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Aphids (Sternorrhyncha, Aphidinea) of Calvary Park in Piekary Śląskie (Upper Silesia)

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ABSTRACT

The paper presents the results of faunistic research conducted in Calvary Park (Polish: Park Kalwaryjski) in Piekary Śląskie (Upper Silesia). As a result, thirty aphid species were recorded, representing two superfamilies and seven families. Four of the recorded species: *Cinara piceae* (Panzer, 1801), *Brachycaudus lateralis* Walker, 1848, *Marcosiphum melampyri* Mordvilko, 1919 and *Hyperomyzus lampsanae* (Boerner & Blunck, 1916) were recorded for the first time in the region of Upper Silesia. A brief discussion on the species richness and composition of the studied area is presented.

KEY WORDS: aphids, fauna, park, Upper Silesia

INTRODUCTION

The town of Piekary Śląskie is a very interesting area of Silesian Upland mesoregion due to the level of human transformation of natural environment in this region. The northern part of Piekary Śląskie is situated within the Middle-Triassic Ridge and from the north it borders with Mała Panew Valley, which is an area characterized by relatively well preserved natural habitats and a high biological diversity. Southern part of the town is situated on Katowice Plateau, and this area is highly industrially transformed.

The northern part of the town is an interesting study area, because it consists of a densely built urban area with housing estates surrounded by diverse and well established seminatural habitats. These are mainly forests, but also moist meadows and agrocenoses (Cempulik *et al*., 1998; Szczepańczyk, 2007; 2008; Szczepańczyk & Holewa, 2009). At the same time, in the central part of the urban area there stands out the greenery of Calvary Park, which is a characteristic landmark of the town because of its acreage and location.

The Calvary Park was planted between 1869 and 1895 (Potempa, 1996), and is presently separated from local natural habitats by dense urban and industrial zones. This kind of location must influence the natural migrations of species and act as a stress-inducing factor on the existing animal communities. The park itself is characterised by the presence of relatively diverse habitats, with areas covered by trees as well as open habitats with xerothermic vegetation.

Since in the area of Middle-Triassic Ridge earlier studies on aphid communities were conducted (Depa & Wojciechowski, 2009) it seemed interesting to compare the aphidofauna of Calvary Park with surrounding aphid communities.

MATERIAL AND METHODS

The Calvary Park covers an area of ca. 10 ha, mainly forested, located on the hill ca. 25 m high and with elevation ranging from 290 to 315 m. a. s. l. (Fig. 1.). It is covered mostly by *Aesculus hippocastanum* L. but also by *Fraxinus excelsior* L., *Pinus nigra* Arn., *Acer platanoides* L., *Acer pseudoplatanus* L. and *Tilia cordata* Mill., which constitute typical park vegetation. The soil has developed on limy substratum (middle-Triassic limestone) and in open areas various xerothermic plant species can be encountered (e.g. *Pimpinella saxifraga* L., *Thymus pulegioides* L., *Scabiosa ochroleuca* L., *Plantago media* L.), which are typical for *Adonido-Brachypodietum pinnati* plant association.

The research was conducted during the vegetation season of 2010, from May until September. In order to collect the specimens, the whole host plants were carefully browsed, from top of the stem to the roots, which is a standard method of faunistic research in the case of aphids. Additionally, the method of shaking the whole branches of trees and bushes over a standard entomological net was applied. The total number of 82 samples were collected. The microscopic slides were prepared using Szelegiewicz's method (Szelegiewicz, 1978). The following keys to identification were used: Heie (1980, 1982, 1986, 1992, 1994, 1995), Blackman & Eastop (1984), Szelegiewicz (1978, 1985). The collected material has been deposited in the collection of the Department of Zoology of the University of Silesia.

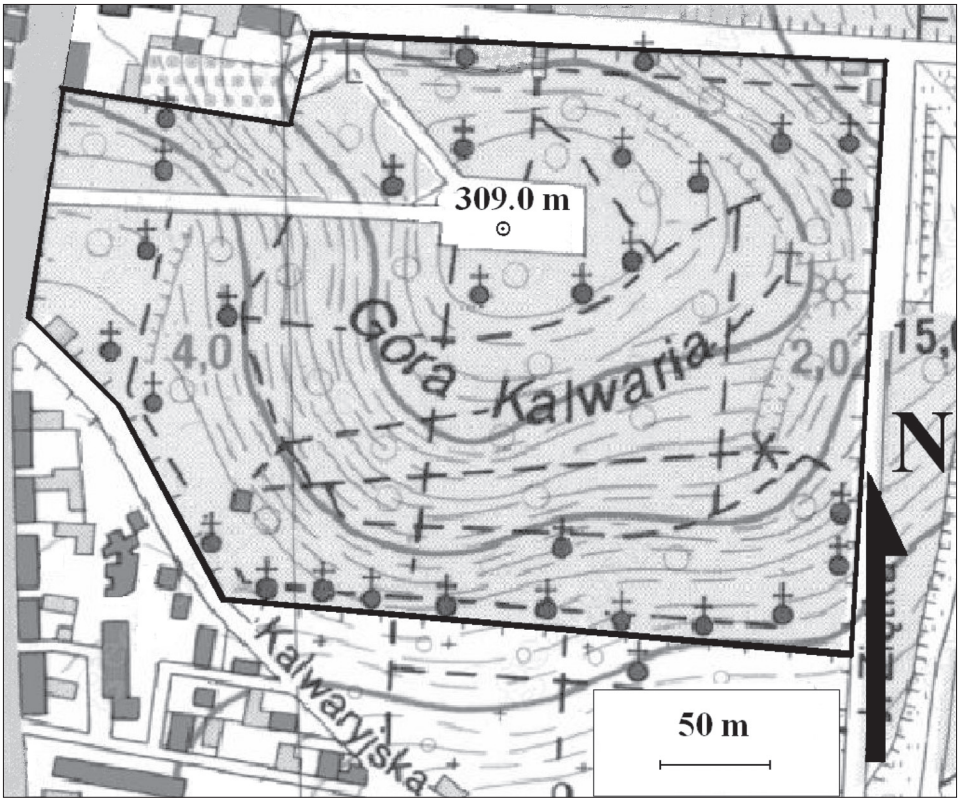

Figure 1. Map of Calvary Park

RESULTS

As a result of the research 30 aphid species were recorded within the territory of Calvary Park, which represented 2 superfamilies: Phylloxeroidea and Aphidoidea (Tab. 1). The superfamily Phylloxeroidea was represented only by one species, belonging to the family Adelgidae. The superfamily Aphidoidea was represented by 29 species belonging to 6 families. The family Aphididae was characterized by the highest species richness, as it was represented by 14 species and 6 genera. Two families: Anoeciidae and Thelaxidae were represented only by a single species each.

Among the collected aphids there were 13 monophagous and dendrophilous species (43.33% of all recorded species) while 5 species were heteroecious with trees as their primary host. As many as 12 species were associated with different herbaceous plants. The total number of monophagous aphids amounted to 17 species (56.67%) while there were only 2 polyphagous species (6.67%).

Table 1. A list of aphid species recorded in Calvary Park

Phylloxeroidea: Adelgidae	
1.	*Adelges laricis* Vallot, 1836
Aphidoidea, Anoeciidae	
2.	*Anoecia corni* (Fabricius, 1775)
Eriosomatidae	
3.	*Forda formicaria* von Heyden, 1837
4.	*Tetraneura ulmi* (Linnaeus, 1758)
Thelaxidae	
5.	*Thelaxes dryophila* (Schrank, 1801)
Drepanosiphidae	
6.	*Chaitophorus populeti* (Panzer, 1801)
7.	*Periphyllus lyropictus* (Kessler, 1886)
8.	*Periphyllus testudinaceus* (Fernie, 1852)
9.	*Eucallipterus tiliae* (Linnaeus, 1758)
10.	*Euceraphis betulae* (Koch, 1855)
11.	*Myzocallis coryli* (Goeze, 1778)
12.	*Drepanosiphum platanoides* (Schrank, 1801)
Lachnidae	
13.	*Cinara cupressi* (Buckton, 1881)
14.	*Cinara laricis* (Hartig, 1839)
15.	**Cinara piceae* (Panzer, 1801)
16.	*Trama troglodytes* von Heyden, 1831
Aphididae	
17.	*Aphis confusa* Walker, 1849
18.	*Aphis craccivora* Koch, 1854
19.	*Aphis fabae* Scopoli, 1763
20.	*Aphis frangulae* Kaltenbach, 1845
21.	*Aphis hieracii* Schrank, 1801
22.	*Aphis podagrariae* Schrank, 1801
23.	*Aphis pomi* de Geer, 1773
24.	**Brachycaudus lateralis* Walker, 1848
25.	*Dysaphis crataegi* (Kaltenbach, 1843)
26.	**Hyperomyzus lampsanae* (Boerner,1932)
27.	*Hyperomyzus picridis* (Boerner & Blunck, 1916)
28.	**Macrosiphum melampyri* Mordvilko, 1919
29.	*Uroleucon cichorii* (Koch, 1855)
30.	*Uroleucon jaceae* (Linnaeus, 1758)

* - marks the species which are new for Upper Silesia region

DISCUSSION

Although as many as 22 aphid species recorded in Calvary Park had also been encountered in the seminatural habitats of the surrounding areas (Depa & Wojciechowski, 2009) the aphidofauna of the studied area is still relatively poor in comparison with other nearby urban parks and greeneries (Osiadacz & Wieczorek, 2003; Wieczorek & Osiadacz, 2005) or in comparison with local seminatural habitats. It is also much poorer if compared with habitats of a similar type in more distant localities (Borowiak-Sobkowiak & Wilkaniec, 2010; Budzińska & Goszczyński, 2010). There may be several reasons for such a situation. Firstly, the studied area is of a low footage and surrounded by urban or industrial areas, both factors disturbing the stability of the habitat and the dispersion ability of aphids. Especially anthropogenic habitat distortion may influence the species richness and species composition of aphid fauna (Klimaszewski *et al*., 1989; 1995). Furthermore, the vegetation of the area is subject to regular mowing, seasonal raking and pruning. Thus, it is probable that many aphid species are unable to establish their colonies due to such management practices. This refers mainly to aphids feeding on herbaceous plants. Aphids exhibit a very dynamic seasonal pattern of occurrence, strongly dependent on host plant condition, and thus the regular management practices make it difficult for them to settle and breed. Also the low number (ca. 20 taxa) of alien species of trees and shrubs, most of which are represented by single specimens, decreases the possibility of occurrence of aphids associated with them.

In spite of low species richness the collected aphid specimens are quite diversified, because apart from the common dendrophilous species, there were also found a few species characteristic of the nearby xerothermic grasslands of the *Sileno-Phleetum* plant association e.g. *Aphis confusa*, *A. hieracii* or *Hyperomyzus picridis* (Depa & Wojciechowski, 2009). However, very interesting is the absence of *Acaudinum centaureae* (Koch, 1854), which is also characteristic of xerothermic grasslands (Depa & Wojciechowski, 2009) despite the presence of its host, i.e. *Centaurea scabiosa* L. The reason for this absence may be, as has already been mentioned above, mowing, which is more intense in spring and summer, when *C. scabiosa* blossoms and when *Ac. centaureae* appears. Regular mowing at this time makes it impossible for *Ac. centaureae* to establish its colonies. *S. ochroleuca* blossoms in late summer and in early autumn, when mowing is less frequent and aphids (namely *A. confusa*) may establish their colonies.

In the collected material there were also four species which had never been recorded before from the territory of Upper Silesia (according to Osiadacz & Hałaj, 2009), and those were: *Cinara piceae*, *Brachycaudus lateralis* (unusually feeding on *Silene inflata* (Salisb.) while it usually feeds on various Asteraceae), *Hyperomyzus lampsanae* and *Macrosiphum melampyri*. This fact may be explained by the presence of patches of xerothermic vegetation in the open areas, especially on the southern slope of the hill. The intense exposure to the sun and

the limy soil allow the xerothermic species of herbaceous plants, together with aphids feeding on them, to appear within the studied area. The similar mixture of species, both polytopic and widespread occurring together with oligotopic and xerothermic ones was observed when the myrmecofauna of the same area was analysed (Depa, 2009). The number of ant species was much higher in Calvary Park than in the adjacent areas. However, ants remain sedentary and are relatively resistant to the changes in a plant association they inhabit. Aphids are far more dynamic and the least change in the condition of their habitat affects the mode of their existence.

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Mszyce (Hemiptera) Parku Kalwaryjskiego w Piekarach Śląskich (Górny Śląsk)

STRESZCZENIE

Praca przedstawia wyniki badań faunistycznych przeprowadzonych w Parku Kalwaryjskim w Piekarach Śląskich (Górny Śląsk). W ich wyniku stwierdzono obecność 30 gatunków mszyc, reprezentujących 2 nadrodziny i 7 rodzin mszyc. Cztery ze stwierdzonych gatunków są to gatunki nowe dla Górnego Śląska: *Cinara piceae* (Panzer, 1801), *Brachycaudus lateralis* Walker, 1848, *Marcosiphum melampyri* Mordvilko, 1919 i *Hyperomyzus lampsanae* (Boerner & Blunck, 1916). Krótka dyskusja przedstawia analizę bogactwa i składu gatunkowego mszyc badanego obszaru.