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Scuttle flies (Diptera, Phoridae) in *Castanea sativa* forests in the southern Alps (Ticino, Switzerland), with thirteen species new to Switzerland

SABINE PRESCHER¹, MARCO MORETTI² & PETER DUELLI³

Scuttle flies were studied in the chestnut forests of Ticino in the southern Alps. In the sampling period of March–September 1997, 1512 individuals were collected and 53 species could be identified. The most abundant species was *Megaselia verralli*. The results of this study indicate a wide distribution and high abundance of this species in the chestnut forests of Ticino. *Megaselia rubella* and *Megaselia brevicostalis* were also common species. The dominant species found in this study were more abundant on sites where wildfires had occurred within the last seven years than on those on which wildfires had not occurred within that period. Thirteen species were new to the Swiss fauna: *Aenigmatias dorni*, *Borophaga agilis*, *B. subsultans*, *Dohnniphora cornuta*, *Megaselia bifida*, *M. glabrifrons*, *M. hirsuta*, *M. latipalpis*, *M. lucifrons*, *M. posticata*, *M. rubella*, *M. verralli* and *Metopina crassinervis*. In addition, a male was found of a genus not included in the genus keys of the palaeartic region.

Keywords: Ticino, Diptera, Phoridae, *Castanea sativa*, chestnut forests, wildfires, *Megaselia verralli*

INTRODUCTION

A study, carried out in Ticino in the chestnut belt of the southern slopes of the Alps, investigated the effects of wildfires on the invertebrate fauna of that region (MORETTI et al. 1998, 2002; WYNIGER & DUELLI 2000; HÖRDEGEN & DUELLI 2000; GIACALONE & MORETTI 2001). In this project many scuttle flies were collected and investigated. The present study discusses the effect of wildfires on the Phoridae and presents the faunistic and ecological data of the species. It is the first time that Phoridae in a forest of *Castanea sativa* have been studied.

INVESTIGATION SITES AND METHODS

The study region is located along a uniform, south-facing slope (450–850 m a.s.l.) near Locarno (46°09' 08"44'), in the canton of Ticino, in southern Switzerland (Fig. 1). The study area has a moist, warm temperate climate, with a mean annual precipitation of 1600–1700 mm, a mean annual temperature of about 12°C, and mean monthly temperatures of 1°C in January and 22°C in July. The vegetation is dominated by European chestnut (*Castanea sativa*) on mainly acidic soil. Chestnut was introduced into the area during the Roman period, about 2000 years ago (TINNER et al. 1999). Its introduction represented a major change in landscape management in southern Switzerland, from a slash-and-burn type of agriculture to chestnut forest grove and coppice management. Since the 1950s, however, the frequency of fires has increased again with the abandonment of most of the chestnut coppices (CONEDERA & TINNER 2000).

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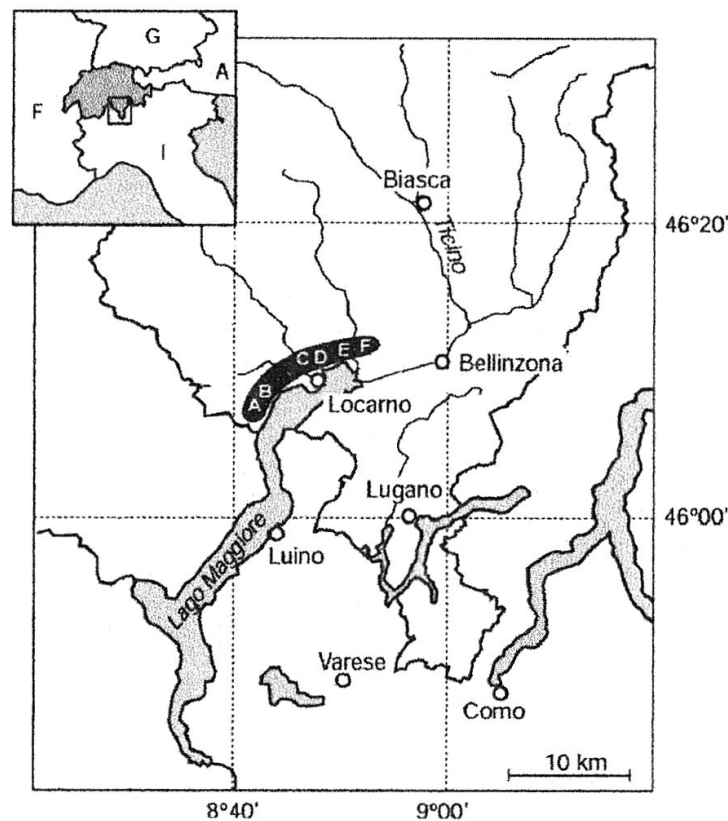


Fig. 1. Location of the study region (dark shading) on the Swiss southern slope of the Alps (A–F: six study sectors).

In the study area we selected 23 study sites. The sites were similar to each other in aspect, slope, soil and plant species composition, but differed in terms of fire frequency and time elapsed since the last fire over the past 30 years (1968–1997) (CONEDERA et al. 1996). Most of the sites, except those which had been recently burnt, contained chestnut forest with a closed canopy. Other common tree species were birch (*Betula pendula*), hazel (*Corylus avellana*) and oak (*Quercus petraea*). Of other plants, the fern *Pteridium aquilinum* and the grass *Molinia coerulea* were the most abundant species. The phytosociological unit is the *Phyteumo betonicifoliae-Quercetum castanosum* (ELLENBERG & KLÖTZLI 1972). Tab. 1 shows the details of the 23 sites.

Scuttle flies were sampled using ground ecollectors developed by BRUNHES (1981). Three ground ecollectors were installed on each of the 23 study sites. The distance between the traps was at least 10 m. The traps were emptied weekly from the beginning of March to the end of September 1997, resulting in a total of 28 sampling periods.

The Phoridae were identified by Sabine PRESCHER, Gisela WEBER (Braunschweig) and Jutta FRANZEN (Köln). For determination, the keys of DISNEY (1983a, 1989), SCHMITZ (1938–1958) and SCHMITZ et al. (1974–1981) were used. The nomenclature follows DISNEY (1991a). Specimens of the species are kept in the Museo Cantonale di Storia Naturale in Lugano.

Statistical analysis of the number of individuals of several species was carried out by Martin OBRIST (WSL, Birmensdorf) with DataDesk statistical software (Data Description, Inc. Ithaca, NY).

Tab. 1. List of the study sites grouped into 6 units of vegetation types and description of some environmental site factors.

Site	Commune	Local name	Coordinate		Alt. (m a.s.l.)	Asp.	Slope	Vegetation unit	Physiological unit	Cover (in %)				Litter depth (in cm)
			coox	cooy						trees	shrubs	herbs	litter	
1	Brissago	Ciossa	696.950	106.800	460	SW	60%	1 Closed chestnut coppices (similar to high forests)	42	90	20	15	76-100	5
4	Ronco s./ Ascona	Fontana Martina	698.880	110.450	480	W-SW	55%		42	90	10	5	76-100	4
11	Locarno	Monte Bré	703.450	115.250	820	S	65%		42	95	20	35	76-100	5
14	Orselina	Gaggio	704.400	115.450	660	S	65%		42	90	1	10	76-100	5
13	Locarno	Piodelle	703.800	115.600	920	S	60%		42 + (34)	90	5	60	76-100	5
15	Minusio	Ronco di Bosco	705.550	115.750	670	S	55%		42 + (34)	93	17	13	76-100	4
16	Minusio	Ronco di Bosco	705.350	115.650	660	S-SW	40%		42-(34) + (34)	88	5	12	76-100	3
8	Locarno	Canegg	703.000	114.650	460	S-SO	65%		(42)-34 + (42)	80	5	40	76-100	3
9	Locarno	Colmagera	702.400	115.300	500	O-SO	70%	2 Closed and mature chestnut coppices (mesophil stands)	34	75	10	15	76-100	4
3	Brissago	Boscopiano	698.450	109.950	560	SW	60%		34	90	5	5	76-100	5
18	Tenero-Contra	Falò	708.200	116.500	590	SW	75%		34	95	5	5	51-75	3
21	Cugnasco	Monti di Ditto	712.100	115.850	730	S	60%		34	95	5	5	76-100	4
5	Ronco s./ Ascona	Buffàga	699.050	110.950	520	SW	65%	3 Closed chestnut coppices with numerous shoots due to wildfires or clear-cuts	42-(34)	80	25	40	51-75	2
6	Locarno	Ai Sassi	703.300	114.750	550	S	70%		42	95	10	30	76-100	3
7	Locarno	Ai Sassi	703.300	114.850	600	S	70%		42	85	3	30	76-100	2
19	Gordola	Sassone	709.950	116.650	860	S	65%		42-(34)	80	20	25	76-100	3
20	Gordola	Sassone	709.950	116.600	830	S	65%	42-(34)	80	15	35	76-100	4	
22	Ronco s./ Ascona	Sponde	698.350	110.650	820	S-SW	60%	4 Closed chestnut coppices freshly burnt	42-(34)	30	5	10	0-5	0
23	Ronco s./ Ascona	Sponde	698.300	110.750	860	S-SW	60%		(42)-34	10	5	2	0-5	0
25	Locarno	Ai Sassi	703.300	114.800	580	S	70%	5 Open chestnut coppices or small clearings with numerous shoots due to wildfires or clear-cuts	clearing 42-(34)	70	10	30	51-75	1
26	Gordola	Sassone	709.950	116.600	830	S	70%		42	65	15	35	6-25	4
10	Locarno	Colmagera	702.500	115.200	540	SO	55%		fire, coppice (42)-34	50	40	15	26-50	1
12	Locarno	Monte Bré	703.500	115.350	890	S	65%		42	20	20	75	51-75	2
2	Brissago	Sciresa	696.850	107.650	680	SW	70%		fire 42-33	58	18	15	6-25	1
17	Tenero-Contra	Selvacce	708.500	117.000	580	W-SW	70%		42-33	18	10	60	6-25	1
24	Locarno	Monte Bré	703.400	115.300	890	S	60%	6 Pre-forest stand due to repeated wildfires and clear-cuts	42	3	10	47	0-5	0

RESULTS AND DISCUSSION

Species composition and number of individuals

1529 individuals of Phoridae were caught in the sampling period of this investigation (Tab. 2). 53 species could be identified (3 with uncertain species name). The real number of species will be much higher, as the females of *Megaselia* and *Phora* and the species of the *Megaselia pulicaria*-complex were not determined. In addition, it was not possible to identify 33 *Megaselia* males.

In the case of 33 species, only one or two individuals were caught. 11 species were represented by at least 10 individuals. Only three species were caught which were represented by more than 30 individuals.

Common species

The most abundant species found in this investigation was *Megaselia verralli*. The males alone accounted for 34% of the total catch. *M. verralli* was recorded on 22 of the 23 investigation sites. This indicates a widespread and common occurrence of this species in the chestnut belt of the Alps. SCHMITZ (1938–1958) reported that *M. verralli* is widely distributed, but rare». The only record for Germany in recent years is given by FELDMANN (1992). He caught two individuals in a wood with *Pinus sylvestris*. However, *M. verralli* was the eudominant species in plantations of moist pine forests in Bialowieza Forest in Poland (DURSKA 2001). In contrast, the number of *M. verralli* in old-growth pine forests in the same investigation area was low. In Ticino too, this species was more abundant in samples from sites subjected to wildfires within the past seven years where younger chestnut trees dominated. The mean number of individuals caught in these sites was significantly higher compared to that found in sites which had never burnt or which had suffered wildfires more than 7 years before ($N = 34.3$, $N = 15.4$, respectively; $p = 0.046$). *M. verralli* had also been recorded in Italy in the vicinity of Forlì in the Romagna. It is the first time that the occurrence of this species in Switzerland is reported (PRESCHER 1998). The nutrition and mode of development of the larvae are not known.

With 6.2% of the total catch, *Megaselia rubella* was one of the most abundant phorid species found in this investigation. It was collected on 17 of the 23 sampling sites. This also indicates a wide distribution in the *Castanea sativa* forests of the Alps. *M. rubella* was also significantly more abundant on the sites subjected to wildfires within the past seven years compared to those on which wildfires had not occurred within that period ($N = 5.7$, $N = 3.1$ respectively; $p = 0.006$). Several individuals of *M. rubella* were also recorded from Bialowieza Forest, mainly from the 4–8 old pine plantations (DURSKA 2001). The species had already been collected in Italy in various locations of the Toscana (M. GORI, pers. comm.) and in many other countries in Europe (DISNEY 1991a). It is the first record for Switzerland (PRESCHER 1998). The larvae of *M. rubella* are mycetophagous (DISNEY 1994). DISNEY reported more than 20 species of fungi in which *M. rubella* develops, for instance *Agaricus campestris*, *Amanita muscaria*, *Boletus edulis*, *Leccinum scabrum* and *Suillus variegatus*.

Only one other species was represented by more than 30 captured individuals. This was *Megaselia brevicostalis*, which contributed 2.0% of the total catch. 27 individuals (87%) of this species were sampled on study site 23 (near Ronco).

Tab. 2. Species list of the investigated study sites (1–23) in the chestnut belt of the Swiss southern slopes of the Alps (Ticino). Columns: N.ind. = number of individuals sampled; % = percentage of the total sampled individuals; New for CH = new Phorid species for Switzerland (PRESCHER 1998).

Species	Study sites																							N. ind.	%	New for CH
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
<i>Megaselia verralli</i> (WOOD, 1910)	11	5	11	16	110	49	21	30	18	23	12	32	4	27	22	28	16	21	7	4	17	41	525	34.34	x	
<i>Megaselia</i> spp. - Females -																							382	25.00		
<i>Megaselia pulicaria</i> -complex - Males -	21	6	4	2	20	5	6	12	23	11	12	5	6	25	27	5	6	12	4	2	2	8	224	15.00		
<i>Megaselia rubella</i> (SCHMITZ, 1920)		1		4	12	1	2	10	11	21	1	1		3		2	10	2		1	5	8	95	6.20	x	
<i>Megaselia</i> spp. - Males -																							33	2.20		
<i>Megaselia brevicostalis</i> (WOOD, 1910)								1													3	27	31	2.00		
<i>Metopina crassinervis</i> SCHMITZ, 1920										1	2											21	24	1.60	x	
<i>Megaselia diversa</i> (WOOD, 1909)								1	21					1									23	1.50		
<i>Megaselia pleuralis</i> (WOOD, 1909)	1		1				1	1	1	3	2	5	2	1							2	1	21	1.40		
<i>Megaselia mallochii</i> (WOOD, 1909)					2	1	2					4		2	3			1		1		4	20	1.30		
<i>Aenigmatias dorni</i> (ENDERLEIN, 1908)					15		1	2															18	1.20	x	
<i>Megaselia altifrons</i> (WOOD, 1909)							2	4	1					2	2	1							12	0.80		
<i>Megaselia spinigera</i> (WOOD, 1908)				2					1						1		7						11	0.70		
<i>Megaselia lucifrons</i> (SCHMITZ, 1918)								5	1				1			2					1		10	0.65	x	
<i>Megaselia lata</i> (WOOD, 1910)							1		1	2	1			1	2								8	0.50		
<i>Megaselia meconicera</i> (SPEISER, 1925)					1	1			2								1						5	0.32		
<i>Megaselia varians</i> SCHMITZ, 1926									1	1				2	1								5	0.32		
<i>Megaselia emarginata</i> (WOOD, 1908)																	2					3	5	0.30		
<i>Megaselia flavicans</i> SCHMITZ, 1935					4					1													5	0.30		
<i>Megaselia pumila</i> (MEIGEN, 1830)											1							3					4	0.26		
<i>Megaselia ruficornis</i> (MEIGEN, 1830)									1			1			1					1			4	0.26		
<i>Metopina braueri</i> (STROBL, 1880)								1										2	1				4	0.26		
<i>Megaselia glabrifrons</i> (WOOD, 1909)	1															2							3	0.19	x	
<i>Aenigmatias</i> sp.					1			1															2	0.13		
<i>Anevrina thoracica</i> (MEIGEN, 1804)									1					1									2	0.13		
<i>Conicera similis</i> (HALIDAY, 1833)								1	1														2	0.13		
<i>Conicera similis/tibialis</i> – Females -			1									1											2	0.13		
<i>Gymnophora integralis</i> SCHMITZ, 1920											1									1			2	0.13		
<i>Megaselia annulipes</i> (SCHMITZ, 1921)					1														1				2	0.13		
<i>Megaselia aquilonia</i> SCHMITZ, 1958 cf.														1						1			2	0.13	X ?	
<i>Megaselia discreta</i> (WOOD, 1909)					1														1				2	0.13		
<i>Megaselia hibernans/fusciclava</i>										2													2	0.13		
<i>Megaselia lutea</i> (MEIGEN, 1830)	1					1																	2	0.13		
<i>Megaselia peyresquensis</i> DELAGE in SCHMITZ et DELAGE, 1974 cf.																	1				1		2	0.13	X ?	
<i>Megaselia posticata</i> (STROBL, 1898)									1					1									2	0.13	x	
<i>Megaselia propinqua</i> (WOOD, 1909)	1						1				1												3	0.13		
<i>Megaselia rufa</i> (WOOD, 1908)						1		1															2	0.13		
<i>Metopina</i> spp.																2							2	0.13		
<i>Pseudacteon brevicauda</i> SCHMITZ, 1925					1																1		2	0.13		
<i>Triphleba distinguenda</i> (STROBL, 1892)		1																		1			2	0.13		
<i>Borophaga agilis</i> (MEIGEN, 1830)								1															1	0.06	x	
<i>Borophaga subsultans</i> (LINNAEUS, 1767)																				1			1	0.06	x	
<i>Conicera floricola</i> SCHMITZ, 1938														1									1	0.06		
<i>Dohrniphora cornuta</i> (BIGOT in DE LA SAGRA, 1857)																			1				1	0.06	x	
<i>Gymnophora arcuata</i> (MEIGEN, 1830)										1													1	0.06		
<i>Gymnophora healeyae/integralis</i>										1													1	0.06		
<i>Megaselia aculeata</i> (SCHMITZ, 1919)					1																		1	0.06		
<i>Megaselia bifida</i> DISNEY, 1983									1														1	0.06	x	
<i>Megaselia dahli</i> (BECKER, 1901)											1												1	0.06		
<i>Megaselia densior</i> SCHMITZ, 1927																					1		1	0.06		
<i>Megaselia fusca</i> (WOOD, 1909)								1															1	0.06		
<i>Megaselia giraudii</i> (EGGER, 1862)									1														1	0.06		
<i>Megaselia hirsuta</i> (WOOD, 1910)																	1						1	0.06	x	
<i>Megaselia insons</i> (LUNDBECK, 1920)														1									1	0.06		
<i>Megaselia latipalpis</i> (SCHMITZ, 1921)										1													1	0.06	x	
<i>Megaselia meigeni</i> (BECKER, 1901)										1													1	0.06		
<i>Megaselia mixta</i> (SCHMITZ, 1918)									1														1	0.06		
<i>Megaselia pectoralis</i> (WOOD, 1910)					1																		1	0.06		
<i>Megaselia subnudipennis</i> (SCHMITZ, 1919)																					1		1	0.06		
<i>Metopina pileata</i> SCHMITZ, 1936								1															1	0.06		
<i>Phora</i> spec. – Female -		1																					1	0.06		
Phoridae, unknown Genus								1															1	0.06	X ?	
<i>Megaselia</i> spp. - Females + Males -	6	4	3	7	26	20	7	25	149	15	8	16	5	36	16	14	10	17	6	1	5	8	415			
Total individuals	42	18	20	30	197	80	43	91	244	86	38	68	18	104	76	54	59	22	3	13	37	127	1529	100		
Total species	7	6	5	5	14	9	11	16	18	16	8	10	5	14	10	7	11	10	8	3	4	7	63			

The last wildfire on this site took place in 1997. *M. brevicostalis* was characteristic for the plantations of pine trees in Bialowieza Forest. In forests of older age class it occurred in lower numbers (DURSKA 2001). This species has been recorded in many investigations using soil emergence traps on agricultural land (e.g. BUCK 1997; FRANZEN et al. 1997; PRESCHER et al. 2000; WEBER & PRESCHER 1995). In Switzerland, it had already been collected in several locations: near Freiburg (SCHMITZ 1926), near Neuchâtel (BASSET 1985) and in the valley of the Limpach river on the border of the Cantons Bern and Solothurn (PRESCHER et al. 2000). The larvae of *M. brevicostalis* are polyphagous saprophages. They develop in dead bees (WEBER & PRESCHER 1995), dead snails, rotten liver and rotten plants (BUCK 1997).

Rare species

Beside *Megaselia verralli* and *M. rubella*, the following 11 species were recorded for the first time in Switzerland (PRESCHER 1998):

Aenigmatias dorni lives in ant hills; the larvae are known to parasitize the pupae of ants. The females are wingless and have no halteres. SCHMITZ (1938–1958) reported that the imagines occur only in June and July on dry, sunny sites with nests of *Formica rufibarbis* FABRICIUS or *F. cunicularia* LATREILLE. Both ant species are recorded in the study region (GIACALONE & MORETTI 2001). Most of the *A. dorni* (83%) were collected in the traps on site 5 near Ronco (last wildfire in 1994). *A. dorni* also occurs in Luxemburg, the Netherlands, Germany and Poland (DISNEY 1991a). Ticino is the southernmost site where *A. dorni* has been collected.

Borophaga agilis is widely distributed throughout Europe (DISNEY 1991a), but in recent years it has only been recorded in a beech and a pine forest in Rheinhessen (D) (FELDMANN 1992) and in the Bialowieza Forest (P) (DURSKA 2001). It is not known from Italy (GORI pers. comm.). The habitat of the larvae is not known.

Borophaga subsultans was recorded in countries in North and Central Europe (DISNEY 1991a). Ticino is the southernmost site where it has been collected (in a trap on site 19 near Gordola). In recent years, in continental Europe it has only been recorded in Bialowieza Forest (P) (DURSKA 2001). Nothing is known about the development of the larvae.

A female of *Dohrniphora cornuta* was found in a trap on a site which had never experienced burning (8 near Contra). This species is known in many countries in Europa (DISNEY 1991b), but its origin is tropical. It has been transported around the world by man, especially on ships. The larvae of *D. cornuta* are polyphagous saprophages and are sometimes carnivorous. They also develop in wounds of cattle. Imagines fly only on hot summer days (SCHMITZ 1938–1958).

Megaselia bifida was caught in a trap on site 8 in Bré s./Locarno. This site has never been subjected to wildfires. It is not known in Germany or Italy. DISNEY (1983b) found this species in England in two different forests and in Scotland. Nothing is known about the development of the larvae.

Megaselia glabrifrons has been recorded in many countries in Europe (DISNEY 1991a), but not in Italy up to now. It was collected in traps on site 1 (near Brissago) and site 16 (Minusio). No wildfire ever occurred on either site. The habitat of the larvae is not known.

Megaselia hirsuta was found in a trap on a site burnt in 1996 (17 near Contra). SCHMITZ (1938–1958) described it as a «rare, very black species». He collected pupae in nests of wasps. It has been recorded in several countries in Europe (DIS-

NEY 1991a), but not in Italy. BUCK (1997) caught it in a beech forest near Ulm in Germany and VAN ZUIJLEN in a wood in the nature reserve «De Kaaistoep» in the Netherlands (unpublished).

Megaselia latipalpis has only been recorded in Germany, Austria, France and Great Britain (DISNEY 1991a). There were no other records of this species in recent years. The nutrition and the habitat of the larvae are unknown.

Megaselia lucifrons has been recorded in many countries in Eastern and Central Europe (DISNEY 1991a) and from several different habitats. FRANZEN et al. (1997) collected it on a site with sugar beet, DISNEY (1981) from pasture soils and BELLSTEDT from the banks of a river (PRESCHER & BELLSTEDT 1994). Nothing is known about the development of the larvae.

Megaselia posticata is distributed throughout many European countries (DISNEY 1991a). There are several records from caves in Belgium and Germany (LERUTH 1939; GRIEPENBURG 1934; WEBER 1995). LERUTH stated that the larvae in caves are «troglophil-guanophil». *M. posticata* was found in traps on site 9 (near Locarno) and site 15 (near Minusio). In the study region there is only one cave, situated at a distance of 500 m to trap 9. But SCHMITZ (1938–1958) and PRESCHER & BELLSTEDT (1994) caught this species also outside of caves (the latter in a forest in Thuringia).

In the study, 24 specimens of *Metopina crassinervis* were found. They were mainly caught on site 23, always together with *Megaselia brevicostalis*. The last wildfire on site 23 was in 1997. *M. crassinervis* has only been recorded in Germany, the Netherlands and Great Britain (DISNEY 1991a). Ticino is the southernmost location in which it has been recorded up to now. FELDMANN (1992) caught it in a beech forest in Germany, but other records in the past few years are lacking. Nothing is known about the development of the larvae.

Two species could not be identified with absolute certainty, but their possible occurrence in Ticino is very interesting. Two males of *Megaselia* cf. *aquilonia* were found on sites 14 (Minusio) and 19 (Gordola). *M. aquilonia* is known only from northern Europe in Scotland, Sweden and Norway (DISNEY 1991a), northern Poland (DURSKA 2001) and a spruce forest in the Eifel mountains in Germany (DISNEY, pers. comm.). If the determination is correct, it would be the third and southernmost record for continental Europe. Beside this, two males of *Megaselia* cf. *peyresquensis* were collected in traps on the sites 17 (Contra) and 23 (Ronco). Up to now this species has only been found in malaise traps in the village of Peyresq (1400m) in the Alps de Provence (SCHMITZ et al. 1974–1981). This could be the second record of this species world-wide.

An unknown Phorid male was present in a trap on site 7 (Bré s./Locarno). The genus could not be determined using the palaeartic keys of DISNEY (1983a) and SCHMITZ (1938–1958). Identification using the world-wide genus key of DISNEY (1994) was also unsuccessful. The male has a third antennal segment similar to that of the genus *Conicera* but a hypopyg similar to that of *Megaselia* (Fig. 2). This male and the males of *Megaselia* cf. *peyresquensis* and *M. cf. aquilonia* have been sent to Dr. R.H.L. DISNEY, Cambridge.

The dominance structure of the Phorid community from the chestnut forests is certainly influenced by the wildfires on the sites. DURSKA (2001) reported, that *Megaselia verralli* and *Megaselia brevicostalis* played the role of colonists in the process of secondary succession of Phorid community in the moist pine forest in Bialowieza Forest. In Ticino, the main colonists after wildfires are *Megaselia verralli* and, in lower number, *Megaselia rubella*. The presence of the last species probably depends on the occurrence of fungi necessary for their development.



Fig. 2. Unknown Phorid male. This male has a third antennal segment similar to that of the genus *Conicera* but a hypopyg similar to that of *Megaselia*. This specimen and the males of *Megaselia* cf. *peyresquensis* and *M.* cf. *aquilonia* have been sent to Dr. R.H.L. DISNEY, Cambridge.

Of the 53 Phorid species from the chestnut belt in Ticino, 35 species were also collected in the Bialowieza Forest (*Anevrina thoracica*, *Borophaga agilis*, *B. subsultans*, *Conicera floricola*, *C. similis*, *Megaselia aculeata*, *M. altifrons*, *M. brevicostalis*, *M. dahli*, *M. discreta*, *M. diversa*, *M. emarginata*, *M. flavicans*, *M. giraudii*, *M. glabrifrons*, *M. insons*, *M. lata*, *M. lucifrons*, *M. lutea*, *M. mallochi*, *M. meconicera*, *M. meigeni*, *M. pectoralis*, *M. pleuralis*, *M. propinqua*, *M. pumila*, *M. rubella*, *M. rufa*, *M. ruficornis*, *M. spinigera*, *M. subnudipennis*, *M. variana*, *M. verralli*, *Metopina braueri*, *Triphleba distinguenda*). In the forest, which is situated in the north-eastern part of Poland, the phytosociological unit Peucedanum-Pinetum is found in its subboreal variety. It is remarkable that these Phorid species are able to develop in two woodland ecosystems under such different ecological conditions.

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ZUSAMMENFASSUNG

Buckelfliegen (Diptera, Phoridae) aus Kastanienwäldern der südlichen Alpen (Tessin, Schweiz) mit 13 für die Schweiz neuen Arten. – Von März bis September 1997 wurden in *Castanea-sativa*-Wäldern im Tessin 1512 Buckelfliegen gesammelt und bestimmt. Es konnten 53 Arten determiniert werden.

Die meisten Individuen gehörten zu den Arten *Megaselia verralli*, *M. rubella* und *M. brevicostalis*. Es wurde nachgewiesen, dass diese drei Arten häufiger auf Flächen vorkamen, auf denen in den letzten sieben Jahren ein Waldbrand stattgefunden hatte, als auf nie oder vor mehr als sieben Jahren abgebrannten Flächen. 13 für die Schweiz neue Arten wurden gesammelt: *Aenigmatias dorni*, *Borophaga agilis*, *B. subsultans*, *Dohrniphora cornuta*, *Megaselia bifida*, *M. glabrifrons*, *M. hirsuta*, *M. latipalpis*, *M. lucifrons*, *M. posticata*, *M. rubella*, *M. verralli* und *Metopina crassinervis*. Außerdem wurde ein Männchen gefangen, dessen Gattung in den Determinationstabellen für die paläarktischen Phoriden nicht enthalten ist.

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