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APOIDEA (*HYMENOPTERA*) OF WARSAW AND MAZOVIA

ABSTRACT

There were 52 species of *Apoidea* recorded in Warsaw during the study carried out in 1974—1975. The species of the families *Apidae* and *Halictidae* predominated. Urban parks were richest in species. Intensive traffic does not largely contribute to the reduction of the abundance of these insects. Most species (78.8%) belong to eury- and polytopic bees, and 7.6% are oligitopic. 13 zoogeographical elements have been distinguished, of which 83.3% are represented by widely distributed species—Palaearctic and European.

INTRODUCTION

Information on bees (*Apoidea*) of urban areas is already contained in the first faunal lists dating from the second of the last century and from the beginning of our century. These lists were mostly prepared for larger areas but they also include many data on the fauna of towns. More important publications were prepared by Wierzejski [42, 43], Śnieżek [38] and Łoziński [17], who collected bees in Kraków and its surroundings, as well as in other areas. Dittrich [11] lists many species living in Wrocław in his paper on the bees of Silesia, similarly Alfken [1] lists bees from Gdańsk, Blüthgen [8, 9] from Szczecin, and Torka [39, 40] from Bydgoszcz and its surroundings. It shoud be noted, however, that these data are only of historical importance now since early in this century urban biocoenoses were not subject to so heavy human pressure as nowadays. As compared with the present industrial conurbations, these were completely different towns, almost without industrial emissions and exhaust gases.

An increased interest in the fauna of towns, observed at the present time, yielded several publications also on bees. Most data come from Poznań due to the study by Banaszak [3—5] and Wójtowski and Szymaś [44, 45]. These authors recorded 127 species, which account for almost 70% of the bees known from central Great Poland. Noskiewicz [21] lists 55 species from the Zoological Garden in Wrocław, and Anasiewicz [2] reports the occurrence of 15 bumble bee species in Lublin.

In Mazovian Lowland, 188 species have been recorded so far, mostly due to the studies carried out by Drogoszewski [14, 15] particularly in Łowicz and its surroundings but also in Skierniewice, Domagała-Lipińska [12, 13] recorded 20 species at Dziekanów Leśny near Warsaw. Bumble bees living at Dziekanów Leśny, Nowy Dwór, and in the former Warsaw province were studied by Ruszkowski [24, 31, 33, 34]. Nasonov [19] lists *Anthophora acervorum* and *A. parietina* from Warsaw surroundings.

Bees of Warsaw have not been studied so far. There are only mentions of single species in papers by Nasonov [20], Popov [23] and Drogoszewski [14]. Moreover, Ruszkowski [24, 27—30, 32, 34], Ruszkowski and Biliński [35, 36], and Ruszkowski and Żak [37] provide data on several species of bumble bees. Dylewska and Noskiewicz [16] report the occurrence of *Nomada flava* at Rembertów. Some of the results of my study in Warsaw have been published elsewhere [7].

The results presented below are based on the two-year study carried out in 1974 and 1975, in different kinds of typical, managed urban green, such as parks, green areas of housing estates, and streetside green [18, 22]. The material was collected by means of Moericke's traps [10], placed on lawns or suspended in tree crowns (lime, chestnut, maple). The fauna of parks was studied in the Saxon Garden, Łazienki, Cemetery of Soviet Soldiers, and in the Praga park. The study plots of housing estates were located in MDM, in a lawn (about 400 m^2) of the courtyard at Wilcza street 64 (Institute of Zoology, PAS), in a large open lawn in the triangle formed by F. Joliot-Curie, Pułku Baszta and A. Warskiego streets, and in a small lawn with trees, located in the quadrate bordered by A. Warskiego, Marzanny, Woronicza and Pułku Baszta streets. Of the streetside green the border parts of parks such as the Saxon Garden, Łazienki, Praga park and Cemetery of Soviet Soldiers were under study, as well as a streetside lawn bordering on gardens at the cross-road of Woronicza and Pułku Baszta streets, an interlane lawn in Al. Niepodległości street (at Rakowiecka street). The green of the suburbs was studied in the quarter Ursynów.

SPECIES COMPOSITION

A total of 311 samples taken in Warsaw contained 1 525 specimens representing 52 species. Together with the earlier recorded species, this gives 58 species of *Apoidea* (Tab. 3) or merely 30.8% of the bees known from Mazovia so far, and only 12.7% of the bees known from Poland.

A comparison of the number of species particular families of *Apoidea* occurring in Warsaw and Mazovia shows significant differences (Tab. 1). As compared with the potential fauna, the bees of Warsaw are poorly

represented by species of the families *Megachilidae*, *Anthophoridae*, and *Andrenidae*, in contrast to the relatively abundant *Apidae* and *Halictidae*. This fact can be explained either by the lack of suitable host plants for more specialized groups or by a greater adaptability of social insects as compared with solitary ones. *Megachilidae* and *Anthophoridae*, and also many species of *Andrenidae* are frequently narrow specialists (oligophages and monophages), in contrast to *Apidae* and *Halictidae*, the majority of which are polyphages, in addition, in a large sense of this word. The group of dominant species, in turn, is dominated by social forms, represented by the bees with the highest degree of social development, i.e., by honey bees and bumble bees, but also by those on the lower level of social life, in Warsaw most abundantly represented by species of the genus *Halictus* Latr. (*H. calceatus*, *H. morio*, and others). Strikingly poorly represented are solitary species of the genera *Megachilidae* (four species), *Anthophoridae* (three species) and *Andrena* Fabr. (eight species). Even such a common and abundant species in Poland as *Andrena flavipes* has not been recorded in Warsaw. And it should be noted that the genus *Andrena* Fabr. contains almost one-fourth of the bees of Poland. The high dominance of social species can suggest that the social life facilitates the overcoming of the barriers of urban pressure. In this place, however, a reservation should be made that Moericke's traps, used as the only method of material collecting, could have a selective effect on some groups. Thus this matter needs further studies.

Parks, which are characterized by the highest number of plant species and most luxuriant vegetation, have been shown to be richest in bee species (Tab. 3). Many bees occurring in parks visit their outskirts towards streets as it is the case of the honey bee, which can be attracted by flowering trees (e.g. limes) or the abundance of honey-dew on streetside trees.

ZOOGEOGRAPHICAL ANALYSIS

The bulk of the bees living in Warsaw consists of widely distributed species, such as cosmopolitan, Holarctic, Palaearctic, and Euro-Siberian (59.3%), and also European (24.0%), accounting together for 83.3% (Tab. 2). The proportion of these species in the suburbs is even higher and it reaches 87.1%, while in the Mazovian Lowland 62.7%. (Tab. 3).

So far, the boreo-mountain and subatlantic elements have not been recorded in Warsaw but they occur in Mazovia. It seems that only more detailed study is needed to discover their presence in the town. For example, this is the case of *Andrena fulva*, a subaltantic species, numerous in western Poland and reaching the left side of the Vistula in the region of Toruń and Bydgoszcz [6].

Table 1. Comparison of the number of species in various families of *Apoidea* occurring in the Mazovian Lowland and Warsaw

Family	Mazovia		Warsaw	
	N	%	N	%
Colletidae	11	5.9	5	8.6
Andrenidae	42	22.3	9	15.5
Halictidae	40	21.3	21	36.2
Melittidae	4	2.1	2	3.5
Megachilidae	41	21.8	4	6.9
Anthophoridae	29	15.4	3	5.2
Apidae	21	11.2	14	24.1
Total	188	100.0	58	100.0

The results of the study show that the north-central European species are much impoverished in Warsaw (1.9%) as compared with the Mazovian Lowland (13.3%).

The number of southern species is also reduced, being 12.9% in Warsaw as compared with 18.1% in Mazovia. They belong to three elements: subpontic, submediterranean, and Pontic-Mediterranean, and consist of seven species: *Prosopis difformis, Halictus subauratus, H. aeneidorsum, H. pauxillus, Sphecodes marginatus, Anthidium manicatum,* and *Xylocopa valga.*

ECOLOGICAL ANALYSIS

HABITAT PREFERENCES

As far as their ecological amplitude is concerned, most of the bees collected (78.8%) belong to eury- and polytopic species, the latter group being larger since the preference for some biotopes is frequently observed. Bumble bees such as *Bombus hypnorum* and *B. hortorum* can be used as an example here. Although they can be met in different habitat types, most frequently they occur in parks or in forests and thickets.

A much smaller group (7.6%) is characterized by a marked habitat preference or is associated with specific host plants. Oligotopic species include *Colletes daviesanus, Panurgus calcaratus, Dasypoda hirtipes,* and *Macropis europaea.*

Colletes daviesanus occurs on isolated dry sites like hillsides covered with xero- and thermophilous plants, wastland, and dunes. Usually it visits the flowers of *Helichrysum arenarium* (L.).

Panurgus calcaratus is associated with dry and sandy sites, it frequently selects calcareous soil, where it nests in large colonies. The female collect pollen from hawkweeds—*Hieracium* spp. or hawkbits—*Leontodon* spp.

Dasypoda hirtipes inhabits mainly open areas, road verges and dry hillsides. It can be observed on various plants, but most frequently on the

Table 2. Proportions of zoogeographical elements in *Apoidea* of Warsaw and non-urban habitats of Mazovia (N—number of species)

Zoogeographical element	Mazovia		Warsaw											
			Suburbs		Urban green areas									
					Total		Parks		Housing estates		Town centre		Others	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Cosmopolitan	1	0.5	1	3.2	1	1.9	1	2.9	1	3.3	1	3.2	—	—
Holarctic	2	1.0	2	6.5	2	3.7	1	2.9	2	6.7	2	6.5	—	—
Palaearctic	26	13.8	6	9.4	11	20.4	8	22.8	5	16.7	6	19.3	6	19.3
West-Palaearctic	27	14.4	5	16.1	11	20.4	8	22.8	7	23.3	7	22.6	6	19.3
Euro-Siberian	30	16.0	3	9.7	7	12.9	4	11.4	3	10.0	4	12.9	6	19.3
Boreo-alpine	3	1.6	—	—	—	—	—	—	—	—	—	—	—	—
European	32	17.0	10	32.2	13	24.0	10	28.6	8	26.7	7	22.6	7	22.6
North-central-European	25	13.3	2	6.5	1	1.9	—	—	1	3.3	1	3.2	1	3.2
Subatlantic	3	1.6	—	—	—	—	—	—	—	—	—	—	—	—
Central-European	5	2.7	—	—	1	1.9	—	—	—	—	—	—	1	3.2
Subpontic	3	1.6	—	—	2	3.7	1	2.9	2	6.7	2	6.5	1	3.2
Submediterranean	16	8.5	1	3.2	2	3.7	2	5.7	—	—	—	—	—	—
Ponto-Mediterranean	15	8.0	1	3.2	3	5.5	—	—	1	3.3	1	3.2	3	9.7

chicory—*Cichorium intybus* L. Even the appearance of these bees coincides with the onset of chicory flowering.

Macropis europaea is associated with wet habitats, where it can find the yellow loosestrife—*Lysimachia vulgaris* L., the most frequently visited plant.

Bombus pratorum can be cited as an example of stenotopic species mostly rarely observed, or some parasitic species.

For some species (11.5%) it is difficult or even impossible to determine their ecological amplitude. This is the case of poorly known species, mostly rarely observed, or some parasitic species.

FEEDING HABITS

Apoidea, which are the group of insects biologically associated with flowers, belong to best pollinators of plants. The degree of their specialization is largely differentiated, and it ranges from very narrow, when pollen and nectar of only one plant species is used as food (monophages), through oligophagous bees, collecting food from a relatively large spectrum of plants but usually restricted to one genus or family, to polyphagous species visiting different available flowers. The bee fauna of Warsaw is largely predominated by polyphages (85%), including honey bees, bumble bees, and most representatives of the genus *Halictus* Latr. For some species it was not possible to determine their food preferences, and 10.3% of the bees are oligophages such as *Colletes daviesanus*, *Panurgus calcaratus*, *Macropis europaea*, *Dasypoda hiritipes*, *Heriades truncorum*, and *Osmia fulviventris*.

ABUNDANCE

The total abundance of *Apoidea* firstly depends on the available food supply, that is, on the host plants with which these insects are closely associated. For wild bees a type of soil is of some importance since most of them build their nests in earth. But to such factors as traffic and habitat pollution the species recorded seem to be relatively resistant.

The most abundant species in green areas of Warsaw is the honey bee, accounting for 27.7% of the material collected. Its abundance depends on the number of apiaries in the town and its surroundings, which varies in number and is difficult to estimate. Of the other species, most abundant are *Halictus morio* (12.0%) and *H. calceatus* (10.2%). Then such abundant species can be listed as *Bombus terrestris*, *B. lucorum*, *B. hypnorum*, *Halictus tumulorum*, *H. laticeps*, *H. fulvicornis*, *H. lativentris*, *H. minutissimus*, *Prosopis communis*, and *Colletes daviesanus*. These and also most of the other bees recorded in Warsaw belong to abundant and common species over Poland.

Bee communities living in various types of green areas differ in their abundance and dominance structure.

CONCLUSIONS

There were 52 species of *Apoidea* recorded in Warsaw during the two-year study (1974—1975), thus the number of the species known from this area increased to 58 (Tab. 3).

It has been shown that the number of social species of the families *Apidae* and *Halictidae* was markedly higher than the number of solitary bees (Tab. 1), which suggests that social life facilites the overcoming of the barrier of urban pressure. The solitary bees of the families *Megachilidae, Anthophoridae*, and *Andrenidae* are poor in species.

Parks have been shown to be richest in species, and many park-dwelling bees penetrate towards their outskirts and streets. It has been found that traffic is not a factor determining the occurrence and numbers of bees, while food supply, soil type and its physical properties are of basic importance.

As a result of zoogeographical analysis, 13 elements have been distinguished in the bees of Warsaw (Tab. 2), of which 83.3% belong to most widespread species (cosmopolitan, Palaearctic Holarctic, Euro-Siberian) and to the European species. The proportion of southern species (subpontic, submediterranean, and Pontic-Mediterranean) is relatively low, amounting to 12,9%.

As far as their environmental tolerance is concerned, most of the bees recorded (78.8%) belong to the eury- and polytopic species, with the predominance of the latter group, while oligotopic species account for only 7.6%.

Bee communities inhabiting various types of urban green areas (parks, housing estates, streetside lawns) differ in the total abundance and dominance structure.

The most abundant species is the honey bee (27.7%). Wild bees are largely predominated by *Halictus morio* (12.0%) and *H. calceatus* (10.2%).

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

No.	○ — literature data ● — proved literature data + — unpublished data ? — doubtful information 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	*Colletes fodiens* (Geoffr.)	○	–	–	–	–	–
2	*Colletes daviesanus* Sm.	○	–	+	+	+	●
3	*Colletes succinctus* (L.)	○	–	–	–	–	–
4	*Colletes cunicularius* (L.)	○	–	–	–	–	–
5	*Prosopis angustata* Schen.	–	–	–	+	+	–
6	*Prosopis bisinuata* (Först.)	○	–	–	–	–	–
7	*Prosopis communis* (Nyl.)	○	+	+	+	+	●
8	*Prosopis gracilicornis* Mor.	○	–	–	–	–	–
9	*Prosopis difformis* Eversm.	○	–	+	+	+	–
—	*Prosopis gibba gibba* (Saund.)	○	–	–	–	–	–
10	*Prosopis gibba confusa* (Nyl.)	–	–	–	+	+	–
11	*Prosopis signata* (Panz.)	○	–	–	–	–	–
12	*Prosopis punctulatissima* (Sm.)	○	–	–	–	–	–
13	*Andrena cineraria* (L.)	○	–	–	–	–	–
14	*Andrena vaga* Panz.	○	–	–	–	–	–
15	*Andrena assimilis* Rad.	○	–	–	–	–	–
16	*Andrena pubescens baltica* Alfk.	○	–	–	–	–	–
17	*Andrena haemorrhoa* (Fabr.)	○	+	–	+	–	–
18	*Andrena carbonaria* (L.)	○	–	–	–	–	+
19	*Andrena nigrospina* Thoms.	○	–	–	–	–	–
20	*Andrena tibialis* (K.)	○	–	–	–	–	–
21	*Andrena morawitzi* Thoms.	○	–	–	–	–	–
22	*Andrena bimaculata* (K.)	○	–	–	–	–	–
23	*Andrena nasuta* Gir.	○	–	–	–	–	–
24	*Andrena suerinensis* Friese	○	–	–	–	–	–
25	*Andrena fulvago* (Chr.)	○	–	–	–	–	–
26	*Andrena fuscipes* (K.)	○	–	–	–	–	–
27	*Andrena denticulata* (K.)	○	–	–	+	+	–
28	*Andrena flavipes* Panz.	○	–	–	–	–	–
29	*Andrena ovatula* (K.)	○	–	–	–	–	–
30	*Andrena albofaciata* Thoms.	○	–	–	–	–	–
31	*Andrena wilkella* (K.)	○	–	–	–	–	–
—	*Andrena propinqua propinqua* Schen.	○	–	–	–	–	–
32	*Andrena propinqua dorsata* (K.)	–	+	+	+	+	–
33	*Andrena sabulosa* (Scop.)	○	+	–	–	–	–
34	*Andrena varians* (K.)	○	–	–	–	–	–
35	*Andrena praecox* (Scop.)	○	–	–	–	–	–
36	*Andrena fucata* Sm.	○	–	–	–	–	–
37	*Andrena apicata* Sm.	○	–	–	–	–	–
38	*Andrena clarcella* (K.)	○	–	–	–	–	–
39	*Andrena humilis* Imh.	○	–	–	–	–	–

1	2	3	4	5	6	7	8
40	*Aphrodes bicolor* Fabr.	○	–	–	–	–	–
41	*Andrena fulvida* Schen.	○	–	–	–	–	–
42	*Andrena symphyti* Schmied.	○	–	–	–	–	–
43	*Andrena ventralis* Imh.	○	–	–	–	–	–
44	*Andrena barbilabris* (K.)	○	–	–	–	–	–
45	*Andrena argentata* Sm.	○	–	–	–	–	–
46	*Andrena floricola* Eversm.	○	–	–	–	–	–
47	*Andrena alfkenella* Perk.	○	–	–	–	–	–
48	*Andrena subopaca* Nyl.	–	–	+	–	–	–
49	*Andrena minutula* (K.)	○	–	–	–	–	–
50	*Andrena minutuloides* Perk.	○	+	–	–	–	–
51	*Andrena fulvicornis* Schen.	○	–	–	–	–	–
52	*Andrena labiata* Fabr.	○	–	–	–	–	–
53	*Andrena marginata* Fabr.	○	–	–	–	–	–
54	*Andrena schencki* Mor.	–	–	+	–	–	–
55	*Andrena chrysosceles* (K.)	○	–	–	–	–	–
56	*Panurgus calcaratus* (Scop.)	○	+	+	+	+	●
57	*Halictus quadricinctus* (Fabr.)	○	–	–	–	–	–
58	*Halictus sexcinctus* (Fabr.)	○	–	–	–	–	–
59	*Halictus eurygnathus* Blüthg.	○	–	–	–	–	–
60	*Halictus subauratus* (Rossi)	○	–	–	+	+	●
61	*Halictus tumulorum* (L.)	–	+	+	–	–	●
62	*Halictus perkinsi* Blüthg.	○	–	–	–	–	–
63	*Halictus xanthopus* (K.)	○	–	–	–	–	–
64	*Halictus prasinus haemorrhoidalis* (Sch.)	○	–	–	–	–	–
65	*Halictus nitidus* (Panz.)	○	–	–	–	–	–
66	*Halictus quadrinotatus* (K.)	○	+	+	+	+	●
67	*Halictus quadrinotatulus* (Schen.)	○	–	–	–	–	–
68	*Halictus lativentris* (Schen.)	○	+	+	+	+	●
69	*Halictus zonulus* Sm.	○	+	–	+	+	–
70	*Halictus costulatus* Kriechb.	○	–	–	–	–	–
71	*Halictus leucozonius* (Schen.)	○	+	+	+	+	–
72	*Halictus villosulus* (K.)	○	–	+	+	+	–
73	*Halictus viridiaeneus* Blüthg.	○	–	–	–	–	–
74	*Halictus brevicornis* Schen.	○	–	–	–	–	–
75	*Halictus sextrigatus* Schen.	○	–	–	–	–	–
76	*Halictus intermedius* Schen.	○	+	+	–	–	–
77	*Halictus semilucens* Alfk.	○	–	–	–	–	–
78	*Halictus minutissimus* (K.)	○	+	+	+	+	●
79	*Halictus nitidiusculus* (K.)	○	+	+	–	–	–
80	*Halictus minutulus* (Schen.)	–	–	–	–	–	+
81	*Halictus fulvicornis* (K.)	○	+	+	–	●	●
82	*Halictus laticeps* Schen.	–	+	+	+	+	●
83	*Halictus pauxillus* (Schen.)	○	–	+	–	–	–
84	*Halictus aeneidorsum* Alfk.	○	–	–	+	+	●
85	*Halictus morio* (Fabr.)	–	+	●	●	●	●
86	*Halictus calceatus* (Scop.)	○	+	●	–	●	●
87	*Halictus albipes* (Fabr.)	○	+	+	–	–	–
88	*Halictus laevis* (K.)	○	–	–	–	–	–
89	*Sphecodes gibbus* (L.)	○	–	–	–	–	–
90	*Sphecodes reticulatus* Thoms.	○	–	–	–	–	–

1	2	3	4	5	6	7	8
92	*Sphecodes spinulosus* v. Hag.	○	–	–	–	–	–
93	*Sphecodes monilicornis* (K.)	○	–	–	–	–	–
94	*Sphecodes pellucidus* Sm.	○	–	–	–	–	+
95	*Sphecodes divisus* (K.)	○	+	+	–	–	–
96	*Sphecodes creassus* Thoms.	○	–	–	–	–	–
97	*Sphecodes marginatus* v.Hag.	–	–	+	–	–	–
98	*Sphecodes scabricollis* Wesm.	○	–	–	–	–	–
99	*Sphecodes albilabris* (K.)	○	–	–	–	–	–
100	*Rophites quinquespinosus* Spin.	○	–	–	–	–	–
101	*Systropha curvicornis* (Scop.)	○	–	–	–	–	–
102	*Melitta leporina* (Panz.)	○	–	–	–	–	–
103	*Melitta tricincta* K.	○	–	–	–	–	–
104	*Melitta nigricans* Alfk.	○	–	–	–	–	–
105	*Dasypoda hirtipes* (Fabr.)	○	+	+	–	–	–
106	*Macropis europaea* Warn.	–	–	–	–	–	+
107	*Anthidium manicatum* (L.)	○	–	–	–	–	○
108	*Anthidium punctatum* Latr.	○	–	–	–	–	–
109	*Anthidiellum strigatum* (Panz.)	○	–	–	–	–	–
110	*Stelis punctulatissima* (K.)	○	–	–	–	–	–
111	*Stelis phaeoptera* (K.)	○	–	–	–	–	–
112	*Stelis breviuscula* (Nyl.)	○	–	–	–	–	–
113	*Stelis ornatula* (Klug)	○	–	–	–	–	–
114	*Stelis signata* (Latr.)	○	–	–	–	–	–
115	*Heriades truncorum* (L.)	○	+	–	–	–	–
116	*Chelostoma maxillosum* (L.)	○	–	–	–	–	–
117	*Chelostoma nigricorne* Nyl.	○	–	–	–	–	–
118	*Osmia rufa* (L.)	○	–	–	+	+	–
119	*Osmia emarginata* Lep.	○	–	–	–	–	–
120	*Osmia xanthomelaena* (K.)	○	–	–	–	–	–
121	*Osmia uncinata* Gerst.	○	–	–	–	–	–
122	*Osmia fulviventris* (Panz.)	○	–	–	+	+	–
123	*Osmia laeiana* (K.)	○	–	–	–	–	–
124	*Osmia coerulescens* (L.)	○	–	–	–	–	–
125	*Osmia aurulenta* (Panz.)	○	–	–	–	–	–
126	*Osmia gallarum* Spin.	?	–	–	–	–	–
127	*Metalinella atrocoerulea* (Schill.)	○	–	–	–	–	–
128	*Hoplitis parvula* (Duf. et Perr.)	○	–	–	–	–	–
129	*Hoplitis adunca* (Panz.)	○	–	–	–	–	–
130	*Hoplitis anthocopoides* (Schencki)	○	–	–	–	–	–
131	*Megachile centuncularis* (L.)	○	–	–	–	–	–
132	*Megachile versicolor* Sm.	○	–	–	–	–	–
133	*Megachile willughbiella* (K.)	○	–	–	–	–	–
134	*Megachile maritima* (K.)	○	–	–	–	–	–
135	*Megachile lagopoda* (L.)	○	–	–	–	–	–
136	*Megachile circumcincta* (K.)	○	–	–	–	–	–
137	*Megachile ericetorum* Lep.	○	–	–	–	–	–
138	*Megachile argentata* (Fabr.)	○	–	–	–	–	–
139	*Megachile rotundata* (Fabr.)	○	–	–	–	–	–
140	*Coelioxys quadridentata* (L.)	○	–	–	–	–	–
141	*Coelioxys rufescens* Lep.	○	–	–	–	–	–
142	*Coelioxys aurolimbata* Först.	○	–	–	–	–	–

1	2	3	4	5	6	7	8
143	*Coelioxys conoidea* (Ill.)	○	–	–	–	–	–
144	*Coelioxys elongata* Lep.	○	–	–	–	–	–
145	*Coelioxys inermis* (K.)	○	–	–	–	–	–
146	*Coelioxys afra* Lep.	○	–	–	–	–	–
147	*Coelioxys brevis* Eversm.	○	–	–	–	–	–
148	*Coelioxys rufocaudata* Sm.	–	–	–	–	–	
149	*Nomada goodeniana* (K.)	○	–	–	–	–	–
150	*Nomada fucata* Panz.	○	–	–	–	–	–
151	*Nomada marshamella* (K.)	○	–	–	–	–	–
152	*Nomada sexfasciata* Panz.	○	–	–	–	–	–
153	*Nomada rufipes* Fabr.	○	–	–	–	–	–
154	*Nomada flavopicta* (K.)	○	–	–	–	–	–
155	*Nomada lathburiana* (K.)	○	–	–	–	–	–
156	*Nomada hillana* (K.)	○	–	–	–	–	–
157	*Nomada ruficornis* L.	○	–	–	–	–	–
158	*Nomada flava* Panz.	○	○	–	–	–	–
159	*Nomada bifida* Thoms.	○	–	–	–	–	–
160	*Nomada moeschleri* Alfk.	○	–	–	–	–	–
161	*Nomada alboguttata* Her.-Schaeff.	○	–	–	–	–	–
162	*Nomada flavoguttata* K.	○	–	–	–	–	–
163	*Nomada fuscicornis* Nyl.	○	–	–	–	–	–
164	*Nomada femoralis* Mor.	○	–	–	–	–	–
165	*Nomada fabriciana* (L.)	○	–	–	–	–	–
166	*Biastes brevicornis* (Panz.)	○	–	–	–	–	–
167	*Epeolus cruciger* (Panz.)	○	–	–	–	–	–
168	*Tetralonia dentata* Germ.	○	–	–	–	–	–
169	*Tetralonia salicariae* (Lep.)	○	–	–	–	–	–
170	*Eucera longicornis* (L.)	○	–	–	–	–	–
171	*Anthophora acervorum* (L.)	○	–	–	–	–	○
172	*Anthophora parietina* (Fabr.)	○	–	–	–	–	–
173	*Anthophora quadrimaculata* (Panz.)	○	–	–	–	–	–
174	*Anthophora pubescens* (Fabr.)	○	–	–	–	–	–
175	*Anthophora bimaculata* (Panz.)	○	–	–	–	–	–
176	*Clisodon furcatus* (Panz.)	○	–	–	–	–	–
177	*Melecta punctata* (Fabr.)	○	–	–	–	–	–
178	*Xylocopa valga* Gerst.	–	–	–	–	–	○
179	*Bombus hortorum* (L.)	○	+	+	+	+	○
180	*Bombus ruderatus* (Fabr.)	○	–	–	–	–	–
181	*Bombus subterraneus* L.	○	–	○	–	–	–
182	*Bombus pomorum* (Panz.)	○	–	–	–	–	–
183	*Bombus pascuorum* (Scop.)	○	+	>	+	+	○
184	*Bombus humilis* Imh.	○	–	–	–	–	–
185	*Bombus muscorum* (L.)	○	–	–	–	–	○
186	*Bombus ruderarius* (Müll.)	○	+	○	+	+	○
187	*Bombus sylvarum* (L.)	○	–	–	–	–	–
188	*Bombus veteranus* (Fabr.)	○	–	–	–	–	–
189	*Bombus confusus* Schen.	○	–	–	–	–	–
190	*Bombus lapidarius* (L.)	○	+	○	+	+	○
191	*Bombus soroeensis* Fabr.	○	–	–	–	–	–
192	*Bombus pratorum* (L.)	–	–	+	–	–	–

1	2	3	4	5	6	7	8
193	*Bombus hypnorum* (L.)	○	+	○	+	+	○
194	*Bombus terrestris* (L.)	○	+	○	○	+	○
195	*Bombus lucorum* (L.)	○	+	○	+	+	○
196	*Psithyrus rupestris* (Fabr.)	○	–	–	–	–	○
197	*Psithyrus campestris* (Panz.)	○	–	–	+	+	○
198	*Psithyrus barbutellus* (K.)	○	–	–	–	–	–
199	*Psithyrus vestalis* (Geoffr.)	○	–	+	–	–	–
200	*Apis mellifera* L.	○	+	+	+	+	–
	Total	188	31	35	30	31	31

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PSZCZOŁY (*HYMENOPTERA; APOIDEA*) WARSZAWY I MAZOWSZA

STRESZCZENIE

Dwuletnie badania (1974—1975) nad fauną *Apoidea* aglomeracji warszawskiej przyniosły informacje o występowaniu 52 gatunków, spośród których najliczniejszymi są: pszczoła miodna (*Apis mudifera*) i z dziko żyjących *Halictus morio* i *H. calceatus*.

Wykazano wyraźną przewagę gatunków społecznych z rodzin *Apidae* i *Halictidae*, co nasuwa przypuszczenie, że społeczny tryb życia ułatwia przełamanie barier presji urbanizacyjnej. Jednocześnie stwierdzono ubóstwo gatunkowe rodzin *Megachilidae*, *Anthophoridae* i *Andrenidae*.

Jakościowo najbogatsze okazały się parki, a wiele gatunków parkowych przenika również na ich obrzeża, ku jezdniom. Stwierdzono, że wzmożony ruch uliczny nie jest czynnikiem decydującym o występowaniu i liczebności badanych owadów. Podstawowe znaczenie ma obecność odpowiedniej bazy pokarmowej oraz rodzaj gleby i jej właściwości fizyczne.

Pod względem wierności środowiskowej większość wykazanych gatunków (78,8%) należy do eury- i politopowych, z przewagą ostatnich, a tylko 7,6% stanowią gatunki oligotopowe.

W wyniku analizy zoogeograficznej wyróżniono 13 elementów, wśród których 83,3% stanowią gatunki najszerzej rozsiedlone (kosmopolityczne, holarktyczne, palearktyczne, europejsko-syberyjskie) i europejskie. Udział gatunków południowych (subpontyjskich, submedyterraneńskich i pontomedyterraneńskich) jest stosunkowo niski i wynosi 12,3%.

ПЧЕЛЫ (*HYMENOPTERA, APOIDEA*) ВАРШАВЫ И МАЗОВИИ

РЕЗЮМЕ

Исследования проведенные в 1974—1975 г.г. по фауне *Apoidea* варшавского городского комплекса показали, что тут встречается 52 вида. Констатировано четкое преимущество общественных видов из семейств *Apidae* и *Halictidae*. В качественном отношении наиболее богатыми оказались городские парки. Отмечено, что большое уличное движение не ограничивает в принципе численности этих насекомых. Большинство видов (78,8%) принадлежит к группе эври- и политопных, а 7,6% — это олиготопные виды. Выделено 13 зоогеографических элементов, 83,3% среди которых относятся к широко распространенным на территории палеарктики и Европы.