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Leafhoppers, planthoppers and psyllids (Hemiptera: Cicadomorpha, Fulgoromorpha, Psylloidea) in ruderal habitats: material attracted by light in the suburbs of Brno (Czech Republic)

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MALENOVSKÝ I. & LAUTERER P. 2005: Leafhoppers, planthoppers and psyllids (Hemiptera: Cicadomorpha, Fulgoromorpha, Psylloidea) in ruderal habitats: material attracted by light in the suburbs of Brno (Czech Republic). *Acta Musei Moraviae, Scientiae biologicae* (Brno) **90:** 195–207. – Leafhoppers, planthoppers and psyllids light-trapped into streetlamps were examined at two sites in complex ruderal habitats (fields, annual and perennial ruderal vegetation, scrub with ruderal and alien species) in Slatina, on the periphery of the city of Brno in South Moravia. A total of 1628 specimens and 61 species were found. Among the dominant species were *Empoasca vitis*, *E. decipiens*, *E. pteridis*, *Macrosteles laevis*, *Psammotettix alienus*, *Javesella pellucida*, *Laodelphax striatella*, *Zyginidia pullula*, *Kybos lindbergi*, and *Edwardsiana rosae*. Noteworthy are records of *Kybos calyculus* and *Oncopsis appendiculata* (both new for the Czech Republic), several rare species living in dry ruderal grassland (*Recilia horvathi*, *Macrosteles quadripunctulatus*, *Balclutha saltuella*), and hygrophilous species caught on dispersal flight (*Pentastiridius leporinus*, *Calamotettix taeniatus*, *Cicadula placida*, *Limotettix striola*, and *Paramesus major*).

Key words. Hemiptera, Auchenorrhyncha, Psylloidea, ruderal habitats, city fauna, light traps, streetlamps, Czech Republic, South Moravia, faunistics, new records.

Introduction

Leafhoppers (Cicadomorpha), planthoppers (Fulgoromorpha) and psyllids (Sternorrhyncha: Psylloidea) are phytophagous insects belonging to the order Hemiptera. They suck plant sap, mostly from phloem vessels, some groups feed on xylem or mesophyll tissues. Leafhoppers and planthoppers (also known collectively and frequently as Auchenorrhyncha) occur in almost all terrestrial ecosystems, often in high densities and species numbers. Knowledge of the Auchenorrhyncha in Central Europe has substantially improved in the course of recent decades thanks to progress in studies of both their taxonomy and biology (HOLZINGER et al. 2003, NICKEL 2003). Most Central-European habitats have been sampled for Auchenorrhyncha, including ruderal habitats and cultivated fields (ACHTZIGER 1999 and NICKEL et al. 2002 give a review of most community-based studies). Here, leafhoppers and planthoppers often attract the attention of scientists as a model group for studies of secondary succession (BROWN et al. 1992, HOLLIER et al. 1994, NOVOTNÝ 1994, 1995) and some species as pests liable to reduce yields of agricultural products either by direct damage or by a transmission of various viruses and phytoplasmas, agents of plant diseases (BRČÁK 1979, KŮDELA & KOCOUREK 2002). Psyllids occur also in most ecosystems in Central Europe, even if they are not represented here in such quantity as the Cicadomorpha or Fulgoromorpha. A great

majority of species are closely associated with dicotyledonous plants, on which they are narrowly host-specific (HODKINSON 1974, BURCKHARDT 2002). Recently a few species of Psylloidea have also proved to be vectors of phytoplasmas seriously damaging fruit trees (TEDESCHI et al. 2003).

Currently, about 580 species of Auchenorrhyncha and 124 species of Psylloidea are known from the Czech Republic (MALENOVSKÝ & LAUTERER in press, LAUTERER & MALENOVSKÝ in press). Several studies have dealt with insect communities, including the Hemiptera, in cultivated fields (SKUHRAVÝ & NOVÁK 1957, SKUHRAVÝ et al. 1959, ŠTUSÁK 1962, OBRTEL 1969, MALENOVSKÝ & LAUTERER 2002). Some data on individual leafhopper, planthopper and psyllid species from ruderal habitats are scattered among faunistic papers (e.g. DLABOLA 1954, LAUTERER 1957, 1958, and many others). For other Hemiptera groups, there is a study of the Heteroptera in ruderal vegetation in the city of Brno by RAUS (1990), based on a considerable quantity of material.

Leafhoppers, planthoppers and psyllids can be sampled in many more or less effective ways (STEWART 2002). Among them, light-trapping is not used very frequently, at least in temperate climates. STEWART (2002) reports that Rothamsted light traps sporadically catch a limited range of species in modest numbers. However, the potential of light-trapping for sampling Auchenorrhyncha has been amply demonstrated by the work of SÖDERMAN (2004) who used it extensively over large areas in Finland and found a considerable proportion of Auchenorrhyncha to be nocturnally active. He also discussed the restrictions and benefits of the method: light-traps cover only strongly-flying species, so brachypterous planthoppers and leafhoppers, for example, are missing from the samples, and such traps do not often allow links to be made between a species and its host-plant, or even a habitat. On the other hand, light-trap samples have a beneficial sex-ratio for identification down to species, as males are mostly represented in high numbers, and they often include species that are only rarely collected by other sampling methods. Light-trapping is also suitable for a fairly complete species survey in areas that are difficult to sample evenly, such as city centres, considerably fragmented by built-up space. Here, the Hemiptera material that gathers in the domes of streetlamps, city transport lights and other lighting elements can be put to good use for this purpose too: LAUTERER (1995) studied Auchenorrhyncha and Psylloidea collected in this way in the centre of Brno, LAUTERER & MALENOVSKÝ (1997) reported on Psylloidea of the centre of Strasbourg in France.

Recently, we have evaluated leafhopper, planthopper, and psyllid material light-trapped in streetlamps in a complex of ruderal habitats in the suburbs of the city of Brno, addressed in this paper.

Material and Methods

The material for this study was collected at two sites in South Moravia (Czech Republic) in the eastern periphery of the city of Brno, in the city district of Slatina, field 6866 of the Central European grid system for mapping flora and fauna (EHRENDORFER & HAMANN 1965, PRUNER & MÍKA 1996). The distance between the sites was 1.8 km. In

both places, the sewerage and water supply systems along the roads were under reconstruction and the street lamp-posts had to be temporarily removed. Thanks to the kind assistance of the construction supervisor, we were allowed to open the domes of the lamps and collect the insect material that had gathered there over the course of several years. Insects attracted by the light penetrated the domes through cracks and chinks in the sealing and were killed and conserved by the heat. The lamp acted in this respect as a primitive light-trap. The lighting element was in the both cases a 250-W high-pressure mercury discharge lamp, which emits white light with bands in the entire spectral range. Due to the long-term effect of intensive light and heat, a part of the insect material was considerably discoloured, but otherwise in fair condition. In the laboratory, leafhoppers, planthoppers and psyllids were sorted out, determined, dry-mounted, and deposited in the collections of Moravian Museum, Department of Entomology. They accounted for approximately 5–10 % of all insects; the most numerous group in the lamp domes were Diptera: Nematocera. The method used is thus similar to that of LAUTERER (1995) and LAUTERER & MALENOVSKÝ (1997).

The nomenclature in the paper follows HOLZINGER et al. (1997) for leafhoppers, HOLZINGER et al. (2003) for planthoppers, BURCKHARDT (2002) for psyllids, and KUBÁT et al. (2002) for plants. Vegetation units are named according to MORAVEC et al. (1995) and CHYTRÝ & TICHÝ (2003).

Both sites lie in the Pannonian biogeographical province, near its northernmost limit (CULEK 1996). The geological substrates of the habitats under study are largely Pleistocene loess, loess loams and fluvial sandy gravels (MÜLLER & NOVÁK 2000).

The "Černovická terasa" site is located where Tuřanka street and the Brno-Veselí nad Moravou railway line cross one another, at 49°10'17''N, 16°40'48''E, an altitude of 230 m. On 8th November 2002, the domes of two street lamps here were examined for insects. The lamp-posts were cca 10 m high, lighting the ground below (only species able to fly strongly could thus be collected). They were situated on the edge of an urbanized area, built-up with warehouses, foundries and other industrial buildings, and a vast open, flat field, previously used as an intensively managed agricultural zone, where rotating crops of maize (*Zea mays*), rape (*Brassica napus* subsp. *napus*), sunflower (*Helianthus annuus*), wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), and peas (*Pisum sativum*) were once grown. Because the area became bureaucratically designated for industry, cultivation was abandoned a few years before the study and annual ruderal vegetation of the class *Chenopodietea* Br.-Bl. in Br.-Bl. et al., 1952 developed there, being close to the annual ruderal grassland of the alliance *Bromo-Hordeion murini* Hejný in Hejný et al. 1979. In 2003, it was already merging into the perennial thermophilous ruderal vegetation (*Artemisietea vulgaris* Lohmeyer et al. ex von Rochow 1951): *Bromus tectorum*, *Carduus acanthoides*, *Arctium* spp., and *Taraxacum* Sect. *Ruderalia* dominated over large areas, other frequent but less dominant herbs included *Achillea millefolium* agg., *Artemisia vulgaris*, *Arrhenatherum elatius*, *Capsella bursa-pastoris*, *Cardaria draba*, *Cirsium arvense*, *Dactylis glomerata*, *Descurainia sophia*, *Echium vulgare*, *Festuca rubra* agg., *Lolium perenne*, *Medicago lupulina*, *Pastinaca sativa*, *Reseda lutea*, *Rumex crispus*, *Saponaria officinalis*, and *Tripleurospermum inodorum*. Bare ground and

trampled parts of construction sites and overburden were also present in the area and approximately 500 m from the lamps were dumps from the foundry with slopes almost monodominantly overgrown with *Calamagrostis epigejos* (an area known as "Švédské šance"). Worthy of note, and not far from the lamps, a relatively species-rich perennial thermophilous ruderal vegetation on gravelly soil (*Dauco-Melilotion* Görs 1966) arose around railway track-works, e.g. with *Artemisia campestris*, *A. vulgaris*, *Echium vulgare*, *Galium mollugo* agg., *Geranium robertianum*, *Hieracium bauhini*, *H. pilosella*, *Medicago sativa*, *Melilotus officinalis*, *Potentilla argentea*, *P. reptans*, *Sambucus ebulus*, *Sanguisorba minor*, *Securigera varia*, *Viola arvensis*, and the embankment of the railway track itself was dominated by *Arrhenatherum elatius*. In the close vicinity of the lamps were several old trees of *Betula pendula*. Other woody plants along the railway embankment, the road, in the field drainage and on the dumps included *Acer negundo*, *A. pseudoplatanus*, *Cornus sanguinea*, *Fraxinus excelsior*, *Juglans regia*, *Populus* × *canadensis*, *P. tremula*, *Prunus avium*, *P. mahaleb*, *Robinia pseudacacia*, *Rosa* spp., *Sambucus nigra*, *Symphoricarpos albus*, *Syringa vulgaris*, and *Tilia cordata*.

The "Stránská" site is located in the street of the same name, at 49°11'14''N, 16°40'17''E, at an altitude of 250 m. Here, insects were collected on 14th April 2004 in five lamp domes that had stood 6 m above the ground. On one side, the lamps were adjacent to an intensively cultivated field where the same agricultural plants had been rotated as in "Černovická terasa". The borders of the field consisted of strips of annual and perennial thermophilous ruderal vegetation, including especially *Arctium* sp., *Artemisia vulgaris*, *Arrhenatherum elatius*, *Bromus sterilis*, *Capsella bursa-pastoris*, *Cardaria draba*, *Cirsium arvense*, *Convolvulus arvensis*, *Echium vulgare*, *Elytrigia repens*, *Festuca pratensis*, *Hordeum murinum*, *Reseda lutea*, *Taraxacum* Sect. *Ruderalia*, *Trifolium repens*, and *Tripleurospermum inodorum*. On the other side of the road was an older ruderal area already completely dominated by grasses, especially *Arrhenatherum elatius* and *Dactylis glomerata*. In the gardens of houses nearby, apple (*Malus domestica*), apricot (*Prunus armeniaca*), and plum trees (*P. domestica*) had been planted. Some fifty metres off is a motorway adjoined by scrub consisting of *Acer pseudoplatanus*, *Cornus sanguinea*, *Corylus avellana*, *Crataegus monogyna*, *Eleagnus angustifolia*, *Ligustrum vulgare*, *Lonicera tatarica*, *Prunus avium*, *Rosa* spp., *Sorbus aucuparia*, and *Tilia cordata*. Three hundred metres from the lamps, the south-facing slopes of the Stránská skála Hill are covered with a species-rich, narrow-leaved dry grassland (*Festucion valesiacae* Klika 1931) on Jurassic limestone; this area is protected as a nature reserve (VALOCH & MUSIL 2000).

Results

A total of 1628 specimens and 61 species were found. Leafhoppers (Cicadomorpha) prevailed with 1486 specimens and 50 species (all belonging to Cicadellidae), while

Fulgoromorpha (120 exx., 3 spp.) and Psylloidea (22 exx., 8 spp.) material was less prolific and less species-rich. Fifty-seven species and 1298 specimens were caught at the "Černovická terasa" site, compared to 32 species and 330 specimens in "Stránská". Twenty-two species (i.e. 36 %) were shared by the both sites. The material is listed in Table 1. As usual in light-collected material (LAUTERER 1995, SÖDERMAN 2004), males (1044 exx.) distinctly prevailed over females (584 exx.). SÖDERMAN (2004) explained this by differing sex-specific activity peaks in the Auchenorrhyncha.

In "Černovická terasa", *Empoasca* spp. dominated. *Empoasca vitis* was the most numerous, totalling more than a third of all Hemiptera material from the site. It was followed by *E. decipiens* and *E. pteridis*. These three leafhoppers are extremely polyphagous, living on a wide range of plants. *E. vitis* is preferentially arboricolous, whereas *E. pteridis* feeds on dicotyledonous herbs, and *E. decipiens* can be found both on herbs and leafy shrubs (NICKEL 2003). Other abundant species included the leafhoppers and planthoppers *Macrosteles laevis*, *Psammotettix alienus*, *Javesella pellucida*, *Zyginidia pullula*, *Kybos lindbergi*, and *Laodelphax striatella*. *Kybos lindbergi* is monophagous on birch (*Betula pendula* and *B. pubescens*), the other species feed on various grasses (Poaceae), although the host range of *J. pellucida*, *L. striatella*, and especially *M. laevis* may be broader (NOVOTNÝ 1995, NICKEL 2003). Noteworthy for "Černovická terasa" was a relatively high proportion of specimens (587 exx., 45 %) and species (27 spp., 47 %) of arboricolous Hemiptera, apparently due to trees and shrubs growing in the close vicinity of the lamps. Except for the euryoecious *E. vitis*, these included leafhoppers and psyllids confined to birch (*Betula pendula: Kybos lindbergi*, *K. calyculus*, *Oncopsis* spp., *Chamaepsylla hartigii*), poplars (*Populus* × *canadensis: Macropsis graminea*, *Populicerus nitidissimus*, *Rhytidodus decimusquartus*, *Kybos abstrusus*), and woody Rosaceae (*Edwardsiana rosae*, *E. crataegi*, *E. prunicola*, *Typhlocyba quercus*, *Zygina angusta*, *Z. flammigera*, *Cacopsylla pruni*). A few individuals also belonged to specialists on ash (*Fraxinus excelsior: Psyllopsis fraxinicola*), willows (*Salix* spp.: *Cacopsylla brunneipennis*, *C.* group *saliceti*) and some other more oligophagous arboricolous species (*Aguriahana stellulata*, *Edwardsiana ampliata*, *E. lethierryi*). The nymphs of the rare thermophilous leafhopper *Allygidius furcatus* dwell in the herb layer while its adults move upward onto trees and shrubs.

In "Stránská" the dominant species composition was similar. However, *Macrosteles laevis* was the most abundant, followed by *Empoasca pteridis* and *Psammotettix alienus*. Further, *Laodelphax striatella*, *Edwardsiana rosae*, *Empoasca decipiens*, *Javesella pellucida*, and *Empoasca vitis* ranked between ten and two per cent of the total at the site. Due particularly to the lower numbers of *Empoasca vitis*, the proportion of arboricolous species was lower than in "Černovická terasa" (54 exx., 16 %, 12 species). The most abundant from them, *Edwardsiana rosae*, is oligophagous on roses (*Rosa* spp.) and other related woody trees (*Malus*, *Sorbus*, *Rubus*, *Prunus*), including their domestic cultivars (NICKEL 2003).

Species	Černovická terasa			Stránská		
	♂	♀	%	♂	♀	%
Cicadomorpha						
CICADELLIDAE						
Aguriahana stellulata (Burmeister, 1841)	2		0.15	1		0.30
Allygidius furcatus (Ferrari, 1882)	1		0.08			
Anoplotettix sp.					1	0.30
Arthaldeus striifrons (Kirschbaum, 1868)					1	0.30
Balclutha calamagrostis Ossiannilsson, 1961		1	0.08			
Balclutha cf. *rhenana* Wagner, 1939	4	1	0.39		1	0.30
Balclutha saltuella (Kirschbaum, 1868)	2	2	0.31			
Calamotettix taeniatus (Horváth, 1911)	1		0.08			
Cicadula placida (Horváth, 1897)	9	5	1.08	1	2	0.91
Edwardsiana ampliata (Wagner, 1948)	1		0.08			
Edwardsiana crataegi (Douglas, 1876)	1		0.08	1		0.30
Edwardsiana flavescens (Fabricius, 1794)	1		0.08			
Edwardsiana lethierryi (Edwards, 1881)	1		0.08			
Edwardsiana prunicola (Edwards, 1914)	1		0.08			
Edwardsiana rosae (Linnaeus, 1758)	5		0.39	22		7.88
Edwardsiana spinigera (Edwards, 1924)				1		0.30
Edwardsiana cf. *stehliki* Lauterer, 1958	1		0.08			
Edwardsiana spp.		7	0.54		4	1.21
Elymana sulphurella (Zetterstedt, 1828)					1	0.30
Empoasca affinis Nast, 1937	14	8*	1.69	4	2*	1.21
Empoasca decipiens Paoli, 1930	157	89*	18.95	17	7*	7.27
Empoasca pteridis (Dahlbom, 1850)	100	57*	12.10	30	13*	13.03
Empoasca vitis (Goethe, 1875)	311	177*	37.60	9	4*	3.94
Empoasca spp.		331			26	
Eupteryx atropunctata (Goeze, 1775)	2		0.15	3	2	1.52
Eupteryx florida Ribaut, 1936				3		0.91
Eupteryx stachydearum (Hardy, 1850)	2	1	0.23	1		0.30
Eupteryx tenella (Fallén, 1806)				1		0.30
Eupteryx cf. *urticae* (Fabricius, 1803)		1	0.08			
Eurhadina concinna (Germar, 1831)	1		0.08			
Chlorita paolii (Ossiannilsson, 1939)	1		0.08			
Kybos abstrusus Linnavuori, 1949	1		0.08			
Kybos calyculus Cerutti, 1939	4	4*	0.62			
Kybos lindbergi Linnavuori, 1951	18	18*	2.77	1		1.82
Kybos spp.		22			5	
Limotettix striola (Fallén, 1806)	2	2	0.31		1	0.30
Macropsis graminea (Fabricius, 1798)	1		0.08	1		0.30
Macrosteles cristatus (Ribaut, 1927)				3	2*	1.52
Macrosteles laevis (Ribaut, 1927)	44	33*	5.93	55	33*	26.67
Macrosteles quadripunctulatus (Kirschbaum, 1868)	1	1*	0.15			
Macrosteles spp.		34			35	
Oncopsis appendiculata Wagner, 1944	1		0.08			
Oncopsis flavicollis (Linnaeus, 1761)	1		0.08	1		0.30
Oncopsis subangulata (J. Sahlberg, 1871)	2	1	0.23			
Oncopsis tristis (Zetterstedt, 1840)	1		0.08			
Paramesus major Haupt, 1927		1	0.08		1	0.30
Populicerus nitidissimus (Herrich-Schäffer, 1835)	1	1	0.15			
Psammotettix alienus (Dahlbom, 1850)	30	22	4.01	20	21	12.42
Recilia horvathi (Then, 1896)	2		0.15			
Rhytidodus decimusquartus (Schrank, 1776)	1	1	0.15	2		0.61
Typhlocyba (Typhlocyba) quercus (Fabricius, 1777)				1		0.30
Zygina angusta Lethierry, 1874	1		0.08			
Zygina flammigera (Geoffroy, 1785)	1		0.08			
Zyginidia pullula (Boheman, 1845)	32	7	3.00	4	1	1.52

Species	Černovická terasa			Stránská		
	♂	♀	%	♂	♀	%
Fulgoromorpha						
CIXIIDAE						
Pentastiridius leporinus (Linnaeus, 1761)				1	1	0.61
DELPHACIDAE						
Javesella pellucida (Fabricius, 1794)	46	1	3.62	9	5	4.24
Laodelphax striatella (Fallén, 1826)	15	13	2.16	18	11	8.79
Psylloidea						
PSYLLIDAE						
Aphalara avicularis Ossiannilsson,1981	1		0.08			
Cacopsylla (Cacopsylla) ulmi (Foerster, 1848)	3		0.23			
Cacopsylla (Hepatopsylla) brunneipennis (Edwards, 1896)	1		0.08			
Cacopsylla (Hepatopsylla) sp., *saliceti* (Foerster, 1848) group		4	0.31			
Cacopsylla (Thamnopsylla) melanoneura (Foerster, 1848)					1	0.30
Cacopsylla (Thamnopsylla) pruni (Scopoli, 1763)		1	0.08			
Chamaepsylla hartigii (Flor, 1861)	3	4	0.54			
Psyllopsis fraxinicola (Foerster, 1848)	3	1	0.31			
Total	**834**	**464**	**100.00**	**210**	**120**	**100.00**

Table 1. List of Psylloidea, Fulgoromorpha, and Cicadomorpha light-trapped in streetlamps in Brno-Slatina. ♂ – number of male specimens; ♀ – number of female specimens (for *Empoasca*, *Kybos*, and *Macrosteles* spp., the females of which cannot be identified to species level with certainty, a number corresponding to the proportion of the males is given and marked with an asterisk); % – percentage dominance of species in the site total.

Discussion

Macrosteles laevis, *Psammotettix alienus*, *Empoasca pteridis*, *Javesella pellucida*, and *Laodelphax striatella* are typical pioneer species, readily colonizing disturbed sites and habitats in the early successional stages (Novotný 1994, Nickel 2003, Nickel & Hildebrandt 2003). They are usually the dominant species of leafhoppers and planthoppers in cultivated fields (Afscharpour 1960, Emmrich 1966, Obrtel 1969, Gromadzka 1970, Raatikainen & Vasarainen 1976, Malenovský & Lauterer 2002). *Empoasca decipiens* and *Zyginidia pullula* in South Moravia also prefer these kinds of sites. Similarly, among the arboricolous species, *Empoasca vitis* is one of the first colonizers of newly-planted shrubs and trees (Achtziger 1994). All these leafhoppers and planthoppers exhibit "colonization syndrome" (Novotný 1995): they have versatile dispersal abilities, wide host plant ranges, large geographical distribution and two or more generations per year. In contrast, colonization syndrome is unknown in Psylloidea. Several Central European psyllids typical of ruderal habitats are narrowly confined to single plant species or genera, e.g. *Polygonum*, *Persicaria*, *Artemisia*, *Chenopodium*, *Atriplex*, *Cirsium arvense* (Burckhardt 2002), and they probably do not differ from their relatives living in more permanent habitats in other life-styles mentioned either.

From among these species at the lights in Slatina we recorded only *Aphalara avicularis*, monophagous on the *Polygonum aviculare* species complex (other Psylloidea found were arboricolous). In Heteroptera communities in ruderal habitats, species with distinct host-preferences also seem to be represented to a greater extent than in Auchenorrhyncha (RAUS 1990).

Some records are especially remarkable. *Kybos calyculus* and *Oncopsis appendiculata* were found in the Czech Republic for the first time. Both live on birch. On 21st May 2003 an additional excursion was made to the nearby housing quarters of Brno-Slatina, and both *K. calyculus* (3 ♂♂) and *O. appendiculata* (4 ♂♂, 7 ♀♀) were found there too, in alleys and on solitary trees of *Betula pendula* together with greater numbers of *Kybos lindbergi*, *Oncopsis flavicollis*, *O. subangulata*, and *O. tristis* (P. Lauterer & R. Mühlethaler leg.). To date, *K. calyculus* has been reported from *Betula pubescens* from only a very few sites in Poland, England, Switzerland, and eastern Germany (DWORAKOWSKA 1976, SCHIEMENZ 1990). *O. appendiculata* is widely distributed through northern, western and central Europe (Sweden, Finland, Latvia, Lithuania, Netherlands, Belgium, France, Germany, Poland, Austria, ex-Yugoslavia: NAST 1972, 1987); however, it also seems to be collected quite rarely. Both species are apparently confined to lower altitudes in Central Europe (NICKEL 2003).

Recilia horvathi had previously been found in the Czech Republic only three-times, in the 1950's at light and by sweeping in alfalfa fields and fallow in the western periphery of Brno: Pisárky, Myslivna, and the Brno Reservoir (LAUTERER 1958, 1995). Recently, the species has also been recorded from green vineyards in Mikulov, the Pavlovské vrchy Hills (Lauterer & Hluchý in litt.). All these records from South Moravia, including the specimens from Slatina, come from open, dry ruderal habitats. In Germany, *R. horvathi* has been recorded at only two sites in the northern upper Rhine plain on inland sand-dunes on *Corynephorus canescens* (HELLER 1996, NICKEL 2003). This grass is absent from all known Czech localities. *R. horvathi* is widespread in southern and south-eastern Europe, Tunisia, Georgia, Kazakhstan, and Mongolia (NAST 1972, 1987, REMANE & FRÖHLICH 1994).

The habitat preferences of *Macrosteles quadripunctulatus* are apparently similar to those of the preceding species. *M. quadripunctulatus* has also been found in the Czech Republic only infrequently. The published records include Čelákovice in central Bohemia (DLABOLA 1954), a red clover field in Střelice near Brno (LAUTERER 1957), and the city of Brno (LAUTERER 1995). It has been recently found in vineyards in the Pavlovské vrchy Hills as well. The species is reported from grasses (*Setaria*, *Panicum*) but also from Chenopodiaceae (*Corispermum*) (NICKEL 2003).

Balclutha saltuella is another uncommon leafhopper in dry ruderal sites. Its distribution in the Czech Republic seems to be more or less limited to the Pannonian province, where it occurs sporadically, e.g. in disturbed dry grassland, pastures, and inland salt marshes.

In spite of the dry character of both sites under study, five hygrophilous species were present in the material: *Pentastiridius leporinus*, *Calamotettix taeniatus*, *Cicadula placida*, *Limotettix striola*, and *Paramesus major*. All of them were found in the

agricultural landscape adjacent to the south-eastern quarters of Brno on other occasions as well, mostly in depressions, wet fields, along streams and canals or by roads, in ditches. Such small-scale habitats were, however, relatively distant from the places under study (at least 3 km) and the individuals (14 males, 13 females) found in the lamps must have been trapped on their dispersal flight. A similar phenomenon has been described from Finland as well (SÖDERMAN 2004).

Pentastiridius leporinus and *Calamotettix taeniatus* feed on reeds (*Phragmites australis*). Only one record, DLABOLA (1970), has been published for *P. leporinus* from the Czech Republic (South Bohemia: Dobev) so far. The species has, however, also been listed without exact data from Bohemia by DUDA (1892) and from Moravia by DLABOLA (1977). In the Brno environs it has also been swept in ruderal habitats in Rebešovice (Rebešovice, 6865, Zadní díl, 15.viii.1968, 1♀, P. Lauterer leg.).

To date, *C. taeniatus* has been reported from only a single locality in South Moravia, the shores of the Nesyt Pond (LAUTERER 1986). It seems to be strongly attracted by light (LAUTERER 1980, SÖDERMAN 2004). Another 2 ♀♀ were caught in 2002 at light in Brno-Štýřice, 6865, Heršpická Street (P. Lauterer & J. Chromý leg.)

Cicadula placida is a hygrophilous and thermophilous species living on tall sedges. LAUTERER (1986) gives *Carex acuta* (= *C. gracilis*) as the host-plant. *C. placida* is probably also present in the Czech Republic only in the Pannonian province and Brno could well be close to the northern edge of its range. In the South Moravian lowlands it occurs on eutrophic shores of rivers and ponds, open marshy sites in floodplain forests and wet depressions in fields (Brno-Chrlice, 6865, Dolní louky, 16.x.1999, *Carex* sp., 2 ♂♂, 1 ♀; Moravský Písek, 7070, 2 km S, wetland in field at road to Veselí, 15.ix.1999, 6 ♂♂, 1 ♀; both I. Malenovský leg.). In Brno it has occasionally been found on disturbed sites (Brno-Starý Lískovec and Bohunice, 6865, banks of the Leskava stream, 10.x.2004, 2 ♂♂, I. Malenovský leg.) and in great numbers at light (Brno-Štýřice, 6865, Heršpická Street, 2002, many exx., P. Lauterer & J. Chromý leg.).

Limotettix striola is widespread in the Czech Republic on the shores of ponds, bogs, meadow springs, and inland salt marshes (DLABOLA 1954), but also in ephemeral habitats such as the exposed beds of regularly drained fish-ponds (NOVOTNÝ 1994). According to NICKEL (2003), it is also a pioneer species in sand and gravel pits and may feed on Cyperaceae, mainly *Eleocharis* spp.

Paramesus major is trophically confined to *Bolboschoenus maritimus* agg. FRÖHLICH (1997) classifies the leafhopper as halobiont. In the Czech Republic, *P. major* lives in inland salt marshes (LANG 1945, DLABOLA 1970, STREJČEK & HONCŮ 1977). In the basins of South Moravia it also successfully colonizes the annual stands of its host-plants in wet depressions of cultivated fields on loamy substrates and their margins (Brno-Chrlice, 6865, Dolní louky, red clover and maize fields, 27.vi.1999, 7♂♂, 2♀♀; Slavkov u Brna, 6867, maize field at the bypass road 1.5 km SE the town, 15. ix.1999, 27 ♂♂, 16 ♀♀, 2 L5; Moravský Písek, 7070, 2 km S, wet depression in maize field, 15.ix.1999, 3 ♂♂, 1 ♀; all on *Bolboschoenus maritimus* agg., I. Malenovský leg.).

The habitats under study belong to group X ("Habitats strongly influenced or created by man") in the habitat classification of the Czech Republic (CHYTRÝ et al. 2001).

As such, they are not considered as valuable for nature conservation. Nevertheless, they may well be important from the biodiversity point of view. As in former brown-coal mining areas (FUNKE & WITSACK 1998), small-scale patches in ruderal habitats or cultivated fields can even harbour a number of rare species. *Calamotettix taeniatus*, *Paramesus major*, *Pentastiridius leporinus*, *Recilia horvathi*, *Allygidius furcatus*, and *Cicadula placida* are listed by MALENOVSKÝ & LAUTERER (in press) as endangered or vulnerable members of the Czech fauna. Any conservative protection of ruderal habitats is, however, generally problematic because of their direct association with human economic activities.

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Souhrn

V práci vyhodnocujeme materiál polokřídlého hmyzu – křísů a mer (Hemiptera: Cicadomorpha, Fulgoromorpha, Psylloidea), ulovený na světlo na předměstí Brna. Na dvou lokalitách v okrajových partiích městské části Slatina (čtverec 6866 středoevropské sítě pro mapování flóry a fauny) jsme v letech 2002 a 2004 v komplexu několika typů biotopů ruderální povahy (intenzivně obhospodařovaná pole, jednoletá a vytrvalá ruderální bylinná vegetace, křoviny s ruderálními a nepůvodními druhy) odebrali hmyz z chráničů pouličního osvětlení (celkem 7 lamp se rtu□ovými výbojkami, ve výšce 6 a 10 m nad zemí), který se v nich hromadil po několik předchozích let. Celkem jsme determinovali 1628 jedinců křísů a mer, příslušejících 61 druhům (Tabulka 1). Mezi nejpočetnější patřily *Empoasca vitis*, *E. decipiens*, *E. pteridis*, *Macrosteles laevis*, *Psammotettix alienus*, *Javesella pellucida*, *Laodelphax striatella*, *Zyginidia pullula*, typické druhy kolonizující stanoviště v raném stádiu sukcese a často narušované plochy, a arborikolní druhy *Kybos lindbergi* a *Edwardsiana rosae*. Z dalších jsou významné především nálezy dvou druhů křísů nových pro Českou republiku, *Kybos calyculus* a *Oncopsis appendiculata* (čeleď Cicadellidae). Oba jsou v Brně-Slatině vázány na stromy břízy bělokoré (*Betula pendula*). Za zmínku stojí také tři v České republice dosud sporadicky nalézané druhy ruderálních trávníků na suchých stanovištích (*Recilia horvathi*, *Macrosteles quadripunctulatus* a *Balclutha saltuella*) a několik hygrofilních druhů (*Pentastiridius leporinus*, *Calamotettix taeniatus*, *Cicadula placida*, *Limotettix striola* a *Paramesus major*), odchycených zřejmě v letu na větší vzdálenost (alespoň 3 km).

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