

Sciomyzidae Fallén, 1820 (Diptera) collected in the Mercantour National Park, France

Jean-Claude VALA

Université d'Orléans, UFR Sciences, Laboratoire Biologie LBLGC, UPRES EA 1207,
boîte postale 6759, F-45067 Orléans cedex 2 (France)
jean-claude.vala@univ-orleans.fr
jean-claude.vala@wanadoo.fr

Christopher D. WILLIAMS

Behavioural Ecology and Biocontrol, Dept. Biology, National University of Ireland,
Maynooth, Co. Kildare (Ireland)
chris.david.williams@gmail.com

Published on 31 December 2015

urn:lsid:zoobank.org:pub:65CC8DC4-775D-49D4-9239-1DF7ACC0F29D

Vala J.-C. & Williams C. D. 2015. — Sciomyzidae Fallén, 1820 (Diptera) collected in the Mercantour National Park, France, in Daugeron C., Deharveng L., Isaia M., Villemant C. & Judson M. (eds), Mercantour/Alpi Maritime All Taxa Biodiversity Inventory. *Zoosystema* 37 (4): 611-619. <http://dx.doi.org/10.5252/z2015n4a7>

ABSTRACT

Only six species of Sciomyzidae Fallén, 1820, with 106 individuals, have been identified from Malaise traps installed during the ATBI at sites near 1400 and 2000 m in the Mercantour National Park, France. They belong to the subfamilies Phaeomyiinae Steyskal, 1965, represented by *Pelidnoptera nigripennis* (Fabricius, 1794) and the Sciomyzinae Schiner, 1862 for the other five species. The species are essentially characteristic of open, dry or wet meadows and forest macrohabitats. *Pelidnoptera nigripennis* larvae are parasitoids of millipedes, while the others are parasitoids or predators of terrestrial snails and slugs. The list given here includes three species (one Tetanocerini and two Sciomyzini Cresson, 1920) already reported from the National Park, where we captured eight specimens of one of them, subsequent to the ATBI period of study. *Dichetophora finlandica* Verbeke, 1964 is cited for the first time in the Park. The altitudinal distribution of the species is discussed.

KEY WORDS
Snail-killing flies,
altitudinal distribution,
Mercantour National Park,
France.

RÉSUMÉ

Les Sciomyzidae Fallén, 1820 (*Diptera*) collectées dans le Parc national du Mercantour, France. Seulement six espèces de *Sciomyzidae* Fallén, 1820, avec un total de 106 individus, ont été identifiées des pièges Malaise installés entre 1400 et 2000 m d'altitude dans le Parc national du Mercantour (France). Elles appartiennent aux sous-familles Phaeomyiinae Steyskal, 1965 avec *Pelidnoptera nigripennis* (Fabricius, 1794) et aux Sciomyzinae Schiner, 1862 pour les cinq autres espèces. Les espèces sont essentiellement caractéristiques de prairies ouvertes, de milieux secs ou humides, et de macrohabitats forestiers. Les larves de *P. nigripennis* sont parasitoïdes de diplopedes alors que celles des autres espèces sont parasitoïdes ou prédatrices de mollusques terrestres ou de limaces. Dans notre liste, nous incluons trois espèces (un Tetanocerini et deux Sciomyzini Cresson, 1920) déjà signalées du Parc national; nous y avons capturé huit exemplaires de l'une d'entre elles après la période d'étude de l'ATBI. *Dichetophora finlandica* Verbeke, 1964 est signalée pour la première fois du Parc. La répartition altitudinale des espèces est commentée.

MOTS CLÉS
Mouches tueuses de
mollusques,
distribution altitudinale,
Parc du Mercantour,
France.

INTRODUCTION

The present work is a contribution to the study of the entomological biodiversity of the Mercantour National Park (Fig. 1), based mainly on material obtained during the “Terrestrial inventory” module of the ATBI project which greatly increased the invertebrate inventory of this national park (Deharveng *et al.* 2015; Villemant *et al.* 2015, this issue), and concerns the Diptera family Sciomyzidae Fallén, 1820. These flies have been well studied since Berg (1953), who confirmed the malacophagy of their larvae; hence the name of snail-killing flies. Worldwide, 541 valid species of sciomyzids (+ 14 subspecies) are known (Knutson & Vala 2011; Vala *et al.* 2012), or else 537 species, depending on the unresolved question of whether to maintain the subfamily Huttonininae Steyskal, 1965 (two genera and nine species) in the Sciomyzidae or recognize it as a distinct family, the Huttoninidae Steyskal, 1965. Among the 158 species known in the Palearctic region, 82 were recorded from France by Vala (1989) with subsequent additions of one species by Vala (1990), and three by Speight *et al.* (2005).

MATERIAL AND METHODS

Collections were made with Malaise traps installed near 1400 m (noted A) and near 2000 m (noted B) at four sites (BOR: Boréon; CAI: Caïros; LAR: Col de Larche; SER: Sestrières), with two traps (M1, M2) at each altitude, as shown in Fig. 1. We conducted this study in the general context of the “Terrestrial Invertebrates fieldwork module” of the ATBI Mercantour project, ranging from early spring to autumn each year from 2009 to 2011 (Deharveng *et al.* 2015). All collections were conducted according to sequential periods of fifteen days, indicated by the letter T (T1 to T8). Here, we report only those that contained sciomyzid species. Moreover, a few specimens were collected with a sweep net (interception, marked IN). All materials had already been sorted in the MNHN. Information on the prospected sites, the precise geographical coordinates of each Malaise trap, their latitude (Lat), longitude (Long), altitude (Alt), the sampling dates and cover vegetation are shown in Table 1.

In addition, we include two species previously collected in the Mercantour National Park (see <http://www.atbi.eu/mercantour-maritime/>), and another one we have collected. Also, for the first time we report the presence of *Dichetophora finlandica* Verbeke, 1964 in the Mercantour National Park.

For the identifications and biological information, we mainly used the adult keys provided by Rozkošný (1987) and Vala (1989), who figured the male genitalia of the European and Palearctic sciomyzid fauna.

All specimens have been deposited in the Diptera collection of the Muséum national d’Histoire naturelle (MNHN).

SYSTEMATICS

Superfamily SCIOMYZOIDEA Fallén, 1820
 Family SCIOMYZIDAE Fallén, 1820
 Subfamily PHAEOMYIINAE *sensu* Steyskal, 1965
 Genus *Pelidnoptera* Rondani, 1856

Pelidnoptera nigripennis (Fabricius, 1794)
 (Fig. 2)

Musca nigripennis Fabricius, 1794: 346.

MATERIAL EXAMINED. — 8 ♂, 2 ♀, M09-BOR1400-T1-M1; 1 ♀, M09-SES1400-T1-M2; 2 ♀, M09-BOR1400-T2-M2; 7 ♂, M09-BOR2000-T2-M1; 7 ♂, 2 ♀, M09-BOR2000-T3-M1; 1 ♂, M09-BOR2000-T4-M1.

ADDITIONAL MATERIAL FROM MERCANTOUR PARK. — Auron, “Adret Rambert,” 1 ♂, 20.VI.2008, Christian Cocquemot *leg.*, according to a recent identification by Michel Martinez (June 2015).

DISTRIBUTION. — European (rare elsewhere): from Scandinavia (but not found in Denmark) and Estonia to Portugal, Spain, Romania, and Croatia. Also in Armenia and Azerbaijan.

COMMENTS

This species is rarely collected. It occupies mainly dry forest habitats, borders of pine forests, edge of scrub oak forests and scrublands. Its presence was noted at altitude (Vala 1989), as is confirmed below. The larvae are internal parasitoids of the terrestrial millipede diplopod *Ommatoiulus moreleti* (Lucas, 1860), which has a lifespan of about two years. Female flies glue their eggs directly onto hosts that are at least 12 months old, and the first-instar larvae penetrate the host through an intersegment membrane. They are inactive during the first 1-2 months, but begin to completely consume the tissues of the diplopod by autumn. Then, they pupariate *in situ* (one per host), and overwinter until the emergence of the adults, beginning in the following May. Adult flight period is short, from May to July, but can extend to the end of August at higher altitudes, as we report here at Saint-Martin-Vésubie and Valdeblore (both at 2000 m altitude). Thus, the species is really univoltine. Details on the biology were first provided by Baker (1985), as *Eginia* sp. (Muscidae Latreille, 1802). Pont (1985) added a partial description of the cephalopharyngeal skeleton of the first- and third-instar larvae and the puparium, as *Eginia ocypterata* (Meigen, 1826). Bailey (1989) published the complete biology, and from the laboratory rearing of this author, Vala *et al.* (1990) described all the immature stages and the life-cycle of the species.

The 30 specimens examined here were collected during a short period, from 9.VI to 13.VIII.2009, and mainly at the Boréon sites, with 12 specimens at 1400 m and 17 at 2000 m. One specimen was collected at the Sestrière site in a natural pasture. Usually, this species has been reported from the capture of single or a few individuals. Therefore, the number reported here seems quite exceptional.

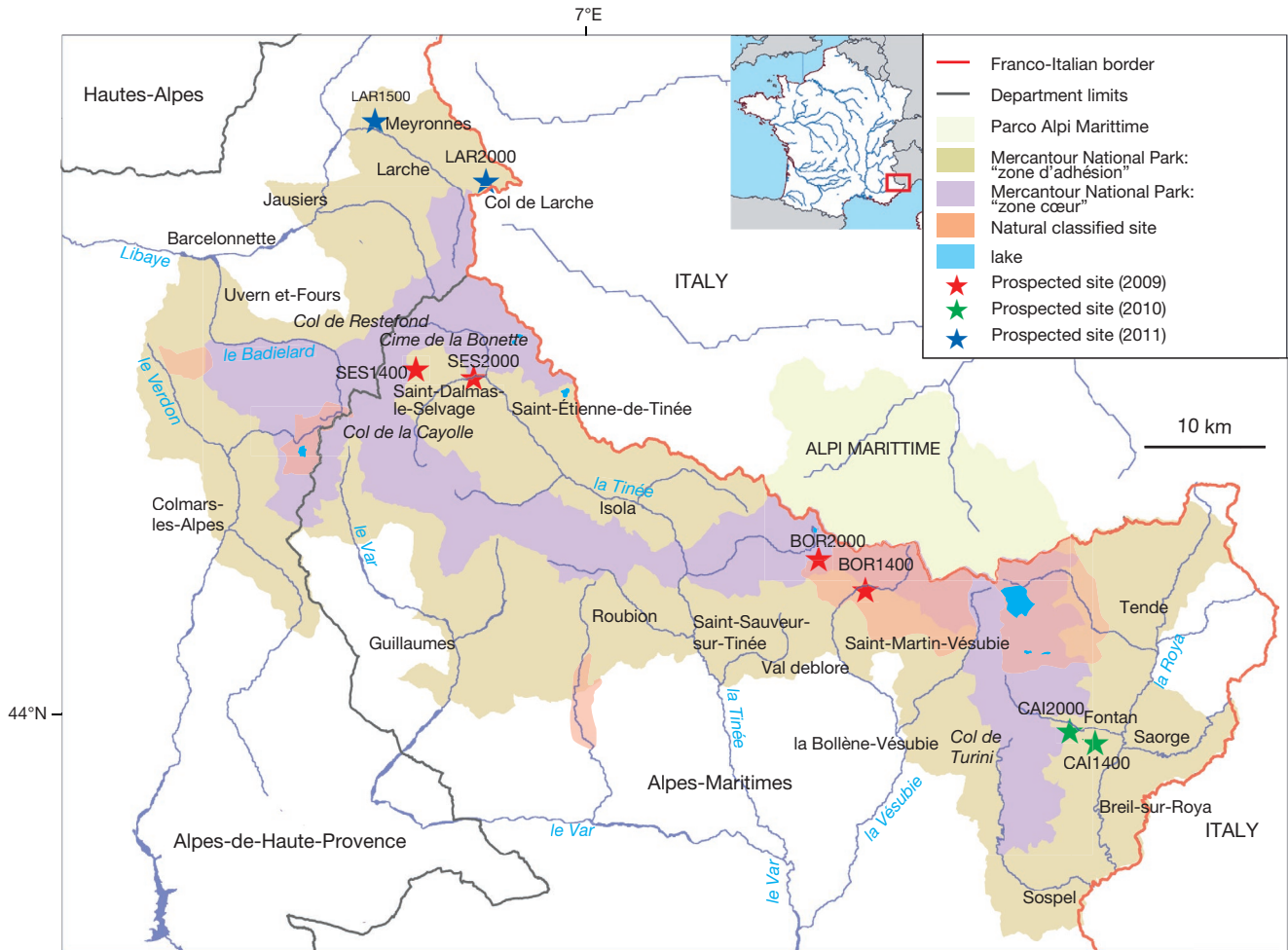


Fig. 1. — Map showing locations of the sampling sites.

Subfamily SCIOMYZINAE Schiner, 1862
 Tribe SCIOMYZINI Cresson, 1920
 Genus *Pherbellia* Robineau-Desvoidy, 1830

Pherbellia cinerella (Fallén, 1820)

Sciomyza cinerella Fallén, 1820: 14.

MATERIAL EXAMINED. — Additional species collected by J.-C. Vala. Boréon: 13-17.VI.2014, 2 ♂. Valdeblora (2800 m), Larch forest, 1 ♀; Saint-Sauveur-sur-Tinée (2700 m), 3 ♂, 2 ♀.

DISTRIBUTION. — Common species with a wide distribution in the Palearctic and Oriental Regions. Also collected in Israel, Turkey, Armenia, Kazakhstan and Afghanistan.

COMMENTS

This species was not found in the material received from the MNHN. However, six males and three females had been already collected at Beonia in a chestnut grove (2060 m) on 7.IX.2009, and one couple (1232-1235 m) on 11.IX.2009. All specimens were identified by R. Rozkošný (ATBI + M Database: EDIT 2010). During subsequent surveys in the park, we collected eight specimens by sweep netting in the

same coniferous forest type throughout 13-17.VI.2014. This *Pherbellia* species is very common in the Palearctic region and can be collected in habitats ranging from dry areas to humid grasslands. Larvae attack and eat a variety of shoreline and terrestrial snails. Bratt *et al.* (1969) described all the immature stages and detailed the larval biology. This species is polyvoltine and overwinters as adult (Vala 1984).

Pherbellia scutellaris (von Roser, 1840)

Sciomyza scutellaris von Roser, 1840: 61.

MERCANTOUR DATA. — We did not find this species in our material, but one specimen (sex unspecified) has been collected at Mont Chajol, southern side (2005-2015 m) on 3.IX.2009, identified by R. Rozkošný (*in* EDIT 2010).

DISTRIBUTION. — Eurasian, from Ireland to Mongolia.

COMMENTS

This species frequents many kinds of forest habitats: coniferous, deciduous, wet and herbaceous open areas.

TABLE 1. — Collection data for the 106 Sciomyzidae Fallén, 1820 collected in the Parc national du Mercantour (France). Date of collection refers to period of the Malaise traps. Gray lines, separation of capture periods for each species. Abbreviations: **IN**, capture by interception net; **M1**, **M2**, Malaise traps; **T1-T8**, serial period of 15 days between each collection (the T1-T8 periods are different according to the year, as specified in the start and end date columns).

Location	Years	Malaise trap (M1, M2) Net (IN)	Periods of two weeks	Altitude (m)	Collecting period per two weeks	Species					Geolocalisation				
						<i>Dichetophora finlandica</i>	<i>Coremacera marginata</i>	<i>Euthycera chaerophylli</i>	<i>Euthycera stichospila</i>	<i>Pelidnoptera nigripennis</i>	<i>Trypetoptera punctulata</i>	specimens by sex	Altitude	Latitude	Longitude
Boréon Cairros Larche Sestrière	2009 2010 2011	M1 M2 IN	T1 T2 T3 T4 T5 T6 T7 T8	1400 2000	from to	Number of specimens									
	x	1	x	x	31.VII.10 16.VIII.10	1				1 ♀	1379	44.00338	7.45615		
	x x	1	x	x	09.VI.09 30.VI.09	1				1 ♂	1421	44.2850731	6.8867683		
	x x	8	x	x	09.VI.09 30.VI.09	8				6 ♂, 2 ♀	1421	44.2850731	6.8867683		
	x x	6	x	x	23.VII.09 07.VIII.09	6				4 ♂, 2 ♀	1421	44.2850731	6.8867683		
	x x	15	x	x	19.VIII.09 22.IX.09	15				9 ♂, 6 ♀	1421	44.2850731	6.8867683		
	x x	3	x	x	22.IX.09 07.X.09	3				1 ♂, 2 ♀	1421	44.2850731	6.8867683		
	x x	2	x	x	07.X.09 15.X.09	2				2 ♀	1421	44.2850731	6.8867683		
	x x	1	x	x	23.VII.09 07.VIII.09	1				1 ♀	1966	44.2927562	6.824021		
	x	1	x	x	31.VII.10 16.VIII.10	1				1 ♂	1387	44.00343	7.45692		
	x	1	x	x	16.VIII.10 30.VIII.10	1				1 ♀	1387	44.00343	7.45692		
	x	1	x	x	22.VII.11 05.VIII.11	1				1 ♂	1986	44.422731	6.878456		
	x	2	x	x	22.VII.11 05.VIII.11	2				2 ♂	1986	44.422731	6.878456		
	x	1	x	x	24.VI.11 11.VIII.11	1				1 ♂	1986	44.422731	6.878456		
	x	1	x	x	24.VII.09 13.VIII.09	1				1 ♂	1540	44.1146875	7.2871439		
	x x	1	x	x	23.VII.09 07.VIII.09	1				1 ♂	1436	44.2847834	6.8876092		
	x x	1	x	x	23.VII.09 07.VIII.09	1				2 ♂	1437	44.2848357	6.8875257		
	x x	2	x	x	19.VIII.09 22.IX.09	2				2 ♂	1421	44.2850731	6.8867683		
	x x	1	x	x	22.IX.09 07.X.09	2				1 ♂, 1 ♀	1421	44.2850731	6.8867683		
	x x	1	x	x	07.X.09 15.X.09	1				1 ♂	1421	44.2850731	6.8867683		
	x	1	x	x	01.VII.10 16.VII.10	1				1 ♀	1387	44.00343	7.45692		
	x	1	x	x	16.VIII.10 30.VIII.10	1				1 ♀	1387	44.00343	7.45692		
	x	2	x	x	31.VII.10 16.VIII.10	2				1 ♂, 1 ♀	1387	44.00343	7.45692		
	x	1	x	x	30.VIII.10 15.IX.10	1				1 ♀	1387	44.00343	7.45692		
	x	10	x	x	11.VI.09 24.VI.09	10				8 ♂, 2 ♀	1540	44.1146875	7.2871439		
	x	2	x	x	24.VI.09 09.VII.09	2				2 ♀	2058	44.13734	7.23698		
	x	7	x	x	24.VI.09 09.VII.09	7				7 ♂	2058	44.13734	7.23698		
	x	9	x	x	09.VII.09 24.VII.09	9				7 ♂, 2 ♀	2058	44.13734	7.23698		
	x	1	x	x	24.VII.09 13.VIII.09	1				1 ♂	2058	44.13734	7.23698		
	x x	1	x	x	09.VI.09 30.VI.09	1				1 ♀	1421	44.2850731	6.8867683		
	x	1	x	x	11.VI.09 24.VI.09	1				1 ♂	1540	44.1146875	7.2871826		
	x	2	x	x	24.VII.09 13.VIII.09	2				2 1 ♂, 1 ♀	1549	44.1143415	7.2890533		
	x	1	x	x	13.VIII.09 27.VIII.09	1				1 ♂	1540	44.1146875	7.2871439		
	x x	1	x	x	09.VI.09 30.VI.09	2				2 1 ♂, 1 ♀	1437	44.2848357	6.8875257		
	x x	1	x	x	23.VII.09 07.VIII.09	1				1 ♂	1437	44.2848357	6.8875257		
	x x	4	x	x	23.VII.09 07.VIII.09	4				3 ♂, 1 ♀	1437	44.2848357	6.8875257		
	x x	4	x	x	19.VIII.09 22.IX.09	4				4 ♂	1421	44.2850731	6.8867683		
	x x	3	x	x	10.VII.09 23.VII.09	3				3 ♂	2011	44.2925219	6.8228732		
	x	1	x	x	22.VII.11 05.VIII.11	1				1 ♂	1491	44.475409	6.796607		
Total per species						1	35	7	14	30	19				
Total sciomyzidae collected							106								

Its flight period extends from May to September. As for many species of *Pherbellia*, Bratt *et al.* (1969) described them and detailed the larval biology using various terrestrial gastropods as prey. In nature, larvae have been found in two species of *Clausilia* Draparnaud, 1805. The puparium is formed outside the shell of the host snail. The

overwintering stage seems to be the mature larva. the larval biology using various terrestrial gastropods as prey. In nature, larvae have been found in two species of *Clausilia* Draparnaud, 1805. The puparium is formed outside the shell of the host snail. The overwintering stage seems to be the mature larva.



FIG. 2. — *Pelidnoptera nigripennis* (Fabricius, 1794), male habitus, characteristic posterior part of the bifurcate surstyli has been manually extended. Scale bar: 0.5 cm.

Tribe Tetanocerini Schiner, 1862
Genus *Coremacera* Rondani, 1856

Coremacera marginata (Fabricius, 1775)
(Fig. 3)

Musca marginata Fabricius, 1775: 784.

MATERIAL EXAMINED. — 6 ♂, 2 ♀, M09-SES1400-T1-M1; 1 ♂, M09-SES1400-T1-M2; 4 ♂, 2 ♀, M09-SES1400-T4-M2; 9 ♂, 6 ♀, M09-SES-1400-T6-M2; 1 ♂, 2 ♀, M09-SES1400-T7-M2; 2 ♀, M09-SES1400-T8-M2.

DISTRIBUTION. — Eurasian, from Scandinavia to Spain, Greece and Turkey, extending to Georgia, *Armenia*, Azerbaijan and Iran.

COMMENTS

Coremacera marginata is frequently collected in various terrestrial, shaded habitats: sub-xeric grasslands, even under direct sunlight; *Quercus* forest or Pine edge; garrigue; Mediterranean shrub formations, including city gardens and boundaries of meadows; and other humid areas.

Females oviposit at the end of September, mainly near terrestrial molluscs that are attacked and eaten by the larvae. These are especially *Cochlicopa lubricella* (Rossmässler, 1835), *C. minima* (Siemaschko, 1774), *Discus rotundatus* (Müller, 1847), *Helicella itala* (Linnaeus, 1758), *H. caperata* (Montagu, 1803), *Cerutuella virgata* (Da Costa, 1778), young *Helix as-*

persa Müller, 1774, *Fruticicola fruticum* (O. F. Müller, 1774), *Trochulus hispidus* (Linnaeus, 1758), and *Oxychilus* Fitzinger, 1833 spp. However, *Zonitoides arboreus* (Say, 1817), which are often abundant at the capture sites, is not attacked in the laboratory. Larvae first feed as predators and continue in a saprophagous manner after the prey is killed, after which they attack a second snail. This species is univoltine, overwintering in the pupal stage outside the snail shell, and flies from June to early November. The life cycle is described by Knutson (1973).

We found the 35 specimens only in Malaise traps installed at 1400 m altitude in the natural pastures of the Sestrière site Vallon de Saint-Dalmas. Usually, this species is collected from the end of May to October, and even at altitudes as low as 2-3 m, as in parts of the Camargue, southwest France (Vala collector).

Genus *Dichetophora* Rondani, 1868

Dichetophora finlandica
Verbeke, 1964

Dichetophora finlandica Verbeke, 1964: 17.

MATERIAL EXAMINED. — 1 ♀, M10-CAI1400-T3-M1.

DISTRIBUTION. — European: mainly Boreo-Alpine and Central European. Fennoscandia, Karelian, Netherland, England, Belgium, France, Italy, Austria, Bulgaria.

COMMENTS

This species is mentioned for the first time in the Mercantour National Park, and added to those previously reported in the French Alps by Vala (1989) in the department of Les Hautes-Alpes (2 ♂, Saint-Véran, 12.VIII.1966, 1 ♂, Embrun, 21.XI.1983). Elsewhere in France, Speight *et al.* (2005) found it in the department of Haute-Savoie (1 ♂ captured in Bernex, IX.1977).

The species has been often confused with the second Palaearctic species mentioned below. However, it differs by the presence of only one pair of post-alar setae, the third antennal segment elongated and very acute, and the yellow femur III.

It is found in exposed herbaceous vegetation along edge of wood, forest; deciduous forest and in *Salix* swamp forest or within humid grass of ponds. The flight period extends from July to September. Its general biology and immature stages are unknown.

Dichetophora obliterata (Fabricius, 1805)

Scatophaga obliterata Fabricius, 1805: 205.

MERCANTOUR DATA. — One specimen has been collected in this Park at Mont Chajol, southern side (2005 m-2015 m) on 3.IX.2009, and previously identified by Rozkošný (ATBI + M data 2010).

DISTRIBUTION. — Palaearctic, Middle-East and Asia. Europe: Ireland, United Kingdom, Germany, France, Italy, Greece, Morocco, Israel, Turkey, Iran and Iraq.

COMMENTS

The species is much larger than the previous one. The third antennal segment is relatively short and the apex rather rounded. Two postalar setae are present. It is present in various habitats: along canals, near temporary or permanent freshwater ponds, edges of various oak forests and in garrigues. In contrast to the previous species, all immature stages have been described by Vala *et al.* (1987), as well as aspects of its biology. The adults emerge during May, oviposition is delayed, and the eggs have a long diapause period (at least two months). This species is univoltine. In laboratory rearing, first-instar larvae are parasitoids in *Lauria cylindracea* (E. M. da Costa, 1774); older instar-larvae eat *Helicella* Férussac, 1821 spp. and *Theba* Risso, 1826 ssp. The older larva is the overwintering stage, and pupariation takes place on the inside or outside of the snail shell.

Genus *Euthycera* Latreille, 1829: 529

Euthycera chaerophylli (Fabricius, 1798)

Musca chaerophylli Fabricius, 1798: 565.

MATERIAL EXAMINED. — 1 ♀, M09-SES2000-T4-M1; 1 ♂, M10-CAI1400-T3-M2; 1 ♀, M10-CAI1400-T4-M1; 1 ♂, M11-LAR2000-T3-M2; 2 ♂, M11-LAR2000-T5-M1; 1 ♂, M11-LAR2000-T5-M2. In addition, two specimens have been collected by sweeping in the

Vallon de la Minière, near Lac Long (2050-2060 m) on 31.VIII.2009, and were identified by Rozkošný (ATBI + M 2010).

DISTRIBUTION. — European: from Fennoscandia to southern Europe, including Corsica and Turkey.

COMMENTS

The habitats are mostly montane areas, humid deciduous forest, and open and swamp woodland. Only the egg and partially the first instar-larva were described by Vala (1989). Larval feeding behaviour is exceptional among the sciomyzids. In contrast to the other species attacking slugs, the larva completely penetrates into its host, without leaving its posterior disc and posterior spiracles exposed. Its location within the slug is still unclear. For breathing, the larva is probably situated near the slug's pneumostome. Although the host remains alive for several weeks with the parasitoid larva inside, it does not survive beyond 45 days. Autopsy of dead or decaying individuals of the slug *Deroceras reticulatum* (O. F. Müller, 1774) revealed that the first-instar larvae had moulted to produce the second instar-larva, identifiable by the presence of the anterior spiracles, which are always absent in first-instar larvae (Vala 1989). Trelka & Foote (1970) indicated that the second instar larva of this species was also obtained in the laboratory by Knutson. Rozkošný (1967) collected a puparium in the Czech Republic, from which a female emerged. The species is univoltine. The flight period runs from June to early September.

Euthycera stichospila (Czerny, 1909)

Limnia stichospila Czerny in Czerny & Strobl, 1909: 257.

Euthycera leclercqi Vala & Reidenbach, 1982: 40.

MATERIAL EXAMINED. — 1 ♂, M09-SES1400-T1-IN; 1 ♂, M09-BOR1400-T4-M1; 1 ♂, M09-SES1400-T4-IN; 1 ♂, M09-SES1400-T4-M1; 2 ♂, M09-SES1400-T6-M2; 1 ♂, 1 ♀, M09-SES1400-T7-M2; 1 ♂, M09-SES1400-T8-M2; 2 ♀, M10-CAI1400-T1-M2; 1 ♀, M10-CAI1400-T3-M2; 1 ♀, M10-CAI1400-T4-M1; 1 ♀, M10-CAI1400-T5-M2.

DISTRIBUTION. — Western Mediterranean: Spain, France, Italy and Algeria.

COMMENTS

The habitats are mainly open dry areas, *Quercus* forest edges, and around dry grassland. Vala & Caillet (1985) described the egg, all larval instars and the puparium, under the synonym *Euthycera leclercqi* Vala & Reidenbach, 1982. The first-instar larvae are primarily parasitoids of small snails and slugs. Their posterior spiracles are always clearly visible on the surface of the host. The second- and third-instar larvae are predators and continue to live saprophagously after the host is killed. In laboratory rearing, all larvae attacked and ate completely *Lauria cylindracea*, *Trochulus hispidus*, *Oxychilus cellarius* (O. F. Müller, 1774) and young individuals of the slug *D. reticulatum*. The puparium, the overwintering stage, is formed outside the shell of the snail host. The species is univoltine. Flight period is early April to mid-November.



FIG. 3. — *Coremacera marginata* (Fabricius, 1775), male habitus. Scale bar: 0.5 cm.

Genus *Trypetoptera* Hendel, 1900

Trypetoptera punctulata (Scopoli, 1763)

Musca punctulata Scopoli, 1763: 338 (designation Cresson [1920]).

MATERIAL EXAMINED. — 1 ♂, M09-BOR1400-T1-M1; 1 ♂, M09-SES1400-T1-IN; 1 ♂, M09-SES1400-T1-M1; 1 ♂, M09-BOR1400-T2-M2; 3 ♂, M09-SES2000-T3-M2; 1 ♂, M09-BOR1400-T4-M2; 1 ♂, M09-SES1400-T4-M1; 3 ♂ 1 ♀, M09-SES1400-T4-M2; 1 ♂, M09-BOR1400-T5-M1; 4 ♂, M09-SES1400-T6-M2; 1 ♂, M11-LAR2000-T5-M2.

DISTRIBUTION. — Palaearctic. From Ireland to Sakhalin, Fennoscandia to south of Europe and Morocco. Iran and Turkey.

COMMENTS

The habitats are open ground, humid, dry, and semi-xeric unimproved grasslands, up to and including subalpine grasslands; open, grassy areas in thermophilous *Quercus* forest; garrigue and Mediterranean scrub. All immature stages have been figured and described from laboratory rearings by Vala (1986), who also detailed the complete life cycle. Females begin to mate and oviposit about two to three months after their emergence in May. In the laboratory, the larvae attack

and feed on various terrestrial gastropods, such as *Candidula unifasciata* (Poiret, 1801), *Helix aspersa*, *L. cylindracea* and *T. hispidus*. Most of the results were obtained from rearings on the viviparous *L. cylindracea*. The first-instar larvae effectively attacked the young snails present in the pallial cavity of the mother snail and moulted *in situ* to the second-instar larva. Although the first-instar larvae show a significant preference for *Lauria* Gray, 1840 as a host, older larvae attacked larger snails and did not successfully complete development in *Lauria*. The puparium, which is the overwintering stage, is usually formed outside the shell of the snail host, rarely inside the host shell, and without formation of a septum. The species is univoltine. The flight period is from May to November, with a peak in June.

DISCUSSION

Considering the six species identified, their altitudinal distribution shows some ecological differences (Fig. 4). *Coremacera marginata* and *Euthycera stichospila* are limited to samples from 1400 m. In contrast, *Pelidnoptera nigripennis*, the dominant species in samples, is distributed in a manner almost equal

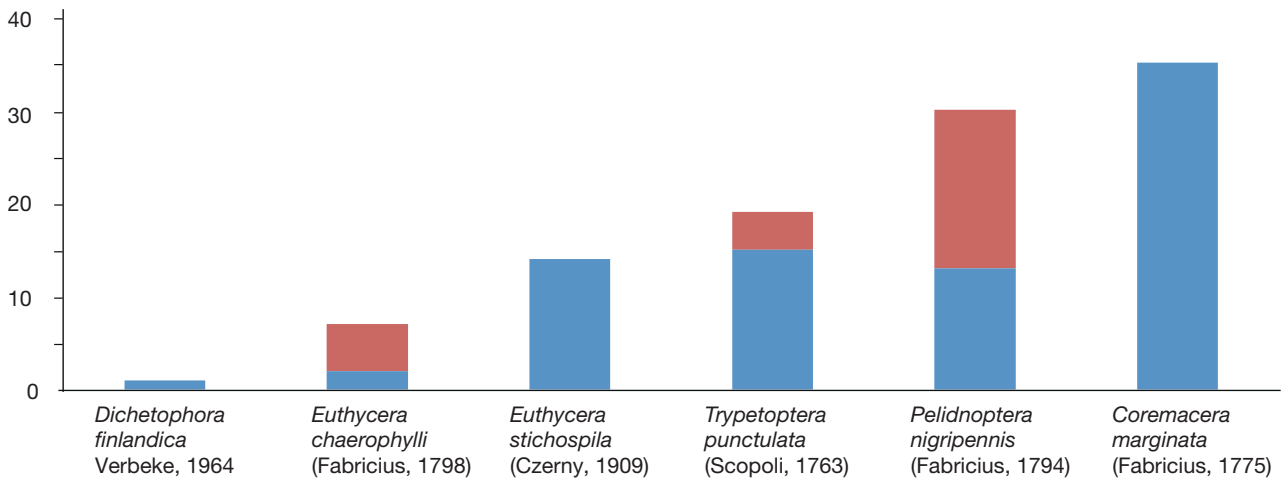


FIG. 4. — Sampling sites for the 106 Sciomyzidae Fallén, 1820 species collected in the Malaise traps at around 1400 m (Blue) and 2000 m (red) from 2009 to 2011.

between 1400 and 2000 m altitudes. *Trypetoptera punctulata* is more frequent at 1400 m (79%). Although the number of *Euthycera chaerophylli* is low, this species seems much more frequent at high altitudes.

The best captures of Sciomyzidae occur during June-July. Surprisingly, the samples examined for 2009 contain more sciomyzids than the subsequent two years, with 93 of the 106 individuals. In fact, the small number of species sorted in the MNHN material, correspond to those that are easily recognizable by their large size and external morphology. The absence of smaller species belonging to genera such as *Colobaea* Zetterstedt, 1837, *Pherbellia* and *Ditaeniella* Sack, 1939 probably results from confusion with other groups of small Diptera. Thus, some sciomyzids collected by MNHN may have been stored in tubes with other Diptera groups. We compared our results with those obtained by Speight *et al.* (2005), using also the Malaise traps at 1400 and 2000 m in Haute-Savoie. These authors identified 50 species, containing those we report here. Consequently, to establish a significant list of Sciomyzidae living in the Mercantour Park, additional samples are needed involving other types of capture methods, such as sweep net sampling.

Concerning the flight periods of the species, the current data are more limited in relation to information from the plains or forests at lower elevations.

The present identified sciomyzid species, whose life cycles are known, develop at the expense of terrestrial molluscs, including slugs. Only larvae of *P. nigripennis* develop as parasitoid inside the terrestrial millipede (Diplopoda) *Ommatoiulus moreleti*. In a global study, it will be interesting to associate the sciomyzid inventory with that of their prey in the Mercantour Park.

Acknowledgements

The All Taxa Biodiversity Inventory + Monitoring Mercantour/Alpi Maritime was launched by the European Distributed Institute of Taxonomy (EDIT) project (2006-2011). The

ATBI was coordinated by M.-F. Leccia (Mercantour National Park) and M. De Biaggi (Parco Naturale Alpi Marittime), who provided the relevant permits.

Most specimens studied in this paper were collected as part the Terrestrial Invertebrates Module set up by the Muséum national d'Histoire naturelle during which malaise trap samples were obtained by J. Molto, M. Torjman and E. Minsieux (Mercantour National Park) and sorted to family level by M. Czyrnek and T. Théry (MNHN).

Special thanks to Emmanuel Delfosse (MNHN) for his help with photography and Vincent Lefebvre (MNHN) for the map. We wish to thank Rudolf Rozkošný as reviewer, for his valuable advice.

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Submitted on 27 May 2014;
accepted on 3rd September 2015;
published on 31 December 2015.

