

## New and remarkable leafhoppers and planthoppers (Hemiptera: Auchenorrhyncha) from Switzerland

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New and interesting records of Auchenorrhyncha from Switzerland are presented. Twelve species are new to Switzerland: *Horvathianella palliceps* (Horváth, 1897), *Kelisia guttulifera* (Kirschbaum, 1868), *Kelisia praecox* Haupt, 1935, *Ribautodelphax vinealis* Bieman, 1987, *Acanalonia conica* (Say, 1830), *Arboridia simillima* (Wagner, 1939), *Athysanus quadrum* Boheman, 1845, *Bobacella corvina* (Horváth, 1903), *Chlorita* cf. *tamaninii* Wagner, 1959, *Hephathus nanus* (Herrich-Schäffer, 1835), *Hishimonus hamatus* Kuoh, 1976 and *Lindbergina aurovittata* (Douglas, 1875). Additional information is provided for the two rarely collected *Conomelus lorifer* Ribaut, 1948 and *Emeljanovianus medius* (Mulsant & Rey 1855).

Keywords: Switzerland, Hemiptera, Cicadomorpha, Fulgoromorpha, neobiota, alien species, vineyards, fauna.

### INTRODUCTION

The known Auchenorrhyncha fauna of Switzerland comprises around 500 species (Mühlethaler *et al.* 2009). Generally the northern half is better known than the south, where most recent studies have revealed new Swiss records (e.g. Trivellone 2010, 2012; Trivellone & Pollini Paltrinieri 2011). Ongoing field research, modern sampling techniques such as suction sampling and acoustic recordings, genetics, climate changes and introduction of neobiota lead to a permanent increase of recorded species (e.g. Nickel *et al.* 2013, Hertach *et al.* 2015).

Records presented in this paper originate from different nature conservation and ecological studies carried out by the University of Bern and in the frame of the BioDiVine research-project (Trivellone *et al.* 2014) within the last four years. In addition some of the new records were discovered during private collecting by the first author.

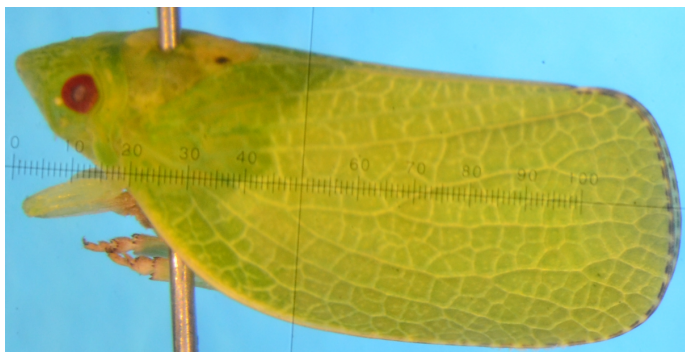


Fig. 1. Adult of *Acanalonia conica* (Say, 1830). (photo: V. Trivellone).

## MATERIALS AND METHODS

Specimens presented in this paper were collected by means of different insect collecting tools such as suction sampler, sweep-net or just by mouth aspirator. Specimens collected by the Community Ecology group of the University of Bern were sampled with a self-made «tree suction sampler» (Turrini & Knop 2015) in order to take standardized samples from silver birch (*Betula pendula*). The nomenclature follows Holzinger *et al.* (2003), Ribaut (1936, 1952), Nickel & Remane (2002) and Biedermann & Niedringhaus (2004). Information on habitat preference, host or food plant and distribution mainly follows Nickel (2003). Voucher specimens are preserved in the private collections of the first or last author.

## RESULTS

### FULGOROMORPHA

#### ACANALONIIDAE

#### *Acanalonia conica* (Say, 1830) (Fig. 1)

First record from Switzerland: Ticino, Agno, green area [45°59'44.51'' N, 8°54'9.21'' E, 272 m], 1 ♂, 26.07.2014, mouth aspirator, leg. & det. Valeria Trivellone.

*Distribution:* USA, Northern Italy, Switzerland.

*Remarks:* *A. conica* is for the moment the only representative of the family in Europe. In North America this extremely polyphagous planthopper is commonly found feeding mixed with flatid species such as *Metcalfa pruinosa* (Say, 1830), *Anormenis chloris* (Melichar, 1902) or *Ormenoides venusta* (Melichar, 1902) (Wilson & Lucchi 2001). In Europe it was recorded for the first time in 2004 (Italy: Veneto) (D'Urso & Uliana 2004, 2006).

#### DELPHACIDAE

#### *Conomelus lorifer* Ribaut, 1948 (Fig. 2A)

Second record from Switzerland: Ticino, Cadenazzo, Vignette, vineyard [46°8'57.12'' N, 8°55'11.89'' E, 209 m], 1 ♀, 07.09.2011, D-vac, leg. & det. Valeria Trivellone.

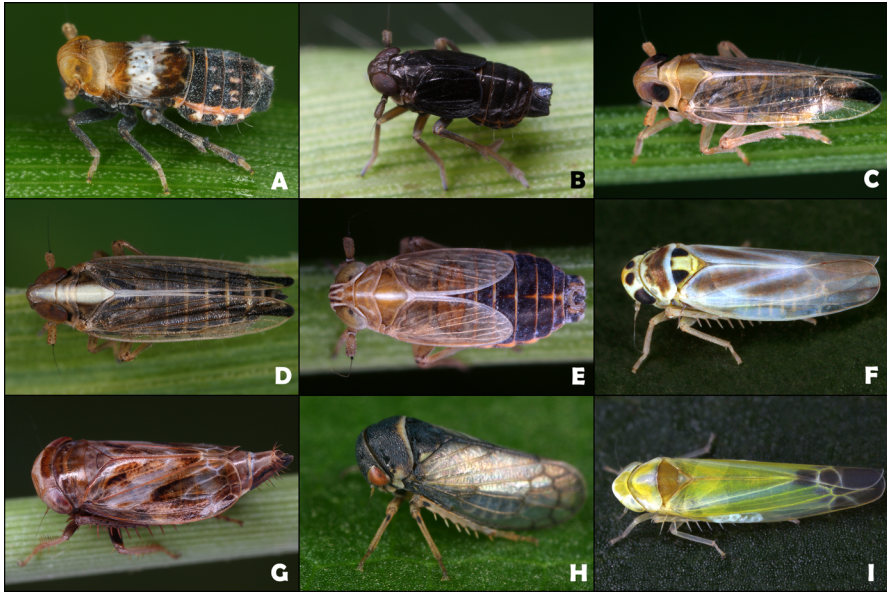


Fig. 2. — A: *Conomelus lorifer* Ribaut, 1948; — B: *Horvathianella palliceus* (Horváth, 1897); — C: *Kelisia guttulifera* (Kirschbaum, 1868); — D: *Kelisia praecox* Haupt, 1935; — E: *Ribautodelphax vinealis* Bieman, 1987; — F: *Arboridia simillima* (Wagner, 1939); — G: *Athysanus quadrum* Boheman, 1845; — H: *Hephathus nanus* (Herrich-Schäffer, 1835); — I: *Lindbergina aurovittata* (Douglas, 1875). (photos: G. Kunz).

**Distribution:** Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, Italy, Macedonia, Poland, Romania, Slovakia, Slovenia, Switzerland, Ukraine, former Yugoslavia.

**Remarks:** *C. lorifer* feeds on *Juncus effusus* and probably other rushes. This species was recorded in Switzerland for the first time in 2010 (Trivellone 2010) and was collected in abundance from the phytocenosis of Sphagno-Caricetum rostratae in the cantons Ticino and Grisons. The single macropterous female of *C. lorifer* was collected in a vineyard under a high mowing disturbance regime with small scattered patches of the nearctic neophyte *Juncus tenuis*.

### ***Horvathianella palliceus* (Horváth, 1897) (Fig. 2B)**

First record from Switzerland: Ticino, Lavertezzo, Montedato, vineyard [46°10'47.25" N, 8°53'16.87" E, 336 m], 5 ♂♂, 24.06.2011, 10.08.2011 & 08.09.2011, D-vac and sweep-net, leg. & det. Valeria Trivellone.

**Distribution:** Austria, Bulgaria, Croatia, Czech Republic, Greece, Hungary, Italy, Iraq, Romania, Slovenia, Switzerland, Turkey, former Yugoslavia.

**Remarks:** *Horvathianella* is a monotypic genus and is known to feed on *Chrysopogon gryllus*. In Switzerland this plant species is largely confined to xerothermic meadows and stony areas of southern parts of the country. In Swiss vineyards *C. gryllus* is quite rare and found only in steep embankments. *H. palliceus* specimens were collected in a vineyard where wide stands of *C. gryllus* were recorded.

***Kelisia guttulifera* (Kirschbaum, 1868) (Fig. 2C)**

First record from Switzerland: Ticino, Bellinzona, Monte Carasso, vineyard [46°12'18.86'' N, 8°01'03.69'' E, 233 m], 1 ♂, 1 ♀, 17.06.2011, D-vac, leg. & det. Valeria Trivellone.

Second record from Switzerland: Ticino, Lavertezzo, Montedato, vineyard [46°10'47.25'' N, 8°53'16.87'' E, 336 m], 1 ♂, 24.06.2011, D-vac, leg. & det. Valeria Trivellone.

Third record from Switzerland: Ticino, Gordola, S. Antonio, vineyard [46°10'57.89'' N, 8°51'54.69'' E, 319 m], 3 ♂♂, 2 ♀♀, 24.06.2011 & 20.07.2011, D-vac, leg. & det. Valeria Trivellone.

Fourth record from Switzerland: Ticino, Cugnasco-Gerra, Gerra Piano, vineyard [46°10'31.74'' N, 8°54'05.64'' E, 199 m], 1 ♂, 24.06.2011, D-vac, leg. & det. Valeria Trivellone.

*Distribution:* Austria, Czech Republic, France, Germany, Great Britain, Greece, Lebanon, Lithuania, Netherlands, Poland, Switzerland, former Yugoslavia.

*Remarks:* This species is known to feed on sedges, in this study the specimens were collected on *Carex* spp. from different vineyards.

***Kelisia praecox* Haupt, 1935 (Fig. 2D)**

First record from Switzerland: Ticino, Lavertezzo, Montedato, vineyard [46°10'47.25'' N, 8°53'16.87'' E, 336 m], 1 ♂, 1 ♀, 08.09.2011, D-vac, leg. & det. Valeria Trivellone.

*Distribution:* Austria, Bulgaria, Czech Republic, Estonia, Germany, Georgia, Greece, Italy, Kazakhstan, Iran, Latvia, Lithuania, Mongolia, Poland, Russia, Slovakia, Switzerland, former Yugoslavia.

*Remarks:* the species is frequently associated with *Carex brizoides* at moist sites, usually forest meadows or clearings (Nickel 2003). In this study, two specimens were collected on embankments inside a vineyard with *Carex caryophylla* and *Carex hirta*.

***Ribautodelphax vinealis* Bieman, 1987 (Fig. 2E)**

First record from Switzerland: Ticino, Mendrisio, Rancate, vineyard [45°52'23.29'' N, 8°58'3.38'' E, 343 m], 1 ♂, 03.08.2011, D-vac, leg. & det. Valeria Trivellone.

Second record from Switzerland: Ticino, Mendrisio, Somazzo, vineyard [45°52'37.53'' N, 8°59'30.34'' E, 537 m], 1 ♂, 26.04.2011, D-vac, leg. & det. Valeria Trivellone.

*Distribution:* Netherlands, Finland (Södermann 2007), Norway (Söderman et al. 2009), Germany, Switzerland.

*Remarks:* both specimens were collected inside vineyards on wild vegetation of embankments. This species is known from the Netherlands to be monophagous on Brown bent (*Agrostis vinealis*) in sandy dry grassland (Bieman 1987b). In the present study a quantitative vegetation sampling at the above-mentioned sites revealed the presence of black bent (*Agrostis gigantea*) and creeping bent (*Agrostis stolonifera*) which are closely related to *A. vinealis*.

## CICADOMORPHA

## CICADELLIDAE

***Arboridia simillima* (Wagner, 1939) (Fig. 2F)**

First record from Switzerland: Valais, Orsières, extensively managed meadows [46°01'44" N; 07°09'82" E, 1022 m], 1 ♂, 17.08.2011, D-vac, leg. Aline Andrey, det. Gernot Kunz.

*Distribution in Europe:* Luxembourg (Nickel *et al.* 2010), Austria, Czech Republic, France, Germany, Hungary, Switzerland.

*Remarks:* In Germany *A. simillima* occurs on sun-exposed shrubs in open xerothermic woodlands, mainly in slope and plateau situations on limestone, gypsum and porphyry. Host plants are *Rosa spinosissima* and other roses, probably *R. rubiginosa* and perhaps *R. canina* (Nickel 2003).

***Athysanus quadrum* Boheman, 1845 (Fig. 2G)**

First record from Switzerland: Valais, south-east of Hérémece, south-east of Euseigne, extensively managed meadows at subalpine level that received different amount of water and irrigation since 2011 [46°10'09" N; 7°25'27" E, 1028 m], 1 ♂, 8 larvae, 28.06.2012, 1 ♀, 10.09.2012, D-vac, leg. Aline Andrey, det. Gernot Kunz.

*Distribution in Europe:* Norway, Sweden, Finland, Russia, Estonia, Latvia, Lithuania, Denmark, Belgium, Netherlands, Germany, Poland, Czech Republic, Belarus, France, Austria, Hungary, Ukraine, Romania, Slovakia, Switzerland.

*Remarks:* *A. quadrum* needs sunny, moist to wet, usually mesotrophic sites, mainly calcareous sedge fens and non-fertilized peat and straw meadows (Nickel 2002). Recent findings in Austria support *Lysimachia vulgaris* as being the host plant of this leafhopper (Nickel & Kunz unpubl.).



Fig. 3. *Bobacella corvina* (Horváth, 1903): A – female in dorsal view; B – female in ventral view. (photos: G. Kunz).

***Bobacella corvina* (Horváth, 1903) (Fig. 3)**

First record from Switzerland: Valais, south-east of Saint-Martin, Eison, extensively managed meadows at subalpine level (that received 20 mm of irrigation water every week from May to August since 2011) [46°09'18'' N; 7°28'10'' E, 1768 m], 1 ♀, 26.07.2012, D-vac, leg. Aline Andrey, det. Gernot Kunz.

*Distribution in Europe:* Austria, France, Hungary & Switzerland but also known from the surroundings of the Black Sea and Pannonian velds (Györfy 1982, Anufriev & Emeljanov 1988, Della Giustina & Remane 2001, Holzinger 2009).

*Remarks:* This brachypterous leafhopper is rarely found in Europe, therefore almost nothing is known about its biology (see Della Giustina & Remane 2001, Holzinger 2009).

***Chlorita cf. tamaninii* Wagner, 1959 (Fig. 4)**

First record from Switzerland: Ticino, Ludiano, Ronco Pizzotti, vineyard, [46°24'57.92'' N; 8°58'11.39'' E, 459 m], 2 ♂♂, 1 ♀, 21.06.2011, D-vac, leg. & det. Valeria Trivellone.

*Distribution in Europe:* Italy, Switzerland.

*Remarks:* In total 24 species of the genus *Chlorita* Fieber are known from the Palaearctic region. Four of them: *C. subulata* (Ribaut, 1933), *C. viridula* (Fallen, 1806), *C. tamaninii* Wagner, 1959 and *C. paolii* (Ossiannilsson, 1939) belong to the *Chlorita viridula* species group and are closely related. Wagner (1959) published a key to distinguish the above-mentioned species. Up to now, in Switzerland only *C. viridula* (Ribaut 1933, Cerutti 1939) and *C. paolii* (Trivellone & Pollini Paltrinieri 2011) were recorded. In 2011, the first author had collected specimens with aedeagus morphological characteristics quite different from *C. viridula* and *C. paolii*. According to the key after Wagner (1959), two main subgroups of species were recognized based on the characteristics of the appendages of the aedeagus: appendages without a blunt tooth and convergent in the *viridula-subulata* subgroup; and appendages with a blunt tooth and divergent in the *paolii-tamaninii* subgroup. The appendages of the examined specimens do neither coincide perfectly with the first, nor with the second subgroup. The following description of a specimen is proposed as reference to further collections.

*Determination:* The genital plate with parameres and the appendices of the anal tube are illustrated in Figs 4A and 4B, respectively; they are similar to *C. viridula* after Le Quesne & Payne (1981). In the male, aedeagus with a pair of recurved appendages, longer than main stem, without tooth along outer margin; but hardly S-shaped in the middle (Fig. 4C) and ending in sharp-hooked apices (Fig. 4D).

***Emeljanovianus medius* (Mulsant & Rey, 1855) (Fig. 5)**

Second record for Switzerland: Valais, Miège, south-west of Cordona, extensively managed meadows at subalpine level (that received 20 mm of irrigation water every week from May to August since 2011 and fertilisation in spring and autumn) [46°19'45'' N; 7°33'08'' E, 1153 m], 1 ♂ and 3 ♀♀, 03.07.2012, D-vac, leg. Aline Andrey, det. Gernot Kunz.

*Distribution in Europe:* Russia, Ukraine, Bulgaria, Greece (Drosopolous *et al.* 1986), Italy, Slovenia (Holzinger & Seljak 2001), France (Ribaut 1952, Guistina & Remane 2001), Switzerland.

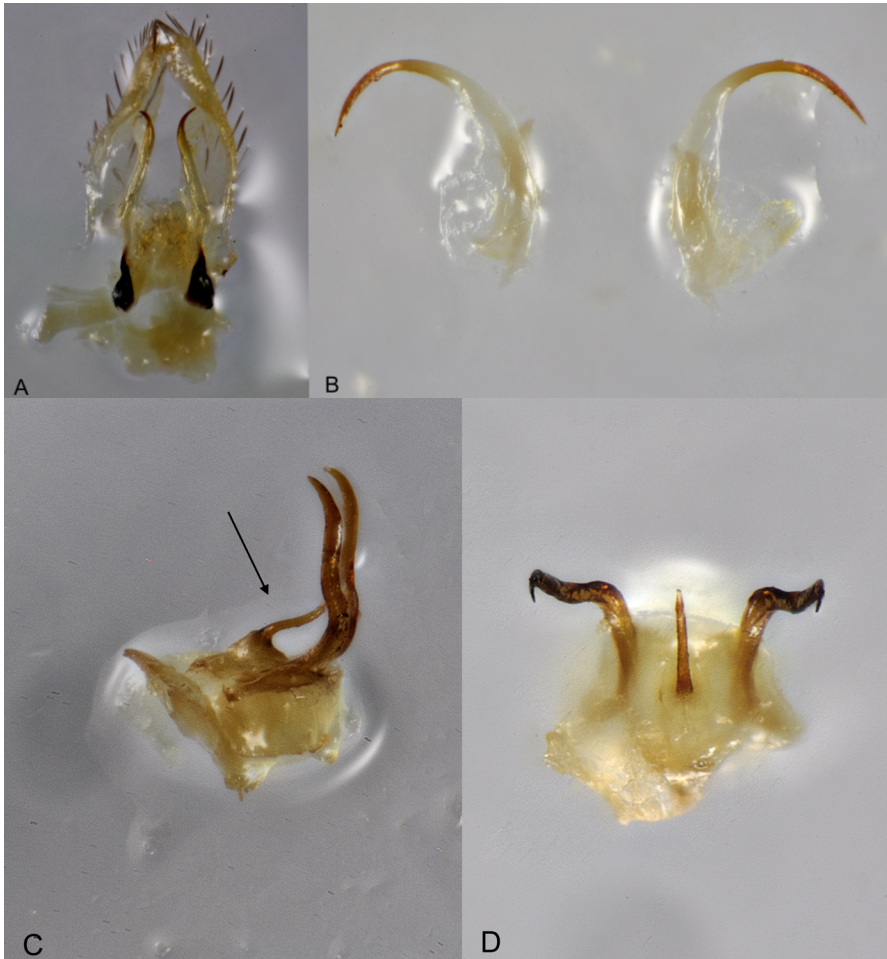


Fig. 4. *Chlorita* cf. *tamaninii* Wagner, 1959: A – genital plates, valve and styles dorsally; B – styles laterally; C – aedeagus laterally; D – view of aedeagus from above. (photos: P. Scaramozzino & V. Trivellone).

*Remarks:* this species was described from the surroundings of Lyon by Mulsant & Rey (1855). The only previous record from Switzerland originates from Château-d'Oex and was published under its junior synonym *Deltocephalus reiberi* Puton, 1877.

***Hephathus nanus* (Herrich-Schäffer, 1835) (Fig. 2H)**

First record from Switzerland: Ticino, Bioggio, Righetto, vineyard [46°0'18.88'' N, 8°53'45.11'' E, 437 m], 1 ♂, 04.08.2011, D-vac, leg. & det. Valeria Trivellone.

Second record from Switzerland: Ticino, Monteceneri, Bironico-Cassona, vineyard [46°7'3.79'' N, 8°55'59.18'' E, 511 m], 2 ♂♂, 14.06.2014 & 04.08.2011, D-vac, leg. & det. Valeria Trivellone.

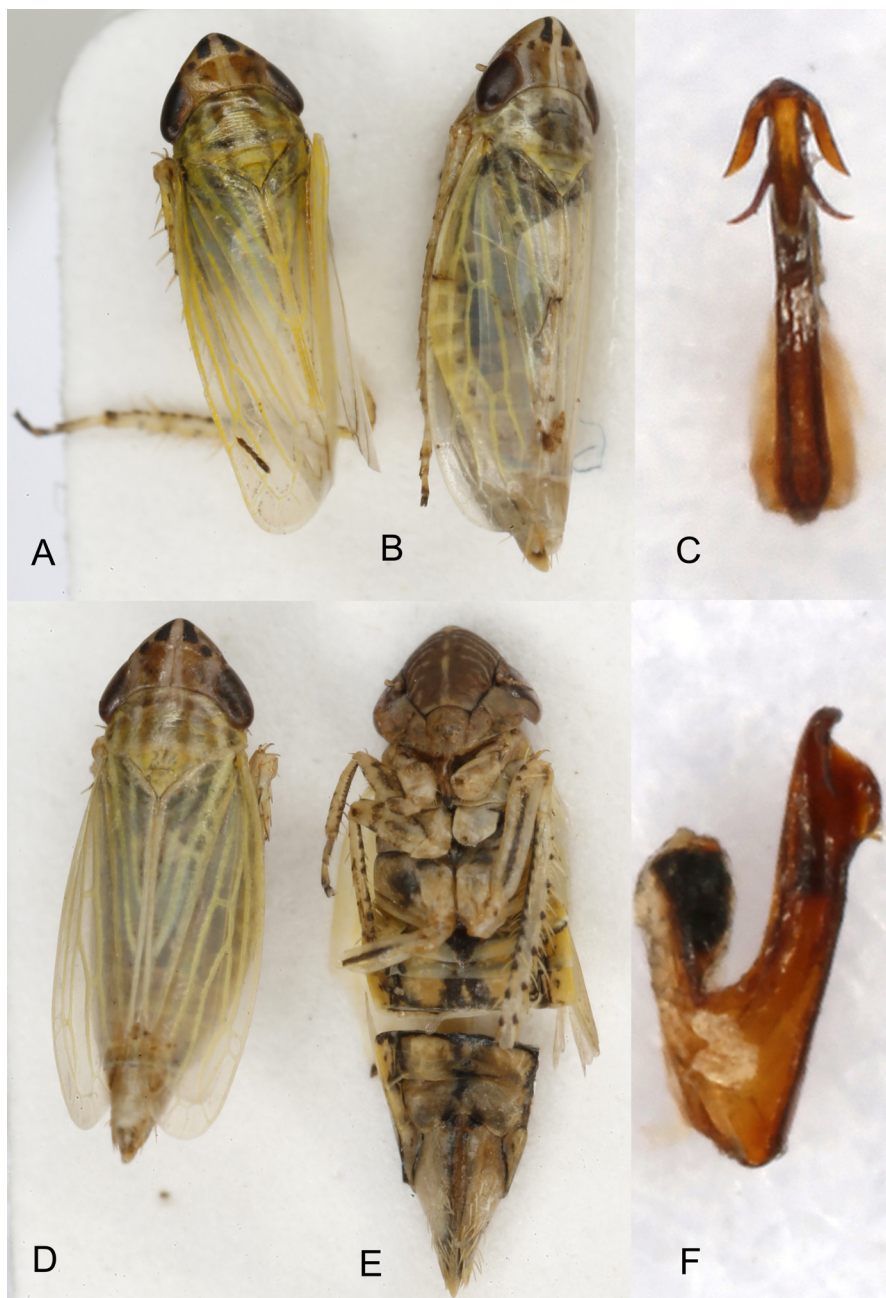


Fig. 5. *Emeljanovianus medius* (Mulsant & Rey, 1855): A – male in dorsal view; B – female in dorso-lateral view; C – aedeagus in ventral view; D – female in dorsal view; E – female in ventral view; F – aedeagus from the left (photos: G. Kunz).





Fig. 6. Adult of *Hishimonus hamatus* Kuoh, 1976. (photo: V. Trivellone).

Third record from Switzerland: Ticino, Lavertezzo, Montedato, vineyard [46°10'47.25'' N, 8°53'16.87'' E, 336 m], 1 ♂, 20.07.2011, sweep-net, leg. & det. Valeria Trivellone.

*Distribution:* Albania, Austria, Balearic Is., Belgium, Britain, Bulgaria, Croatia, Czech Republic, Danish mainland, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Moldova, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Switzerland, Netherlands, Ukraine, former Yugoslavia.

*Remarks:* This species is usually found on sunny, oligotrophic and xerothermic sites, often in quite disturbed pastures (Nickel 2003). In this study some specimens were collected on vineyards floor vegetation and one specimen was unexpectedly collected from vine canopy.

#### ***Hishimonus hamatus* Kuoh, 1976 (Fig. 6)**

First record from Switzerland: Ticino, Agno, green area [45°59'44.51'' N, 8°54'9.21'' E, 272 m], 2 ♂♂, 21.06.2014, mouth aspirator, leg. & det. Valeria Trivellone.

Second record from Switzerland: Ticino, Stabio, Montalbano, woody margins surrounding the vineyards [45°51'18.44'' N, 8°55'39.38'' E, 417 m], 2 ♂♂ and 1 ♀, 19–26.07.2011, 8–15.07.2014 & 24–30.09.2014, yellow sticky trap, leg. & det. Valeria Trivellone.

*Distribution:* Australia, China, Ethiopia, Fiji, Japan, India, Indonesia, Slovenia, Italy? & Switzerland.

*Remarks:* The genus *Hishimonus* Ishihara belongs to the tribe Opsiini of Deltocephalinae, and is native to the Oriental region with records into the Ethiopian, Australian and eastern Palaearctic regions (Dai *et al.* 2013). Some species of *Hishimonus* are known to be of economic importance, because they were recorded as vector of phytoplasmas causing dwarf disease, Rhus yellows and witches broom (Weintraub & Beanland 2006; Seljak 2013). The first appearance in 2012 in Europe (Slovenia) was published by Seljak (2013). However, an increasing number of records (<http://www.fitosanitario.re.it>) and recent findings from the surroundings of Grado (Italy) suggest its primary introduction in the North of Italy. Nevertheless dissected material is still not available.

***Lindbergina aurovittata* (Douglas, 1875) (Fig. 2I)**

First record from Switzerland: Basel-Landschaft, MuttENZ, urban settlement area, specimen collected on *Betula pendula* [47°31'32.53'' N; 7°38'21.59'' E, 289 m], 1 ♂ and 1 ♀, 17.08.2011, tree-suction sampler, leg. Tabea Turrini, det. Gernot Kunz.

*Distribution:* Ireland, England, Belgium, Luxembourg (Niedringhaus *et al.* 2010), Germany, France, Portugal, Italy, Bulgaria, Greece, Slovenia, Switzerland.

*Remarks:* This leafhopper produces two generations each year. The summer generation switches the host plant from different woody species (*Quercus* spp., *Fagus sylvatica*, *Alnus glutinosa*, *Corylus avellana* and *Betula pubescens*) to *Rubus fruticosus* and lays the eggs on this evergreen plant for overwintering. Adults during springtime switch again to their summer hosts.

DISCUSSION

The Auchenorrhyncha records in Switzerland increased by at least 30 species in the last seven years due to higher interest to involve leafhoppers and planthoppers in biodiversity studies. From this present study, seven new species were collected in vineyard agroecosystems. This can be explained with the use of modern sampling methods such as intense sampling of cover crops in vineyards. This xerothermic biotope harbours a high diversity of leafhoppers and planthoppers and was insufficiently studied in the South of Switzerland up to now. Most of the insect alien species have been unintentionally introduced by imported ornamental plants, and some of them are able to spread into man-made or disturbed habitats as well as into natural habitats (Roques *et al.* 2009). In this study, *Acanalonia conica* and *Hishimonus hamatus* have likely been introduced into Southern Switzerland by ornamental plant trade. Moreover, *H. hamatus* has become invasive on woody plants surrounding a vine growing area. Therefore we believe the species was introduced years ago and an immigration from North Italy would also be possible.

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