeed new unpublished records; 2) the taxonomy used here is updated according to the specialists' opinions; 3) no records are listed here if any of the collaborating specialists plan to publish their own data independently.

### Methods

Most of the material was obtained during three excursions in recent years. In 2012, Dr Keith Bensusan, Director of the Alameda Botanic Gardens in Gibraltar organized and led a field trip to study selected invertebrates including Diptera (collected by MJE), taking in localities from Azrou to Merzouga and Midelt to Larache. In 2014, a second visit taking localities from Larache to the Rif mountains again allowed MJE to sample widely. On a third visit MJE spent a week at Tétouan University, mostly going through samples previously collected by KK, but also undertaking some field work around Tanger with Dr Ahmed Taheri and, with KK and students, along the Mediterranean coast north of the Rif. Some data from limited collecting by MJE in February 1984 is also included. PG collaborated in two European Union-funded projects: MECO: Bases for the Integrated Sustainable Management of Mediterranean Sensitive Coastal Ecosystems, contract No: ERB IC18-CT98-0270, 4th Framework Programme: 1998–2001; and in 2004, the 6th Framework Pro-

gramme, MED-CORE Project Contract ICA3-CT2002-10003 (2002–2004). KK continued to sample in the period 2015–18 using Malaise traps and sweeping. Several students contributed material from samples forming part of their studies. Almost all the material has been examined by MJE, searching for species not previously recorded.

The three main excursions mentioned above, alone yielded about 780 species most of which have been identified. The following six families are not included in this study because no effort was made to collect them: Cecidomyiidae, Ceratopogonidae, Chironomidae, Phoridae, Psychodidae, Simuliidae. The following families, consisting of either many species with many new records for the country or because of special interest to the authors, were published separately: Chamaemyiidae (Ebejer, 2016b), Chloropidae (Ebejer & Kettani, 2016), Chyromyiidae (Ebejer, 2016a, 2018), Lauxaniidae (Ebejer, 2019a; Ebejer & Kettani, 2019), Micropezidae (Ebejer, 2019b) and Sphaeroceridae (Gatt *et al.*, 2016), adding 110 new records for the country, 11 of which, described as new to science. The Atelestidae, Heleomyzidae, Keroplattidae, Mycetophilidae and Pipunculidae are being studied separately and papers on these are in preparation. The remaining 156 new records for Morocco are listed in this article where a small number of undescribed species are listed to genus only. Time has not permitted descriptions of these here and in most cases more material would be helpful. It is hoped that such work will be undertaken by others in the future.

Taxa are listed in alphabetical order with full locality data given in date order and the depository for all specimens is included. Localities are listed with the commonly accepted transliteration names. Co-ordinates are given in two formats to correspond with the data labels. For material collected by MJE the format in most cases is in degrees, and minutes to three decimal points: 31°06.093'N 04°04.018'W, whereas for material collected by KK and her students the format is

generally in degrees, minutes and seconds: 35°31'24"N 05°37'43"W. Altitude is given in metres above sea level (m asl.) In a very few cases, it was not possible to confidently identify the sex of the specimens and therefore this is given simply as “ex”, short for exemplar.

It is beyond the scope of this article to review each family in detail and to give all the available literature records relating to it. This will be made available in the forthcoming catalogue. Only a brief note is entered under each family name indicating the main recent literature where the latest information on the particular group is given and in a few instances other literature is included where this was considered relevant to points of taxonomy or geographical distribution. Only the new records are then listed. The large numbers of previously recorded species are not listed in order to remain within the scope of this article.

Persons' initials and codons of institutions are abbreviated thus: PG – Paul Gatt (Southend, UK); KK – Kawtar Kettani (Tétouan, Morocco); MJE – Martin J Ebejer (Cowbridge, UK); OUMNH – Oxford University Museum of Natural History (UK); MHNN – Museum Histoire Naturelle Neuchatel (Switzerland); NMWC – National Museum of Wales, Cardiff (UK); NHMUK – Natural History Museum, London, UK; NPT – National Park of Talassemtane; PPNB – Project of Natural Park of Bouhachem; SIBE – Site d'Intérêt Biologique et Ecologique. The letter “P” before the initials in parenthesis indicates the depository of those specimens being in the personal collection of the named individual.

## Taxonomy

Table I lists the families known to occur in Morocco. Those in bold have new records of species added in this paper and those with an “\*” are families new to the country.

**Table I.** The 92 families of Diptera known to occur in Morocco (out of 102 families in the Mediterranean). Those with new species records listed in this article are given in bold. A new family record for the country is denoted by “\*”.

1. ACROCERIDAE	32. DIXIDAE	63. PIPUNCULIDAE
2. AGROMYZIDAE	33. DOLICHOPODIDAE	64. PLATYPEZIDAE
3. ANISOPODIDAE	34. DROSOPHILIDAE	65. PLATYSTOMATIDAE
4. ANTHOMYIIDAE	35. DRYOMYZIDAE*	66. PSILIDAE*
5. ANTHOMYZIDAE	36. EMPIDIDAE	67. PSYCHODIDAE
6. ASILIDAE	37. EPHYDRIDAE	68. PTYCHOPTERIDAE
7. ASTEIIDAE	38. FANNIIDAE	69. RHAGIONIDAE
8. ATELESTIDAE*	39. HELCOMYZIDAE	70. RHINIIDAE
9. ATHERICIDAE	40. HELEOMYZIDAE	71. RHINOPHORIDAE
10. AULACIGASTRIDAE*	41. HIPPOBOSCIDAE	72. SARCOPHAGIDAE
11. BIBIONIDAE	42. HYBOTIDAE	73. SCATHOPHAGIDAE
12. BLEPHARICERIDAE	43. KEROPLATIDAE	74. SCATOPSIDAE
13. BOMBYLIIDAE	44. LAUXANIIDAE	75. SCENOPINIDAE
14. BRAULIDAE	45. LIMONIIDAE	76. SCIARIDAE
15. CALLIPHORIDAE	46. LONCHAEIDAE	77. SCIOMYZIDAE
16. CAMILLIDAE	47. LONCHOPTERIDAE	78. SEPSIDAE
17. CANACIDAE	48. MICROPEZIDAE	79. SIMULIIDAE
18. CARNIDAE	49. MILICHIIDAE	80. SPHAEROCERIDAE
19. CECIDOMYIIDAE	50. MUSCIDAE	81. STRATIOMYZIDAE
20. CERATOPOGONIDAE	51. MYCETOPHILIDAE	82. STREBLIDAE
21. CHAMAEMYIIDAE	52. MYDIDAE	83. SYRPHIDAE
22. CHAOBORIDAE	53. MYTHICOMYIIDAE	84. TABANIDAE
23. CHIRONOMIDAE	54. NEMESTRINIDAE	85. TACHINIDAE
24. CHLOROPIDAE	55. NYCTERIBIIDAE	86. TEPHRITIDAE
25. CHYROMYIDAE	56. ODINIIDAE	87. THAUMALEIDAE
26. CLUSIIDAE*	57. OESTRIDAE	88. THEREVIDAE
27. COELOPIDAE	58. OPOMYZIDAE	89. TIPULIDAE
28. CONOPIDAE	59. PALLOPTERIDAE*	90. TRICHOCERIDAE
29. CRYPTOCHETIDAE	60. PEDICIIDAE	91. ULIDIIDAE
30. CULICIDAE	61. PHORIDAE	92. VERMILEONIDAE
31. DIASTATIDAE	62. PIOPHILIDAE	

LIST OF NEW RECORDS FOR MOROCCO

**Anthomyiidae**

Since the publication of the Palaearctic Catalogue (Dely-Draskovits, 1993), the only published records of Anthomyiidae from Morocco are those by Pärvu *et al.* (2006). Many more species are to be expected.

***Anthomyia quinque maculata* Macquart, 1839**

2 ♂♂, Middle Atlas, Ifrane, cedar forest, 3.5 km S of Azrou, 33°25.491'N 05°12.393'W, 1450 m asl, 8.v.2013, MJE (PMJE); 1 ♂, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

***Botanophila varicolor* (Meigen, 1826)**

1 ♀, Middle Atlas, Khenifra, Lac Aguelmame, Sidi Ali, 33°03.238'N 05°01.615'W, 2052 m asl, 7.v.2012, MJE (PMJE).

***Leucophora cinerea* Robineau-Desvoidy, 1830**

1 ♀, eastern High Atlas, Khenifra, 17 km SW of Midelt, 32°34.771'N 04°51.413'W, 1940 m asl, 5.v.2012, MJE (PMJE).

***Leucophora dissimilis* (Villeneuve, 1920)**

1 ♀, eastern High Atlas, Khenifra, 17 km NW of Zaida, 32°57.179'N 05°04.514'W, 1878 m asl, 6.v.2012, MJE (PMJE).

***Mycophaga testacea* (Gimmerthal, 1834)**

1 ♀, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

***Pegomya terminalis* Rondani, 1866**

1 ♂, Larache, Bouhachem NP, Tazroute, Adrou, 35°22'56"N 05°32'34"W, 556 m asl, 25.iv.2015, MJE (PMJE).

**Anthomyzidae**

The Anthomyzidae of the Palaearctic were monographed by Roháček (2006) and the only species recorded from Morocco was *Anagnota major* Roháček & Freidberg, 1993.

***Amygdalops thomasseti* Lamb, 1914**

2 ♀♀, Chefchaouen, Stehat, 35°20'34"N 04°57'01"W, 1 m asl, 26.iv.2015–26.v.2015, beach, Malaise trap, KK (PKK).

**Asilidae**

A list of species known from Morocco was available from the database of Asilidae (Geller-Grimm, 2007). A new species of *Amphisbetetus* Hermann, 1906 was added afterwards (Tomasovic & Weyer, 2008).

***Dioctria cothurnata* Meigen, 1820**

1 ♀, Chefchaouen, Dardara, 35°06.354'N 05°17.971'W, 484 m asl, 13.vi.2013, oak forest, meadow, MJE (PMJE).

***Dioctria rufa* Strobl, 1906**

2 ♂♂ 3 ♀♀, Chefchaouen, Dardara, 35°06.015'N 05°20.324'W, 730 m asl, 11.vi.2013, flowery meadow, pond, pine forest, MJE (PMJE).

***Galactopogon hispidus* Engel, 1929**

1 ♂, SE High Atlas, Errachidia, 23 km S of Rich, arid slopes, 32°09.639'N 04°21.844'W, 2012 m asl, 3.v.2012, MJE (PMJE).

**Asteiidae**

Papp (1984) and Mouna (1998) give only one species from Morocco.

***Asteia ibizana* (Enderlein 1935)**

1 ♂ 3 ♀♀, Larache, Lower Loukkos saltmarsh, 35°12.274'N 06°08.222'W, 2 m asl, 10.v.2012, MJE (PMJE).

***Asteia mahunkai* Papp, 1979**

1 ♂, Larache, Lower Loukkos saltmarsh, 35°12.274'N 06°08.222'W, 2 m asl, 10.v.2012, MJE (PMJE).

***Phlebotomera mirabilis* Papp, 1972**

1 ♂, Errachidia, 12 km S of Rissani, 31°15.914'N 04°09.350'W, 737 m asl, 29.iv.2012, MJE (PMJE).

**Atelestidae**

This family is new to Morocco, but no specimen data is included here because a study of the Mediterranean Atelestidae is being prepared separately.

**Aulacigastridae**

Rung & Mathis (2011) revised the genus *Aulacigaster* Macquart, 1835 and listed four species from the Palaearctic, none of which were known to occur in North Africa at the time. *A. leucopeza* is the first record from Morocco and North Africa.

***Aulacigaster leucopeza* (Meigen, 1830)**

1 ♂, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

**Bibionidae**

Only one Bibionidae species is given for Morocco in the Catalogue of Palaearctic Diptera (Krivoseina, 1986). Mouna (1998) lists 12 species of *Bibio* Geoffroy, 1762 and three of *Dilophus* Meigen, 1803. Haenni (*in litt.*) questioned the occurrence of most of these as no specimens originating from Morocco are found in the collections at Rabat.

***Bibio lanigerus* Meigen, 1818**

16 ♂♂, Tétouan, Amsemlil (PPNB), 35°15'44"N 05°26'00"W, 1067 m asl, 27.iv.2012, KK (PKK) (J.-P. Haenni det.).

***Bibio laufferi* Strobl, 1906**

2 ♂♂, Middle Atlas, Ifrane, 3.5 km S of Azrou, 33°25.491'N 05°12.393'W, 1450 m asl, 8.v.2012, MJE (PMJE); 2 ♀♀, Middle Atlas, Ifrane, 20 km S of Azrou, 33°19.567'N 05°14.238'W, 1720 m asl, 9.v.2012, MJE (PMJE).

***Bibio leucopterus* (Meigen, 1804)**

1 ♂, Middle Atlas, Ifrane, 6 km S of Azrou, 33°25.901'N 05°10.551'W, 1610 m asl, 7.v.2012, MJE (PMJE).

***Bibio* sp. ? n.**

3 ♂♂, Middle Atlas, Ifrane, Lac Aguelmame, Sidi Ali, 30 km SW of Azrou, 33°03.238'N 05°01.615'W, 2050 m asl, 7.v.2012, MJE (PMJE).

***Dilophus antipedialis* (Wiedemann, 1818)**

4 ♂♂, Oued Azla (Nwawel), 35°32.548'N 05°17.509'W, 57 m asl, 28.iii.2010, KK (PKK); 1 ♂ 1 ♀, Oued Azla (Hallila), 35°31'N 05°17'W, 95 m asl, 28.iii.2010, KK (PKK) (J.-P. Haenni det.).

***Dilophus tridentatus* Walker, 1848**

2 ♂♂, Essaouira, Sidi Mokhtar env., 4.iv.2002, J.-P. Haenni (MHNN).

**Bombyliidae**

The Moroccan species of Bombyliidae have been relatively well-studied. Nevertheless, new species continue to be discovered and described. The fauna is large and more records can be expected.

***Anthrax lucidus* (Becker, 1902)**

1 ♀, Errachidia, 13 km N of Erfoud, Ziz River, 31°31.558'N 04°11.174'W, 800 m asl, 1.v.2012, MJE (PMJE).

***Cononedys* sp.**

1 ♂, High Atlas, Errachidia, 13 km N of Erfoud, Ziz River, 31°31.558'N, 04°11.174'W, 800 m asl, 1.v.2012, MJE.

This single specimen represents a species with characters intermediate between *C. lyneborgi* François, 1969 and *C. scutellata* (Meigen, 1835). It has clear wings and holoptic eyes as in *C. scutellata*, but yellow tibiae and r-m crossvein proximal to the middle of the discal cell as in *C. lyneborgi*. The description of *C. lyneborgi* is brief and rather overemphasizes the importance of chromatic characters and relative lengths of the segments of the antennal style as well as features of the terminalia. The illustrations given by François are unconvincing (François, 1969). The differences are minor and well within variation exhibited by many species of Bombyliidae. Both *C. scutellata* and *C. lyneborgi* were described from very few specimens. At this stage, without more material being available, it is not possible to say if the Moroccan specimen recorded above is a third species or if all three represent one taxon.

***Cytharea thyridophora* (Bezzi, 1925)**

1 ♀, Rif, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, MJE (PMJE).

***Desmatoneura albifacies* (Macquart, 1840)**

1 ♀, Errachidia, Merzouga, 30°06.294'N 04°00.627'W, 714 m asl, 30.iv.2012, agriculture under date palms, MJE (PMJE).

***Efflatounia berbera* Bowden, 1973**

1 ♂, 21.ii.1984 and 1 ♂, 28.ii.1984, Agadir, MJE (one specimen in NMWC and one in PMJE).

**Camillidae**

Only two species have so far been recorded in Morocco, one by Séguy (1942) and another by Pârveu *et al.* (2006). Mouna (1998) also listed "*Camilla griseola* Fall." but there is no species with such a name and without specimens to check it is not possible to say what this actually refers to.

***Camilla acutipennis* (Loew, 1865)**

2 ♂♂ 1 ♀, Tanger, Tahaddart, Ain Jdioui, 35°34'34"N 05°55'17"W, 76 m asl, 31.i.2017, KK (PKK); 6 ex, Tanger, Al Manzla, Chrabkha pond, 35°30'50"N 05°48'18"W, 58 m asl, 31.i.2017, KK (PKK).

***Camilla pruinosa* Duda, 1934**

1 ♀, Larache, 35°12.503'N 06°08.873'W, 5 m asl, 11.v.2012, beach and dunes, MJE (PMJE).

**Diastatidae**

The subfamily Campichoetinae is recorded for the first time from Morocco and North Africa.

***Campichoeta obscuripennis* (Meigen, 1830)**

1 ♀, High Atlas, Lalla Takrkoust, Oued N'fiss, 31°21'30,39"N 08°08'3,79"W, 628 m asl, 26.iii.2017, sweep net, Toubkal Expedition (PKK).

**Canacidae**

The only new records in this family to appear since the publication of the World Catalog of Canacidae (Munari & Mathis, 2010) are those of *Tethina flavigenis* (Hendel, 1934) and *Tethina strobliana* (Mercier, 1923) published very recently by Munari and Bramuzzo (2018).

***Canace actites* Mathis, 1982**

1 ♂, Larache, Loukkos marsh, 35°09.445'N 06°06.220'W, 2m, 4.vi.2013, MJE.

**Carnidae**

The North African Carnidae are poorly known and several more species can be expected to be found in Morocco. Brake (2011) listed two species from this country.

***Meoneura hungarica* Papp, 1977**

68 ♂♂ 63 ♀♀, Larache, Taghzoute (PNPB), Adrou, 35°31'24"N 05°37'43"W, 556m, 14.vii–15.viii.2013, Malaise trap, *Quercus suber* forest, KK (PKK, 3 ♂♂ 3 ♀♀, PMJE).

**Clusiidae**

This family is recorded for the first time from North Africa.

***Clusiodes verticalis* (Collin, 1912)**

1 ♂, Tétouan, Amsemlil (PPNB), bog, 35°15'44"N 05°26'00"W, 1067 m asl, 27.iv.2012, KK (PKK).

**Dixidae**

The last publication to list the Dixidae was by Dakki (1997). The following two species are new records.

***Dixella attica* (Pandazis, 1933)**

1 ♀, Tétouan, Cabo Negro, indoors, 35°39'45"N 05°17'21"W, 10 m asl, 26.iv.2015, MJE (PMJE).

***Dixella martini* (Peus, 1934)**

1 ♂, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE).

**Dolichopodidae**

A checklist of Moroccan Dolichopodidae was published by Kettani & Negrobov (2016). However, the species from recent excursions were omitted. This is a large family and many more records can be expected.

***Asyndetus separatus* (Becker, 1902)**

1 ♀, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE).

***Campsicnemus loripes* (Haliday, 1832)**

3 ♂♂, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE).

***Chrysotus albibarbus* Loew, 1857**

1 ♂, Middle Atlas, Ifrane, Lac Aguelmame Afennourir, 30 km SW of Azrou, 33°17.108'N 05°15.058'W, 1760 m, 9.v.2012, MJE (PMJE).

***Chrysotus pennatus* Lichtwardt, 1902**

1 ♂, Errachidia, 1 km N of Tarda, 31°49.003'N 04°36.282'W, 1023 m asl, 3.v.2012, MJE (PMJE); 1 ♂, Tétouan, Smir Barrage, meadow, 35°41.193'N, 05°22.757'W, 145 m asl, 6.vi.2013 MJE (PMJE).

***Diaphorus africanus* Parent, 1924**

1 ♀, Chefchaouen, Oued Siflaou, 35°11.616'N 05°18.487'W, 281 m asl, 6.vi.2013, sandy river bank, MJE (PMJE).

***Dolichopus andalusiacus* (Strobl, 1899)**

1 ♂, Larache, Loukkos marsh, 35°09.445'N 06°06.220'W, 2 m asl, 4.vi.2013, MJE (PMJE).

***Dolichopus sabinus* Haliday, 1838**

1 ♂, Tétouan, Martil, 35°38.741'N 05°17.575'W, 9 m asl, 9.vi.2013, meadow and dunes, MJE (PMJE); 1 ♂, Chefchaouen, Oued Laou, 35°25'17"N 05°04'31"W, 2 m asl, 21.iv.2015, dunes, MJE (PMJE).

***Hercostomus appendiculatus* (Loew, 1859)**

2 ♀♀, Tétouan, Zinat, Oued Nakhla, 35°25.836'N 05°23.637'W, 200 m asl, 6.vi.2013, pine forest, riverside, MJE (PMJE); 1 ♂, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE); 4 ♂♂ 3 ♀♀, Chefchaouen, Dardara, 35°06.015'N 05°20.324'W, 730 m asl, 11.vi.2013, flowery meadow, pond, pine forest, MJE (PMJE); 3 ♂♂ 1 ♀, Tanger, Cap Spartel, 35°47'42"N 05°54'16"W, 155m asl, 19.iv.2015, maquis, MJE (PMJE).

***Hercostomus chetifer* (Haliday, 1849)**

1 ♂, Tétouan, Sidi Yahia Aärab, 35°17'43"N 04°53'50"W, 377 m asl, 23.iv.2015, MJE (PMJE).

***Medetera micacea* Loew, 1857**

1 ♂, Chefchaouen, Dardara, 35°06.015'N 05°20.324'W, 730 m asl, 11.vi.2013, flowery meadow, pond, pine forest, MJE (PMJE).

***Medetera truncorum* Meigen, 1824**

1 ♀, Chefchaouen, Dardara, 35°06.354'N 05°17.971'W, 484 m asl, 13.vi.2013, oak forest, meadow, MJE (PMJE).

***Orthoceratium lacustre* (Scopoli, 1763)**

8 ♂♂ 8 ♀♀, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

***Parathalassius blasigii* Mik, 1891**

1 ♀, Larache, 35°12.503'N 06°08.873'W, 5 m, 11.v.2012, beach and dunes, MJE (PMJE).

***Poecilobothrus infuscatus* (Stannius, 1831)**

5 ♂♂ 2 ♀♀, Rif, Tahaddart, marsh, 35°37'51"N 5°14'57"W, 2 m asl, 29.iv.2015, MJE (PMJE)

***Schistostoma eremita* Becker, 1902**

1 ♂ 1 ♀, Errachidia, 12 km S of Rissani, Ziz river, 31°15.914'N 04°09.350'W, 737 m asl, 29.iv.2012, MJE (PMJE); 1 ♀, Errachidia, Lac de Tifert, 4 km W of Merzouga, 31°06.093'N 04°04.018'W, 702 m asl, 30.iv.2012, MJE (PMJE).

***Sciapus costae* (Mik, 1890)**

1 ♀, Chefchaouen, Oued Laou, 35°21.462'N 05°10.781'W, 30 m asl, 9.vi.2013, sandy river bank, MJE (PMJE).

***Sciapus laetus* (Meigen, 1838)**

1 ♀, Tétouan, Martil, 35°38.741'N 05°17.575'W, 9 m asl, 9.vi.2013, meadow and dunes, MJE (PMJE).

***Teuchophorus cristulatus* Mueffels & Grootaert, 1990**

1 ♂ 1 ♀, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE).

***Thinophilus indigenus* Becker, 1902**

1 ♀, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE); 3 ♀♀, Chefchaouen, Oued Laou, 35°25'17"N 05°04'31"W, 2 m asl, 21.iv.2015, dunes, MJE (PMJE).

***Xanthochlorus tenellus* (Wiedemann, 1817)**

1 ♀, Bouhachem, Moulay Abdessalam, 35°16.236'N 05°29.220'W, 1180 m asl, 7.vi.2013, oak forest, MJE (PMJE).

**Drosophilidae**

The most up to date list of species known from Morocco can be obtained from TaxoDros (Bächli, 2017).

***Hirtodrosophila cameraria* (Haliday, 1833)**

1 ♂, Rif, Taida, Oued Taida, 35°22'06"N 05°32'02"W, 504 m, 16.v.2010, KK (PKK).

***Phortica variegata* (Fallén, 1823)**

1 ♀, Rif, Bab Bered, 35°01.191'N 05°00.731'W, 1433 m asl, 10.vi.2013, oak forest, MJE (PMJE); 1 ♂, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 14.vi.2013, meadow in mixed forest, MJE (PMJE).

***Scaptomyza adusta* (Loew, 1862)**

1 ♂, Larache, Loukkos marsh, 35°09.445'N 06°06.220'W, 2 m asl, 4.vi.2013, MJE (PMJE); 1 ♀, Chefchaouen, Dardara, 35°06.015'N 05°20.324'W, 730 m asl, 11.vi.2013, flowery meadow, pond, pine forest, MJE (PMJE).

**Dryomyzidae**

Soós (1984) did not specifically list any Mediterranean countries for this family. However, the Checklist of Italian Diptera (Munari & Rivosecchi, 1995) includes Sardinia and possibly Sicily in the distribution of *Dryope flaveola*. One of us (MJE) found this species in *Fagus* forest in the Nebrodi mountains in Sicily, thus confirming its presence on the island. This family record and species is the first for Morocco and North Africa.

***Dryope flaveola* (Fabricius, 1794)**

2 ♂♂ 2 ♀♀, Talassemtane, Jebel Lakra, 35°07.182'N 05°07.953'W, 1596 m asl, 12.vi.2013, mixed forest, MJE (PMJE).

**Empididae**

Despite the Empididae being richly represented in Morocco, little has been published. Since the publication of the Palaearctic Catalogue (Chvála & Wagner, 1989), Daugeron (1997) new species of *Empis* Linnaeus, 1758 have been described in the following subgenera: three species in *Xanthempis* Bezzi, 1909 (Daugeron, 1997); one in *Kritempis* Collin, 1926 (Daugeron, 2009); Bahid *et al.* (2017) described two in *Leptempis* Collin, 1926 and Bahid *et al.* (2018) another species of *Xanthempis*; Shamshev (2018) add a species in the subgenus *Coptophlebia* Bezzi, 1909. Chvála (2008) included all known Moroccan species of *Hilara* up to that time and he described *H. schachtii*.

***Empis (Empis) decora* Meigen, 1822**

1 ♂, Tétouan, Zinat, Oued Nakhla, 35°25.836'N 05°23.637'W, 200 m asl, 6.vi.2013, pine forest, riverside, MJE (PMJE); 1 ♂, Larache, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE); 1 ♂, Larache, Bouhachem, Moulay Abdessalam, 35°16.236'N 05°29.220'W, 1180 m asl, 7.vi.2013, oak forest, MJE (PMJE).

***Empis (Polyblepharis) eumera* Loew, 1866**

1 ♀, Ifrane, Foret de Cedres, 33°31'30" N, 05°06'30"W, 1500 m a.s.l., 29.iv.1999, Vrabec & Vrabokova (OUMNH).

***Empis (Pachymeria) suberis* Becker, 1907**

1 ♂ 5 ♀♀, Ifrane, Ghabat Al-Bahar, 33°31'30"N, 5°6'30"W, 1650–1700 m a.s.l., 8.v.1981, S.C. Sherman (OUMNH); 1 ♀, Larache, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE); 1 ♂, Issaugen, scrub on rocky slope in cedar forest, 35°57.652'N 04°39.978'W, 1620 m asl, 10.vi.2013, MJE (PMJE); 4 ♂♂ 4 ♀♀, Rif, Bab Bered, 35°01.191'N 05°00.731'W, 1433 m asl, 10.vi.2013, oak forest, MJE (PMJE); 6 ♂♂, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

***Hilara algecirasensis* Strobl, 1899**

1 ♀, SE High Atlas, El-Hajeb, 9.5 km SE of Rich, Ziz River, 32°15.693'N 04°24.749'W, 1285 m asl, 29.iv.2012, MJE (PMJE); 1 ♂, Middle Atlas, Ifrane, Lac Aguelmame Afennour, 30 km SW of Azrou, 33°17.108'N 05°15.058'W, 1760 m, 9.v.2012, MJE (PMJE).

**Ephydriidae**

This is one of the few families that received a good deal of attention over many years. The species known from Morocco are listed in The World Catalog of Shoreflies (Mathis & Zatwarnicki, 1995).

***Brachydeutera ibari* Ninomyia, 1929**

5 ♂♂ 3 ♀♀, Rif, Oued Martil, Taboula, 35°33'59"N 05°24'28"W, 14 m asl, 16.xii.2015, A. Guellef (PKK); 1 ♂ 1 ♀, same data (PMJE).

***Lamproscatella sibilans* (Haliday, 1833)**

1 ♂, Errachidia, 1 km N of Tarda, 31°49.003'N 04°36.282'W, 1023 m asl, 3.v.2012, MJE (PMJE).

***Pelina subpunctata* Becker, 1896**

3 ♀♀, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE).

***Philygria posticata* (Meigen, 1830)**

1 ♀, eastern High Atlas, Khenifra, 17 km SW of Midelt, 32°34.771'N 04°51.413'W, 1940 m asl, 5.v.2012, MJE (PMJE).

***Psilopa aequalipes* (Becker, 1907)**

4 ex, Errachidia, Lac de Tifert, 4 km W of Merzouga, 31°06.093'N 04°04.018'W, 702 m asl, 30.iv.2012, MJE (PMJE); 2 ex., SE High Atlas, Errachidia, 13 km N of Erfoud, Ziz River, 31°31.558'N 04°11.174'W, 800 m asl, 1.v.2012, MJE (PMJE).

***Psilopa fratella* (Becker, 1903)**

6 ex., SE High Atlas, Errachidia, 13 km N of Erfoud, Ziz River, 31°31.558'N 04°11.174'W, 800 m asl, 1.v.2012, MJE (PMJE); 1 ex., Errachidia, 1 km N of Tarda, 31°49.003'N 04°36.282'W, 1023 m asl, 3.v.2012, MJE (PMJE).

***Psilopa nilotica* (Becker, 1903)**

3 ex., Errachidia, Merzouga, 30°06.294'N 04°00.627'W, 714 m asl, 30.iv.2012, agriculture under date palms, MJE (PMJE); 1 ex., Errachidia, Erfoud, 2 km N, 31°27.401'N 04°13.352'W, 818 m asl, 1.v.2012, agriculture under date palms, MJE (PMJE); 2 ex., Errachidia, 10 km S of Errachidia, Ziz river, 31°53.945'N 04°20.188'W, 1008 m asl, 1.v.2012, MJE (PMJE); 1 ex., Errachidia, 1 km N of Tarda, 31°49.003'N 04°36.282'W, 1023 m asl, 3.v.2012, MJE (PMJE).

***Psilopa obscuripes* Loew, 1860**

1 ex., Southern Middle Atlas, Khenifra, 28 km S of Timahdite, 33°01.862'N 05°04.204'W, 2100 m asl, 7.v.2012, MJE (PMJE); 1 ex., Larache, Lower Loukkos saltmarsh, 35°12.274'N 06°08.222'W, 2 m asl, 10.v.2012, MJE (PMJE); 1 ex., Larache, 35°12.503'N 06°08.873'W, 5 m asl, 11.v.2012, beach and dunes, MJE (PMJE); 1 ex., Tétouan, Ksar el-Kebir to Chefchaouen road, bridge near Oued Azla, 35°03.713'N 05°38.466'W, 80 m asl, 5.vi.2013, MJE (PMJE).

***Psilopa rufithorax* (Becker, 1903)**

1 ex., Errachidia, Merzouga, 30°06.294'N 04°00.627'W, 714 m asl, 30.iv.2012, agriculture under date palms, MJE (PMJE).

***Scatella tenuicosta* Collin, 1930**

1 ♂, SE High Atlas, Errachidia, 13 km N of Erfoud, Ziz River, 31°31.558'N 04°11.174'W, 800 m asl, 1.v.2012, MJE (PMJE).

***Scatophila unicornis* Czerny, 1900**

1 ♂, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE).

**Fanniidae**

Species of Fanniidae that are known from Morocco were listed in the Catalogue of Palaearctic Diptera (Pont, 1986) and later included in the list published by Mouna (1998).

***Fannia monilis* (Haliday, 1838)**

2 ♂♂, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE); 2 ♂♂, Chefchaouen, Dardara, 35°06.354'N 05°17.971'W, 484 m asl, 13.vi.2013, oak forest, light trap, MJE (PMJE).

**Heleomyzidae**

Since the publication of the Palaearctic Catalogue (Gorodkov, 1984) and the updated list by Mouna (1998), we found only one additional species for the Moroccan fauna: *Gymnomus atlasicus* Woźnica 2011, which was described from Tazekka in the north eastern Middle Atlas (Woźnica, 2011). The specimen recorded below has

characters more in keeping with *G. caesioides* (Meigen, 1830), which is known from Spain. Males are required to confirm identification. Hackman (1970) described one species of Trixoscelidinae and recorded another from Morocco. Cassar *et al.* (2008) mention two other species. Apart from the few records added below, several more species are under study because some are undescribed species and others present some taxonomic difficulty.

***Gymnomus caesioides* (Meigen, 1830)**

1 ♀, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

***Suillia bistrigata* (Meigen, 1830)**

1 ♂, Middle Atlas, Ifrane, 6 km S of Azrou, 33°25.901'N 05°10.551'W, 1610 m asl, 7.v.2012, MJE (PMJE); 1 ♀, Middle Atlas, Ifrane, 20 km S of Azrou, 33°19.567'N 05°14.238'W, 1720 m asl, 9.v.2012, MJE (PMJE); 1 ♀, Bouhachem, Moulay Abdessalam, 35°17.648'N 05°30.532'W, 1098 m asl, 7.vi.2013, pine & oak forest, MJE (PMJE); 3 ♂♂ 2 ♀♀, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE).

***Suillia notata* (Meigen, 1830)**

1 ♀, Bouhachem, Moulay Abdessalam, 35°16.236'N 05°29.220'W, 1180 m asl, 7.vi.2013, oak forest, MJE (PMJE); 5 ♂♂ 3 ♀♀, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE); 2 ♂♂ 1 ♀, Tétouan, Bouhachem NP, Beni Ratene, Oued Kbir, 35°25'01"N 05°27'2"W, 157 m asl, 25.iv.2015, MJE (PMJE).

***Suillia tuberiperda* (Rondani, 1876)**

1 ♀, Middle Atlas, Ifrane, 6 km S of Azrou, 33°25.901'N 05°10.551'W, 1610 m asl, 7.v.2012, MJE (PMJE).

***Trixoscelis canescens* (Loew, 1865)**

4 ♂♂, Chefchaouen, Azilane, Ain Tissemlal (NPT), 35°10'18"N 05°11'53"W, 1255 m asl, 4.vii–15.viii.2013, Malaise trap, KK (PKK).

***Trixoscelis curvata* Carles-Tolrà, 1993**

2 ♂♂, Larache, 35°12.503'N 06°08.873'W, 5 m asl, 11.v.2012, beach and dunes, MJE (PMJE).

***Trixoscelis pedestris* (Loew, 1865)**

13 ♂♂ 9 ♀, Tanger, Tahaddart, Ain Jdioui, 35°34'34"N 05°55'17"W, 76 m asl, 31.i.2017, KK (PKK).

### Hybotidae

Some publications give a number of species from Morocco (Cassar *et al.*, 2008; Chvála & Kovalev, 1989; Grootaert & Chvála, 1992; Pârnu, 2006). However, this is a large family, inadequately surveyed in the Mediterranean and many species remain undescribed, including some from Morocco.

***Chersodromia pseudohirta* Chvála, 1970**

1 ♀, Tétouan, M'Diq, Smir, Kabila beach, dunes, 11.iv.2001, PG (PPG).

***Crossopalpus dilutipes* (Strobl, 1906)**

3 ♂♂ 5 ♀♀, Tétouan, M'Diq, Smir, lagoon/saltmarsh/Kabila beach, dunes, 11–12.iv.2001, PG (PPG); 1 ♀, Larache, Ain Chouk, 9 km SE, Lower Loukkos marsh, 35°08.886'N 06°05.139'W, 6 m asl, 10.v.2012, MJE (PMJE).

***Crossopalpus nigritellus* (Zetterstedt, 1842)**

1 ♂, Chefchaouen, Oued Laou, saltmarsh, 35°25'4"N 05°06'33"W, 28.iv.2004, PG (PPG); 2 ♀♀, Issaguen, scrub, rocky slope, cedar forest, 35°57.652'N 04°39.978'W, 1620 m asl, 10.vi.2013, MJE (PMJE).

***Crossopalpus setiger* (Loew, 1859)**

1 ♂, Tétouan, M'Diq, Smir lagoon/saltmarsh, 11.iv.2004, PG (PPG).

***Elaphropeza boergei* Chvála, 1971**

1 ♀, Tétouan, M'Diq, Smir lagoon/saltmarsh, 11.iv.2001, PG (PPG); 2 ♂♂, Chefchaouen, Oued Laou, saltmarsh, 35°25'4"N 05°06'33"W, 28.iv.2004, PG (PPG).

***Elaphropeza hutsoni* Smith, 1967**

1 ♂, Tétouan, Jnane Niche, oued with cultivation on river bank, 35°17'03"N 04°51'27"W, 46 m asl, 23.iv.2015, MJE (PMJE).

***Platypalpus anomalitarsis* Chvála & Kovalev, 1974**

2 ♂♂, SE High Atlas, Errachidia, 30 km N of Erfoud, Ziz River,

31°40.108'N 04°11.471'W, 894 m asl, 1.v.2012, MJE (PMJE); 3 ♂♂ 2 ♀♀, Middle Atlas, Ifrane, 10 km S of Azrou, 33°24.363'N 05°12.278'W, 1775 m asl, 8.v.2012, MJE (PMJE); 4 ♂♂ 2 ♀♀, Middle Atlas, Ifrane, 10 km S of Azrou, 33°19.567'N 05°14.238'W, 1720 m asl, 9.v.2012, MJE (PMJE).

***Platypalpus chrysonotus* (Strobl, 1899)**

4 ♂♂, Chefchaouen, Oued Laou, saltmarsh, 35°25'4"N 05°06'33"W, 28.iv.2004, PG (PPG).

***Platypalpus desertorum* (Becker, 1907)**

1 ♂, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE).

***Platypalpus distichus* Grootaert & Chvála, 1992**

2 ♂♂ 1 ♀, Chefchaouen, Oued Laou, river bank, wheat field, N35°21'46"W 05°10'41", 27.iv.2004, PG (PPG); 1 ♂ 3 ♀♀, Chefchaouen, Oued Laou, saltmarsh, 35°25'4"N 05°06'33"W, 28.iv.2004, PG (PPG); 1 ♂, Errachidia, 10 km S of Errachidia, Ziz River, 31°53.945'N 04°20.188'W, 1008 m asl, 1.v.2012, MJE (PMJE); 1 ♀, Larache, Ain Chouk, 9 km SE, Lower Loukkos marsh, 35°08.886'N 06°05.139'W, 6 m asl, 10.v.2012, MJE (PMJE).

***Platypalpus flavicornis* (Meigen, 1822)**

1 ♀, Errachidia, Erfoud, 2 km N, 31°27.401'N 04°13.352'W, 818 m asl, 1.v.2012, agriculture under date palms, MJE (PMJE); 1 ♂, SE High Atlas, Errachidia, 30 km N of Erfoud, Ziz River, 31°40.108'N 04°11.471'W, 894 m asl, 1.v.2012, MJE (PMJE).

***Platypalpus longicauda* Grootaert & Chvála, 1992**

1 ♀, Tétouan, M'Diq, Smir lagoon, 11.iv.2001, PG (PPG).

***Platypalpus obscuripes* (Strobl, 1899)**

1 ♂, Larache, Loukkos marsh, 35°09.445'N 06°06.220'W, 2 m asl, 4.vi.2013, MJE (PMJE); 1 ♀, Tétouan, Martil, 35°38.741'N 05°17.575'W, 9 m asl, 9.vi.2013, meadow and dunes, MJE (PMJE).

***Platypalpus pachycerus* (Collin, 1949)**

1 ♂, Errachidia, 10 km S of Errachidia, Ziz River, 31°53.945'N 04°20.188'W, 1008 m asl, 1.v.2012, MJE (PMJE).

***Platypalpus pseudoexiguus* (Strobl, 1909)**

2 ♂♂ 3 ♀♀, Chefchaouen, Oued Laou, saltmarsh, 35°25'4"N 05°06'33"W, 28.iv.2004, PG (PPG).

***Stilpon subnubilus* Chvála, 1988**

1 ♀, Tétouan, M'Diq, Smir lagoon, saltmarsh, 11.iv.2001, PG (PPG); 1 ♀, Tétouan, M'Diq, Kabila beach and dunes, 13.iv.2001, PG (PPG); 1 ♂, Tétouan, Martil, beach and dunes, 1.v.2004, PG (PPG).

***Tachydromia arrogans* (Linnaeus, 1761)**

1 ♂ 1 ♀, Chefchaouen, Oued Laou, El-Fahsa, 35°17'57"N 05°13'04"W, *Tetraclinis*, maquis, 30.iv.2004, PG (PPG).

### Limoniidae

Recent studies of this family (Driaouach *et al.*, 2013; Driaouach & Belqat, 2016) made significant contributions to the species list including description of new species.

***Symplecta grata* Loew, 1873**

1 ♂, Tanger, Ain Jdioui, 35°33'53"N 05°55'25"W, 8 m asl, 17.iv.2015, MJE (PMJE).

### Lonchaeidae

There appears little work to have been done on the Moroccan fauna of this family since Kovalev & Morge (1984) and MacGowan & Freidberg (2008).

***Proteareomyia* sp.**

1 ♂, Talassemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE); 2 ♂♂ 1 ♀, Talassemtane, Jebel Lakra, 35°05.313'N 05°09.277'W, 1288 m asl, 14.vi.2013, grazed dry and wet meadows, MJE (PMJE).

This genus is difficult to identify and several new species have been recently described from the West Palaearctic. The distinctly infuscated wing and the dark setulae on the margin of the calypter suggest this may be an undescribed species. More material would be helpful.

### Milichiidae

Brake (2000) gave the species known from Morocco up to that time.

### ***Desmometopa varipalpis* Malloch, 1927**

1 ♀, SE High Atlas, 6 km N of Errachidia, 31°58.803'N 04°28.386'W, 1010 m asl, 3.v.2012, MJE (PMJE).

### ***Desmometopa* sp.**

1 ♂, Larache, Loukkos marsh, 35°09.445'N 06°06.220'W, 2 m asl, 4.vi.2013, MJE (PMJE); 1 ♂, Tétouan, Martil, 35°38.741'N 05°17.575'W, 9 m asl, 9.vi.2013, meadow and dunes, MJE (PMJE); 1 ♂ 3 ♀♀, Tétouan, M'diq, 35°42'05"N 05°21'17"W, 5 m asl, 24.iv.2015, farm, dung heap and flowering spontaneous vegetation, MJE (PMJE). This species has characters intermediate between those of *D. singaporensis* Kertész, 1899 and *D. sordida* (Fallén, 1820) both of which are very widespread species. The head shape, broad black palpus and the pattern on the gena are very similar to those of *D. sordida* but unlike in that species, the haltere is pale and the mid and hind tarsi mainly yellow. The pattern of the gena, the partly pale palpus and the polished pleural spot not extending from the katapisternum dorsad into the lower anterior border of the anepisternum in *D. singaporensis* differ from the same characters in the species from Morocco.

### ***Leptomotopa ruffifrons* Becker, 1903**

1 ♀, Errachidia, Merzouga, agriculture under date palms, 30°06.294'N 04°00.627'W, 714 m asl, 30.iv.2012, MJE (PMJE); 1 ♂, Middle Atlas, Taounate, Commune Ratba, Sommet Jbel Outka, 34°45'5.47"N 04°50'34.69"W, 1498 m asl, 21.iv.2017, forest, sweep net, Y. Fekrani (PKK).

### ***Madiza glabra* Fallén, 1820**

1 ex., High Atlas, Province of Midelt, Anafgou (Parc National Haut Atlas Oriental), 32°17'07"N 05°25'4"W, 2271 m asl, sweep net, Cedar forest, 2.vii.2017, Y. Fekrani & N.H. El Ouazzani (PKK).

### ***Phyllomyza* sp. aff. *equitans* (Hendel, 1919)**

1 ♂, Errachidia, 12 km S of Rissani, Ziz river, 31°15.914'N 04°09.350'W, 737 m asl, 29.iv.2012, MJE (PMJE), det. J.C. Deeming. The single specimen is a male and is similar to *P. equitans* in having divergent apical scutellar setae and an overall habitus owing to the olive brown scutal pollinosity and yellow haltere, tibiae and tarsi. It differs in having the palpus pale brown on the apical half and yellow on the basal half instead of totally black, with its ventral setulae very short, narrower gena at 1/6th height of eye instead of 1/4th, veins R<sup>2+3</sup>, R<sup>4+5</sup> and M<sup>1</sup> divergent and not parallel to one another, the basal flagellomere yellow ventrally over the basal half instead of entirely black and dorsoapically somewhat angulate instead of round. Although the Moroccan species is probably undescribed, the degree of variation in *P. equitans* is not known and therefore more material of both species needs to be studied before a satisfactory conclusion can be reached.

### **Odiiniidae**

This family is poorly known from Morocco. Séguy (1934) recorded *O. boletina* (Zetterstedt, 1848), a species close to *mejerei* Collin, 1952, which differs by the extensively yellow anterior part of the frons and the legs.

### ***Odinia mejerei* Collin, 1952**

1 ♀, Larache, PPNB, Taghzout, Adrou, 35°31'24"N 05°37'43"W, 556 m asl, 14.vi–15.vii.13, Malaise trap, KK (PKK).

### **Opomyzidae**

Little is known about this family in Morocco. Mouna (1998), Pärnu *et al.* (2006) and Maarouf (2003) all listed *Geomyza tripunctata* (Fallén, 1823).

### ***Opomyza petrei* Mesnil, 1934**

1 ♂, Chefchaouen, Azilane, Ain Tissemlal (NPT), 35°10'18"N 05°11'53"W, 1255 m asl, 4.vii–15.viii.2013, Malaise trap, KK (PKK).

### **Palloppteridae**

There are no previous records of this family from Morocco.

### ***Pallopptera ustulata* (Fallén, 1820)**

1 ♀, Middle Atlas, Ifrane, National Park of Ifrane, Zaouia d'Ifrane, 33°34'01"N 05°07'05"W, 1603 m asl, 2.iv.2017, cedar forest, Y. Fekrani (PKK).

### **Piophilidae**

Mouna (1998) listed only two species in this family.

### ***Prochyliza nigrimana* (Meigen 1826)**

1 ♀, Chefchaouen, Azilane, Ain Tissemlal (NPT), 35°10'18"N 05°11'53"W, forest of *Quercus ilex*, *Pinus halepensis*, *Tetraclinis articulata*, *Olea oleaster*, *Juniperus oxycedrus*, 1255 m asl; Malaise trap, 04.vii–15.viii.2013, KK (PKK).

### **Platypezidae**

This family is poorly known in Morocco. Chandler (2001) in his in depth review of the West Palaearctic fauna mentions only *Lindneromyia dorsalis* (Meigen, 1804) as occurring in Morocco.

### ***Protoclythia rufa* (Meigen, 1830)**

1 ♀, Tanger, Tahaddart, 35°32'32"N 05°57'40"W, 1 m asl, 8.iii.2015, marshy plain, F-Z. Bahid (PKK).

### **Platystomatidae**

Only three species of this family have been recorded from Morocco. One of these *Rivellia syngenesiae* (Fabricius, 1781) is based on an old record (Becker & Stein, 1914) repeated in Mouna (1998). *R. hispanica* is very similar and North African as well as Iberian old records of *R. syngenesiae* need confirmation.

### ***Rivellia hispanica* Lyneborg, 1969**

1 ♂, Oujda, Berkane, Tafoughalt, SIBE de Béni Snassen, 34°48'04"N 02°24'03"W, 788 m asl, N.H. El Ouazzani (PKK).

### **Psilidae**

This family is recorded for the first time from Morocco.

### ***Chamaepsila nigricornis* (Meigen, 1826)**

1 ♂, Tétouan, Onsar Lile, 35°38'54"N 05°25'45"W, 349 m asl, 1.iii.2012, forest of *Pinus pinaster*, KK (PKK); 1 ♂, eastern High Atlas, Khenifra, 17 km SW of Midelt, 32°34.771'N 04°51.413'W, 1940 m asl, 5.v.2012, MJE (PMJE); 1 ♀, Middle Atlas, Ifrane, Lac Aguelmame Afennourir, 30 km SW of Azrou, 33°03.238'N 05°15.058'W, 2050 m asl, 7.v.2012, MJE (PMJE); 1 ♂, Chefchaouen, Azilane (NPT), Ain Tissemlal, 35°10'18"N 05°11'53"W, forest of *Quercus ilex*, *Pinus halepensis*, *Tetraclinis articulata*, *Olea oleaster*, *Juniperus oxycedrus*, 1255 m asl, Malaise trap, 04.vii–15.viii.2013, KK (PKK); 1 ♂, Oujda, Berkane, Madagh, 35°01'07"N 02°20'23"W, 70 m asl, 9.iv.2017, Malaise trap, agricultural field, N.H. El Ouazzani & KK (PKK).

### **Rhagionidae**

The only species of Rhagionidae known to date from Morocco are two species of *Chrysopilus* Macquart, 1826 listed in Dakki (1997). Two more species are added here and a fifth species listed below is not readily identifiable as the specimens are females in poor condition and males are required for a positive identification.

### ***Chrysopilus pullus* Loew, 1869**

1 ♂, Talassemantane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, mixed forest, MJE (PMJE); 2 ♀♀, Talassemantane, Jebel Lakra, 35°05.993'N 05°08.489'W, 1377 m asl, 14.vi.2013, oak forest, moss on rocks, MJE (PMJE); 1 ♀, Larache, Bouhachem NP, Tazroute, Adrou, 35°22'56"N 05°32'34"W, 556 m asl, 25.iv.2015, MJE (PMJE).

### ***Chrysopilus splendidus* (Meigen, 1820)**

1 ♂, Tétouan, Bouhachem NP, Beni Ratene, Oued Kbir, 35°25'01"N 05°27'02"W, 157 m asl, 25.iv.2015, MJE (PMJE).

### ***Chrysopilus* sp.**

2 ♀♀, Larache, Bouhachem NP, Tazroute, Adrou, 35°22'56"N 05°32'34"W, 556 m asl, 25.iv.2015, MJE (PMJE).

### **Rhiniidae**

Rognes (2002), included the Rhiniidae (as subfamily of Calliphoridae) in his extensive review of the blowfly species of Israel. His detailed keys and illustrations enabled the identification of two species not previously known from Morocco.

### ***Cosmina viridis* (Townsend, 1917)**

2 ♂♂, SE High Atlas, 13 km E of Goulmina, 31°44.568'N 04°51.945'W, 1100 m asl, dry stony steppe, 3.v.2012, MJE (PMJE).

### ***Rhyncomya yahavensis* Rognes, 2002**

1 ♀, SE High Atlas, Errachidia, 30 km W of Errachidia, 31°48.647'N 04°40.813'W, 1065 m asl, 2.v.2010, MJE (PMJE).

### **Rhinophoridae**

Surprisingly few species of this family are recorded from Morocco, given the species diversity in neighbouring Iberia and Algeria. Mouna (1998) overlooked two listed in the Catalogue of Palaearctic Diptera (Herting, 1993). The last publication to add a species from Morocco was that of Mulieri *et al.* (2010).

### ***Phyto melanocephala* (Meigen, 1824)**

1 ♂, Tétouan, M'Diq, Smir Barrage, 35°41.193'N, 5°22.757'W, 145 m asl, 6.vi.2013, MJE (PMJE).

### **Sarcophagidae**

Pape (1996) is the most complete and up to date source for species in this family that occur in Morocco, except for a few species given in Whitmore (2011) and Whitmore *et al.* (2013).

### ***Miltogramma oestraceum* (Fallén, 1820)**

3 ♂♂, Larache, Lower Loukkos saltmarsh, 35°12.274'N 06°08.222'W, 2 m asl, 10.v.2012, MJE (PMJE); 1 ♂ 1 ♀, Tétouan, M'Diq, Belwazen, 35°40.149'N 05°25.023'W, 200 m asl, scrub and flowery meadow, 8.vi.2013, K. Bensusan, (PMJE).

### ***Miltogramma rutilans* Meigen, 1824**

1 ♂, Tétouan, Ben Karrich, Oued Mhajrate, 35°28'22"N 05°24'17"W, 180 m asl, 20.vii–13.x.2016, riparian vegetation, Malaise trap, KK (PKK).

### ***Nyctia lugubris* Macquart, 1834**

1 ♂, Larache, Lower Loukkos saltmarsh, 35°12.274'N 06°08.222'W, 2 m asl, 10.v.2012, MJE (PMJE).

### ***Sarcophaga incisilobata* (Pandellé, 1896)**

1 ♂, Tanger, Tahaddart, scrub, 35°38'21"N 05°54'57"W, 8 m asl, 17.iv.2015, MJE (PMJE).

### ***Taxigramma plurisetia* Pandellé, 1895**

1 ♂, Larache, Loukkos marsh, 35°09.445'N 06°06.220'W, 2 m asl, 4.vi.2013, MJE (PMJE); 4 ♂♂ 6 ♀♀, Tétouan, Ben Karrich, Oued Mhajrate, 35°28'22"N 05°24'17"W, 180 m asl, 20.vii–13.x.2016, riparian vegetation, Malaise trap, KK (PKK, except 1 ♂ 1 ♀, PMJE).

### **Scathophagidae**

Only one species of this family was listed by Mouna (1998).

### ***Norellia tipularia* (Fabricius, 1794)**

1 ♂, Chefchaouen, Dardara, 35°06.015'N 05°20.324'W, 730 m asl, 11.vi.2013, flowery meadow, pond, pine forest, MJE (PMJE); 1 ex. Rif, Talasemtane, Maison Forestière (NPT), 35°07'55.139"N 05°08'13"W, 1696 m asl, 7.vi.2014 – 17.x.2014, Fir forest (*Abies maroccana*), Malaise trap, KK (PKK).

### ***Scathophaga lutaria* (Fabricius, 1794)**

7 ♂♂ 8 ♀♀, Talasemtane, Chefchaouen, 35°06'47"N 05°08'40"W, 1554 m asl, 13.v.2009, A. Taheri (PKK); 4 ♂♂ 3 ♀♀, Talasemtane, Jebel Lakra, 35°06.913'N 05°08.034'W, 1541 m asl, 12.vi.2013, meadow in mixed forest, MJE (PMJE); 1 ex. Rif, Dardara, Oued Siflaou, 35°05.525'N 05°14.445'W, 405 m asl, 22.xi.2013, KK (PKK).

### **Scenopinidae**

Few members of this family from Morocco have been recorded in the literature. Two species of *Scenopinus* Latreille, 1802 were described from Morocco (Séguy, 1930), and two further undescribed species of this genus are added below. Both belong to the *albicinctus* group as defined by Kelsey (1969).

### ***Scenopinus* sp. 1**

4 ♂♂, Tétouan, Martil, 35°38.741'N 05°17.575'W, 9 m asl, 9.vi.2013, meadow and dunes, MJE (PMJE).

### ***Scenopinus* sp. 2**

1 ♂, Larache, PPNB, Taghzout, Adrou, 35°31'24"N 05°37'43"W, 556 m asl, 14.vi–15.vii.2013, Malaise trap, KK (PKK).

### ***Stenomphrale teutankhameni* (Kröber, 1923)**

1 ♀, Rabat, Maamora Forest, 34°16'38"N 06°22'12"W, 56 m asl 5.iii.2017, *Quercus suber*, Y. Fekrani (PKK).

### **Sepsidae**

The Sepsidae reliably recorded from Morocco can be found in the following literature: Zuska & Pont (1984), Mouna (1998), Pont & Meier (2002).

### ***Saltella sphondylii* (Schrank, 1803)**

1 ♀, Rif, Tétouan, Smir Barrage, 145 m asl, 35°41.193'N 05°22.757'W, 6.vi.2013, MJE (PMJE); 1 ♀, Tétouan, Ben Karrich, Oued Mhajrate, 35°28'22"N 05°24'17"W, 180 m asl, 20.vii.2016 –13.x.2016, riparian vegetation, Malaise trap, KK (PKK).

### ***Sepsis flavimana* Meigen, 1826**

1 ♂, Errachidia, 10 km S of Errachidia, Ziz River, 31°53.945'N 04°20.188'W, 1008 m asl, 1.v.2012, MJE (PMJE).

### **Syrphidae**

Hoverflies are one of the most popular families of Diptera and the Moroccan fauna has received a good deal of attention in the last 20 years resulting in a significant literature. Notwithstanding this and recent additions to the fauna, mainly through revisions of genera or species groups (Popović *et al.*, 2015; Reemer *et al.*, 2004; Speight, 2013; Steenis *et al.*, 2016), there are more new records and still more species can be expected to occur there.

### ***Merodon pumilus* Macquart, 1849**

1 ♂, Larache, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE).

### ***Merodon unguicornis* Strobl, 1909**

3 ♂♂, Middle Atlas, Ifrane, 10 km S of Azrou, 33°24.363'N 05°12.278'W, 1775 m asl, cedar forest, 8.v.2012, MJE

### ***Platycheirus fulviventris* (Macquart, 1829)**

1 ♂ 1 ♀, eastern High Atlas, Errachidia, 14 km E of Rich, 32°15.242'N 04°23.211'W, 1278 m asl, 4.v.2012, MJE (PMJE).

### ***Xanthogramma dives* (Rondani, 1857)**

1 ♂ 1 ♀, eastern High Atlas, Errachidia, 29 km N of Rich, 32°26.679'N 04°29.275'W, 1570 m asl, 4.v.2012, MJE (PMJE).

### **Tachinidae**

This large family of parasitoid flies is poorly known in Morocco. A few species have been added in recent years (Cerretti & Tschorsnig, 2007, 2012; Sun & Marshall, 2003). Apart from the few further additions to the fauna listed below, many more species remain to be discovered.

### ***Actia infantula* (Zetterstedt, 1844)**

1 ♂, Tanger, Douar Dakchire forest, 35°48'30"N 05°31'07"W, 320 m asl, 18.iv.2015, MJE (PMJE).

### ***Aphria longirostris* (Meigen, 1824)**

1 ♂, Tétouan, Jnane Niche, oued with cultivation on river bank, 35°17'03"N 04°51'27"W, 46 m asl, 23.iv.2015, MJE (PMJE).

### ***Aplomyia confinis* (Fallén, 1820)**

1 ♂, Chefchaouen, Dardara, 35°06.354'N 05°17.971'W, 484 m asl, 13.vi.2013, oak forest, meadow, MJE (PMJE).

### ***Chetogena filipalpis* Rondani, 1859**

1 ♂, Tanger, Ain Jdioui, 35°33'53"N 05°55'25"W, 8 m asl, 17.iv.2015, MJE (PMJE).

### ***Dufouria nigrita* (Fallén, 1810)**

1 ♀, Larache, Lower Loukkos saltmarsh, 35°12.274'N 06°08.222'W, 2 m asl, 10.v.2012, MJE (PMJE).

### ***Exorista grandis* (Zetterstedt, 1844)**

1 ♂, Chefchaouen, Dardara, 35°06.354'N 05°17.971'W, 484 m asl, 13.vi.2013, oak forest, meadow, MJE (PMJE).

### ***Leucostoma obsidianum* (Wiedemann, 1830)**

1 ♂, Errachidia, 10 km S of Errachidia, Ziz river, 31°53.945'N 04°20.188'W, 1008 m asl, 1.v.2012, MJE (PMJE).

### ***Leucostoma tetraptera* (Meigen, 1824)**

1 ♂, Tétouan, M'Diq, Barrage Smir, 27 m asl, 18.vi.16–27.vii.2016, Malaise trap, KK (PKK).

### ***Macquartia chalconota* (Meigen, 1824)**

1 ♀, Tétouan, M'Diq, Smir lagoon, 1 km N., meadow, 12.iv.2001, PG (PPG).

### ***Microphthalma europaea* Egger, 1860**

1 ♂, SE High Atlas, Errachidia, 30 km N of Erfoud, Ziz River,

31°40.108'N 04°11.471'W, 894 m asl, 1.v.2012, MJE (PMJE).

***Peribaea apicalis* Robineau-Desvoidy, 1863**

1 ♀, Chefchaouen, Dardara, 35°06.354'N 05°17.971'W, 484 m asl, 13.vi.2013, oak forest, light trap, MJE (PMJE).

***Periscepsia meyeri* (Villeneuve, 1930)**

1 ♀, Larache, Taghzoute (PNPB), Adrou, 35°31'24"N 05°37'43"W, 556m, 14.vii–15.viii.2013, Malaise trap, *Quercus suber* forest, KK (PMJE).

***Pseudomintho diversipes* (Strobl, 1889)**

1 ♂, Larache, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE).

***Siphona variata* Andersen, 1982**

1 ♂, Tétouan, Sidi Yahia Aârab, 35°17'43"N 04°53'50"W, 377 m asl, 23.iv.2015, MJE (PMJE); 1 ♂, Tétouan, Bouhachem NP, Beni Ratene, Oued Kbir, 35°25'01"N 05°27'2"W, 157 m asl, 25.iv.2015, MJE (PMJE).

***Trichopoda pennipes* (Fabricius, 1794)**

1 ♂ 1 ♀, Tanger, Tahaddart, scrub, 35°38'21"N 05°54'57"W, 8 m asl, 17.iv.2015, MJE (PMJE).

***Zaira cinerea* (Fallén, 1820)**

1 ♂, Tanger, Ain Jdioui, 35°33'53"N 05°55'25"W, 8 m asl, 29.iv.2015, MJE (PMJE).

### Therevidae

Since the publication of the Palaearctic Catalogue (Lyneborg, 1989), a number of species were described or recorded from Morocco (Lyneborg, 2002; Pârvu *et al.*, 2006; El Hawagry, 2011). The large genus *Thereva* Latreille, 1797 contains some species that are particularly difficult to identify and some older records from Morocco are likely to be incorrect given the northern distribution of the species mentioned.

***Acrosathe annulata* (Fabricius, 1805)**

1 ♂ 1 ♀, Tétouan, Bouhachem NP, Beni Ratene, Oued Kbir, 35°25'01"N 05°27'2"W, 157 m asl, 25.iv.2015, MJE (PMJE).

***Thereva aureoscutellata* Kröber, 1914**

1 ♀, Larache, Bouhachem, Moulay Abdessalam, 35°16.054'N 05°25.805'W, 965 m asl, 7.vi.2013, wet meadow, MJE (PMJE).

***Thereva bipunctata* Meigen, 1820**

1 ♂, eastern High Atlas, Khenifra, 17 km SW of Midelt, 32°34.771'N 04°51.413'W, 1940 m asl, 5.v.2012, MJE (PMJE); 2 ♂♂, eastern High Atlas, Khenifra, 17 km NW of Zaida, 32°57.179'N 05°04.514'W, 1878 m asl, 6.v.2012, MJE (PMJE); 2 ♂♂ 2 ♀♀, southern Middle Atlas, Khenifra, 28 km S of Timahdite, 33°01.862'N 05°04.204'W, 2100 m asl, 7.v.2012, MJE (PMJE); 1 ♀, Middle Atlas, Ifrane, Lac Aguelmame Afennourir, 30 km SW of Azrou, 33°03.238'N 05°15.058'W, 2050 m asl, 7.v.2012, MJE (PMJE).

***Thereva cincta* Meigen, 1820**

1 ♀, Tanger, Ksar Sghir, Oued Alian, dune marsh and beach, 35°49'39"N 05°38'44"W, 1 m asl, 18.iv.2015, MJE (PMJE).

### Ulidiidae

Mouna (1998) found four species recorded in the literature, but omitted one recorded by Zaitzev (1984) and another by Becker (1910). Kameneva (2007) added three more and Kameneva & Korneyev (2016) added another. It is surprising that the common species given below were not previously recorded.

***Ceroxys urticae* Linnaeus, 1758**

1 ♀, Larache, Ain Chouk, 9 km SE, Lower Loukkos marsh, 35°08.886'N 06°05.139'W, 6 m asl, 10.v.2012, MJE (PMJE); 1 ♀, Larache, 35°12.55'N 06°07.28'W, 5 m asl, 4.vi.2013, oued and vegetated coastal dunes, MJE (PMJE).

***Melieria nigratarsis* Becker, 1903**

3 ♂♂ 3 ♀♀, Errachidia, Merzouga, agriculture under date palms, 30°06.294'N 04°00.627'W, 714 m asl, 30.iv.2012, MJE (PMJE).

### Vermileonidae

Séguy (1953) refers to *Vermileo degeeri* Macquart, 1834, a species considered to be a synonym of *V. vermileo* (Linnaeus, 1758). It is

unlikely that Séguy's identification refers to either of these taxa, because the genus is in need of revision and there are several Mediterranean species whose taxonomic status needs clarification.

***Vermileo nigriventris* (Strobl, 1906)**

2 ♂♂ 1 ♀, Tanger, Cap Spartel, larvae from pits in sandy bank & caves near small river, 15 m asl, 35°45'40"N 05°56'09"W, 19.iv.2015; adults emerged: 14.iv.2016, 29.v.2016 & 15.vi.2016, MJE (PMJE); 1 ♂, Natural Park of Bouhachem, Anissar, 35°16'51"N 05°27'20"W, 987 m asl, Malaise trap, 21.v.16–14.vii.2016, KK (PKK).

### Conclusion

The preparation of a catalogue of Moroccan Diptera prompted us to intensify fieldwork in order to fill some glaring gaps in the faunal knowledge of this very important order of insects. Although this article lists 156 new species records apart from the 110 previously listed in separate publications, we are convinced that the fauna of the country is still poorly known. For example, the fauna of Iberia totalled 6184 species when the catalogue of the peninsula was published (Carles-Tolrá Hjorth-Andersen, 2002) and since then more species have been added. Morocco shares a large number of species with Iberia, but it also has a fauna restricted to North Africa. At this stage of our knowledge, it is difficult to give more than an estimate of the number of species that should occur in Morocco. We estimate that the 3000 or so species already known are only about 60% of the number of species expected. Our conclusions are based on the following: 1) we note that specialist workers reporting on their families of interest within the last three years regularly added many new records and often described new species; 2) there are still large areas of the country with diverse habitats that have been poorly explored; 3) by far, most fieldwork has taken place between April and September and given that there is a second peak for diversity in the Mediterranean between October and November, we can assume that many species active during this time have been missed; 4) fieldwork in the Anti Atlas mountains and south of these between November and March has been very scant; 5) a few, very speciose families, notably the Cecidomyiidae, Sciaridae, Phoridae have hardly been investigated and these three families alone will yield a few hundred species, even though the first two families are more speciose in cooler temperate regions. Collaboration between local scientists and foreign specialists is highly recommended.

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