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## PIPUNCULIDAE (DIPTERA) OF WARSAW AND MAZOVIA

## ABSTRACT

A review is presented of parasitic dipterans of the family *Pipunculidae* collected so far in Mazovia and Warsaw, with particular emphasis on urban green areas (Table 2) where nine species were recorded, accounting for 40% of the *Pipunculidae* of Mazovia. In urban green areas of Warsaw the most abundant dipterans of this family consist of *Chalarus spurius*, *Alloneura sylvatica*, *Eudorylas ruralis*, *E. fascipes*, *E. terminalis*, and *Pipunculus thomsoni*.

## INTRODUCTION

Flies of the family *Pipunculidae* are internal parasites of *Homoptera Auchenorrhyncha*, thus they are natural allies of man in his efforts to control these harmful plant pests.

The purpose of the present paper is to analyse the species composition of these flies in urban green areas and to determine their origin.

The taxonomy and bionomics of this family are not well known. Small body sizes, taxonomic features difficult to recognize, trouble with collecting larger materials account for the fact that few dipterologists were interested in this family. On our continent this group of flies is best known in Great Britain and Scandinavia (due to Collin's papers), and also in Central Europe. There are no data from Eastern Europe, Siberia and Central Asia. For this reason it is difficult to characterize the distribution of *Pipunculidae* beyond Europe. The ranges of the majority of known species are likely to cover taiga and forest-steppe zones.

In Poland, the first information on the occurrence of *Pipunculidae* in Mazovia can be found in the list of *Diptera* prepared by Sznabl in 1881 [4]. He noted there seven species. Three of them, such as *Alloneura geniculata*, *Verrallia pilosa*, and *Eudorylas ruralis*, were recorded in Warsaw. During the present study, carried out almost 100 years later, *A. geniculata* was not found in Warsaw, though it is rather frequent in the surroundings of Warsaw. *Verrallia pilosa*, the second species recorded by Sznabl, has not been caught neither in Warsaw nor in Mazovia, while the third species, *Eudorylas ruralis*, is rather frequent in both urban green areas and beyond the boundaries of the town.

*Pipunculidae* are rather rich in Warsaw. In the administrative boundaries of the town there are 18 species, this accounting for one-third of the total *Pipunculidae* of Poland. In urban green areas of Warsaw nine species have been recorded. A total of 47 *Pipunculidae* species are known from Poland so far, and 23 from Mazovia.

In addition to the list prepared by Sznabl, Table 2, contains data also from recent faunal contributions, concerning the whole area of Poland, including Warsaw and Mazovia [1, 2]. These data are supplemented by the materials collected in recent studies in Warsaw and surroundings. Due to this, the present check-list is enriched with nine species.

#### ZOOGEOGRAPHICAL ANALYSIS

Since *Pipunculidae* are poorly known in most countries of our continent, we have to rely on scarce data mostly from Central Europe, Great Britain, and Scandinavia. In this situation the majority of *Pipunculidae* occurring in Mazovia should temporarily be classified to the species representing the European zoogeographical element. It is probable that their ranges are much more extended, thus some corrections should be expected with increasing knowledge of this group of flies. From the 23 species known from Mazovia, only one, *Chalarus spurius*, has a very large geographical range. It is known not only from Europe but also from North America.

All the *Pipunculidae* species occurring in Warsaw are also known from other parts of the country. They are an integral component of our fauna.

#### ECOLOGICAL ANALYSIS

Flies of the family *Pipunculidae* inhabit mainly open areas such as meadows, forest edges, and clearings, but they can also be met in shrubs and even in tree crowns, though they are not so abundant there. They follow their hosts, occurring in habitats richest in *Auchenorrhyncha*. The agricultural activity of man provided favourable conditions for the colonization of crops by many *Homoptera* species, thus also by their parasites. A similar situation exists in the case of urban green areas. The introduction of decorative plants is followed by the appearance of *Homoptera* and the associated parasites such as *Pipunculidae*. Such a large number of these parasites in the town (9 species) is closely related to a high proportion of their pests in the fauna of urban green areas. Under specific conditions of urbicoenoses, phytophagous insects with piercing-sucking mouth parts, including *Homoptera*, are strongly favoured. In urban green areas of Warsaw, *Auchenorrhyncha*

are rather rich in species, and particularly abundant on isolated lawns in the centre of the town (Chudzicka — personal communication).

Unfortunately, we do not know much of the bionomics of *Pipunculidae*. In some species, a narrow host specialization was observed. For instance, species of the genus *Verrallia* parasitizes only species of the family *Cercopidae*, *V. acuta* is a parasite of *Philaenus spumarius* (L.), species of the genus *Chalarus* attack leafhopper of the subfamily *Typhlocybinae*. *Chalarus spurius*, one of the most abundant species of *Pipunculidae* in Warsaw, frequently parasitizes the leafhopper *Typhlocyba rosae* (L.), which is also numerous in green areas of Warsaw. Species of the genera *Eudorylas* Achr. or *Pipunculus* Latr. parasitize many homopterans of the family *Cicadellidae*, e. g., *Macrosteles laevis* (Rib.) is attacked by the fly *Pipunculus campestris*. Similarly, *Alloneura sylvatica*, also frequently occurring in urban green areas of various types, parasitizes the leafhopper *Arthaldeus pascuellus* (Fall.). Species of the genus *Cephalops* Fall. are known as parasites of *Homoptera* of the family *Delphacidae*.

The analysis of the material collected in Warsaw shows that the highest number of the species of *Pipunculidae*, i. e., as many as 16, inhabit the suburbs. In urban green areas nine species were recorded, including five in parks, six in green areas of housing estates, and nine in the centre, mainly in lawns surrounding buildings and in squares.

If the collected *Pipunculidae* are classified into three categories of abundance, it can be seen that the town is colonized mostly by abundant species and their proportion markedly increases in urban green areas (Table 1). Instead, the proportion of scarce and sporadic species drops in the town. Urban habitats are dominated by such species as *Chalarus spurius*, *Alloneura sylvatica*, *Eudorylas terminalis*, *E. fascipes*, *E. ruralis*, and *Pipunculus thomsoni*.

#### CONCLUSIONS

There are 23 species of *Pipunculidae* recorded from Mazovia, that is, almost a half of the species known from Poland so far. In the administrative boundaries of Warsaw 18 species were found, including nine associated with urban green areas. A large proportion of these parasitic flies in urban green areas (up to 40% of all *Pipunculidae* of Mazovia) should be related to rather high abundance and diversity of *Auchenorrhyncha*, their direct hosts, in this habitat.

The town is mostly colonized by expansive and most abundant species. They account for 67% of the urban *Pipunculidae*. All the species occurring in the town are of local origin. They also occupy natural habitats all over the country. They do not include brought or introduced species.

Table 1. Proportions of groups with different abundances in *Pipunculidae* of Warsaw and non-urban habitats of Mazovia  
(N — number of species)

Group	Mazovia		Warsaw									
			Suburbs		Urban green areas							
	Total				Parks		Housing estates		Town centre			
	N	%	N	%	N	%	N	%	N	%	N	%
Abundant	6	26.0	6	37.5	6	67.0	5	100.0	6	100.0	6	67.0
Scarce	6	26.0	6	37.5	2	22.0	—	—	—	—	2	22.0
Sporadic	11	48.0	4	25.0	1	11.0	—	—	—	—	1	11.0
Total number of species	23		16		9		5		6		9	

## SPECIES NEW TO MAZOVIA

*Chalarus latifrons* Hardy

One specimen caught in a tree crown on the site of a coniferous-deciduous forest in Białoleka Dworska, Warsaw.

In Poland known so far from one stand in Słupsk, Pomeranian Lakeland.

*Chalarus basalis* (Loew)

One specimen caught in grass in a coniferous-deciduous forest of the Kampinos National Park.

In Poland known only from former Galicia.

*Dorylomorpha xanthopus* (Thomson)

One specimen caught in Białoleka Dworska, Warsaw, in a tree crown on the site of an oak-hornbeam forest.

In Poland known so far from Western Pomerania and Silesia.

*Cephalops semifumosus* (Kowarz)

One female caught in a tree crown, on the site of a moist coniferous-deciduous forest in Białoleka Dworska, Warsaw, and two specimens caught in grass in the centre of Warsaw.

In Poland known so far from several stands in Western Pomerania and Silesia.

*Eudorylas fascipes* (Zetterstedt)

Many specimens caught in urban green areas of Warsaw in both tree crowns and grass.

In Poland known from the Pomerania Lakeland, Silesia, and the Małopolska Upland.

*Eudorylas montium* (Becker)

One specimen found in grass in the centre of Warsaw.

In Poland known so far only from the Tuchola forest.

*Eudorylas unicolor* (Zetterstedt)

One specimen caught in Białoleka Dworska, Warsaw, in grass on the site of an oak-hornbeam forest.

In Poland known so far from the Pomeranian Lakeland, Silesia and the Bieszczady mountains.

*Eudorylas zonellus* Collin

One specimen caught in Białoleka Dworska, Warsaw, in grass on the site of an oak-hornbeam forest.

In Poland known from the Pomeranian Lakeland and the West Sudetes.

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Table 2. Check-list of *Pipunculidae* (Diptera) 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>Verrallia aucta</i> (Fall.)	●	—	—	—	—	—
2	<i>Verrallia villosa</i> (v. Roser)	●	—	—	—	—	—
3	<i>Verrallia pilosa</i> (Zett.)	○	—	—	—	—	○
4	<i>Chalarus basalis</i> (Lw)	+	—	—	—	—	—
5	<i>Chalarus latifrons</i> Hardy	—	+	—	—	—	—
6	<i>Chalarus spurius</i> (Fall.)	●	+	+	+	+	—
7	<i>Alloneura geniculata</i> (Meig.)	●	—	—	—	—	○
8	<i>Alloneura sylvatica</i> (Meig.)	●	+	+	+	+	—
9	<i>Dorylomorpha haemorrhoidalis</i> (Zett.)	●	—	—	—	—	—
10	<i>Dorylomorpha xanthopus</i> (Thoms.)	+	—	—	—	—	—
11	<i>Pipunculus ater</i> Meig.	●	+	—	—	+	—
12	<i>Pipunculus campestris</i> Latr.	●	+	—	—	—	—
13	<i>Pipunculus thomsoni</i> Beck.	●	+	+	+	+	—
14	<i>Pipunculus spinipes</i> Meig.	—	+	—	—	—	—
15	<i>Cephalops semifumosus</i> (Kow.)	—	+	—	—	+	—
16	<i>Eudorylas fascipes</i> (Zett.)	—	+	+	+	+	—
17	<i>Eudorylas fascipes</i> (Zett.)	●	—	—	—	—	—
18	<i>Eudorylas montium</i> (Beck.)	+	+	—	—	+	—
19	<i>Eudorylas ruralis</i> (Meig.)	●	+	—	+	+	○
20	<i>Eudorylas terminalis</i> (Thoms.)	●	+	+	+	+	—
21	<i>Eudorylas unicolor</i> (Zett.)	+	+	—	—	—	—
22	<i>Eudorylas zonatus</i> (Zett.)	●	+	—	—	—	—
23	<i>Eudorylas zonellus</i> Coll.	+	+	—	—	—	—

## PIPUNCULIDAE (DIPTERA) WARSZAWY I MAZOWSZA

## STRESZCZENIE

Praca daje przegląd gatunków pasożytniczych muchówek z rodziny *Pipunculidae*, zebranych dotąd z terenu Niziny Mazowieckiej oraz obszaru Warszawy, ze szczególnym uwzględnieniem środowisk zieleni miejskiej (Tab. 2). Dziewięć gatunków tam występujących stanowi 40% fauny *Pipunculidae* Mazowsza. Do najliczniej reprezentowanych muchówek tej rodziny w faunie zieleni miejskiej Warszawy należą: *Chalarus spurius*, *Alloneura sylvatica*, *Eudorylas ruralis*, *E. fascipes*, *E. terminalis* i *Pipunculus thomsoni*.

## PIPUNCULIDAE (DIPTERA) ВАРШАВЫ И МАЗОВИИ

## РЕЗЮМЕ

В работе дается обзор паразитических видов диптер из семейства *Pipunculidae*, найденных до сих пор на территории Мазовии, включая Варшаву, с особым учетом биотопов городской зелени (Табл. 2). Встречающиеся там 9 видов составляют 40% фауны *Pipunculidae* Мазовии. К наиболее многочисленно представленным видам из этого семейства в фауне городской зелени относятся: *Chalarus spurius*, *Alloneura sylvatica*, *Eudorylas ruralis*, *E. frascipes*, *E. terminalis* и *Pipunculus thomsoni*.