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Hoverflies of the Guelma district, with species new to Algeria and North Africa (Diptera: Syrphidae)

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Summary. A survey of the hoverflies (Diptera: Syrphidae) of the region of Guelma, northeast Algeria, was carried out from August 2011 to July 2013. A total of 31 species was recorded with six (*Scaeva mecogramma, Epistrophe melanostoma, Syrphus vitripennis, Brachypalpus valgus, Merodon calcaratus* and *M. chalybeus*) new to Algeria. Of these, three species (*E. melanostoma, M. calcaratus* and *M. chalybeus*) are also new additions to the entomofauna of North Africa. The results complement those of a previous study covering Numidia and Tebessa and provide a more comprehensive view of the phenology and distribution of Syrphidae across northeast Algeria. An improved knowledge of the distribution of North African hoverflies will contribute to a better assessment of the status of each taxon and inform conservation efforts.

Résumé. Syrphidae (Diptera) de la Wilaya de Guelma : espèces nouvelles pour l'Algérie et l'Afrique du Nord. Un inventaire des Syrphidae (Diptera) dans la région de Guelma, nord-est de l'Algérie, a été réalisé d'août 2011 à juillet 2013. Au total, 31 espèces ont été identifiées, dont 6 (*Scaeva mecogramma, Epistrophe melanostoma, Syrphus vitripennis, Brachypalpus valgus, Merodon calcaratus* et *M. chalybeus*) sont nouvelles pour l'Algérie. Trois de ces espèces (*E. melanostoma, M. calcaratus* et *M. chalybeus*) sont aussi nouvelles pour l'entomofaune d'Afrique du Nord. Ces résultats complètent ceux d'une étude précédente qui couvrait les régions de Numidie et de Tebessa. Ils apportent ainsi une vue plus complète de la phénologie et de la distribution des Syrphidae dans le nord-est algérien. Une meilleure connaissance de la distribution des Syrphidae en Afrique du Nord contribue ainsi à une meilleure évaluation du statut de chaque taxon et renseigne sur les nécessités de conservation.

Keywords: biodiversity; Malaise trap; faunistics; species richness

Owing to its outstanding plant richness and high level of endemism, the Mediterranean Maghreb is considered to be one of the most important biodiversity hotspots of the planet (Medail & Quezel 1999; Myers et al. 2000). Northeast Algeria, part of this southern Mediterranean region, also hosts a diverse insect fauna with many endemics (Samraoui & Menaï 1999; Annani et al. 2012; Chaib et al. 2013) and a rich array of rare plant species (Véla & Benhouhou 2007). However, as happened elsewhere across the Mediterranean Basin (Blondel et al. 2010), human pressures have for centuries relentlessly been eroding the biodiversity of this region, raising concerns for the conservation of this hotspot.

Both plants and insects make up a large component of the overall biodiversity, and indications of patterns of covariation in species richness between these two groups (Schaffers et al. 2008; Basset et al. 2012; Zhang et al. 2016) have provided fresh impetus for the search for indicator species to monitor biodiversity and ecosystem health (Lawton et al. 1998; Hilty & Merenlender 2000). Among the insects, a good candidate which may appropriately fill this role is the hoverflies (Syrphidae), which exhibit a large spectrum of adaptations allowing them to exploit a wide range of habitats and microhabitats, thus occupying most terrestrial and aquatic habitats (Rotheray 1993; Rotheray & Gilbert 2011).

As biodiversity is eroded through climate change, pollution, species invasions and habitat loss, hoverflies may constitute an excellent tool in environmental assessments. Indeed, insects represent an important segment of overall biodiversity that also requires adequate management to maintain ecosystem functioning. In addition, like many other invertebrates, insects respond in a faster way to environmental changes and thus constitute models of choice for biomonitoring and biodiversity assessments

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(Kremen et al. 1993; McGeoch 1998; Samways et al. 2010).

The Syrphidae of Algeria have been surveyed since the nineteenth (Lucas 1849) and early twentieth centuries (Becker 1907), and despite significant progress over several decades (Séguy 1961; Peck 1988; Hurkmans 1993; Kassebeer 1999), this taxon remains poorly known, and thus many additions and corrections are to be expected once in-depth studies commence. In the early 1990s, a long and sustained effort was deployed (Djellab & Samraoui 1994; Djellab et al. 2013) to improve our knowledge of this family, concentrating on the regions of Numidia and Tebessa. The present study continues these efforts by attempting to fill a knowledge gap for one region, Guelma, located halfway between Numidia and Tebessa. In addition, most specimens collected in the 1990s were unfortunately lost, and thus attempts were made to mitigate this loss by setting up a new reference collection.

Material and methods

Fieldwork

For three consecutive years (2011–2013), sampling was carried out using a hand net and through Malaise traps at 16 sites within the three separate localities of Maouna, Debagh and Seybouse (Table 1). Unfortunately, vandalism was omnipresent and most Malaise traps were stolen or destroyed, resulting in inconsistent sampling. Collection of specimens complied with the code for insect collecting (Samways et al. 2010).

Material examined

Specimens were identified by A.R. and B.S. using keys and descriptions in Bezzi (1924), Goeldlin de Tiefenau (1976), Vujić (1999), Vujić & Šimić (1999), Lyneborg & Barkemeyer (2005), Reemer et al. (2005), Van Veen (2010). For species identification, mainly in Eristalinae, male genitalia were examined following the protocol in Ricarte et al. (2012). Photos were produced as composites of individual images made with a camera (Leica DFC 450) attached to a binocular stereomicroscope (Leica M205 C) and combined in Adobe Photoshop® v. 2015. All specimens are kept in the insect collection of the Laboratoire de Conservation des Zones Humides, University of Guelma, Algeria.

Table 1. List of sampled stations with GPS coordinates and habitat descriptions.

Station	Latitude (N)	Longitude (E)	Habitat	Altitude (m)
M1	36° 22.670′	7° 22.809′	Cork oak	1317
M2	36° 22.769′	7° 22.772′	Zeen oak	1300
M3	36° 22.971′	7° 22.871′	Cork oak	1143
M4	36° 23.283′	7° 22.962′	Open field	1048
M5	36° 23.300′	7° 23.056′	Open cork oak	1028
M6	36° 22.854′	7° 22.949′	Zeen oak	1184
M7	36° 24.559′	7° 23.601′	Open field	841
M8	36° 25.365′	7° 20.734′	Open field	507
D1	36° 31.930′	7° 15.908′	Open field	880
D2	36° 31.886′	7° 16.023′	Cork oak	805
D3	36° 31.437′	7° 16.195′	Open field	782
D4	36° 31.269′	7° 16.144′	Cork oak	774
D5	36° 31.185′	7° 15.204′	Open field	648
D6	36° 30.766′	7° 14.441′	Open field	477
D7	36° 27.792′	7° 15.508′	Open field	307
S	36° 28.198′	7° 28.920′	Open field	186

Study area

The district (wilaya) of Guelma is sandwiched between the sub-humid coastal area of Numidia, which includes the Guerbes-Senhadja region, Annaba and the El Kala National Park (Samraoui & de Bélair 1997; Samraoui & Samraoui 2008), and the semi-arid regions of Constantine, Oum El Bouaghi and Tebessa, located further south (Figure 1). At least four mountains with elevations above 1000 m are located in Guelma, two of which (Maouna and Debagh peak at 1411 m and 1060 m, respectively) are mainly characterized by dense forest cover made up of holm oak (*Quercus ilex*), cork oak (*Quercus suber*), zeen oak (*Quercus canariensis*) and Aleppo pine (*Pinus halepensis*).

A narrow plain made up by the passage of Wadi Seybouse cuts through this rugged terrain. Wadi Seybouse is a Mediterranean river 134.7 km long, with its sources in the semi-arid Hauts Plateaux (Yalles Satha & Samraoui 2017). It drains a large basin of 6570 km^2. The Seybouse watercourse is mainly the result of the confluence of two wadis, Bouhamdane and Cherf, which converge at Medjaz Amar giving rise to the Seybouse. This latter wadi then proceeds through the plain of Guelma/Bouchegouf on its way northward towards the sea, which it reaches at Annaba.

The climate of the Guelma region is typically Mediterranean, located between two bioclimatic regions: the continental semi-arid climate of the Hauts Plateaux, and the subtropical humid and sub-humid climates of coastal Numidia. The annual rainfall averages 650 mm (Yalles Satha & Samraoui 2017).

Results

The survey recorded 31 species, with six new to Algeria, including three new to North Africa. The region of Guelma shares 18 and 13 species with Numidia and Tebessa, respectively (Table 2). The distribution, flight period in the Guelma district and comments are provided for each recorded species. Information on food habits, unless indicated otherwise, originate from Rotheray (1993) and/or Speight (2016).

Tribe Bacchini

Melanostoma mellinum (Linnaeus, 1758)

New localities. M1, M2, M4, M7, M8, D1, D3, D5, D7, S.

Flight period. March–July.

Comments. Present in North Africa, from Morocco to Egypt, but with only a single locality (west of Algiers) known previously from Algeria (Dirickx 1994). Common in northeast Algeria, from the Mediterranean shore to the fringes of the Sahara desert (Djellab et al. 2013). The feeding habits of *Melanostoma* larvae are relatively poorly known. The larvae readily feeds on aphids but may be generalized predators.

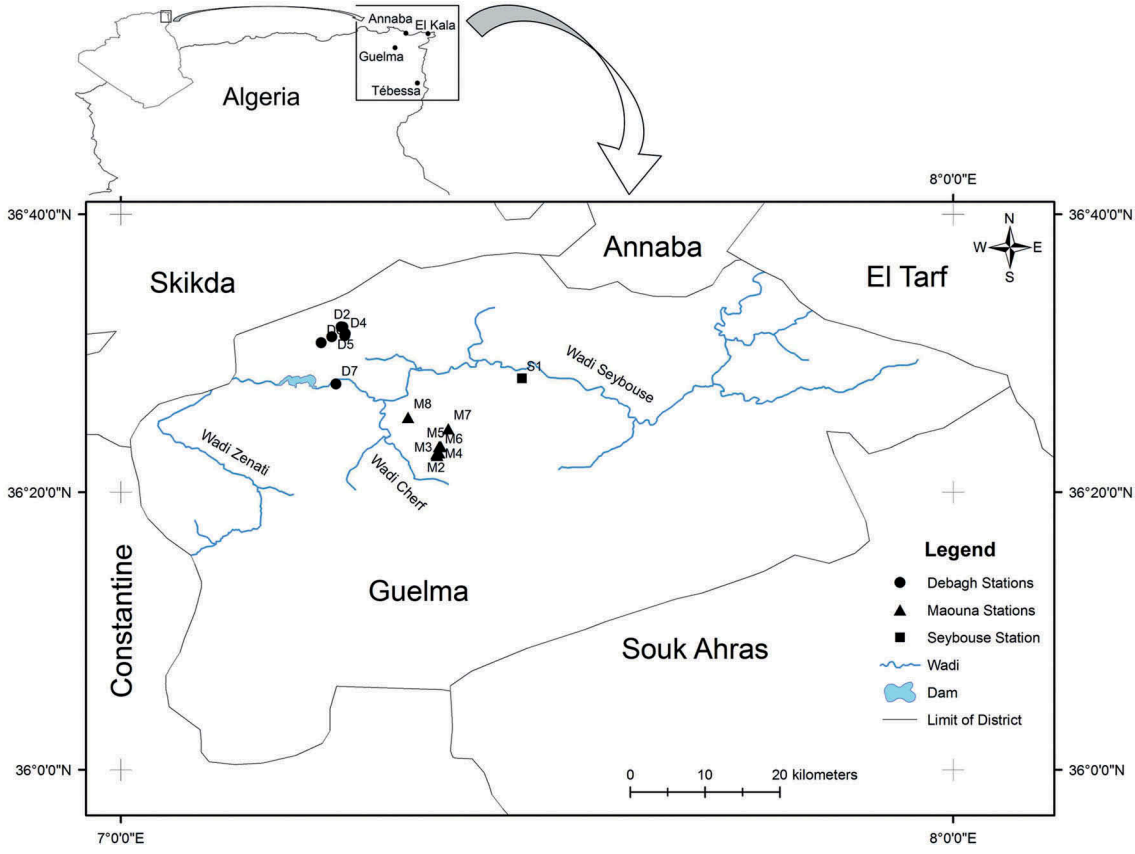

Figure 1. Map of Algeria showing the study area, Guelma, and previously sampled regions: Annaba and Tebessa.

Melanostoma scalare (Fabricius, 1794)

New localities. M1–M4, M7, M8, D1–D3, D5, D7, S.

Flight period. March –August.

Comments. Only known in northeast Algeria, the species is locally abundant, having previously been found in four Numidian localities (Djellab et al. 2013). Absent from Tunisia and only known from a single locality (near Tangiers) in Morocco (Dirickx 1994).

Tribe Paragini

Paragus bicolor (Fabricius, 1794)

Localities. M1, M4, D3.

Flight period. July.

Comments. Rarely collected in northeast Algeria, but present from the coastal area to the semi-arid regions (Djellab et al. 2013). Present in Morocco, but so far unrecorded in Tunisia (Dirickx 1994). *Paragus* larvae feed on aphids (Rojo et al. 2003).

Paragus quadrifasciatus Meigen, 1822

Locality. M1.

Flight period. May.

Comments. Known from Morocco, Algeria (one locality in northeast Algeria) and Tunisia (Dirickx 1994), it was unrecorded by Djellab et al. (2013).

Paragus strigatus Meigen, 1822

Locality. M8.

Flight period. June.

Comments. Present in North Africa from Morocco to Egypt (Dirickx 1994). In northeast Algeria, the species is distributed from the coastal area to the Sahara's northern border (Djellab et al. 2013).

Tribe Syrphini

Chrysotoxum intermedium Meigen, 1822

Localities. M1, M4, M8, D3, D5, D7, S.

Table 2. Check-list of species of the Guelma district with their recorded distribution in Numidia and Tebessa (Djellabet al. 2013). 1 and 0 indicate presence and absence, respectively.

Num	Tribe	Taxon	Numidia	Guelma	Tebessa
	Bacchini				
1		*Melanostoma mellinum* (Linnaeus, 1758)	1	1	1
2		*Melanostoma scalare* (Fabricius, 1794)	1	1	0
	Paragini				
3		*Paragus bicolor* (Fabricius, 1794)	1	1	1
4		*Paragus quadrifasciatus* Meigen, 1822	0	1	0
5		*Paragus strigatus* Meigen, 1822	1	1	1
	Syrphini				
6		*Chrysotoxum intermedium* Meigen, 1822	1	1	1
7		*Epistrophe melanostoma* (Zetterstedt, 1843)	0	1	0
8		*Episyrphus balteatus* (Degeer, 1776)	1	1	1
9		*Meliscaeva auricollis* (Meigen, 1922)	1	1	1
10		*Eupeodes corollae* (Fabricius, 1794)	1	1	1
11		*Scaeva mecogramma* (Bigot, 1860)	0	1	0
12		*Scaeva pyrastri* (Linnaeus, 1758)	1	1	0
13		*Sphaerophoria scripta* (Linnaeus, 1758)	1	1	1
14		*Sphaerophoria rueppellii* Wiedemann, 1830	0	1	0
15		*Syrphus vitripennis* Meigen, 1822	0	1	0
	Cerioidini				
16		*Ceriana vespiformis* (Latreille, 1804)	1	1	1
	Cheilosiini				
17		*Cheilosia sp.* 1	0	1	0
18		*Cheilosia sp.* 2 (cf. *latifrons*)	0	1	0
	Chrysogastrini				
19		*Myolepta difformis* (Strobl, 1909)	1	1	0
20		*Riponnensia splendens* (Meigen, 1822)	0	1	0
	Eristalini				
21		*Eristalinus aeneus* (Scopoli, 1763)	1	1	1
22		*Eristalinus taeniops* Wiedemann, 1818	1	1	0
23		*Eristalis arbustorum* (Linnaeus, 1758)	1	1	1
24		*Eristalis similis* (Fallén, 1817)	1	1	0
25		*Eristalis tenax* (Linnaeus, 1758)	1	1	1
	Merodontini				
26		*Eumerus amoenus* Loew, 1848	0	1	0
27		*Merodon calcaratus* (Fabricius, 1794)	0	1	0
28		*Merodon chalybeus* Wiedemann *in* Meigen, 1822	0	1	0
29		*Platynochaetus setosus* (Fabricius, 1794)	0	1	0
	Xylotini				
30		*Brachypalpus valgus* (Panzer, 1798)	0	1	0
31		*Syritta pipiens* (Linnaeus, 1758)	1	1	1

Flight period. March–June, August.

Comments. Common and, in the Maghreb, known from Morocco to Tunisia (Dirickx 1994). Its range in Algeria covers central (Dirickx 1994) and northeast Algeria, from the Mediterranean coastline to the fringes of the Sahara desert (Djellab et al. 2013). *Chrysotoxum* larvae probably feed on ant-attended root aphids.

Episyrphus balteatus (Degeer, 1776)

Localities. M1, M2, M4, M5, M7, M8, D1–D3, D5, D7, S.

Flight period. March–July.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994), it is widespread in Algeria, ranging from the Mediterranean coastline to the fringes of the Sahara desert (Djellab et al. 2013). The larva is a polyphagous predator, mostly feeding on aphids.

Eupeodes corollae (Fabricius, 1794)

Localities. M1, M2, M4, M7, M8, D1–D3, D5, D7, S.

Flight period. March–July.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994). Common in northeast Algeria from the Mediterranean shore to the fringes of the

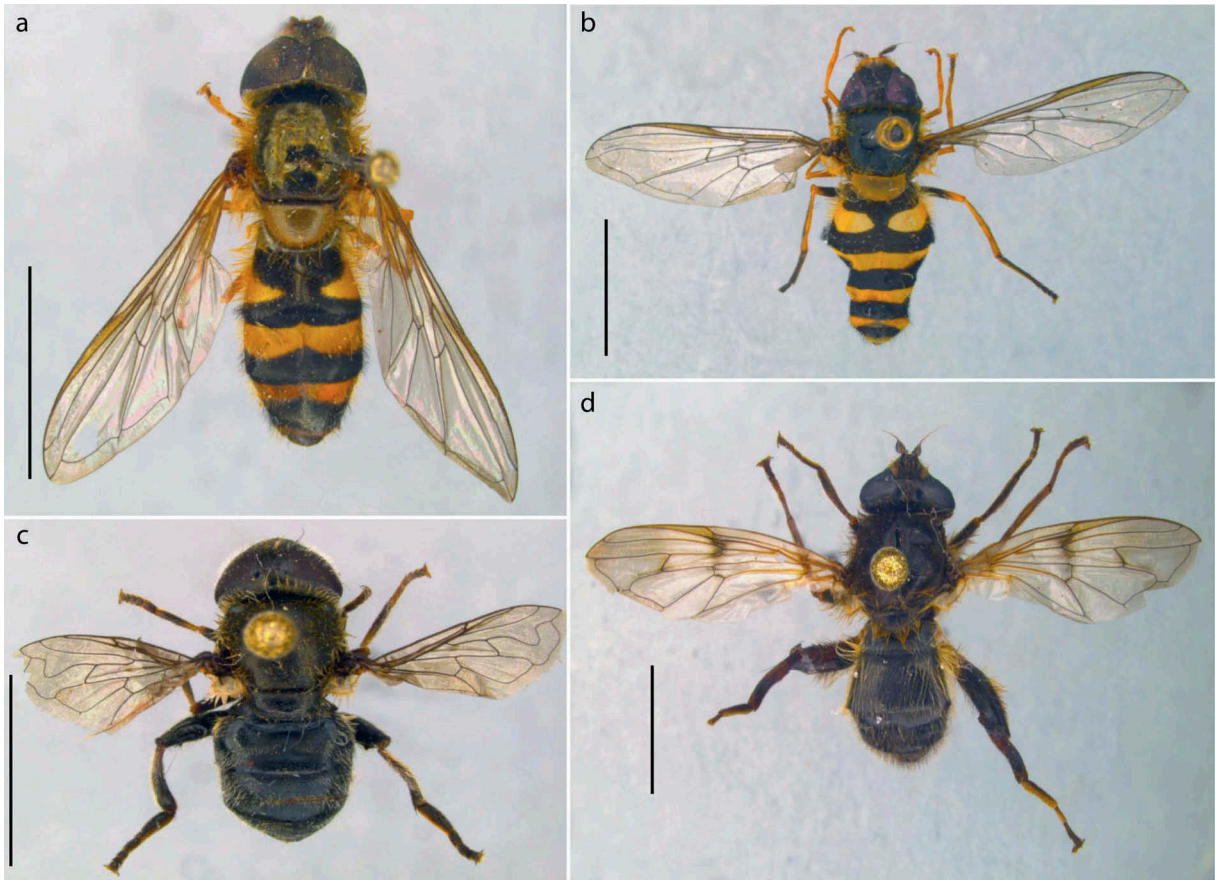

Figure 2. **a**, *Epistrophe melanostoma*, male from Maouna, Algeria; overall appearance, dorsal view. **b**, *Syrphus vitripennis*, female from Debagh, Algeria; overall appearance, dorsal view. **c**, *Merodon chalybeus*, female from Maouna, Algeria; overall appearance, dorsal view. **d**, *Brachypalpus valgus*, female from Debagh, Algeria; overall appearance, dorsal view. Scale bars = 5mm.

Sahara desert (Djellab et al. 2013). Larvae of *E. corollae* feed on ground-layer aphids.

Epistrophe melanostoma (Zetterstedt, 1843) (Figure 2(a))

Locality. M3.

Flight period. May.

Comments. New to Algeria and North Africa. *Epistrophe* larvae are aphidophagous.

Meliscaeva auricollis (Meigen, 1822)

Localities. M2–M4, M8, D5.

Flight period. May–June.

Comments. Present in North Africa from Morocco to Egypt (Lucas 1849; Dirickx 1994). Described in northeast Algeria by Djellab et al. (2013) as abundant and widespread from the coastal area to the semi-arid region. The larvae feed on aphids and plant lice (Psyllidae).

Scaeva mecogramma (Bigot, 1860)

Localities. M1, M4, S.

Flight period. May, August.

Comments. New to Algeria and still unrecorded in Tunisia, this is the second record for North Africa (Kassebeer 1998). Confined, in northeast Algeria, to a few sites in the vicinity of Guelma. Larvae of *S. mecogramma* have been recorded feeding on the psyllid *Euphyllura olivina* on olive trees.

Scaeva pyrastri (Linnaeus, 1758)

Localities. M8, D5.

Flight period. June.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994). In northeast Algeria, the species is rarely abundant, but is widespread from the Mediterranean shore to the fringes of the Sahara desert (Djellab et al. 2013). The larvae feed on ground-layer aphids.

Sphaerophoria scripta (Linnaeus, 1758)

Localities. M1, M2, M4, M5, M7, M8, D1-D3, D5, D7, S.

Flight period. March–September.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994). In Algeria, it is widespread and abundant from the Mediterranean shore to the fringes of the Sahara desert (Djellab et al. 2013). *Sphaerophoria* larvae feed on ground-layer aphids (Rojo et al. 2003).

Sphaerophoria rueppellii (Weidemann, 1830)

Localities. M1–M3, M8, D3, D5, D7, S.

Flight period. March–July.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994). In northeast Algeria, it is at present only known from the Guelma district. *Sphaerophoria rueppellii* prey on several aphid species considered to be pests of several Mediterranean crops (Amorós-Jiménez et al. 2012).

Syrphus vitripennis Meigen, 1822 (Figure 2(b))

Localities. M8, D7.

Flight period. March, May.

Comments. Previously known from a single North African locality (Tangiers, Morocco) (Dirickx 1994), this is a new addition to the entomofauna of Algeria. *Syrphus* larvae are aphidophagous.

Tribe Cerioidini

Ceriana vespiformis (Latreille, 1804)

Locality. M4.

Flight period. June.

Comments. Present in Morocco and Algeria (Dirickx 1994). All previous records of *Ceriana conopsoides* (Linnaeus, 1758) in Algeria (Lucas 1849; Séguy 1961; Peck 1988; Dirickx 1994) pertain to *C. vespiformis*. Its range extends from the coastal area to the Sahara's fringes (Djellab et al. 2013). The larvae are saproxylic.

Tribe Cheilosiini

Cheilosia sp. 1

Locality. D5.

Flight period. June.

Comments. Females of *C. paralobi* examined in the Entomological Collection of Alicante University (CEUA) – deposited at the Research Institute CIBIO – have a much larger basoflagellomere than *Cheilosia sp*. 1. Females of *C. rodgersi* have a pilose eye, while the examined female of *Cheilosia sp*. 1 has bare eyes (Figure 3(a)). In addition, female *C. rodgersi* has the femora narrowly red at the apex, while *Cheilosia sp*. 1 has large red areas on the hind femora. A wide spectrum of feeding modes (mycophagous, saprophagous, tunneling in roots and stems, and leaf-mining) have been described for *Cheilosia* larvae.

Cheilosia sp. 2 (cf. *latifrons*)

Localities. M1, D1.

Flight period. April–May.

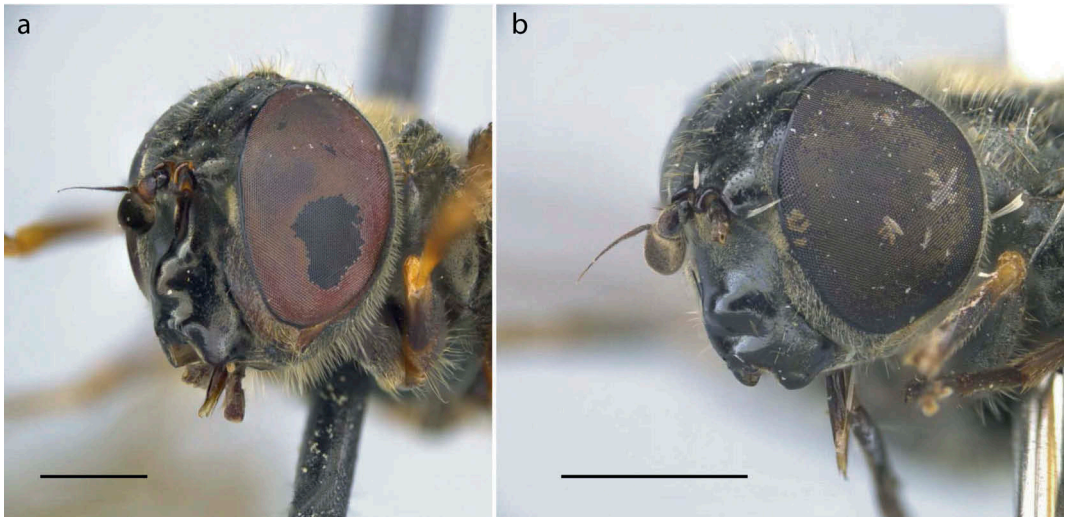

Figure 3. *Cheilosia*, close up view of head. **a**, *Cheilosia sp*. 1. **b**, *Cheilosia sp*. 2. Scale bars = 1 mm.

Comments. The female of this taxon shares with *Cheilosia sp*. 1 the same distinctive characters that distinguishes it from *C. paralobi* and *C. rodgersi* (Figure 3) (see comment under *Cheilosia sp*. 1). The two examined females of *Cheilosia sp*. 2 are smaller and have lighter legs than the female of *Cheilosia sp*. 1; for example, the hind femora of *Cheilosia sp*. 2 – which are missing on one of the two examined specimens – are red only at the apices, while those of *Cheilosia sp*. 1 have large red areas.

Tribe Chrysogastrini

Myolepta difformis (Strobl, 1909)

Locality. M8.

Flight period. May.

Comments. Present in the Maghreb from Morocco to Tunisia with the latter country hosting an additional congeneric, *Myolepta carthaginiensis* (Reemer et al. 2005). Rarely recorded in northeast Algeria, it is confined to Numidia (Djellab et al. 2013) and the Guelma district. Larvae are saproxylic, living in rot-holes of narrow-leaved ash *Fraxinus angustifolia* (Ricarte et al. 2007).

Riponnensia splendens (Meigen, 1822)

Locality. M1.

Flight period. May.

Comments. Present in the Maghreb, from Morocco to Tunisia (Dirickx 1994). Rarely recorded in northeast Algeria where it is confined to the Guelma district. Larvae of *Riponnensia, Chrysogaster, Orthenevra* and *Lejogaster* are found in decaying vegetation and mud of ponds, ditches, springs and seepages.

Tribe Eristalini

Eristalinus aeneus (Scopoli, 1763)

Localities. M1, M2, M4, M7, M8, D1, D3, D5, S.

Flight period. May–June.

Comments. Present in North Africa from Morocco to Egypt (Dirickx 1994). In northeast Algeria, the species is distributed from the Mediterranean shore to the fringes of the Sahara desert (Djellab et al. 2013). The larvae have been recorded feeding on decaying seaweed in rock pools along shorelines.

Eristalinus taeniops Weidemann, 1818

Localities. D3, D5.

Flight period. May.

Comments. Present in North Africa from Morocco to Egypt (Séguy 1961; Dirickx 1994). In northeast Algeria, it is widespread from the Mediterranean shore to the fringes of the Sahara desert (Djellab et al. 2013). The larvae feed on decaying plant material or rotting carcasses in standing or running waters.

Eristalis arbustorum (Linnaeus, 1758)

Localities. M1, M3, M4, M7, M8, D1, D3, D5, D7, S.

Flight period. March–June, August.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994). In northeast Algeria, it is distributed from the Mediterranean shores to the fringes of the Sahara desert (Djellab et al. 2013). Larvae live in wet decaying organic material, farmyard manure, and silage.

Eristalis similis (Fallén, 1817)

Localities. M4, M7, M8, D1–D3, D5, S.

Flight period. April, May, June

Comments. Present in North Africa and the Middle East (Dirickx 1994). In Numidia, it is less common than *E. tenax* (Djellab et al. 2013). Larvae live in running or standing waters enriched with decaying organic material.

Eristalis tenax (Linnaeus, 1758)

Localities. M1–M5, M7, M8, D1–D3, D5, D7, S.

Flight period. March–August.

Comments. Present across the whole of North Africa (Dirickx 1994). In Algeria, it is widespread and abundant from the Mediterranean shores to the fringes of the Sahara desert (Djellab et al. 2013). Larvae live in decaying organic material in a wide range of damp or wet habitats.

Tribe Merodontini

Eumerus amoenus Loew, 1848

Localities. M8, S1.

Flight period. June.

Comments. Present in North Africa from Morocco to Egypt (Dirickx 1994). Unrecorded by Djellab et al. (2013), but listed by Séguy (1961) and Peck (1988). Larvae are phytophagous, living in plant bulbs.

Merodon calcaratus (Fabricius, 1794)

Localities. M1, M8.

Flight period. September.

Comments. New to Algeria and North Africa. This species is confined, as far as we know at present, to Djebel Maouna. Merodon larvae are phytophagous, feeding on rhizomes and bulbs.

Merodon chalybeus Wiedemann *in* Meigen, 1822 (Figure 2(c))

Locality. M1.

Flight period. May.

Comments. New to Algeria and North Africa. Another new *Merodon* species also confined, as far as we know at present, to Djebel Maouna.

Platynochaetus setosus (Fabricius, 1794)

Locality. M1.

Flight period. May.

Comments. Present in the Maghreb from Morocco to Tunisia (Dirickx 1994). Relatively uncommon in northeast Algeria where it is confined to the Guelma district. The larval habitat is undescribed but larvae are expected to be phytophagous.

Tribe Xylotini

Brachypalpus valgus (Panzer, 1798) (Figure 2(d))

Localities. D2, D5.

Flight period. June.

Comments. New to Algeria, and the only second record for North Africa (Kassebeer 1998). Confined, as far as we know at present, to Djebel Debagh. Larvae are saproxylic, living in rot-holes of trees.

Syritta pipiens (Linnaeus, 1758)

Localities. M1, M2, M4, M7, M8, D1–D3, D5, D7, S.

Flight period. March–July.

Comments. Present in North Africa from Morocco to Libya (Dirickx 1994). In northeast Algeria, it is abundant and widespread from the Mediterranean shore to the fringes of the Sahara desert (Djellab et al. 2013). Larvae live in wet, decaying organic matter.

Discussion

The Syrphidae of northeast Algeria

We recorded 31 species, with six of them (*Scaeva mecogramma, Epistrophe melanostoma, Syrphus vitripennis, Brachypalpus valgus, Merodon calcaratus* and *M. chalybeus*) new to Algeria. The two *Merodon* species and *E. melanostoma* are also first records for North Africa. A total of 115 species are known from Algeria (Djellab et al. in prep.) but more are bound to be recorded in the future. This study improves substantially our knowledge of the composition, phenology and distribution of hoverflies of northeast Algeria, paving the way to a better grasp of their life history and conservation status.

Some species present in Numidia (such as *Neoascia clausseni, Spilomyia maroccana, Volucella liquida* and *Ferdinandea fumipennis*) were already noted as probably absent from Tebessa by Djellab et al. (2013). *Neoascia clausseni* was previously recorded in wet forests (alder carrs) and marshy areas; both habitat types being absent in the Guelma district. The other three species are saproxylic and may also require more humid *Quercus* habitats as found in Mount Edough and in Djebel Ghora, where they were previously recorded (Djellab et al. 2013). Thus, it appears that these unrecorded species are confined to the humid and subhumid habitats of Numidia. In contrast, one species, *Melanostoma scalare*, first recorded by Djellab et al. (2013), has now been confirmed in Algeria and its known range in the country extended further south.

In the present study, two *Cheilosia* species were recorded (*sp*. 1 and *sp*. 2). However, the material was not sufficient for an identification at the species level. In Algeria there are six species of *Cheilosia* recorded to date: *Cheilosia laticornis* [as *C. latifacies* in Dirickx (1994)], *Cheilosia griseiventris* [as *C. marokkana* in Dirickx (1994)], *Cheilosia mutabilis* (Dirickx 1994), *Cheilosia paralobi* (Dirickx 1994; Djellab et al. 2013), *Cheilosia rodgersi* (Wainwright 1911; Dirickx 1994) and *Cheilosia scutellata* (Djellab et al. 2013). *Cheilosia laticornis, C. griseiventris, C. mutabilis* and *C. scutellata* are included in the key of van Veen (2010), but *Cheilosia sp*. 1 and *sp*. 2 clearly do not key out as any of these four species. Thus the three examined females appear to belong to two taxa that are new to Algeria. However, in the absence of males of *Cheilosia sp*. 1 and *sp*. 2, as well as of females in better preservation condition, it is very difficult to find a name for the examined *Cheilosia* material.

Insect conservation

The biodiversity hotspot approach, as a practical way to set up conservation priorities, has gained much support among conservationists (Myers 1988). With high levels of plant diversity and endemism, the Mediterranean Basin ranks as

one of the most important biodiversity hotspots in the world (Mittermeier et al. 1998). Its diversity is partly due to the human activities that have shaped its landscapes for thousands of years (Pons & Quézel 1985; Blondel et al. 2010). Conservation efforts in the region have been lagging behind those of more environmentally conscious countries, but over recent decades most Mediterranean countries have taken formal steps to stem biodiversity loss by adhering to international treaties and conventions.

Insect conservation is still the underdog in the relatively recent conservation drive of Mediterranean countries, especially North African countries, but IUCN initiatives have recently corrected this bias. Like butterflies or dragonflies, hoverflies are an attractive and fascinating family of insects that enjoy public popularity (Rotheray & Gilbert 2011). However, excessive enthusiasm might easily be dampened by the local shortage of taxonomic expertise. In spite of this formidable challenge, material support for odonatology has been forthcoming and IUCN Red Lists, adequate keys and fieldguides covering the region are available (Dijkstra & Lewington 2006; Samraoui et al. 2010).

Based on this encouraging example, there is no reason why other charismatic insect groups such as hoverflies would not enjoy similar interest and success. An encouraging lead is provided by Spain where three hoverflies have made their way into the Spanish Red Book of Invertebrates (Verdú & Galante 2006): *Caliprobola speciosa* (Rossi) (EN), *Mallota dusmeti* (Andréu) (VU), and *Meligramma cingulata* (Egger) (VU). Similarly, the ecology of Maghrebian endemics such as *Spilomyia maroccana* and *Volucella liquida* should be investigated and their status monitored. There can be little doubt that studies of climate and habitat changes would benefit from the monitoring of this fascinating group (Reemer 2005; Kaloveloni et al. 2015).

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