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Muscidae and Fanniidae (Diptera) from the Alp Flix area (Swiss Alps, Grisons), with special reference to species from the alpine level

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Musciden und Fanniiden (Diptera) der Alp Flix (Schweizer Alpen, Graubünden), mit besonderer Beachtung der Arten der alpinen Stufe

Zusammenfassung

Der Bericht gibt eine provisorische kommentierte Artenliste der Echten Fliegen (Muscidae) und der Familie der Fanniidae der Alp Flix (Graubünden, Schweizer Alpen). 48 Arten Musciden und 5 Arten Fanniiden wurden nachgewiesen, wovon 32 Musciden und 2 Fanniiden Neunachweise für diese Region sind. Die Art *Coenosia ambulans* wurde zum ersten Mal in der Schweiz nachgewiesen.

Schlagworte: Fliegen, Muscidae, Fanniidae, Erstnachweis, Artenliste, Alp Flix, Graubünden

Summary

A provisional annotated list is given of the Muscidae and Fanniidae of the Alp Flix area in Grisons (Eastern Swiss Alps). 48 species of Muscidae and 5 of Fanniidae are recorded, of which 32 of Muscidae and 2 of Fanniidae are new for the area. One species, *Coenosia ambulans* Meigen, 1826, is recorded as new for the Swiss fauna.

1. Introduction

During the Geo-Tag der Biodiversität 2000, 233 taxa of the order Diptera (identified at least to generic level) were recorded from the Alp Flix area in Grisons (BÄCHLI in HÄNGGI & MÜLLER 2001, including taxa that were identified later), although many others could only be identified to family level. Much work remains to be done before the inventory of the biodiversity of the Diptera in this area is completed, since BÄCHLI (in HÄNGGI & MÜLLER 2001) suggests that at least 2000 species may be found there.



Fig. 1: *Thricops aculeipes* (ZETTERSTEDT 1838), a boreoalpine species (Plan Lung, 2395m, 3.VIII.2004, male). Note the curious elongate inner process on the posterior tibia, typical of the male of this species, the function of which is unknown.



Fig. 2: *Coenosia obscuricula* (RONDANI 1871), an endemic species of the high mountains of Europe (Giond Alva, 2547m, 3.VIII.2004, male).

Due to the early date of the Geo-Tag (2 and 3 June), the upper regions of the Schatzinsel Alp Flix area could not be sampled. Between 1 and 3 August 2004, 3 days were devoted by one of us (JPH) to collect Diptera in the Alp Flix area, with particular emphasis on the alpine region at higher altitudes. As a result, a rich array of species in numerous families was collected, many of which are new to the Alp Flix region and some of which may even be new to Switzerland.

The present paper deals with the species of the families Muscidae and Fanniidae. In areas above the tree-line in the Alps, the Muscidae (and Anthomyiidae) are the principal pollinators of flowers, as recently summarized by PONT (1995). An annotated list of the species of these two families found in the Alp Flix area is given below, mainly based on the 2004 collection but also including the species of Muscidae and Fanniidae collected and identified by BÄCHLI in 2000 (in GEO 2000).

2. Material and methods

Flies of the 2004 material were collected by the first author (JPH) with a hand-net, either by individual collecting or by sweeping vegetation. The material was then pinned and is preserved dry in the collections of the Muséum d'Histoire Naturelle de Neuchâtel (MHNN). In doubtful cases, the abdomen was cleared in potash in order to study the genital structures, and was stored in glycerine in a microvial attached to the same pin as the specimen. Identification of the material was made by JPH using the key to the Muscidae of Central Europe by GREGOR et al. (2002), and the keys to the Fanniidae of Central Eu-

rope by GREGOR & ROZKOŠNÝ (1991) and of the whole of Europe by ROZKOŠNÝ et al. (1997), supplemented by HENNIG's (1955-64) monograph of the Palaearctic Muscidae (including Fanniidae) and the key to the British species of Muscidae s.l. (including Fanniidae) by D'ASSIS-FONSECA (1968). The identity of dubious specimens and of at least one specimen of each species was checked by ACP who also revised the 2000 material collected by G. BÄCHLI and corrected some previous misidentifications. The nomenclature follows that of the *Fauna Europaea* (PONT, 2005).

Localities

2004 localities:

CA1: Caddotsch, 770.562/154.488, 2105 m, grazed dwarf Ericaceae-heath, 3.VIII.2004

CA2: Caddotsch, 770.730/154.520, 2145 m, along brook, mossy stones in the splash zone, 3.VIII.2004

GA1: Giond Alva, 772.220/154.170, 2547 m, shore of lakelets, with *Eriophorum*, 3.VIII.2004

GA2: Giond Alva, 772.045/154.455, 2510 m, alpine meadow, 3.VIII.2004

LN: Lai Neir, 768.770/156.143, 1937 m, boggy meadow, 2.VIII.2004

MA: Malpass, 771.237/154.541, 2335 m, springs zone, with *Cardamine amara*, 3.VIII.2004

PL: Plang Lung, 771439/154594, 2395 m, richly flowering alpine meadow, 3.VIII.2004

PR: Pale Rodonda, 768.584/155.500, 1862 m, marshy infilled pond, 2.VIII.2004

PA: Paleis, 768.240/155.450, 1785m, infilled pond in forest, dry, 2.VIII.2004

SR1: Son Roc, 769.685/154.620, 1968 m, damp meadow, 1.VIII.2004

SR2: Son Roc, 769.577/154.585, 1965 m, edge of brook, 1.VIII.2004
TI: Tigias, *Alnus viridis* stands, on umbels, 770.080/154.460, 1975 m, 1.VIII.2004

2000 localities:

CM1: Crap Marsch, 768.15/155.15, 1680–1760 m, scree, dry forest (*Larix* / *Pinus*), 3.VI.2000
CM2: Crap Marsch, 768.25/155.35, 1800–1840 m, wooded ridge (*Picea*), with clearings, 3.VI.2000
LB: Lai Bloss, 769.15/156.05, 1965 m, marshy shore, boggy sloping meadow, 3.VI.2000
PT: Planets, 768.5/154.6, 1730–1800 m, *Larix* forest/ pastured meadow along brook, 3.VI.2000
PB: Plan la Baselgia, 768.20/154.95, 1650 m, mesophilous meadows, 3.VI.2000
PR: Pale Rodonda, 768.580/155.500, 1870 m, infilled pond in forest, 2.VI.2000 (G. BÄCHLI)
RD: Recta Daveins, 768.25/154.10, 1580 m, mesophilous meadow, 2.VI.2000
SU: Sur, [near village], 768.50/154.50, 1550–1600 m, meadow, 3.VI.2000 (G. BÄCHLI leg. et det.)

3. Systematic list

In the list below, subfamilies, genera and species are listed alphabetically within each family. Species collected and identified by G. BÄCHLI (in GEO 2000) are given in a smaller type. New records for the Alp Flix area are marked with an asterisk (*). Codes refer to the above list of localities. Biogeographical patterns of distribution areas (elements) follow DE LATTIN (1967).

MUSCIDAE

Azeliinae

Azelia nebulosa Robineau-Desvoidy, 1830 SU

Distribution: Throughout Europe, as far east as Estonia and Moldova. An expansive Mediterranean element.
 Biology: Larvae in horse and cow dung; final instar carnivorous. A forest species, in the Alps generally up to 1900 m; once above the tree-line in the Ötz Valley, Austria (PONT, 1995), at 2670 m. Adults on flowers.

* *Drymeia alpicola* (Rondani, 1871) CA1, PL, PR, SR1, SR2
 Distribution: Holarctic. In Europe confined to high mountains. A Manchurian element.
 Biology: Not known. In the Alps at 1470–2973 m, in meadows and heaths above the tree-line and into the nival zone. Adults on flowers.

* *Drymeia brumalis* (Rondani, 1866) SU
 Distribution: Europe, confined to mountainous areas (Great Britain, Pyrenees, Alps, Tatras).
 Biology: Not known. In the Alps at 1200–2800 m, in forests and on heaths above the tree-line. Adults on flowers.

* *D. hamata* (Fallén, 1823) SR2
 Distribution: Throughout Europe, as far east as Belarus. An Adriatic-Mediterranean element.
 Biology: Larvae in soil; obligate carnivores. A lowland species, also occurring abundantly in the Alps up to 2700 m, in forests and above the tree-line. Adults common on flowers.

D. vicana (Harris, 1780) SU
 Distribution: Palaearctic. A Manchurian element.
 Biology: Larvae in cow dung and cow manure; obligate carnivores. A lowland species, occurring in the Alps up to 2400 m (BEZZI, 1918), in forests and above the tree-line; up to 3000 m in the Caucasus Mts of Georgia (PONT leg.). Adult females are sweat flies.

Hydrotaea dentipes (Fabricius, 1805) SU
 Distribution: Holarctic, and reaching Central America and the north of India and Nepal. Probably a Manchurian element, but euryoecious and expansive in Europe.
 Biology: Larvae in dung, organic refuse, carrion, rubbish dumps; facultative carnivores. A forest species, rarely over 2100 m in the Alps. Adults are common filth flies.

* *H. irritans* (Fallén, 1823) PR
 Distribution: Palaearctic. A Manchurian element.
 Biology: Larvae in pasture soil; obligate carnivores. Generally a lowland forest species, only rarely occurring above the tree-line in the Ötz valley, Austria (PONT, 1995), at 2300 m, or even to 2500 m (BEZZI, 1918). The adult female is the most abundant and persistent lowland sweat fly in late summer.

H. pandellei Stein, 1899 PR, SU
 Distribution: Palaearctic. A Manchurian element, but with boreo-montane disjunctions in Europe.
 Biology: Not known. It replaces *H. irritans* as a sweat fly at high altitudes and high latitudes. Adults at 1470–2670 in the Alps. Females are sweat flies in high and late summer.

* *Thricops aculeipes* (Zetterstedt, 1838) (Fig. 1) PL, SR1, SR2
 Distribution: West Palaearctic. In Europe confined to upland and northern areas, with clear boreo-alpine (taiga) disjunctions.
 Biology: Not known. Adults in forests and above

the tree-line, in the Alps from 1800–2400. Adults on flowers, common in forest and riverside locations, or even to 2800 m (BEZZI, 1918).

* *T. beckeri* (Pokorný, 1893) MA, SR2, TI

Distribution: Endemic to the upland areas of Central Europe; also Ukraine.

Biology: Not known. Found in forests and less commonly above the tree-line, 1470–2280 m in the Alps. Adults usually collected by sweeping.

* *T. cunctans* (Meigen, 1826) SR1

Distribution: Palaearctic. A Manchurian element, with clear boreo-alpine (taiga) disjunctions in Europe.

Biology: Not known. Adults on flowers and leaves, abundant in forest and riverine habitats, also above the tree-line to 2480 m or even to 2700 m (BEZZI, 1918); one capture at 2930 m at the Gurgler Scharl in the upper Ötztal valley, Austria, probably carried there by thermals.

* *T. furcatus* (Stein, 1916) GA2

Distribution: Holarctic. Oreo-tundral, sometimes descending to extreme upper part of the arboreal. With a true arcto-alpine disjunction in its European distribution.

Biology: Not known. Adult habits not known; a characteristic species of the heath zone. In the Alps from 1840–3000 m.

* *T. genarum* (Zetterstedt, 1838) MA, PL

Distribution: West Palaearctic. Arboreal, with a true boreo-montane (taiga) disjunction.

Biology: Not known. Adults on flowers and leaves, common in the upper forest zone and in riverine habitats, also above the tree-line, 1470–2680 m.

* *T. innocuus* (Zetterstedt, 1838) CM1

Distribution: Holarctic. A Mongolian element, with a boreo-montane (taiga) disjunction in Europe.

Biology: Not known. Mainly a forest species, 1470–2400 m. Adults on flowers and leaves.

T. longipes (Zetterstedt, 1845) MA, PL, SR2, SU, TI

Distribution: Palaearctic. A Mongolian element, with boreo-montane (taiga) disjunctions in Europe.

Biology: Larvae found in wet moss. Adults on flowers, especially umbels, and most abundant in riverine and heath habitats. 1400–2423 m in the Alps, or even 2600 m (BEZZI, 1918).

T. nigrifellus (Zetterstedt, 1838) MA, PL, PR, RD, SR1, SR2, SU

Distribution: Palaearctic. A Mongolian element, with boreo-montane (taiga) disjunctions in Europe.

Biology: Not known. Adults on flowers and leaves, in forest and riverine habitats, also extending above the tree-line, 1400–2400 m or 2800 m (BEZZI, 1918) in the Alps.

T. semicinctus (Wiedemann, 1817) SU

Distribution: Palaearctic. A Manchurian element.

Biology: Larvae in humus soil. A common lowland forest species, generally around 1400–1700 m but rarely extending up to 2300 m (TIMON-DAVID, 1937b). Adults on flowers, sometimes in huge numbers on flowering grasses.

Coenosiinae

* *Coenosia ambigua* Ségué, 1923 PL, SR1, SR2

Distribution: Endemic to the mountains of Europe (Alps, Pyrenees).

Biology: Not known. Adults carnivorous, among ground vegetation, from the upper limit of the forest zone to the nival zone, 1850–2500 m in the Alps.

* *C. ambulans* Meigen, 1826 PR

Distribution: Palaearctic. A Manchurian element. **New for Switzerland.**

Biology: Not known. Adult habits unknown; found in the forest zone and above the tree-line, 800–2500 m in the Alps (BEZZI, 1918).

* *C. femoralis* (Robineau-Desvoidy, 1830) LN, SR1

The three females from SR1 have only one posterior preapical seta on mid femur, whereas there are usually two in this species. However these females can hardly be any other species, and so are provisionally identified as *femoralis*.

Distribution: Europe. A Ponto-Mediterranean element.

Biology: Not known. Adults carnivorous, among ground vegetation, in the forest zone and above the tree-line, up to 2500 m in the Alps (RINGDAHL, 1957).

* *C. gracilis* Stein, 1916 SR1

Distribution: Central Europe, and found only in the Alps of Austria, France and Switzerland.

Biology: Not known. Adult habits unknown. Recorded from 1800–2100 m in the Alps (BEZZI, 1918).

* *C. means* Meigen, 1826 SR1, LN

Distribution: Europe. A Ponto-Mediterranean element.

Biology: Not known. Adults are carnivorous, among ground vegetation; found in the forest zone and in the meadows and heaths just above the tree-line, 1400–2200 m in the Alps.

* *C. obscuricula* (Rondani, 1871) (Fig. 2), GA1, GA2, PL

Distribution: Europe. Endemic to the high mountains (Alps, Pyrenees, Apennines, Tatra). Oreotundral, sometimes descending to extreme upper part of the arboreal.

Biology: Not known. Adults carnivorous, among ground-vegetation. Mostly in heaths and in the boulder zone in the Alps, 1840–3020 m.

* *C. pedella* (Fallén, 1825) CA1

Distribution: Holarctic. A Mongolian element.

Biology: Not known. Adults carnivorous, among ground vegetation. A lowland forest species, also found on the coast. 1400–2100 m in the Alps.

* *C. styriaca* Hennig, 1961 PR, SR2

Distribution: Endemic to the upland areas of Central Europe.

Biology: Not known. Adults carnivorous, among ground vegetation in shaded woodlands. Upland and montane species, 650–2280 m in the Alps.

C. tigrina (Fabricius, 1775) SU

Distribution: Holarctic. An expansive Mediterranean element in Europe.

Biology: Larvae in soil; carnivorous. A common lowland species, well known as a predator of other small insects. Adults on leaves and vegetation, occurring up to 1950 m in the Alps.

C. verralli Collin, 1953 RD, SU

Distribution: Holarctic. A Mongolian element.

Biology: Not known. Adults carnivorous, among ground-vegetation. A lowland species, also found in coastal dunes. In the forest zone in the Alps up to 1400 m, but also found in upland heaths up to 2120 m (PONT leg.).

Macrorchis meditata (Fallén, 1825) PR, SU

Distribution: Palaearctic. A Mongolian element.

Biology: Larvae in soil. Adults carnivorous, among ground vegetation. In the forest and heath zones, in the Alps up to 2300 m (RINGDAHL, 1957).

Schoenomyza litorella (Fallén, 1823) CM2, PB, SR2, SU

Distribution: Holarctic; also in Nepal and Pakistan; and Ethiopia, Kenya, South Africa. Probably polycentric in Europe, expansive Mediterranean and Mongolian.

Biology: Larvae in *Carex* stand. Adults carnivorous, in ground vegetation. A euryoecious species, found in lowlands and at high altitudes, in coastal and inland habitats. In the Alps, mostly above the tree-line, from the heaths up to the nival zone, from 1470–3020 m.

* *Spilogona atricans* (Pandellé, 1899) MA

Distribution: A European montane species, known only from the Alps, Pyrenees, Apennines and Sudeten Mts.

Biology: Larvae in wet moss. Adult habits unknown, but always found near running water and certainly carnivorous. In a narrow band of the upper forest and lower heath zones, 1870–2400 m in the Alps. At 2771 m on Mt Blanc (TIMON-DAVID, 1937a).

* *S. brunneisquama* (Zetterstedt, 1845) GA2

Distribution: West Palaearctic. Probably a Mongolian element, with boreo-alpine (taiga) disjunctions.

Biology: Larvae in moss on the ground. Adults carnivorous, always found near water. Occurring from the forest zone up to the subnival zone, 1400–2850 m in the Alps.

* *S. caliginosa* (Stein, 1916) GA1, GA2, MA

Distribution: An endemic Alpine species.

Biology: Larvae unknown. Adults carnivorous, around sandy and muddy pools and small streams. Most abundant at high altitudes, but also occasionally occurring in the upper forest zone, 1840–2930 m in the Alps.

* *S. denigrata* (Meigen, 1826) LN, PA, TI

Distribution: North and Central Europe. Probably a Ponto-Mediterranean element.

Biology: Larvae unknown. Adults carnivorous, on leaves and vegetation near streams. Mainly a lowland species; in the forest zone in the Alps, up to 2400 m.

* *S. meadei* (Schnabl, 1915) CA2

Distribution: North and upland Central Europe. With boreo-montane (taiga) disjunctions.

Biology: Larvae unknown. Adults carnivorous, on rocks and stones by streams. Near streams in

the upper forest zone, up to the subnival zone, 1470–2850 m in the Alps.

* *S. solitaria* (Collin, 1921) GA1, SR2

Distribution: Endemic to the Central European uplands and mountains; also the UK, but not Scandinavia.

Biology: Larvae unknown. Adults carnivorous, on rocks and stones, usually near water. From the forest zone up to the nival zone, 1470–2800 m.

Muscinae

* *Morellia aenescens* Robineau-Desvoidy, 1830 SU

Distribution: Palaearctic. A Manchurian element.

Biology: Larvae in horse and cow dung. Adults on flowers, especially umbels. In the forest zone, rarely up to alpine heaths at 1950 m.

* *Musca autumnalis* De Geer, 1776 PR

Distribution: Mainly Holarctic, but also recorded from the northern Oriental region and some parts of the Afrotropical. An expansive Mediterranean element.

Biology: Larvae usually in cow dung; coprophagous. Adults common in rural areas, especially near cattle, often resting on gates and fence posts. Rarely above the forest zone in the Alps, up to the boulder zone at 2300 m where it was observed feeding on nectar on *Saxifraga azoides*.

* *M. domestica* Linnaeus, 1758 SU

Distribution: Cosmopolitan, «The House Fly».

Biology: Larvae in all kinds of decaying organic matter where the rate of fermentation is high. Adults in houses, but occurring outdoors and in the Alps following man up to 2930 m.

Mydaeinae

H. vespertina (Fallén, 1823) SU

Distribution: Holarctic. A Manchurian species.

Biology: Larvae in decaying organic material; obligate carnivores. A forest species, up to 2100 m. Adults on leaves and in ground vegetation.

Mydaea rufinervis (Pokorný, 1889) PL, SU

Distribution: An endemic Alpine species. Oreotundral (alpine oreol).

Biology: Larvae not known; almost certainly in dung in marmot burrows and obligate carnivores.

Adults found only above the tree-line, on grass and stones around the entrance to marmot burrows: this species could be called «The Marmot Fly». 2020–3006 m. Observed feeding on nectar on *Saxifraga azoides*.

* *Myospila alpina* Hendel, 1901 GA1

Distribution: An endemic Central European montane species. Oreotundral.

Biology: Larvae not known, but certainly in dung, carnivorous. Adults commonly on flowers such as *Saxifraga azoides*. Occasionally found in the upper forest zone, but mostly above the tree-line to subnival zone, 1700–3020 m in the Alps.

* *Myospila mediatunda* (Fabricius, 1781) SU

Distribution: Holarctic. Probably a Manchurian element.

Biology: Larvae found mainly in cow dung, but also in the dung of other mammals. Adults on flowers and on dung. Usually in the forest zone, but occasionally in meadows up to 2600 m.

Phaoniinae

Helina fratercula (Zetterstedt, 1845) SU

Distribution: North and mainly upland Central Europe. Possibly a Ponto-Mediterranean element, with boreomontane (taiga) disjunctions.

Biology: Larvae in moss; obligate carnivores. Adult habits unknown; in the forest zone and above the tree-line up to the nival zone, up to 2850 m in the Alps.

* *H. obscurata* (Meigen, 1826) SR1

Distribution: Holarctic. A Manchurian element.

Biology: Larvae in humus soil; obligate carnivores. Adults in ground vegetation; mostly in the forest zone, but also in the heaths just above the tree-line. Up to 2400 m in the Alps.

* *H. obtusipennis* (Fallén, 1823) GA2, PL

Distribution: North and montane Central Europe, and Turkey. A Ponto-Mediterranean element.

Biology: Larvae not known. Adults in ground vegetation, and occurring almost exclusively above the tree-line, from alpine meadows to the nival zone. 1840–3006 m in the Alps.

H. reversio (Harris, 1780) CM1, GA1, GA2, PB, PL, PR, PR, SU

Distribution: Holarctic. It may be polycentric in the Palaearctic, both expansive Mediterranean and Manchurian.

Biology: Larvae in decaying organic matter; obligate carnivores. A highly euryoecious species, with adults abundant in ground-vegetation in coastal dunes, in lowland and upland forests, and above the tree-line. Up to the nival zone in the Alps, to 3006 m.

* *Phaonia jugorum* (Strobl, 1910) MA

Distribution: An endemic Central European species, known only from the Alps, the Tatras, and a few other upland areas.

Biology: Larvae unknown. A forest species, with adults in ground vegetation in damp, shaded habitats. Up to 2200 m in the Alps (BEZZI, 1918).

P. serva (Meigen, 1826) PA, SU

Distribution: Holarctic. A Manchurian element.

Biology: Larvae primarily in humus soil, also in decaying vegetable matter; obligate carnivores. A forest species, but adults also found in alpine meadows just above the tree-line, on open flowers especially *Ranunculus*. Up to 2200 m in the Alps (BEZZI, 1918).

FANNIIDAE

Fannia manicata (Meigen, 1826) SU

Distribution: Holarctic, and reaching the Oriental region in India, Nepal, Pakistan. A Manchurian element.

Biology: Larvae in decaying organic matter, including fungi, carrion, dung; saprophagous. A forest species, up to 2400 m in the Alps. Adult males form small swarms; females in ground vegetation.

F. mollissima (Haliday, 1840) LB, PA, SU

Distribution: Holarctic. A Mongolian element.

Biology: Larvae in rotting plant material and wood; saprophagous. Adults only in early spring, on flowers, especially *Ranunculus*. A forest species, occurring up to 2300 m in the Alps (BEZZI, 1918).

* *F. postica* (Stein, 1895) PT

Distribution: Holarctic. A Ponto-Mediterranean element.

Biology: Larvae in rotting plant material and wood; saprophagous. Adult males form swarms; females in ground vegetation. This is one of the few *Fannia*-species to extend through the forest zone and to occur above the tree-line. Up to 2060 m in the Alps. In the Caucasus Mts of Georgia, from the forest zone and heaths, 1900–2500 m (PONT leg.).

* *F. serena* (Fallén, 1825) RD, PT

Distribution: Holarctic. A Manchurian element.

Biology: Larvae in nests and in dung; saprophagous. Adult males form swarms; females in ground vegetation. Adults found only in the forest zone, up to 2060 m in the Alps.

F. similis (Stein, 1895) SU

Distribution: Palaearctic. A Mongolian element.

Biology: Larvae in humus soil; saprophagous. Adult males form small swarms; females in ground vegetation. Adults found only in the forest zone, up to 2100 m in the Alps.

* *F. sp.* SR2

This small female has an anteroventral seta on mid tibia on both sides, and runs to *umbratica* Collin, 1939, in the key by ROZKOŠNÝ et al. (1997). However, this identification cannot be confirmed because of the possibility that the unknown female of the recently described *Fannia slovaca* GREGOR & ROZKOŠNÝ (2005), may also possess the same characters. Furthermore, the lower calypter is extremely reduced, as in species of the *serena*-group, but there is no known species of the *serena*-group with the characters of this female (single prealar seta, postocular setulae in two rows, presutural acrostichal setulae triserial). As pointed out by GREGOR & ROZKOŠNÝ (2005), the three recorded Swiss females of *umbratica* may actually belong to *slovaca* now that this additional species is known from Central Europe.

4. Discussion

The findings given in this report represent a preliminary survey of the Alp Flix, since only a few days were spent collecting samples, namely the Geo-Tag in 2000 and three days in August 2004. In the light of this, the list of 48 species of Muscidae enumerated here is an impressive total. There are certainly some obvious gaps, as it was not possible to collect from the nival zone which is present although much reduced in extent in the Alp Flix area, and collecting during different seasons will also reveal a much greater diversity.

Previous records of 3 species, namely *Hebecnema fumosa* (MEIGEN 1826), *Muscina pascuorum* (MEIGEN 1826) and *M. prolapsa* (HARRIS 1780) (GEO 2000), must be deleted as they were based on misidentifications.

The 48 species form some 17 percent of the recorded Swiss muscid fauna of 281 species, and include one species that is here recorded from Switzer-

land for the first time (*Coenosia ambulans* [MEIGEN]). The Swiss muscid fauna is still under-recorded, as the numbers of species in adjacent alpine countries are 290 for Italy and 315 for Austria. Further field-work on the Alp Flix could almost double the present list, as there are a number of forest species, alpine heath species (e.g. *Thricops culminum* [POKORNY]) and nival species (*Phaonia chalinata* [PANDELLÉ], *Thricops villosus* [HENDEL]) that occur commonly in their respective habitats but which were not found during the present survey.

A survey of the upper Ötz valley in the Austrian Tyrol, encompassing the main valley and side valleys from Zwieselstein up to Obergurgl, Hochgurgl, the Timmelsjoch pass and Vent, 1470 to 3020 m, has resulted in a list of 143 species (ACP). This gives some indication of the muscid biodiversity that can be expected in these Alpine valleys and mountain slopes. So far as the fauna above the tree-line is concerned, there appears to be a considerable biodiversity and level of endemism in the high-alpine heaths and in the boulder zone above them. It is also the case that in the course of the short alpine summer, species may migrate from the forest zone up to the heath zone, or at least are carried there passively by thermal currents. In the Ötz valley, 70 species of Muscidae have been recorded from above the tree-line (PONT 1995), whilst in the South Tyrol, 71 species have been recorded from a Malaise trap set at 2315 m from 29 June to 30 August 2005 (PONT, in press). It can be expected that further collecting will substantially increase the species list for the Alp Flix.

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