Cicadina 13 (2013): 29-41

Contribution to the Auchenorrhyncha fauna of the Pálava Protected Landscape Area (Czech Republic) (Hemiptera: Fulgoromorpha et Cicadomorpha)

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Summary: A list of Auchenorrhyncha species collected from field excursions during the 17th Central-European Auchenorrhyncha Meeting held in Mikulov, South Moravia, Czech Republic in August 2010 is given. A total of 133 species was recorded at four sites. One species, *Macrosteles spinosus* Kwon, 2013, is recorded for the first time for the Czech Republic and 34 species are new records for the fauna of the Pálava Protected Landscape Area and the Dolní Morava Biosphere Reserve. The area is valuable from a nature conservation viewpoint for the occurrence of many rare stenotopic Auchenorrhyncha species associated particularly with dry grassland vegetation, open xerothermic woodland and remnants of inland saltmarshes.

Key words: *Macrosteles*, faunistics, Pannonian biogeographical province, Czech Republic, Moravia

1. Introduction

The Pálava Hills (also known as the Pavlovské vrchy Hills) constitute a limestone cliff zone elevated above the plane of the north-western outskirts of the Pannonian lowland in southern Moravia, the Czech Republic, near the border with Austria. The hills are covered with rocks, dry grassland and xerothermic woodland. These habitats harbour a remarkably rich flora and fauna including many thermophilous species with sub-Mediterranean or Pannonian distributions that do not occur elsewhere in the Czech Republic. For its great value for nature conservation, the Pálava was accorded the status of a Protected Landscape Area in 1976 which covers 83.32 km^2. This was later included, together with neighbouring areas of the Dyje and Morava River floodplains, in a larger UNESCO Biosphere Reserve within the Man and Biosphere programme, currently named Dolní Morava (Mackovčin et al. 2007).

The fauna of the Pálava Protected Landscape Area and the Dolní Morava Biosphere Reserve is relatively well-known due to a series of monographs bringing together annotated check-lists for practically all terrestrial and aquatic invertebrate

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published online 16 December 2013

and vertebrate taxa found in the area (Laštůvka 1994; Rozkošný & Vaňhara 1995a, b, 1996, 1998, 1999; Opravilová et al. 1999; Řehák et al. 2002; Bryja et al. 2005; Šťáhlavský & Chytil 2013). With more than 13,300 species of invertebrates and 447 species of vertebrates, the Pálava Protected Landscape Area and the Dolní Morava Biosphere Reserve represent a true biodiversity hotspot in the Czech Republic.

The information on the local fauna of the Auchenorrhyncha, largely based on historical records and previously published data, was summarized by Lauterer (1995) who reported 180 species of leafhoppers and planthoppers from the area. Several species were added later in faunistic papers by Lauterer (1996, 2000), Malenovský & Lauterer (2010) and Malenovský et al. (2011). Many additional records of Auchenorrhyncha from the Pálava Hills and surrounding areas of the Dolní Morava have, however, been documented through extensive material in museum collections, particularly of the Moravian Museum, Brno, and still remain unpublished.

This paper provides a list of species of Auchenorrhyncha collected in the Pálava Protected Landscape Area during field excursions undertaken mainly in the course of the 17th Central European Auchenorrhyncha Meeting held in August 27–29 in Mikulov (Witsack & Malenovský 2011).

2. Collecting sites and methods

The material was collected at four localities:

(1) Klentnice, Stolová hora hill ("Tabulová, Růžový vrch a Kočičí kámen" national nature reserve), 48°50'26"N, 16°38'17"E, 290–459 m a.s.l., on 27.VIII. 2010, by W. Witsack. The site is a mosaic of rock outcrop vegetation and dry grassland on limestone rocks and loess (plant associations/alliances *Poo badensis-Festucetum pallentis*, *Minuartio setaceae-Seslerietum caeruleae*, *Saxifrago paniculatae-Seslerietum caeruleae*, *Festucion valesiaceae*, and *Cirsio-Brachypodion pinnati*), dry herbaceous fringes (*Geranio sanguinei-Peucedanetum cervariae*), and tall mesic and xeric shrubs (*Berberidion*).

(2) Sedlec u Mikulova, saltmarsh at the Nesyt pond ("Slanisko u Nesytu" national nature reserve), 48°46'33"N, 16°41'52"E, 176 m a.s.l., on 27.VIII.2010, by S. Koczor, I. Malenovský, G. Seljak, and W. Witsack. The site is covered with remnants of a mesic to wet saline grassland and marsh vegetation (*Scorzonero parviflorae-Juncetum gerardii*, *Loto tenuis-Potentilletum anserinae*, *Puccinellietum limosae*, *Astero pannonici-Bolboschoenetum compacti*, *Arrhenatherion elatioris*, *Caricetum ripariae*, and *Phragmitetum australis*).

(3) Klentnice, southern and south-eastern slopes of the Děvín hill ("Děvín-Kotel-Soutěska" national nature reserve), 48°51'56"N, 16°38'40"E, 330–550 m a.s.l., on 28.VIII.2010, by C. Bückle, A. Guglielmino, S. Koczor, I. Malenovský, S. Schuch, G. Seljak, and W. Witsack. The site is a large-scale mosaic of rock out-

crop vegetation and dry grassland on limestone rocks and loess (*Festucion valesiacae*, *Diantho lumnitzeri-Seslerion albicantis*, *Poo badensis-Festucetum pallentis*, and *Cirsio-Brachypodion pinnati*), tall xeric shrubs (*Violo hirtae-Cornetum maris*), dry herbaceous fringes (*Geranio sanguinei-Dictamnetum albae*), basiphilous thermophilous oak forests (*Corno-Quercetum* and *Pruno mahaleb-Quercetum*), and Pannonian oak-hornbeam forests (*Primulo veris-Carpinetum*).

(4) Mikulov, southern and western slopes of the Svatý kopeček hill ("Svatý kopeček" nature reserve), 48°48'22"N, 16°38'43"E, 250–360 m a.s.l., on 18.VI. 2010 by I. Malenovský, and on 28.VIII.2010 by C. Bückle, A. Guglielmino, S. Koczor, S. Schuch, and W. Witsack. The site is mainly covered with dry grassland and rock outcrop vegetation on limestone rocks (*Minuartio setaceae-Seslerietum caerulae, Poo badensis-Festucetum pallentis, Koelerio macranthae-Stipetum joannis*), with intermixed tall mesic and xeric shrubs (*Berberidion*) and fragments of woodland.

More details on the natural history of each locality can be found in Mackovčin et al. (2007). Auchenorrhyncha were collected from herbal vegetation, shrubs and trees mainly with different types of sweeping nets and aspirator. The voucher material is deposited in the collections of individual authors. The nomenclature in the species list follows Holzinger et al. (2003), Holzinger & Kunz (2006), and Hoch (2013).

3. Results and discussion

A total of 133 species was recorded, of which 34 are new for the fauna of the Pálava Protected Landscape Area and the Dolní Morava Biosphere Reserve (Table 1, see appendix). Many of the species recorded are rare in central Europe; altogether 39 of them are classified in the Red List of threatened invertebrates of the Czech Republic (Malenovský & Lauterer 2005).

Particularly the Auchenorrhyncha fauna associated with dry grassland and rocky habitats includes many noteworthy species. The sparsely vegetated limestone rocky slopes of the Pálava Hills constitute strongholds of the occurrence of *Zygina frauenfeldi* in the Czech Republic. Despite a wide distribution of its host plant, *Sanguisorba minor*, the species has been otherwise documented from only two other small localities in southern Moravia (Lauterer 1980, Malenovský & Lauterer 2012) and is quite sporadic also elsewhere throughout the range of its general distribution, southern parts of central Europe and the Balkan peninsula (Holzinger et al. 2011). *Pleargus pygmaeus* and *Praganus hofferi* are grass-feeders widespread in the Asian steppe zone, with apparently relic populations on few xerothermic treeless sites in central Europe, namely the Bohemian Karst and the Pálava Hills in the Czech Republic (Dlabola 1954, Lauterer 1996, Malenovský & Lauterer 2010), the Thuringian Basin in Germany (Nickel 2003: *P. hofferi*), the Pannonian part of Austria (Holzinger 2009a) and Hungary (Györffy et al. 2009).

Kelisia halpina, associated with *Carex humilis*, is only known from the Alps in Austria, Italy, Germany and Switzerland, and a few xerothermic sites in Lower Austria and South Moravia (Remane & Jung 1995, Nickel 2003). *Chlorionidea flava* and *Zyginidia mocsaryi* are very local species in the Czech Republic, although they are more common in the plant communities dominated by *Sesleria caerulea* elsewhere, particularly in the Alps (Lauterer 1984, Nickel 2003, Malenovský & Lauterer 2010). Other remarkable, stenotopic species of xerothermic grasslands include *Reptalus cuspidatus*, *Metropis mayri*, *Arboridia kratochvili*, *A. parvula*, *A. pusilla*, *Anaceratagallia venosa*, *Austroagallia sinuata*, *Batracomorphus irroratus*, *Doratura exilis*, *Ebarrius cognatus*, *Goniagnathus brevis*, *Henschia quadricornis*, *Laburrus impictifrons*, *Platymetopius undatus*, and *Rhoananus hypochlorus*; all are generally restricted to relatively well-preserved sites and occur only locally in the Czech Republic and neighbouring countries (Dlabola 1954, Nickel 2003, Holzinger 2009b, Malenovský et al. 2011).

Another habitat important for conservation of Auchenorrhyncha in the Pálava Hills is open xerothermic oak woodland. *Lindbergina loewi*, monophagous on *Quercus cerris*, reaches here the absolute northern limit of its distribution (Lauterer 1984) while *Mycterodus cuniceps*, *Platymetopius complicatus*, and *Thamnotettix exemtus* have been documented also from a few localities lying a few dozens of kilometers to the north but still more or less within the reach of the Pannonian part of South Moravia (Dlabola 1954, Malenovský et al. 2011, Malenovský & Lauterer 2012). These species, among others, are also characteristic members of species-rich Auchenorrhyncha communities of thermophilous oak forests in Austria (Holzinger 1996).

Inland saltmarshes represented a relatively common habitat in southern Moravia in the past (Vicherek 1962, Chytrý 2007). However, only very small and isolated remnants have been preserved until present. A rapid assessment of the Auchenorrhyncha fauna in the saltmarsh at the Nesyt pond near Sedlec on one of the excursions during the meeting ascertained a few halophilous species, particularly *Paramesus major* and *Psammotettx kolosvarensis*, which are characteristic inhabitants of saline sites (Lang 1945, Fröhlich 1997, Nickel et al. 2002, Nickel 2003).

Macrosteles spinosus Kwon, a species very recently described from Turkey, Bulgaria, France, Russia, China and New Zealand (Zhang et al. 2013) has also been identified in the material collected on the excursion in the saltmarsh at the Nesyt pond near Sedlec (one male deposited in coll. G. Seljak). A revision of *Macrosteles* material in the Moravian Museum, Brno revealed further specimens of this species from historical collections at the same locality and three additional sites in the Czech Republic: 2 males, Sedlec near Mikulov, Nesyt Pond, saltmarsh, 15.VIII.1962, P. Lauterer leg.; 1 male, Rakvice (district Břeclav), saltmarsh in a disused rice field, 2.VII.1962, P. Lauterer leg.; 1 male, Lednice (district Břeclav), southern shore of

Mlýnský rybník (Apollo) pond, 4.VII.1995, T. Grim leg.; 1 male, Bílé Karpaty Mts., Brumov-Bylnice (district Zlín), wet ruderal vegetation along the Vlára river near Bylnice railway station, 300 m, 11.IX.1999, I. Malenovský leg. (the latter specimen had been misidentified and cited as *M. fieberi* (Edwards) by Malenovský & Lauterer 2012). Based on these records, *Macrosteles spinosus* seems to be widespread (though probably uncommon) at least in the lowlands of southern and eastern Moravia but has been overlooked or misidentified in the Czech Republic until present. It is similar to *M. fieberi* (Edwards) and *M. lividus* (Edwards) and can be distinguished by details of the aedeagus (lack of lateral flanges and presence of teeth on aedeagus stem ventrally) and sternal apodemes (Zhang et al. 2013). The nomenclature in this group still needs to be confirmed by a study of the type material of *M. fieberi* and *M. lividus* (not examined by Zhang et al. 2013) – the names are interpreted here according to Ossiannilsson (1983). The biology of *M. spinosus* is largely unknown but the species seems to have similar habitat requirements as *M. lividus* which occurs in temporarily or permanently flooded sunny sites on shores of ponds, in sand and gravel pits and in salt marshes on *Eleocharis palustris*, in contrast to *M. fieberi* (sensu Ossiannilsson 1983) which is a tyrphobiont strictly confined to *Eriophorum angustifolium* in raised and intermediate bogs (Nickel et al. 2002, Nickel 2003, Nickel & Gärtner 2009). It is likely that *M. spinosus* is widely distributed in Europe and Asia and particularly the material previously published under *M. fieberi* from lowland, not peaty sites should be revised. For instance, records by Dlabola (1954) from south-eastern Moravia and southern Slovakia, by Okáli (1968) from Slovakia, Hungary, Romania and Russia, and by Anufriev (1968) from the Russian Far East (?) may, at least in part, refer to *M. spinosus*. The same is true for other records mentioned by Nast (1972, 1987) as *M. fieberi*, especially for those from the southern part of the indicated range.

4. Zusammenfassung

Ein Beitrag zur Zikadenfauna des Landschaftsschutzgebiets Pálava (Tschechische Republik). – Es wird eine Liste der Zikadenarten präsentiert, die im Rahmen der Exkursionen zur 17. Mitteleuropäischen Zikadentagung in Mikulov, Süd-Mähren, Tschechische Republik im August 2010 gesammelt wurden. Insgesamt konnten 133 Arten an den 4 Untersuchungsstandorten nachgewiesen werden. Eine Art, *Macrosteles spinosus* Kwon, 2013, wurde zum ersten Mal in der Tschechischen Republik nachgewiesen, 34 Arten sind neu für die Fauna des Landschaftsschutzgebiets Pálava und das Biosphärenreservat Dolní Morava. Naturschutzfachlich wertvoll ist das Gebiet aufgrund des Vorkommens vieler seltener, stenotoper Zikadenarten, insbesondere von Besiedlern der Trockenrasen, der offenen, trockenwarmen Buschvegetation und der letzten Binnensalzstellen.

Acknowledgements

We thank Jiří Matuška and Pavel Dedek (of the Pálava Protected Landscape Area Management, Mikulov) for a logistic support and arrangement of collecting permits for the field excursions, and Petr Baňař (of the Moravian Museum, Brno) for his invaluable help in the organisation of the meeting. Pavel Lauterer (Moravian Museum, Brno) generously allowed us to cite his unpublished historical records of *Macrosteles spinosus* from Moravia. This paper appears through financial support provided to the Moravian Museum, Brno by the Ministry of Culture of the Czech Republic as part of its long-term conceptual development programme for research institutions (ref. MK000094862).

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Appendix

Table 1: List of Auchenorrhyncha species recorded in the Pálava Protected Landscape Area from field excursions in 2010; * = new record for the Pálava Protected Landscape Area and the Dolní Morava Biosphere Reserve. BG = Christoph Bückle & Adalgisa Guglielmino leg., K = Sándor Koczor leg., M = Igor Malenovský leg., Se = Gabrijel Seljak leg., Sh = Sebastian Schuch leg., W = Werner Witsack leg.

Species	**Klentnice: Stolová hora hill 27.VIII.2010**	**Sedlec: Saltmarsh at the Nesyt pond 27.VIII.2010**	**Klentnice: Děvín hill 28.VIII.2010**	**Mikulov: Svatý kopeček hill 18.VI. + 29.VIII.2010**
FULGOROMORPHA				
Cixiidae				
**Reptalus cuspidatus* (Fieber)				M
Delphacidae				
**Acanthodephax spinosa* (Fieber)			Se	
Asiraca clavicornis (Fabricius)			Se	
Chloriona unicolor (Herrich-Schäffer)		K, M, Se, W		
Chlorionidea flava (Löw)				M
Dicranotropis hamata (Boheman)	W		BG, W	
Ditropsis flavipes (Signoret)	W			
**Eurysa lineata* (Perris)				M
**Hyledelphax elegantula* (Boheman)			BG, Se	
Javesella dubia (Kirschbaum)		M		
Javesella pellucida (Fabricius)		K, M, Se	BG, M, W	
Kelisia halpina Remane & Jung	W			BG
Laodelphax striatella (Fallén)	W	K, M, Se	BG, K, M, Se, W	BG, K, W
Megadelphax sordidula (Stål)	W		BG, M, Se, Sh, W	
Metropis mayri Fieber				M
**Toya propinqua* (Fieber)		M		
**Xanthodelphax straminea* (Stål)		M, W		
Dictyopharidae				
Dictyophara europaea (Linnaeus)				K
Issidae				
Issus muscaeformis (Schrank)				M
Mycterodus cuniceps Melichar				M
CICADOMORPHA				
Aphrophoridae				
Aphrophora alni (Fallén)	W		K, M, W	M, W
Lepyronia coleoptrata (Linnaeus)	W		BG, M, W	K, M, Sh, W
Neophilaenus albipennis (Fabricius)			M	
Neophilaenus campestris (Fallén)			K	
**Neophilaenus minor* (Kirschbaum)	W			
Philaenus spumarius (Linnaeus)	W			

Species	Klentnice: Stolová hora hill 27.VIII.2010	Sedlec: Saltmarsh at the Nesyt pond 27.VIII.2010	Klentnice: Děvín hill 28.VIII.2010	Mikulov: Svatý kopeček hill 18.VI. + 29.VIII.2010
Membracidae				
Gargara genistae (Fabricius)	W			
Stictocephala bisonia Kopp & Yonke	W	W	K	
Cicadellidae				
Acericerus vittifrons (Kirschbaum)			K	
Adarrus multinotatus (Boheman)			M, W	Sh
Agallia consobrina Curtis			W	
Alebra albostriella (Fallén)			K	
Alebra coryli Le Quesne			M	
Alebra viridis (Rey)			Se	
Alebra wahlbergi (Boheman)			M, Se	M
Allygidius atomarius (Fabricius)				M
Allygidius furcatus (Ferrari)			BG, K, M	
Allygus mixtus (Fabricius)			K	
Alnetoidia alneti (Dahlbom)				M
Anaceratagallia ribauti (Ossiannilsson)		M	BG	
Anaceratagallia venosa (Fourcroy)	W			BG, M, W
**Arboridia erecta* (Ribaut)				W
**Arboridia kratochvili* (Lang)			W	
**Arboridia parvula* (Boheman)				BG, K, W
**Arboridia pusilla* (Ribaut)			BG, K, M, W	BG, Sh, W
Arboridia simillima (Wagner)			BG, W	BG, W
Arboridia velata (Ribaut)			K, M, Se	BG, W
Arocephalus languidus (Flor)	W		BG	M
**Arthaldeus striifrons* (Kirschbaum)		M, W		
Artianus interstitialis (Germar)			K	
Austroagallia sinuata (Mulsant & Rey)				BG
Austroasca vittata (Lethierry)			BG, K, M, Se, Sh	
Balcanocerus larvatus (Herrich-Schäffer)				M
Balclutha punctata (Fabricius)	W		K, M, Se, W	BG, K
**Batracomorphus irroratus* Lewis				BG, M, W
Chlorita paolii (Ossiannilsson)	W	K, M	BG, M, Se, Sh	BG, K, M, Sh, W
Cicadella viridis (Linnaeus)	W	K, M, W		
**Deltocephalus pulicaris* (Fallén)		M, Se		
**Diplocolenus bohemani* (Zetterstedt)	W			
**Doratura exilis* Horváth				M, W
Doratura homophyla (Flor)		K, M		
Doratura impudica Horváth			BG, M, Se, Sh	M, W
Doratura stylata (Boheman)			BG, M, Se	W
**Dryodurgades reticulatus* (Herrich-Schäffer)	W		BG	
Ebarrius cognatus (Fieber)	W		BG	

Species	**Klentnice: Stolová hora hill 27.VIII.2010**	**Sedlec: Saltmarsh at the Nesyt pond 27.VIII.2010**	**Klentnice: Děvín hill 28.VIII.2010**	**Mikulov: Svatý kopeček hill 18.VI. + 29.VIII.2010**
Edwardsiana crataegi (Douglas)			M	
Edwardsiana flavescens (Fabricius)				M
Edwardsiana lethierryi (Edwards)			K, M	
**Edwardsiana ulmiphagus* Wilson & Claridge			BG	
Elymana sulphurella (Zetterstedt)	W			
Emelyanoviana mollicula (Boheman)	W		BG, M, Sh, W	Sh
Empoasca affinis Nast				W
Empoasca decipiens Paoli		W	BG, Se, W	W
Empoasca pteridis (Dahlbom)				W
Empoasca vitis (Göthe)	W		K	M, W
Enantiocephalus cornutus (Herrich-Schäffer)			W	
**Errastunus ocellaris* (Fallén)		M, Se		
Eupelix cuspidata (Fabricius)	W			M
Eupteryx aurata (Linnaeus)			W	
Eupteryx adspersa (Herrich-Schäffer)			BG	
Eupteryx calcarata Ossiannilsson		K	Se	
**Eupteryx decemnotata* Rey				Sh
Eupteryx florida Ribaut			BG, Se, W	W
Eupteryx tenella Fallén			W	BG, W
Eurhadina concinna (Germar)			K	
Eurhadina pulchella (Fallén)			M, W	
Fagocyba cruenta (Herrich-Schäffer)				M
Fieberiella florii (Stål)			Se	BG, K, W
Goniagnathus brevis (Herrich-Schäffer)				BG, W
Hardya tenuis (Germar)	W		BG, Sh, W	BG, K, Sh, W
**Henschia collina* (Boheman)		M		
Henschia quadricornis (Dlabola)	W		BG, K, M, Se, Sh, W	BG, K, M, Sh, W
Iassus lanio (Linnaeus)				M
Japananus hyalinus (Osborn)			BG, K, M, Se, W	
Jassargus obtusivalvis (Kirschbaum)	W		BG, K, M, Se, Sh, W	BG, M, W
**Jassargus sursumflexus* (Then)	W			
Laburrus impictifrons (Germar)	W			BG, K, M, W
**Limotettix striola* (Fallén)		K, M, Se, W		
Lindbergina loewi (Lethierry)			M	
**Macrosteles cristatus* (Ribaut)			K, M	
Macrosteles laevis (Ribaut)		K, M	K, M	
Macrosteles quadripunctulatus (Kirschbaum)		W		

Species	**Klentnice: Stolová hora hill 27.VIII.2010**	**Sedlec: Saltmarsh at the Nesyt pond 27.VIII.2010**	**Klentnice: Děvín hill 28.VIII.2010**	**Mikulov: Svatý kopeček hill 18.VI. + 29.VIII.2010**
Macrosteles sexnotatus (Fallén)		K, M, W		
**Macrosteles spinosus* Kwon		Se		
**Macrosteles viridigriseus* (Edwards)		K, M, Se, W	K	
Mocydia crocea (Herrich-Schäffer)	W	M, W	K, M, W	BG, K, W
Mocydiopsis longicauda Remane			BG, K, M, W	BG, W
**Neoaliturus fenestratus* (Herrich-Schäffer)	W		W	
**Paralimnnus phragmitis* (Boheman)		M		
**Paramesus major* Haupt		K, M, Se, W		
Penthimia nigra (Goeze)				M
**Planaphrodes trifasciata* (Fourcroy)				M
Platymetopius complicatus Nast			BG, Se	BG
Platymetopius major (Kirschbaum)	W			W
**Platymetopius undatus* (De Geer)			BG, K, M, Se, Sh	BG, K, M, Sh
Pleargus pygmaeus (Horváth)			BG	M
Praganus hofferi (Dlabola)				BG, K, M, W
Psammotettix alienus (Dahlbom)		K, M, W	BG	
Psammotettix confinis (Dahlbom)		K, M, Se, W	K	
Psammotettix helvolus (Kirschbaum)	W	M	BG	M
**Psammotettix kolosvarensis* (Matsumura)		M, W		
Rhoananus hypochlorus (Fieber)				M
Rhopalopyx vitripennis (Flor)			Se	M
**Ribautiana* cf. *alces* (Ribaut)			M	
Thamnotettix exemtus Melichar				M
Turrutus socialis (Flor)	W	K, M	BG, K, M, Se, W	BG, K, M, Sh, W
Zygina flammigera (Geoffroy)				M, Sh
Zygina frauenfeldi Lethierry			BG	BG, M, Sh
**Zygina hyperici* (Herrich-Schäffer)			M	BG, W
Zygina schneideri (Günthart)				BG, M, Sh
Zyginella pulchra Löw			K, Se	
Zyginidia mocsaryi (Horváth)				BG, W
Zyginidia pullula (Boheman)		K, M		W