

# Contribution to the knowledge of the Auchenorrhyncha fauna of bogs and fens of Ticino and Grisons, with some new records for Switzerland (Hemiptera: Fulgoromorpha et Cicadomorpha)

Valeria Trivellone<sup>1</sup>

**Abstract:** 97 species belonging to 7 different families of Fulgoromorpha and Cicadomorpha from various wetland areas of the Cantons of Ticino and Grisons are reported. Specimens were collected between 1991 and 1998 for two arthropod research projects. Eight species were new to Switzerland. The ecological significance of the recorded species is briefly discussed.

**Zusammenfassung:** *Beitrag zur Kenntnis der Zikadenfauna der Hoch- und Niedermoore des Tessin und Graubündens, mit einigen Neufunden für die Schweiz.* Es werden 97 Zikadenarten aus 7 verschiedenen Familien von verschiedenen Feuchthabitate der Kantone Tessin und Graubünden mitgeteilt. Das Material stammt aus zwei Arthropoden-Erfassungen aus den Jahren 1991-1998. Acht Arten waren neu für die Schweiz. Habitate, Wirtspflanzen, Generationenzahl und andere ökologische Ansprüche werden anhand der Literatur kurz diskutiert.

**Keywords:** Leafhoppers, planthoppers, faunistics, marshland, peat bogs, Switzerland

## 1. Introduction

The Swiss Auchenorrhyncha fauna has been studied by Hoffmänner (1924), Cerutti (1938, 1939a, 1939b, 1939c), Günthart (1971, 1974, 1984, 1987, 1994, 1997, 2000), Günthart *et al.* (2004), Mühlethaler (2001) and Mühlethaler *et al.* (2009). A preliminary species list was produced by Günthart & Mühlethaler (2002). Altogether, about 500 species were recorded, but this number could further increase. This paper presents the results of Fulgoromorpha and Cicadomorpha (except Typhlocybinæ) collected during two research projects between 1991 and 1998. The first survey dealt with the marshland habitat of Bolle di Magadino (Ticino), carried out by Lucia Pollini Paltrinieri, the second took place in peatlands of the Canton of Ticino and Moesano (Canton of Grisons), carried out by Filippo Rampazzi. Results on others insect taxa have been published by Rampazzi (1997, 1998, 2002), Rampazzi & Dethier (1997) and Pollet & Rampazzi (2003).

The present study focuses primarily on species new to Switzerland, presents data on their collecting sites in Ticino and Moesano with remarks on their habitat. Furthermore, a list of collected species from Swiss wetland habitats is given.

## 2. Study sites, material and methods

Sixteen selected sites (14 in the Canton of Ticino and two in the Canton of Grisons: Moesano) were sampled in 1998 (Site 1) and 1991-1993 (Sites 2-16) (Tab. 1 and Fig. 1). Site 1 comprises the two main plant communities: pseudo-reedbeds dominated by *Phragmites australis* and *Carex* spp. community.

<sup>1</sup> Peschiera 29, CH-6982 Agno; email: valeria.trivellone@gmail.com

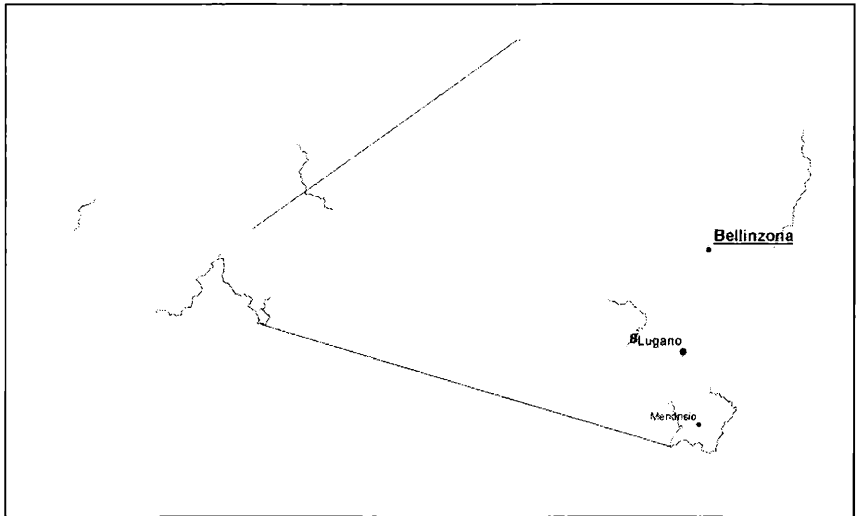


Figure 1: Location of sites. Left: Switzerland. Right: Canton of Ticino (shaded): 1: Bolle di Magadino (BOM); 2: Dalpe (BED); 3: Personico (BDP); 4: Mesocco (a: BSR, b: SUO, c: SDG); 5: Medeglia (MED); 6: Quinto (a: CAD, b: CDR); 7: Olivone (a: CAM, b: PSO, c: FRO); 8: Astano (ERB); 9: Cornignolo (GDL); 10: Osco (NPI); 11: Castaneda (PDS); 12: Airolo (PSC); 13: Intragna (PSA); 14: Bignasco (PIA); 15: Losone (ARB); 16: Chironico (VEL).

Table 1. List of collecting sites in Canton Ticino and Moesano (Grisons).

No.	Collecting Sites	Abbr.	Altitude (m)	Coordinates
1	Locarno, Bolle di Magadino, Ticino	BOM	194	709.850/112.250
2	Dalpe, Bedrina, Ticino	BED	1230	702.500/148.800
3	Personico, Bolle di Pianazzora, Ticino	BDP	1705	714.800/133.175
4	Mesocco, Bosch de San Remo, Grisons	BSR	1630	734.240/146.420
4b	Mesocco, Suossa, Grisons	SUO	1700	735.240/144.690
4c	Mesocco, Sass de la Golp, Grisons	SDG	1950	734.140/149.160
5	Medeglia, Boscior, Ticino	MED	945	718.000/109.720
6	Quinto, Cadagno di Fuori, Ticino	CAD	1915	696.880/155.960
6b	Quinto, Canariscio di Ritom, Ticino	CDR	1950	696.160/154.430
7	Olivone, Campra di Là, Ticino	CAM	1425	709.770/153.060
7b	Olivone, Pian Segno, Ticino	PSO	1655	707.900/154.430
7c	Olivone, Frodalera, Ticino	FRO	1760	706.840/154.100
8	Astano, Erbagni, Ticino	ERB	700	705.540/096.610
9	Camignolo, Gola di Lago, Ticino	GDL	965	718.040/107.040
10	Osco, Nei Pini, Ticino	NPI	2020	701.060/151.640
11	Castaneda, Pian di Scignan, Grisons	PDS	1500	729.800/125.950
12	Airolo, Pian Secco, Ticino	PSC	1850	687.070/154.140
13	Intragna, Pian Segna, Ticino	PSA	1175	692.700/115.100
14	Bignasco, Piano, Ticino	PIA	1430	691.000/130.450
15	Losone, Pian d'Arbigo, Ticino	ARB	275	700.780/114.360
16	Chironico, Vel, Ticino	VEL	1445	704.250/146.180

The Sites 2-16 include twelve peat-bogs of the southern Swiss Alps. Each different type of bog plant community (Pino mugo-Sphagnetum, Sphagno-Caricetum rostratae, Eriophoro-Trichophoretum caespitosae, Caricetum limosae, Rynchosporium albae and Eleocharitetum pauciflorae) and their contact areas (woods, shrubs, pastures and meadows) were sampled. Three sampling methods were used: pitfall trapping, sweep-netting and pan trapping. Most of the material was collected by a sweep-net. Samples were taken from May to September.

The material comprised 6123 specimens of Fulgoromorpha and Cicadomorpha (except Typhlocybinae that will be considered for a following work), and was preserved in 70% alcohol. The nomenclature and identification are based on Ribaut (1952), Della Giustina (1989) and Holzinger *et al.* (2003). The main ecological parameters (host plants, diet width, generation numbers and overwintering stage) are taken from Nickel and Remane (2002) and Nickel (2003), however the data on the ecology of the species collected in Switzerland, especially for the alpine habitats, need to be validated. Species distribution data within Europe are taken from Asche & Hoch (2004). All identified specimens are deposited in the Cantonal Natural History Museum of Lugano (Ticino).

### 3. Results

#### 3.1 Species accounts

Altogether 29 species of Fulgoromorpha and 68 species of Cicadomorpha belonging to 7 different families were identified (see Table 2). The first 8 of the following species are new to Switzerland:

##### *Cixius similis* Kirschbaum, 1868

*Material* – Site 3: 3.VIII.1992, 1 ♀; Site 5: 28.V.1991, 1 ♂; Site 8: 23.V.1991, 5 ♀♀; Site 9: 1.VI.1991, 1 ♂; Site 11: 29.VII.1992, 3 ♀♀; Site 13: 5.VI.1991, 1 ♂, 1 ♀; 13.VII.1992, 2 ♀♀.

*Notes* – In Europe this species is reported from Austria, Britain Isles, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Lithuania, Norway, Poland, Russia, Slovakia, Sweden, Netherlands, Ukraine and former Yugoslavia.

##### *Conomelus lorifer* Ribaut, 1948

*Material* – Site 2: 14.VII.1992, 1 ♀; Site 3: 3.VII.1991, 1 ♂; Site 8: 9.VII.1991, 1 ♂; 29.VII.1991, 7 ♂♂, 7 ♀♀; 7.VII.1992, 1 ♂, 4 nymphs; 1.IX.1992, 3 ♂♂, 4 ♀♀; Site 10: 19.IX.1991, 1 ♀; Site 13: 21.VIII.1991, 4 ♂♂, 2 ♀♀; 8.IX.1992, 1 ♂, 1 ♀; Site 14: 29.VIII.1991, 7 ♂♂, 10 ♀♀; 16.IX.1992, 14 ♂♂, 8 ♀♀; Site 15: 24.VII.1991, 1 ♂, 2 ♀♀; 2.VII.1992, 3 ♂♂, 16 ♀♀. In Germany this species is known from *Juncus*. In this study it was abundantly collected from the phytocenosis of Sphagno-Caricetum rostratae and it occurred between 275 and 1430 m, one single individual was found up to 2020 m.

*Notes* – This species is known from Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, France, Germany, Hungary, Italy, Macedonia, Poland, Romania, Sardinia, Slovakia, Slovenia, Ukraine and former Yugoslavia.

##### *Paraliburnia adela* (Flor, 1861)

*Material* – Site 1: 4.VIII.1998, 1 ♂, on pseudo-reedbeds.

*Notes* – Species listed from Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Latvia, Lithuania, Poland, Romania, Russia, Sweden and the Netherlands.

***Dicranotropis montana* (Horváth, 1897)**

*Material* – Site **4b**: 25.VI.1991, 3 ♂♂, 2 ♀♀; 16.VI.1992, 1 ♂, on pasture grasses at altitudes of 1700 m.

*Notes* – Species so far listed from Austria, Germany, France, Italy and Romania.

***Stroggylocephalus agrestis* (Fallén, 1806)**

*Material* – Site **1**: 7.VII.1998, 3 ♂♂, 2 ♀♀; 21.VII.1998, 4 ♂♂; 4.VIII.1998, 1 ♂; 2.IX.1998, 1 ♂; Site **9**: 2.IX.1992, 15 ♂♂. Found in Magnocaricion association (*Carex elata*, *C. rostrata*, *C. vesicaria*) in Site **9**, and on pseudo-reedbeds and *Carex* spp. in Site **1**.

*Notes* – In Europe this species is reported from Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Poland, Romania, Russia, Sicily, Slovakia, Sweden, Netherlands, Ukraine and former Yugoslavia.

***Ophiola corniculata* (Marshall, 1866)**

*Material* – Site **12**: 21.VIII.1992, 1 ♂, Pino mugo- Sphagnetum.

*Notes* – In Europe this species is reported from Austria, Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Great Britain, Italy, Latvia, Lithuania, Romania, Russia, Slovakia, Slovenia, Sweden, Netherlands, Ukraine and former Yugoslavia.

***Jassargus dentatus* D'Urso, 1980**

*Material* – Site **9**: 2.IX.1992, 2 ♂♂; 20.VII.1993, 5 ♂♂, 2 ♀♀; Site **11**: 19.VIII.1991, 5 ♂♂, 6 ♀♀; 29.VII.1992, 1 ♂; 17.IX.1992, 4 ♂♂, 5 ♀♀; Site **13**: 8.IX.1992, 1 ♂, 1 ♀; Site **14**: 16.IX.1992, 1 ♀; Site **15**: 24.VII.1991, 1 ♂. Found in Rynchosporium albae, Sphagnocaricetum rostratae, Eriophoro-Trichophoretum caespitosi and Pino mugo- Sphagnetum communities and on heather-moor. It occurred at altitudes ranging from 965 to 1500 m.

*Notes* – This species is reported as endemic to the Piedmont (Italy) and Slovenia.

***Rhopalopyx monticola* Ribaut, 1939**

*Material* – Site **4b**: 12.VIII.1992, 2 ♂♂. Site **13**: 5.VI.1991, 1 ♂. Found on heather-moor and pasture grasses at altitudes of 1175 m (Site **13**) and 1700 m (Site **4**).

*Notes* – In Europe this species is reported only from France.

***Psammotettix dubius* Ossiannilsson, 1974**

*Material* – Site **4a**, **4b**, **4c**: 2.VIII.1991, 1 ♂; 4.VIII.1991, 2 ♂♂; 5.VIII.1991, 6 ♂♂; 4.IX.1991, 9 ♂♂; 11.VIII.1992, 7 ♂♂; 12.VIII.1992, 2 ♂♂; 13.VIII.1992, 1 ♂; Site **5**: 6.V.1992, 3 ♂♂; 3.IX.1992, 4 ♂♂; 28.VI.1993, 2 ♂♂; Site **6a**, **6b**: 5.IX.1991, 3 ♂♂; 6.IX.1991, 4 ♂♂; 19.VIII.1992, 10 ♂♂; Site **7a**, **7b**, **7c**: 30.VII.1992, 1 ♂; 6.VIII.1992, 6 ♂♂; 7.VIII.1992, 1 ♂; Site **9**: 2.V.1992, 1 ♂; 2.IX.1992, 1 ♂; 20.VII.1993, 2 ♂♂; Site **12**: 21.VIII.1992, 5 ♂♂; Site **13**: 8.IX.1992, 1 ♂; Site **16**: 13.VIII.1991, 2 ♂♂. Found mainly in the Eriophoro-Trichophoretum caespitosi community. It occurred at altitudes ranging from 945 to 1950 m.

*Notes* – In Europe this species is reported from Scandinavia, central Russia and Austria. Recently it was also published from Switzerland, Canton of Grisons, Alp Flix (Mühlethaler *et al.* 2007). However, it should be noted that this taxon belongs to the *Psammotettix nodosus* group, which is taxonomically difficult (Nickel, pers. comm.).

## 3.2 Ecological notes

### 3.2.1 Marshland habitat (Site 1)

**Pseudo-reedbeds:** Eight species were collected from reed dominated by *Phragmites australis*: *Euodes basilinea*, *Megamelus notula*, *Paraliburnia adela*, *Stroggylocephalus agrestis*, *Cicadella viridis*, *Macrosteles laevis*, *Recilia coronifer*, *Psammotettix* spec. The group of Auchenorrhyncha is dominated by species with 1-2 generations per year (71%) and species which are hibernating as egg (71%). Furthermore, two species are monophagous 1st level (25%), *E. basilinea* on *Phragmites australis* and *P. adela* on *Phalaris arundinacea*. *M. notula* and *S. agrestis* are both monophagous 2nd level on *Carex* spp. (25%).

**Carex spp.:** In total 17 species were collected from *Carex* spp.: *Myndus musivus*, *Stenocranus major*, *E. basilinea*, *Megamelus notula*, cf. *Hyledelphax elegantula*, *Ribautodelphax albostrata*, *Stroggylocephalus agrestis*, *Cicadella viridis*, *Macrosteles septemnotatus*, *M. laevis*, *Recilia coronifer*, *Cicadula quadrinotata*, *Paralimnus phragmitis*, *Arocephalus longiceps*, *Psammotettix* sp., *Ps. alienus*, *Ps. confinis*. A large proportion of these are monophagous (59%) and hibernate as egg (65%). In particular, *E. basilinea* and *P. phragmitis* are both monophagous on *Phragmites australis*, *R. albostrata* on *Poa pratensis*, *M. septemnotatus* on *Filipendula ulmaria* and *S. major* on *Phalaris arundinacea*. Furthermore, *M. musivus* is monophagous on *Salix* spp. and *M. notula*, *C. quadrinotata* and *S. agrestis* on *Carex* spp. About 30% of the species are monovoltine, about 70% are mono-bivoltine. Out of 17 species collected from Site 1, seven (more than 40%) are hygrophilous (*E. basilinea*, *M. notula*, *P. adela*, *S. major*, *S. agrestis*, *C. quadrinotata*, *P. phragmitis*). The remaining species are mesophilous.

### 3.2.2 Peatland habitat (Site 2-16)

The peatland samples yielded altogether 91 species. In particular six stenotopic peatbog species were identified, two of them tyrphobiontic (*Cixius similis* and *Macrosteles fieberi*) and four of them tyrphophilous (*Kelisia ribauti*, *Oncodelphax pullula*, *Stroggylocephalus livens* and *Macrosteles ossiannilssoni*).

*C. similis* was collected in Eriophoro-Trichophoretum caespitosi and Molinietum caeruleae communities, from planar to montane altitudinal belt as already reported by Nickel *et al.* (2002). *M. fieberi* was found in association with Rynchosporium albae, Sphagno-Caricetum rostratae and Eriophoro-Trichophoretum caespitosi. *K. ribauti* was collected on Sphagno-Caricetum rostratae; *O. pullula* only on Eriophoro-Trichophoretum caespitosi; *S. livens* was only caught by yellow-pan traps in Sites 9 and 13 on Magnocaricion associations and heather-moor, respectively, *M. ossiannilssoni* on Pino mugo- Sphagnetum, Eriophoro-Trichophoretum caespitosi, Rynchosporium albae, Sphagno-Caricetum rostratae and Eleocharitetum pauciflorae communities.

Totally the same rate of monophagous and oligophagous species were collected (about 40%) and high proportions of species with 1 generation per year (57%) and species hibernating as egg (62%). About 36% of all species were hygrophilous (hygro-mesophilous), over 60% mesophilous (meso-xerophilous). Only few xerophilous species were collected in these sites (4%).

## 4. Discussion and conclusion

The leafhopper and planthopper fauna of wetland habitats in Switzerland has hitherto been little investigated. In total 6123 specimens of Fulgoromorpha and Cicadomorpha were examined and 97 species were identified. Eight species were recorded for the first

time in Switzerland (*Cixius similis*, *Conomelus lorifer*, *Paraliburnia adela*, *Dicranotropis montana*, *Stroggylocephalus agrestis*, *Ophiola cornicula*, *Jassargus dentatus*, *Rhopalopyx monticola*).

The analysis of the ecological parameters for wetland habitats showed that a larger part of the species are monophagous (43%), followed by oligophagous (35%) and polyphagous (22%) species. Similar proportions could be observed for the different life cycles: a high percentage of species with 1 generation per year (50%), followed by species with 1-2 generations per year (30%) and with 2 generations per year (20%). Considering the overwintering stage, 63% of the species hibernated as egg, 32% as nymphs and only 5% as adults. The Auchenorrhyncha assemblage was further characterised by a low percentage of xerophilous species, whereas mesophilous and hygrophilous species prevailed in all sites as expected. Totally eighteen hygrophilous species characterized both marsh and peat land habitats and they were strictly associated with a single host plant species.

Following the categorization of Achtziger & Nickel (1997) and Nickel & Achtziger (2005), the recorded assemblages of species can be classified as rather specific, since monophagous, stenotopic, wing-dimorphic and mono- or bivoltine species dominate.

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**Appendix:** List of the identified specimens. Ecological parameters after Nickel & Remane (2002) and Nickel (2003): Diet width (m1 = 1st degree monophagous, m2 = 2nd degree monophagous, o1 = 1st degree oligophagous, o2 = 2nd degree oligophagous, po = polyphagous); Hibernation (E = egg stage, N = nymphal stage, A = adult stage) and altitudinal distribution.

Taxon	Site		Diet width	Voltinism	Hibernation	Altitude (m)
	1	2-16				
<b>FULGOROMORPHA</b>						
<b>Issidae</b>						
<i>Issus coleoptratus</i> (F.) <sup>1</sup>		6	po	1	N	275-1430
<b>Cixiidae</b>						
<i>Cixius similis</i> Kbm. <sup>2</sup>		15	o2?	1	N	700-1705
<i>Myndus musivus</i> (Germ.)	10		m2?	1	N	195
<b>Delphacidae</b>						
<i>Acanthodelphax spinosa</i> (Fieb.) <sup>3</sup>		5	m2	(1-?)2	N	965 and 1445
<i>Acanthodelphax denticauda</i> (Boh.) <sup>4</sup>		4	m1	2	N	945 and 1445
<i>Conomelus lorifer</i> Rib. <sup>5</sup>		96	m2?	1	E	275-2020
<i>Dicranotropis divergens</i> Kbm.		21	m1?	2	N	965-1850
<i>Dicranotropis montana</i> (Horv.)		6	o1?	1	N?	1700
<i>Ditropis pteridis</i> (Spin.)		3	m1	1	N	275
<i>Enides basilinea</i> (Germ.)	3		m1	1-2	N	194
<i>Florodelphax leptosoma</i> (Fl.)		3	m2	2	N	945
<i>Kelisia vittipennis</i> (J. Shlb.)		423	m2?	1	E	965-1500
<i>Kelisia guttula</i> (Germ.)		7	m1?	1	E	965 and 1655
<i>Kelisia monoceros</i> Rib.		32	m2	1	E	1430
<i>Kelisia pallidula</i> (Boh.)		1	m1	1	E	1445
<i>Kelisia ribauti</i> (W.Wg.)		22	m2?	1	E	1430-1630
<i>Kossviganella exigua</i> (Boh.)		1	m1	2	N	945
<i>Hyledelphax elegantula</i> (Boh.)	1	1	o1	2	N	195-1430
<i>Javesella discolor</i> (Boh.)		253	po?	1	N	1630-1850
<i>Javesella obscurella</i> (Boh.)		6	o1?	2	N	1850
<i>Laodelphax striatella</i> (Fall.)		68	po?	2	N	275-1700
<i>Megamelus notula</i> (Germ.) <sup>6</sup>	3	7	m2	1-2	E?	194-1655
<i>Muellerianella brevipennis</i> (Boh.)		1	m1	1-2	E	1175
<i>Muellerianella extrusa</i> (Scott)		1	m1	1	E	1430
<i>Oncodelphax pullula</i> (Boh.)		2	m2?	1	N	965
<i>Paraliburnia adela</i> (Fl.)	1		m1	1-2	N	194
<i>Ribautodelphax albostrata</i> (Fieb.)	1		m1	2	N	194
<i>Stenocranus major</i> (Kbm.)	3		m1?	1	A	194
<i>Toya propinqua</i> (Fieb.) <sup>7</sup>		5	o1?	2?	N	700-1950
<b>CICADOMORPHA</b>						
<b>Cercopidae</b>						
<i>Cercopis vulnerata</i> Rossi		20	po	1	N	700-1705
<b>Aphrophoridae</b>						
<i>Aphrophora major</i> Uhl.		26	po	1	E	275-700
<i>Aphrophora alni</i> (Fall.)		1	po	1	E	965
<i>Neophilaenus campestris</i> (Fall.)		916	o1	1	E	945-2020
<i>Philaenus spumarius</i> (L.)		24	po	1	E	700-1700



Taxon	Site		Diet width	Voltinism	Hibernation	Altitude (m)
	1	2-16				
<b>Membracidae</b>						
<i>Stictoccephala bisonia</i> K. & Y.		2	po	1	E	275 and 1175
<b>Cicadellidae</b>						
<i>Ulopa reticulata</i> (F.)		16	m1	1/2	N/A	700-1230
<i>Ledra aurita</i> (L.)		1	po	1-2	N	1230
<i>Macropsis fuscula</i> (Zett.)		7				
<i>Anaceratagallia ribauti</i> (Oss.)		1	o2?	1	A	275
<i>Anaceratagallia venosa</i> (Geoffr.)		36	o2?	1	E	1655-1915
<i>Metidiocerus elegans</i> (Fl.)		1	m2	1	E?	700
<i>Eupelix cuspidata</i> (F.)		12	m2?	1/2	N/A	945
<i>Anoscopus flavostriatus</i> (Don.)		2	o1	1	E	1230
<i>Planaphrodes nigrata</i> (Kbm.)		1	o1?	1	E	1850
<i>Stroggylocephalus agrestis</i> (Fall.)	11	15	m2?	1	E?	195-965
<i>Stroggylocephalus livens</i> (Zett.) <sup>8</sup>		3	m2?	1?	A?	965 and 1175
<i>Cicadella viridis</i> (L.)	107	327	po	1-2	E	195-1950
<i>Errhomenus brachypterus</i> Fieb.		4	po?	1/2	N/A	1430
<i>Evacanthus interruptus</i> (L.)		3	po	1	E	1655
<i>Adarrus exornatus</i> Rib.		14				1430-1705
<i>Arocephalus longiceps</i> (Kbm.) <sup>9</sup>	1	3	o1	(1?)2	E	194 and 945
<i>Balclutha punctata</i> (F.)		234	o1	1	A	275-1500
<i>Cicadula quadrinotata</i> (F.)	2	682	m2?	1-2	E	965-1950
<i>Colobotettix morbillosus</i> (Mcl.)		1	m1?	1	N	1425
<i>Conosanus obsoletus</i> (Kbm)		3	o2	1	E	965
<i>Diplocolenus bohemani</i> (Zett.)		1	o1	1	E	1430
<i>Deltocephalus pulicaris</i> (Fall.)	144		o1	1-2	E	1655-1915
<i>Doratúra stylata</i> (Boh.)		1	o1	1(-2?)	E	965
<i>Ebarrius cognatus</i> (Fieb.) <sup>10</sup>		5	m2?	1	E?	965-1500
<i>Elymana sulphurella</i> (Zett.)		1	o1	1	E	965
<i>Errastunus ocellaris</i> (Fall.)		1	o1	2	E	1700
<i>Enscelis incisus</i> (Kbm.)		3	o2	1-2	N/E	945-965
<i>Goniagnathus brevis</i> (H.-S.)		1	m2?	1	A	1175
<i>Henschia collina</i> (Boh.)		1	o1	2	E	945
<i>Idiodonus cruentatus</i> (Panz.) <sup>11</sup>		3	po	1	E	1175-1700
<i>Jassargus allobrogicus</i> (Rib.)		10	o1	(1?)2	E	1700
<i>Jassargus bisubulatus</i> (Then)		19				965
<i>Jassargus bobbicola</i> Rem. & Schlz.		6				1655
<i>Jassargus dentatus</i> D'Urso		34				965-1500
<i>Jassargus flori</i> (Fieb.)		2	m1?	(1?)2	E	965 and 1445
<i>Limotettix striola</i> (Fall.)		29	o1	(1?)2	E	1425-1655
<i>Macrosteles septemnotatus</i> (Fall.)	22		m1	2	E	194
<i>Macrosteles sexnotatus</i> (Fall.)		17	po	2	E	1655-1915
<i>Macrosteles fieberi</i> (Edw.)		26	m1	2	E	1425-1445
<i>Macrosteles alpinus</i> (Zett.)		243	m2?	1	E	1705-1950
<i>Macrosteles laevis</i> (Rib.) <sup>12</sup>	6	1	po	(1?)2	E	194 and 945
<i>Macrosteles horvathi</i> (W.Wg.)		77	m2	1-2	E	1760-1915
<i>Macrosteles ossiannilssoni</i> Ldb.		161	po?	1-2	E	965-1700
<i>Macnustus griseus</i> (Zett.)		9	o2	1	N	1425

Taxon	Site		Diet width	Voltinism	Hibernation	Altitude (m)
	1	2-16				
<i>Ophiola cornicula</i> (Marsh.)		1	o1?	1	E	1850
<i>Paralimnus phragmitis</i> (Boh.)	1		m1	1(-2?)	E	194
<i>Psammotettix cephalotes</i> (H.-S.)		44	m1	1-2	E	1850-1950
<i>Psammotettix confinis</i> (Dhlb.) <sup>13</sup>	15	18	o1	2	E	194-2020
<i>Psammotettix dubius</i> Oss.		96				945-1950
<i>Psammotettix nardeti</i> Rem.		7	m1?	1	E	1760
<i>Psammotettix nodosus</i> (Rib.)		4	?	1?	E	1950
<i>Psammotettix alienus</i> (Dhb.)	2	2	o1	2	E	194 and 1950
<i>Recilia coronifer</i> (Marsh.)	56	2	o1	1	E	194
<i>Rhopalopyx monticola</i> Rib. <sup>14</sup>		3				1175-1700
<i>Rhopalopyx elongata</i> W.Wg.		1	?	2?	E	965
<i>Rhopalopyx vitripennis</i> (Fl.)		1	m2?	2	E	945
<i>Sotanus thenii</i> (P. Löw)		6	o1?	1	N	1760-1950
<i>Spseudotettix subfuscus</i> (Fall.)		63	po	1	N	1175-1700
<i>Streptanus aemulans</i> (Kbm.)		2	o1	2?	E	1700
<i>Thamnotettix confinis</i> (Zett.)		6	po	1	N	1230-1500
<i>Thamnotettix dilutior</i> (Kbm.)		3	po?	1	N	275 and 700
<i>Verdanus abdominalis</i> (F.)		494	o1	1	E	1445-1950

<sup>1</sup> Only 1 specimen at 275 and 1230 m, respectively

<sup>2</sup> Only 1 specimen at 945, 965 and 1705 m, respectively

<sup>3</sup> Only 1 specimen at 965 m

<sup>4</sup> Only 1 specimen at 945 m

<sup>5</sup> Only 1 specimen at 1705 and 2020 m, respectively

<sup>6</sup> Only 1 specimen at 1655 m

<sup>7</sup> Only 1 specimen at 945, 965 and 1950 m, respectively

<sup>8</sup> Only 1 specimen at 1175 m

<sup>9</sup> Only 1 specimen at 194 m

<sup>10</sup> Only 1 specimen at 1425 and 1500 m, respectively

<sup>11</sup> Only 1 specimen at 1175 m

<sup>12</sup> Only 1 specimen at 945 m

<sup>13</sup> Only 1 specimen at 700, 1700, 1950 and 2020 m, respectively

<sup>14</sup> Only 1 specimen at 1175 m

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