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WASPS (*HYMENOPTERA*, *VESPIDAE*) OF WARSAW AND MAZOVIA

ABSTRACT

In the *Vespidae* of Mazovia 42 species have been recorded, including 11 social and 31 solitary wasps. In Warsaw only 14 species have been recorded, which account for 33.3% of the wasps of Mazovia. They include 7 solitary species (22.5% of the wasps of Mazovia) and 7 social species (63.6%). In the areas subject to extremely high urban pressure, two social species are almost the only wasps. These are *V. (V.) vulgaris* and *V. (V.) germanica*.

A zoogeographical analysis shows that the proportion of the species with large ranges increased in the town. Wasps occurring in urban green areas mostly include ubiquitous social species and solitary species without specific requirements for nest sites.

INTRODUCTION

The family of wasps have been studied by few workers in Poland. They mostly prepared faunal lists of wasps or inserted fragmentary data on them in general lists of the *Aculeata* of a given area.

Relatively best known wasps are those living in western Poland, that is, in Silesia, due to the studies carried out by Dittrich [5], in Pomerania, due to the studies by Paul [15], and also in southern Poland, mostly in Little Poland and the Tatra mountains, due to the studies conducted by Wierzejski [22], Niezabitowski [13], Niesiołowski [12], and Drogoszewski [6—8].

The earliest data from Mazovia are given by Nasonov [11], who lists *Vespidae* from Warsaw and some near localities like Otwock and Gałachy. The next data are in the papers by Drogoszewski [6—8], studying *Aculeata* of Łowicz surroundings, Stępkowska-Barańska [18], who analysed wasps of Warsaw surroundings, and Puławski [17], who in his key for identifying insects of Poland lists the sites found in Mazovia.

The present paper is based on the literature data and on author's materials collected in 1974—1977. It forms a part of the comprehensive work on The species composition and origin of the fauna of Warsaw [21].

The material was quantitatively collected, mostly by means of Moericke's traps [2, 10], over the growing season from May to October. In addition, the sweeping method was used.

The material was collected in three zones differing in the degree of urban pressure [14]:

1. Non-urban areas subject to relatively little urban pressure. These are forests such as a moist coniferous forest, and a mixed coniferous forest (Łomna), an oak-hornbeam forest and a carr (Hamernia), a non-managed rural park (Młochów), a managed rural park (Radziejowice), a mown meadow and a garden near buildings (Wola Mrokowska).

2. Suburban areas including forests such as a moist coniferous forest, a mixed coniferous forest, an oak-hornbeam forest, and a carr (Białołęka Dworska), a park in the suburbs of Warsaw (Ursynów), and a suburban housing estate (Jelonki).

3. Urban areas of Warsaw, including parks, green areas of housing estates, green of the centre of the town, and allotments.

The species composition of wasps living in urban areas is based exclusively on author's materials since the literature data cannot be classified to particular types of urban green areas. These data, together with author's materials from habitats of other types e.g. from allotments are shown in Table 3, column 8. The data on wasps occurring in urban areas are much poorer and probably not complete, as compared with the data from non-urban areas, which are largely supplemented by the literature data (Tab. 3).

SPECIES COMPOSITION

So far 59 wasp species are known from Poland, including 14 social and 45 solitary.

From the whole Mazovia, including the suburban and urban areas of Warsaw, 42 wasp species have recorded (11 social and 31 solitary). For 33 species, Mazovia lies within the zone of their continuous range. Only seven species, one boreal and six submediterranean, are on the edge of their continuous range. In Mazovia, *Vespa (Dolichovespula) norvegica* has not been recorded. These social wasps are widely distributed over the Palaearctic and North America, the whole forest zone of the Soviet Union, they reach far north and are frequently met there. The type of the distribution of this species in Poland [18] is consistent with the thesis by Blüthgen [1] that in Europe this is a boreo-alpine species. Thus the absence of *V. (D.) norvegica* in Mazovia is understandable.

The second species occurring over the European Lowland and common in Poland [17] but very rare in Mazovia is *Polistes gallicus*. Drogośzewski and [6] and Stępkowska-Barańska [18] have recorded it from Mazovia but with a note that it is a very rare species in the surroundings of Warsaw.

In non-urban areas, 39 species have been recorded, including 10 social and 29 solitary. In suburban areas, 27 wasp species have been recorded,

including nine social and 18 solitary. In urban green areas of Warsaw, the number of species is largely reduced. In urban parks ten species have been recorded, including seven social ones. In green areas of housing estates only three species of wasps have been caught, all of them being social. In the centre of Warsaw, seven species have been recorded, including five social. These data show that firstly solitary wasps are eliminated from urban areas. They have, as compared with solitary wasps, a greater adaptability to urban conditions, and consequently their importance in the urban communities of *Vespidae* is higher. Under extreme conditions, e.g. in green areas of housing estates, only social wasps occur.

ZOOGEOGRAPHICAL ANALYSIS

On the basis of the geographical distribution of wasps, the following geographical elements have been distinguished in the species living in Mazovia: cosmopolitan, Holarctic, Palaearctic, Euro-Siberian, European, boreal, and submediterranean [2]. The geographical range of two species, *Microdynerus parvulus* and *Leptohilus orenburgensis*, is unknown.

The most abundant group in the *Vespidase* of Mazovia is represented by European species (Tab. 1). In the areas subject to relatively low urban pressure, thus in non-urban, and suburban areas, and also in parks of Warsaw, their proportion was more than 40%. In green areas of housing estates and in the centre of the town they sporadically occur.

The proportion of zoogeographical elements with large ranges (cosmopolitan, Holarctic and Palaearctic) increased with growing urban pressure. The highest increase was noted for the cosmopolitan element—from 2.6% in non-urban habitats to 33.3% in green areas of housing estates.

The proportion of boreal and submediterranean elements was relatively low in the wasps of Mazovia. They are absent in urban areas and the submediterranean species occur in the suburbs.

It should be noted that there are large differences in the proportions of particular zoogeographical elements between the communities of social and solitary wasps (Tab. 2), and consequently they occupy the urban habitat to differing degrees.

Almost all social wasps of Mazovia have large geographical ranges (cosmopolitan, Holarctic, Palaearctic). Of the solitary wasps, only four species have wide geographical ranges. These are *Ancistrocerus parietum*, a Holarctic species, *A. oviventris*, *A. parietinus*, and *Oplomerus laevipes*, all Palaearctic species. A vast majority of solitary wasps belong to the European species. The other few species represent the submediterranean and boreal elements. In Warsaw, solitary wasps mostly inhabit parks. These are four European species: *Discoelius zonalis*, *Odynerus bifasciatus*, *Ancistrocerus nigricornis*, and *A. trifasciatus*.

Table 1. Proportions of zoogeographical elements in wasps of Warsaw and non-urban habitats of Mazovia (N—number of species)

Zoogeographical element	Mazovia		Suburbs		Warsaw								All habitats	
					Urban green areas									
	Total		Parks		Housing estates		Town centre		N	%				
	N	%	N	%	N	%	N	%			N	%		
Cosmopolitan	1	2.6	1	3.8	1	9.0	1	10.0	1	33.3	1	14.3	1	2.4
Boreal	1	2.6	—	—	—	—	—	—	—	—	—	—	1	2.4
Holarctic	6	15.6	4	15.4	4	36.3	3	30.0	2	66.6	3	42.8	6	14.3
Palaeartic	4	10.2	5	19.2	2	18.1	2	20.0	—	—	2	28.6	6	14.3
Euro-Siberian	1	2.6	1	3.8	—	—	—	—	—	—	—	—	1	2.4
European	19	48.7	12	46.1	4	36.3	4	40.0	—	—	1	14.3	19	45.2
Submediterranean	5	12.8	3	11.5	—	—	—	—	—	—	—	—	6	14.3
Unknown	2	5.1	—	—	—	—	—	—	—	—	—	—	2	4.8

Table 2. Zoogeographical composition of social and solitary wasps occurring in Warsaw and Mazovia (N—number of species)

Zoogeographical element		Mazovia		Warsaw								All habitats	
				Suburbs		Urban green areas							
		Parks				Housing estates		Town centres		N	%		
		N	%	N	%	N	%	N	%			N	%
social wasps	Cosmopolitan	1	10.0	1	11.1	1	16.7	1	33.3	1	33.3	1	9.1
	Holarctic	5	50.0	3	33.3	3	50.0	2	66.6	2	66.6	5	45.4
	Palearctic	2	20.0	3	33.3	2	33.3	—	—	3	27.3	3	27.3
	Euro-Siberian	1	10.0	1	11.1	—	—	—	—	—	—	1	9.1
	Submediterranean	1	10.0	1	11.1	—	—	—	—	—	—	1	9.1
solitary wasps	Holarctic	1	3.4	1	5.6	—	—	—	—	1	50.0	1	3.2
	Palearctic	2	6.9	2	11.2	—	—	—	—	—	—	3	9.7
	European	19	65.5	12	66.6	4	100.0	—	—	1	50.0	19	61.3
	Submediterranean	4	13.8	3	16.6	—	—	—	—	—	—	5	16.1
	Boreal	1	3.4	—	—	—	—	—	—	—	—	1	3.2
	Unknown	2	6.9	—	—	—	—	—	—	—	—	2	6.5

It follows from the zoogeographical analysis of the *Vespidae* of Warsaw that mostly the species with large geographical ranges (cosmopolitan, Holarctic, Palaearctic) colonize the towns. All of them are social. No submediterranean species were recorded in green areas of housing estates. European species are largely eliminated from the fauna of the town. In both these groups there are only solitary wasps.

ECOLOGICAL ANALYSIS

The habitat requirements of solitary and social wasps include the degree of insolation and the abundance of flowers since adults of all their species are melliphages. The *Vespidae*, like other *Aculeata*, prefer dry and insolated areas and they avoid shady and wet sites. In carr habitats only three species of social wasps have so far been recorded: *Vespa* (*Vespa*) *germanica*, *V. (V.) vulgaris* and *V. (Dolichovespula) saxonica*, and one species of solitary wasps — *Ancistrocerus nigricornis*.

Because of significant differences in the adaptability to urban habitats between solitary and social wasps, these two groups will be analysed separately.

ECOLOGICAL ELEMENTS

Of the solitary wasps occurring in Mazovia, ten species have been recorded in forests and seven in open areas. Only three species of solitary wasps have so far been found in both forest and open habitats. These are *Odynerus crassicornis*, *Ancistrocerus nigricornis*, and *A. trifasciatus*. In the present study, wasps were most frequently caught in deciduous forests on the site of an oak-hornbeam forest. In Mazovia, the sites of this type were preferred by all the recorded wasps of the genera *Ancistrocerus* and *Odynerus*. The literature data indicate that the species of the genus *Eumenes* living in Mazovia prefer open habitats. The sites of 11 species of solitary wasps are unknown.

As already noted, the solitary wasps recorded in Mazovia are most abundantly represented by two genera, *Ancistrocerus* Wesm. and *Odynerus* Latr.. Also in urban green areas these two genera are the richest. In Mazovia, the most abundant species of the genus *Ancistrocerus* are *A. nigricornis* and *A. trifasciatus*, and of the genus *Odynerus* — *O. bifasciatus* and *O. mutinensis*. In urban green areas these two genera were represented by *A. nigricornis*, *A. trifasciatus*, *A. parietum*, *A. parietinus*, and *O. bifasciatus*. *A. nigricornis* and *A. trifasciatus* are frequent not only in Mazovia but also over Poland [17]. *A. trifasciatus*, *A. parietinus*, *A. parietum*, and *O. bifasciatus* belong to most frequently recorded solitary wasps over the forest zone of the Soviet Union, from taiga to the steppe zone [16]. *A. parietum*, *A. trifasciatus*, and *A. nigricornis* are also frequent in large open habitats of Mohelnove Stepi in Czechoslovakia [20]. *A. parietum*

is one few solitary wasps recorded from the ZOO in Berlin [3, 4]. Thus the solitary wasps recorded from urban green areas of Warsaw occur in various habitats such as forests, open areas and urban areas. They show a high ecological tolerance.

Almost all social wasps recorded from Mazovia inhabit forests, mostly coniferous ones, and also open habitats (except for *V. (D.) omissa*). Of 11 species of these wasps, seven occur in the two habitat types. These are *V. (V.) crabro*, *V. (D.) media*, *V. (D.) silvestris*, *V. (D.) saxonica*, *V. (V.) rufa*, *V. (V.) germanica*, and *V. (V.) vulgaris*. Some of them, e.g. *V. (V.) crabro* are more frequent in forests, thus they are likely to prefer this habitat.

On all the study sites of different types of urban green areas, there have been recorded *V. (V.) rufa*, *V. (V.) germanica*, and *V. (V.) vulgaris*. These are species of a high ecological tolerance, occurring also in non-urban and suburban habitats.

ABUNDANCE

Two species of social wasps, *V. (V.) vulgaris* and *V. (V.) germanica* are most abundant in non-urban, suburban and urban areas of different types. In some plots subject to heavy urban pressure, these two species represent almost the whole fauna of *Vespidae*, and show a tendency to mass occurrence. The effect of urban pressure on the communities of social wasps is not followed by their complete elimination from urban green areas, as it is the case of solitary wasps, but it transforms the structure of the community [19]. Also in the literature, *V. (V.) vulgaris* and *V. (V.) germanica* are considered as common species, occurring in different habitats. They are often met near man and sometimes can be rather aggressive.

In the materials collected, *V. (V.) vulgaris* is more abundant than *V. (V.) germanica*. It should be noted that in some cases it was difficult to distinguish between workers of these two species because of large individual differences. The specimens having all features characteristic of *V. (V.) germanica* were included to this species. The workers showing features of both these species were considered as a race of *V. (V.) vulgaris* — (var. *pseudogermanica*), following Guiglia [9].

Such species as *V. (V.) rufa* and *V. (V.) crabro* are less abundant in the town than *V. (V.) vulgaris* and *V. (V.) germanica*. Other species of social wasps such as *V. (Dolichovespula) saxonica*, *V. (D.) omissa*, and *V. (D.) silvestris* were sporadically caught in non-urban, suburban and urban habitats.

Solitary wasps are scarce as compared with social ones. Their abundance is related to some extent to the number of generations per year. According to Blüthgen [1] and other authors, some species of the genus *Ancistrocerus* have two generations a year. This should be kept in mind but not

overestimated since many species rare in Mazovia and not visiting the town at all, have also two generation a year. Of the species living in Warsaw, *A. parietum* and *A. nigricornis* have two generations a year. The number of generations in *A. parietinus* and *A. trifasciatus* is not exactly known.

NEST TYPE

V. (V.) vulgaris and *V. (V.) germanica*, the species dominant in the town, usually build their nests of earth, sometimes they nest in tree holes or the crevices of walls, etc. Most nests reach a diameter of 20–30 cm, the number of honeycombs can be 10–12, while in *V. (V.) rufa* 5–6. Consequently, the nests of *V. (V.) vulgaris* and *V. (V.) germanica* contain more individuals than those of *V. (V.) rufa*. Wasps of the subgenus *Vespula* are monogynous.

Solitary wasps occurring in urban green areas have no specific requirements for nest sites and probably due to this they can live there. Wasps of the genus *Ancistrocerus* build the nests of the most primitive type, that is, the nests which are located in different casual empty spaces. These wasps do not require a special substrate or the space of a specific size to build the nest. Their nests were met in rock crevices, wall crevices, in earth (on clay), in various holes in fences, etc. They also build nests in shrub branches and shoots of herbaceous plants, and in many other unexpected places, e.g. according to Blüthgen [1] in folds of clothing, hoses of rubber, etc. These wasps mould dividing walls or cells in clay particles fastened with saliva, and in this way they fill a selected space. Also wasps of the genus *Odynerus* Latr. build such primitive nests.

Since social and solitary wasps build their nests in various sites, they cannot be classified to any vegetation layer. It is even more so that they visit low vegetation layers, i.e., the herb layer, as well as the shrub layer and tree crowns.

DIET

Social wasps feed their offspring on protein food, thus on partly crumbled insects, as well as on the carbohydrate food such as nectar produced by flowers. In their first days of life, the larvae are fed on liquid food. Crumbled insects are added to the diet of older larvae. Adults are pantophages. They feed on the protein food and to a large extent on the carbohydrate food.

Solitary wasps feed their offspring on caterpillars of small lepidopterans, on larval beetles (mostly *Curculionidae* and *Chrysomelidae*), and to a lower extent on larval *Symphyta*. No close dependence was found on single prey species.

CONCLUSIONS

On the basis of the present materials it can be stated that the wasps of Mazovia are rather rich, as compared with the fauna of *Vespidae* occurring in Poland. Social wasps are mostly represented by species of the genus *Vespa*, and solitary wasps by species of the genera *Ancistrocerus*, *Odynerus* and *Eumenes*. There are differences in wasp communities between Mazovia and urban green areas of Warsaw. Many species are lacking in the town. Solitary wasps are largely eliminated. Species composition of social wasps is rather similar but the structure of the community is largely modified in the town. As a result, the *Vespidae* of Warsaw are largely, sometimes exclusively represented by two eurytopic species: *V. (V.) vulgaris* and *V. (V.) germanica*. Thus the wasps of Warsaw are represented mainly by the genus *Vespa* L., subgenus *Vespula* Thoms. The species of the subgenera *Vespa* s. str. L. and *Dolichovespula* Rohwer are scarce in the town.

The species occurring in the town generally have large geographical ranges. The species with smaller ranges are reduced in the town. All submediterranean wasps are eliminated from the town. Also the European species are eliminated but to a lower extent. Both these categories consist almost exclusively of solitary wasps.

In urban green areas, solitary wasps are generally represented by the genera *Ancistrocerus* and *Odynerus*, which have no specific nest site requirements. Their nests are primitive and located in various, sometimes unexpected places, like folds of old clothing, crevices in walls or fences, etc.

Neither social nor solitary wasps can be classified to specific vegetation layers since their nests sites are not specific and because they visit the herb layer as well as the shrub layer and tree crowns.

SPECIES NEW TO MAZOVIA

Vespa (Dolichovespula) omissa Bischoff

Białoleka Dworska (amoist coniferous forest); Warsaw (Saxon Garden, Konstytucji Squara). Three males caught in July and August.

Discoelius zonalis (Panz.)

Hamernia (an oak, hornbeam forest); Białoleka Dworska (an oak-hornbeam forest); Warsaw (park). Caught from June to September.

Ancistrocerus trifasciatus (Müll.)

Hamernia (an oak-hornbeam forest); Białoleka Dworska (an oak-hornbeam forest); coniferous forest); Ursynów; Warsaw (parks). Caught from June to September.

Ancistrocerus renimacula (Lepel.)

Hamernia (an oak-hornbeam forest); Ursynów. Caught from June to August.

Oplomerus laevipes (Schuck.)

Białoleka Dworska (a mixed coniferous forest). One female caught in July.

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Table 3. Check-list of *Vespidae* (*Hymenoptera*) species occurring in Warsaw and Mazovia

No.	Species	Mazovia	Warsaw				
			Suburban areas	Parks	Green areas in housing estates	Town centre	Other sampling areas
1	2	3	4	5	6	7	8
1	<i>Vespa (Vespa) crabro</i> L.	●	●	+	-	-	○
2	<i>Vespa (Dolichovespula) media</i> Retz.	●	●	-	-	-	-
3	<i>Vespa (Dolichovespula) silvestris</i> Scop.	○	●	-	-	+	-
4	<i>Vespa (Dolichovespula) omissa</i> Bischoff	-	+	+	-	+	-
5	<i>Vespa (Dolichovespula) saxonica</i> Fabr.	●	●	+	-	-	-
6	<i>Vespa (Dolichovespula) adulterina</i> Buys.	○	-	-	-	-	-
7	<i>Vespa (Vespula) rufa</i> L.	●	-	+	+	+	●
8	<i>Vespa (Vespula) austriaca</i> Panz.	○	-	-	-	-	-
9	<i>Vespa (Vespula) germanica</i> Fabr.	●	●	+	+	+	+
10	<i>Vespa (Vespula) vulgaris</i> L.	●	●	+	+	+	+
11	<i>Polistes (Polistes) gallicus</i> (L.).	○	-	-	-	-	-
12	<i>Discoelius zonalis</i> (Panz.).	+	+	+	-	-	-
13	<i>Discoelius priesneri</i> Mad.	○	-	-	-	-	-
14	<i>Eumenes (Eumenes) pedunculatus</i> (Panz.).	○	-	-	-	-	-
15	<i>Eumenes (Eumenes) coarctatus</i> (L.).	○	○	-	-	-	-
16	<i>Eumenes (Eumenes) subpomiformis</i> Bl.	○	○	-	-	-	-
17	<i>Eumenes (Eumenes) pomiformis</i> (Fabr.).	●	-	-	-	-	-
18	<i>Odynerus murarius</i> (L.).	○	○	-	-	-	-
19	<i>Odynerus crassicornis</i> (Panz.).	●	●	-	-	-	-
20	<i>Odynerus bifasciatus</i> (L.).	●	●	+	-	-	-
21	<i>Odynerus elegans</i> Wesm.	●	+	-	-	-	-
22	<i>Odynerus mutinensis</i> Bald.	●	+	-	-	-	-
23	<i>Odynerus debilitatus</i> Sauss.	●	-	-	-	-	-
24	<i>Ancistrocerus nigricornis</i> (Curt.).	●	●	+	-	+	-
25	<i>Ancistrocerus dusmetiolus</i> (Strand).	○	-	-	-	-	-
26	<i>Ancistrocerus oiventris</i> (Wesm.).	○	-	-	-	-	○
27	<i>Ancistrocerus scoticus</i> (Curt.).	○	-	-	-	-	-
28	<i>Ancistrocerus antilope</i> (Panz.).	○	-	-	-	-	-
29	<i>Ancistrocerus parietinus</i> (L.).	●	●	-	-	-	●
30	<i>Ancistrocerus trifasciatus</i> (Müll.).	+	+	-	-	+	-
31	<i>Ancistrocerus ichneumonideus</i> (Ratz.).	●	+	-	-	-	-
32	<i>Ancistrocerus renimacula</i> (Lep.).	+	+	-	-	-	-
33	<i>Ancistrocerus parietum</i> (L.)	●	○	-	-	+	-
34	<i>Ancistrocerus quadratus</i> (Panz.).	○	●	-	-	-	-
35	<i>Ancistrocerus gazella</i> (Panz.).	○	+	-	-	-	-
36	<i>Microdynerus parvulus</i> (H.-S.).	○	-	-	-	-	-
37	<i>Leptochilus (Euodynerus) dantici</i> (Rossi).	○	-	-	-	-	-
38	<i>Leptochilus (Stenodynerus) xantomelas</i> (H.-S).	-	○	-	-	-	-
39	<i>Leptochilus (Stenodynerus) orenburgensis</i> (Ed. André)	○	-	-	-	-	-
40	<i>Oplomerus laevipes</i> (Schuck.).	-	+	-	-	-	-
41	<i>Oplomerus reniformis</i> (Gmel.).	○	-	-	-	-	-
42	<i>Oplomerus spinipes</i> (L.).	○	-	-	-	-	-

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OSOWATE (*HYMENOPTERA, VESPIDAE*) WARSZAWY I MAZOWSZA

STRESZCZENIE

Na podstawie danych z piśmiennictwa oraz materiałów własnych stwierdzono występowanie na Mazowszu 42 gatunków osowatych (*Vespidae*), w tym 5 po raz pierwszy wykazanych dla Niziny Mazowieckiej. W zieleni miejskiej Warszawy (w parkach, zieleni osiedlowej i zieleni śródmiejskiej) występuje tylko 14 gatunków, co stanowi 33,3% gatunków wykazanych

z Mazowsza. Ze wzrostem presji urbanizacyjnej liczba gatunków *Vespidae* maleje. Eliminowane są głównie gatunki os prowadzących samotny tryb życia — do Warszawy wkracza tylko 22,5% tych gatunków, a gatunków os społecznych 63,6%. Na podstawie tych danych można stwierdzić, że osy społeczne lepiej potrafiły się przystosować do warunków panujących w zieleni miejskiej niż osy samotne. Wpływ presji urbanizacyjnej na zorganizowanie os społecznych odzwierciedla się głównie w zmianie i przebudowie jego struktury. W wyniku tych zmian fauna *Vespidae* Warszawy — szczególnie na terenach o skrajnie dużej presji urbanizacyjnej — w ogromnym procencie jest reprezentowana przez 2 gatunki: *Vespa (V.) vulgaris* i *(V.) germanica*.

W zieleni Warszawy spotykane są w zasadzie gatunki os samotnych tylko z rodzajów *Ancistrocerus* i *Odynerus*. Oba te rodzaje cechują małe wymagania przy wyborze podłoża, na którym budują gniazda. Osy samotne występują głównie w parkach, w zieleni osiedlowej nie stwierdzono żadnego gatunku.

Analiza zoogeograficzna wykazała, że do miasta wkraczają głównie gatunki *Vespidae* o szerokim zasięgu geograficznym — kosmopolityczne, holarktyczne i palearktyczne. Wszystkie gatunki szeroko rozmieszczone i wchodzące w skład fauny miejskiej są gatunkami os społecznych. W zieleni miejskiej nie występują gatunki sumediterańskie i w znacznym stopniu są wyeliminowane gatunki europejskie, reprezentowane niemal wyłącznie przez osy prowadzące samotny tryb życia.

СКЛАДЧАТОКРЫЛЫЕ ОСЫ (*HYMENOPTERA, VESPIDAE*) ВАРШАВЫ И МАЗОВИИ

РЕЗЮМЕ

В фауне *Vespidae* констатировано 42 вида (11 видов общественных ос и 31 — одиночных ос). В варшавском городском комплексе констатировано уже только 14 видов ос, что составляет 33,3% фауны Мазовии (7 видов одиночных ос — 22,5% фауны Мазовии и 7 видов общественных ос — 63,6%). На территориях с исключительно сильным урбанизационным прессом почти исключительно встречаются только 2 вида общественных ос *V. (V.) vulgaris* и *V. (V.) germanica*.

Зоогеографический анализ показал, что в городе возрастает процент видов с широким географическим ареалом. Виды, которые встречаются в городских зеленых насаждениях — это прежде всего виды-убиквисты общественных ос, а также одиночных ос, не проявляющих особых требований в отношении мест для постройки гнезда.