

Ants (Hymenoptera: Formicidae) in the Münstertal (Val Müstair) – a hot spot of regional species richness between Italy and Switzerland

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Abstract

The ant fauna (Hymenoptera, Formicidae) of the Münstertal / Val Müstair (Italy, Switzerland) was extensively studied by different field methods during a Biodiversity Day held on the 25th June 2011. A total of 47 species from 4 subfamilies were recorded. Two species, *Formica clara* FOREL, 1886 and *Lasius reginae* (FABER, 1967), represent new records for Southern Tyrol (and probably for Italy). *Myrmecina graminicola* (LATREILLE, 1802) is new for the Vinschgau / Val Venosta. Habitat and vertical distribution of *Temnothorax lichtensteini* sp. 2 in the Alps is discussed. Xerothermic habitats (dry grassland, woodland, scree slopes) show a high species richness. Local wetlands shelter a relatively poor ant fauna without stenotopic species.

Keywords: Ants, Formicidae, *Temnothorax lichtensteini* sp. 2, *Lasius reginae*, *Formica clara*, faunistic, Italy, Southern Tyrol, Switzerland

1 Introduction

The regional faunistic knowledge of ants (Hymenoptera, Formicidae) in the upper Etsch valley (Vinschgau / Val Venosta, Italy, Southern Tyrol) is documented in several papers (BUSCHINGER 1999, GLASER 2003, 2005a, GLASER et al. 2010). The adjacent canton Graubünden was well studied from the myrmecological point of view by KUTTER (1975, 1980) and DETHIER & CHERIX (1982). In the last years, myrmecological field work concentrated on the Swiss National Park, which culminated in the discovery of a probably new species of the *Formica* s.str. -complex by molecular genetic means (BERNASCONI et al. 2011).

The ant fauna of the Italian and Swiss Münstertal (Val Müstair), a western side valley of the Val Venosta / Vinschgau, has not been systematically studied yet. On 25th June 2011 the Naturmuseum Südtirol and the Swiss National Park organized an event ("Tag der Artenvielfalt") where different specialists collected faunistic and floristic data in the Münstertal / Val Müstair. The myrmecological team consisted of Daniel Cherix (CH), Anne Freitag (CH), Florian Glaser (A) and Holger Martz (D). All presented data were collected during this event.

In this paper we want to summarize the new faunistic data of ants from this myrmecologically neglected region.

2 Study area

The study was conducted in the Swiss and Italian parts of the Münstertal/Val Müstair. Table 1 shows position, sea level and investigated habitats of the different sites. For further information see SCHATZ et al. (2012).

Table 1: Sampled sites, locations and elevations in the Münstertal / Val Müstair (Italy, Switzerland) (ordered by elevation resp. nation).

Site number	Habitat(s)	Location	X (wgs 84)	Y (wgs 84)	m (a.s.l.)
6	small fen	CH, 0,5 km E Müstair	10,4539	46,6240	1245
B	alpine stream: riparian forest, shore line (gravel, sand), elevated bank (mud)	CH, Sta. Maria Val Müstair, Rombach/Aua da Vaua	10,4149	46,6027	1350
3	grassland, road verges	CH, Sta. Maria Val Müstair, Costas	10,4251	46,6073	1340-1370
4a	coniferous forest	CH, Sta. Maria Val Müstair, Runcs	10,4415	46,6076	1430
4b	coniferous forest	CH, Müstair, Bains du Guad	10,4488	46,6114	1500
2	pasture in a dry grassland	CH, Sta. Maria Val Müstair, La Crusch	10,4223	46,6100	1540 -1560
C	subalpine pasture	CH, 1,2 km NNE Sta. Maria Val Müstair	10,4155	46,6103	1800
13a	(irrigated) meadows with scattered <i>Larix decidua</i> and dry grassland	Italy, 3,2 km NE Taufers / Tubre, Calvenwald	10,4962	46,6642	1070
9	ruderal site, open sand with scattered vegetation	Italy, 1,4 km NE Taufers / Tubre, Rambach/Rombach	10,4804	46,6504	1100
10	intensive grassland with hedges	Italy, 2 km NE Taufers / Tubre	10,4853	46,6547	1130
13b	scree slopes with <i>Quercus pubescens</i> and <i>Pinus sylvestris</i> , and rocks with <i>Sedum</i> and <i>Sempervivum</i>	Italy, 3,6 km NE Taufers / Tubre, Calvenwald	10,4989	46,6681	1150
13	different habitats mentioned sub 13a and 13b	Italy, 3,2 - 3,6 km NE Taufers / Tubre, Calvenwald	see 13a, b	see 13a, b	1070-1150
11a	dry grassland	Italy, 0,5 km NE Taufers / Tubre	10,4758	46,6550	1180
A	village, gravel roof	Italy, Taufers/Tubre, village	10,4635	46,6457	1250
7	dry grassland	Italy, 0,7 km NW Taufers / Tubre	10,4544	46,6445	1300-1335
11b	dry grassland, scree slopes	Italy, 1 km NE Taufers / Tubre	10,4686	46,6551	1430-1500
12	dry grassland	Italy, 1,6 km N Taufers / Tubre	10,4616	46,6601	1700

3 Material and methods

Several sampling methods were applied to get an overview about the local ant fauna:

Sampling by hand and nest search: Potential microhabitats were controlled for ant colonies. Dead wood and grass tussocks were opened manually or by a knife or gardening tool. Even single individuals outside nests were collected (all sites except C; 184 records).

Sugar baits: Small plastic vials with cotton soaked with sugared water were distributed on the ground along several transects. The vials were collected after one hour and the ants were put in ethanol (sites 2, 3; 58 records).

Sieving: Small and cryptic ant species in litter, dead wood and moss were additionally sampled by sieving. The material was predominantly sorted in the field, in some cases by a Berlese apparatus in the laboratory (sites 6, 7, 9, 11, 13b, B; 7 samples, 32 records).

Soil samples: Ants from soil samples applied to collect Acari Oribatida (see SCHATZ & FISCHER 2012) were extracted in a Berlese apparatus (sites 6, 11, 12, 13b, C; 6 samples, 26 records).

Netting and beating: Higher vegetation was extensively sampled by netting and beating (site 11; 2 samples, 4 records).

Identification

The ant material was identified using the key in SEIFERT (2007). Species of the *Tetramorium caespitum/impurum*-complex were not identified to species level in this study. The material is deposited in the Coll. Martz, Coll. Glaser and the Musée cantonal de zoologie Lausanne (CH).

4 Results

A total of 304 ant records (ca. 2500 individuals) were collected, belonging to 4 subfamilies (Myrmicinae, Ponerinae, Dolichoderinae and Formicinae) and 47 species. Table 2 shows a list of the recorded species and informs about their occurrence in different sites and the number of records. *Lasius reginae* (FABER, 1967) and *Formica clara* FOREL, 1886 represent first records for Southern Tyrol (Alto Adige) and probably Italy. *Myrmecina graminicola* (LATREILLE, 1802) was found in the Vinschgau / Val Venosta for the first time. The species sampled in the Swiss part of Val Müstair were all already known from Swiss National Park (KUTTER 1975) or observed in Val Müstair by R. Neumeyer (in 2011, databank Centre suisse de Cartographie de la Faune, Neuchâtel). Only *Temnothorax unifasciatus* (LATREILLE, 1798) is a new record for this region.

Table 2: List of ant species (Hymenoptera, Formicidae) recorded in the Münstertal/Val Müstair. Occurrence at different sites, number of records, comments and recording methods.

Abbreviations: I = Italy, CH = Switzerland, V = Vinschgau/Val Venosta, VM = Val Müstair, SNP = Swiss National Park; S = sieving, H = catch by hand and/or nest search, B = bait, N = netting, G = soil samples. Sites with only records of gynes or males are given in brackets.

Species (in alphabetical order)	Sites	n (records)	Comments	Methods
<i>Aphaenogaster subterranea</i> (LATREILLE, 1798)	I: 11a, 13b	8	Several records from V up to app. 800 m a.s.l. (GLASER 2003), at the study site up to 1150 m a.s.l.	S, H
<i>Camponotus herculeanus</i> (LINNAEUS, 1758)	CH: 3	1	Already recorded from V (GLASER 2003, 2009a), SNP (KUTTER 1975).	H
<i>Camponotus ligniperda</i> (LATREILLE, 1802)	CH: 2, 3, 4b; I: 7, 11a, 13a, 13b	14	Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF).	S, H
<i>Formica cinerea</i> MAYR, 1853	I: 13a	1	A single worker was collected in xerothermic grassland. The morphology (head sides with hairs) corresponds to the " <i>balcanina</i> -form" (see GLASER 2003).	H
<i>Formica clara</i> FOREL, 1886	I: 10, 11a	2	First record for Southern Tyrol and maybe Italy.	H
<i>Formica cunicularia</i> LATREILLE, 1798	I: 10, 11b, 13	7	Already recorded from V (GLASER 2003, 2009a).	H
<i>Formica exsecta</i> NYLANDER, 1846	CH: 3	2	Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF).	H
<i>Formica fusca</i> LINNAEUS, 1758	CH: 2; I: 9, 11a, 13	8	Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF), SNP (KUTTER 1975).	H
<i>Formica lemani</i> BONDROIT, 1917	I: 12	1	Already recorded from V (GLASER 2003, 2009a), SNP (KUTTER 1975).	G
<i>Formica rufa</i> LINNAEUS, 1761	CH: 4a, 4b; I: 13b	4	Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF).	H
<i>Formica rufibarbis</i> FABRICIUS, 1793	CH: 2, 3; I: 7, 11a, 11b, 13	24	Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF), SNP (KUTTER 1975).	S, H, B
<i>Formica sanguinea</i> LATREILLE, 1798	CH: 2, 3, 4b; I: 7, 11a, 11b, 13	14	Already recorded from V (GLASER 2003), VM (R. Neumeyer, 2011, Databank CSCF), SNP (KUTTER 1975).	H, B, N
<i>Formica selysi</i> BONDROIT, 1918	I: A	1	A single colony was collected from a gravel roof with scattered vegetation (see Fig. 1), which represents a rather unusual habitat for this stenotopic predominantly ripicolous pioneer species (but compare SCHLICK-STEINER & STEINER (2004) for other ripicolous ant species). Already recorded from V (GLASER 2003, 2009), SNP (KUTTER 1975).	H

Species (in alphabetical order)	Sites	n (records)	Comments	Methods
<i>Formicoxenus nitidulus</i> (NYLANDER, 1846)	CH: 4a	1	In a <i>F. rufa</i> – nest. In V just one other record from the same host species (GLASER 2003, Naturns / Naturno), SNP (KUTTER 1975) in <i>F. aquilonia</i> YARROW, 1955 nests.	H
<i>Lasius brunneus</i> (LATREILLE, 1798)	I: 13b	5	This arboricolous species seems not to be very common in V (just one record from Naturns/Naturno, GLASER 2003). Missing records even in well investigated regional flood plain forests (GLASER 2005a), which represent a typical habitat in other regions of the Alps (GLASER 2001, 2005c, 2009b).	G, S, H
<i>Lasius flavus</i> (FABRICIUS, 1782)	CH: 3; I: 11a, 13a	8	Already recorded from V (GLASER 2003), SNP (KUTTER 1975).	H
<i>Lasius fuliginosus</i> (LATREILLE, 1798)	I: 10, 12, 13	3	Already recorded from V (GLASER 2003).	H
<i>Lasius meridionalis</i> (BONDROIT, 1920)	I: 11b	1	Already recorded from V (GLASER 2003), VM (R. Neumeyer 2011, Databank CSCF).	H
<i>Lasius niger</i> (LINNAEUS, 1758)	CH: 3; I: 9, 13a	13	Already recorded from V (GLASER 2003), VM (R. Neumeyer 2011, Databank CSCF).	H, S, B
<i>Lasius paralienus</i> SEIFERT, 1992	I: 7, 11a, 11b, 12, 13a, 13b	9	Already recorded from V (GLASER 2003, 2009a).	G, S, H
<i>Lasius platythorax</i> SEIFERT, 1991	I: 13a	1	Not very common in V (just one record from Prad/Prato) (GLASER 2003).	H
<i>Lasius psammophilus</i> SEIFERT, 1992	CH: 2; I: 7, 11a, 11b	5	Less frequent than <i>L. paralienus</i> , but often syntopically with this species, which can be observed even in V and the Upper Tyrolean Inn Valley. VM (R. Neumeyer, 2011, Databank CSCF).	G, S, H
<i>Lasius reginae</i> (FABER, 1967)	I: 11a, 11b	4	First record for Southern Tyrol and Italy. Few records in the region (2 records from the Upper Inn Valley, Austria, Northern Tyrol, Fliess and Schönwies) (GLASER 2001 and unpubl.). 1 Swiss record from Locarno (NEUMEYER 2008). <i>Lasius paralienus</i> and <i>L. psammophilus</i> represent potential host species at the sample location. Habitat see Fig. 2.	H
<i>Leptothorax muscorum</i> (NYLANDER, 1846)	CH: 4b	1	Already recorded from V (GLASER 2003), SNP (KUTTER 1975).	H
<i>Manica rubida</i> (LATREILLE, 1802)	CH: 4b; I: (11a, 11b)	4	Already recorded from V (GLASER 2003, 2009), SNP (KUTTER 1975).	H, N
<i>Myrmecina graminicola</i> (LATREILLE, 1802)	I: 13b	3	First record for V (probably for methodological reasons, compare <i>Stenamma</i>).	G, S

Species (in alphabetical order)	Sites	n (records)	Comments	Methods
<i>Myrmica lobicornis</i> NYLANDER, 1846	CH: 2; I: 11b	4	First secure records for V (the predominantly subalpine sister species <i>M. lobulicornis</i> NYLANDER, 1854 has been already recorded from Graun and Laas, GLASER 2008). The published records in GLASER (2003: V) and KUTTER (1975: SNP) have not been checked according to SEIFERT (2005) yet.	H, B, N
<i>Myrmica lonae</i> FINZI, 1926	CH: 2; I: 7, 11a, 11b, 13a	8	Already recorded from V (GLASER 2003, 2009), VM (R. Neumeyer, 2011, Databank CSCF).	H, B
<i>Myrmica rubra</i> (LINNAEUS, 1758)	CH: 3, 6, B; I: 9, 10	25	Already recorded from V (GLASER 2003), VM (R. Neumeyer, 2011, Databank CSCF).	G, S, H, B
<i>Myrmica ruginodis</i> NYLANDER, 1846	CH: 2, 4b, 6, (B); I: 13	12	Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF), SNP (KUTTER 1975).	G, S, H, B
<i>Myrmica sabuleti</i> MEINERT, 1861	CH: 2, 3, 6; I: 10, 11b	8	Already recorded from V (GLASER 2003).	G, H, B
<i>Myrmica scabrinodis</i> NYLANDER, 1846	CH: C; I: 13	2	Already recorded from V (GLASER 2003), VM (R. Neumeyer, 2011, Databank CSCF), SNP (KUTTER 1975; Kutter may have confused some <i>M. scabrinodis</i> with <i>M. sabuleti</i>).	G, H
<i>Myrmica schencki</i> VIERECK, 1903	CH: 2, 3; I: 11b	15	Already recorded from V (GLASER 2003).	H, B
<i>Myrmica sulcinodis</i> NYLANDER, 1846	CH: B	1	Already recorded from V (GLASER 2003, 2009a), SNP (KUTTER 1975).	H
<i>Plagiolepis vindobonensis</i> LOMNICKI, 1925	I: 11a, 13	3	Already recorded from V (GLASER 2003).	H
<i>Polyergus rufescens</i> LATREILLE, 1798	I: 13a	1	Some records from the V (GLASER 2003).	H
<i>Ponera coarctata</i> (LATREILLE, 1802)	I: 13b	2	First records for V identified according to CZÖSH & SEIFERT (2003). The published record in GLASER (2003) belongs to <i>P. testacea</i> (see GLASER 2005a).	H, S
<i>Ponera testacea</i> EMERY, 1895	I: 7, 13b	2	Already recorded from the Prader Sand (V) (GLASER 2005a).	S
<i>Stenamma debile</i> (FÖRSTER, 1850)	I: 13b	1	The rareness in V (one record from Schlanders/Silandro, GLASER 2003) should be a methodological artefact. The altitude of the actual record seems to be relatively high.	G
<i>Tapinoma subboreale</i> SEIFERT, 2012	I: (10), 11a, 11b	4	Many records from V sub <i>T. ambiguum</i> (see SEIFERT 2012).	H
<i>Temnothorax albipennis</i> (CURTIIS, 1954)	I: 11a, 13b	3	Already recorded from Graun (V) (GLASER 2009).	H, S

Species (in alphabetical order)	Sites	n (records)	Comments	Methods
<i>Temnothorax cf nigriceps</i>	I: (11a)	1	The single gyne collected in site 11 could not be identified without doubt. The species is known from several sites in V (GLASER 2003) and in VM (R. Neumeyer, 2011, Databank CSCF).	H
<i>Temnothorax lichtensteini</i> sp. 2	I: 13b	2	5 workers have been sieved in humid litter of a <i>Quercus pubescens</i> - group in a scree slope, 1376 m a.s.l. (leg. Irene Schatz). A further single worker has been collected by hand in a similar habitat (leg. Glaser). No nest records. The <i>T. lichtensteini</i> -sample from Naturns/Naturno belongs to this undescribed (sub)species, too (GLASER 2003; sub <i>Leptothorax lichtensteini</i> , see also NEUMEYER 2008). Next Swiss records from Brissago (NEUMEYER 2008).	H, S
<i>Temnothorax nylanderi</i> (FÖRSTER, 1850)	I: 13a, 13b	3	Already recorded from V (GLASER 2003).	H, S
<i>Temnothorax tuberum</i> (FABRICIUS, 1775)	CH: 2, 3, 6, C; I: 11a, 11b, 12	14	One sample (site 3) has been identified morphologically as a potential hybrid with <i>T. unifasciatus</i> (det. B. Seifert). Already recorded from V (GLASER 2003, 2009a), VM (R. Neumeyer, 2011, Databank CSCF).	G, H, B
<i>Temnothorax unifasciatus</i> (LATREILLE, 1798)	CH: 2, 6, C; I: 7, 11a, 11b, 12, 13a, 13b	23	Already recorded from V (GLASER 2003). First record for Val Müstair/SNP region.	G, S, H
<i>Tetramorium</i> sp.	CH: 2, 3; I: 7, 11a, 11b, 12, 13b	26	Already recorded from V (GLASER 2003, 2009a).	G, S, H, B

5 Discussion

The species number recorded in the Münstertal/Val Müstair is high compared with similar one-day-studies. For example during other “Days of Biodiversity” ant species numbers between 9 and 33 could be collected in Southern Tyrol (GLASER 2005b, 2006, 2007, 2009a) and only 9 ant species were collected in the Vallon de Nant (canton de Vaud, Switzerland) (FREITAG & CHERIX 2009). The relatively high species richness of the study site can be explained by several reasons.

1. High sampling intensity (team of four experienced myrmecologists, additional by-catch from different methods like sieving and soil sampling by other entomologists and arachnologists).
2. Sampling sites in dry grassland, xerothermic scree slopes and xerothermic woodland which represent the ant habitats with the highest species richness of ants in Central Europe and
3. the unique biogeographical location sheltering a diverse mixture of oriental (*Temnothorax lichtensteini* sp.2, *Lasius reginae*) and occidental (*Temnothorax nylanderi* FÖRSTER, 1850), submediterranean, boreomontane and wide spread “European” species (comp. BUSCHINGER 1999, GLASER 2003). Nevertheless the local ant diversity of the Münstertal/Val Müstair is not yet completely known. Social parasites, species restricted to higher elevations, and even whole species groups like mound building *Formica* s. str. are highly underrepresented in this study. At least two more species are present in the Val Müstair, *Temnothorax nigriceps* (MAYR, 1855) and *Formica polycтена* FÖRSTER, 1850 (R. Neumeyer, databank CSCF).

Especially open xerothermic grassland supports the presence of a rich ant fauna. From the view of conservation these habitats require extensive grazing and are often threatened by afforestation or natural succession of woodland as well as by intensified agriculture. Some of the ant species recorded in this habitat, especially *Lasius reginae*, are very rare. In the Alps this temporary social parasite is known from just one location in Switzerland (NEUMEYER 2008) and very few locations in Tyrol (GLASER 2001) and Lower Austria (SCHLICK-STEINER et al. 2003).

The investigated fen (site 6) shows a rather poor ant fauna. Stenotopic species like *Myrmica vandeli* BONDROIT, 1920 and *Formica picea* NYLANDER, 1846, but even the typical and wide spread hygrophilous, polytopic *Myrmica scabrinodis* NYLANDER, 1846 are missing. The next known (and single) population of *Formica picea* in Southern Tyrol exists in the Upper Vinschgau/Val Venosta, distant less than 20 km (GLASER 2009a). This result may be caused by isolation and anthropogenic degradation.

The small Myrmicinae ant *Temnothorax lichtensteini* sp.2 represents an oriental sister taxon of *Temnothorax lichtensteini* (BONDROIT, 1918) with unclear taxonomical position (SEIFERT 2007, Seifert in litt).

This form has been recorded in the Alps from a few locations in Southern Tyrol, Austria and Switzerland (GLASER 2003, NEUMEYER 2008, Wagner in prep., Seifert in litt.). The ecological requirements of *T. lichtensteini* sp.2 are not well known. The few available habitat notes suggest that the species is restricted to xerothermic woodland with stony substrate. In the Vinschgau/Val Venosta all records originate from sites with *Quercus pubescens*. In Carinthia (Austria) the species inhabits xerothermic woodland with *Pinus sylvestris* and nests between stones or rocks (Seifert in litt., Wagner in prep.). The vertical distribution ranges from 195 m (CH, Brissago) up to 1137 m a.s.l. (Southern Tyrol).

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Figure 1: Gravel roof in the center of Taufers/Tubre (site A), habitat of the xenotopic pioneer species *Formica selysi*.



Figure 2: Steep slope with xerothermic grassland (NE Taufers/Tubre, site 11a) and high species richness (19 spp.). Habitat of *Lasius reginae* and *Formica clara*, two species recorded for the first time in Southern Tyrol (and probably Italy). For further occurring species see table 2.

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