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# *CALLIPHORIDAE* PARASITICA (*DIPTERA*) OF WARSAW AND MAZOVIA

ABSTRACT

There are 22 species of parasitic *Calliphoridae* recorded from the Mazovian Lowland, and 18 species from Warsaw. The number of species differs in various habitats of the town. There are 13 species in the suburbs and 17 in urban green areas, including 16 in parks, 8 in green areas of housing estates, and 7 species in the centre of the town. Parasites of earthworms (17 species) are richer in species than parasites of snails (2 species), toads and frogs (1 species).

## INTRODUCTION

Flies of the family *Calliphoridae* are poorly known both in Poland and in the whole Palaearctic. So far they have not been studied extensively in Mazovia and Warsaw. From Warsaw four species were recorded [7], and now 18 species are known.

From the Mazovian Lowland, five species were recorded, including three listed by Sznabl [7], one quoted by Sandner [5] and one by Schumann [6]. Now 22 species of parasitic flies of the family *Calliphoridae* are known. Of the 17 species not noted from the Mazovian Lowland earlier, one is new to the fauna of Poland.

The objective of this paper is to analyse the species composition of *Calliphoridae* parasitica occurring in the Mazovian Lowland and Warsaw, and also a zoogeographical and ecological analysis of the collected material.

The present contribution is mostly based on the materials collected in Warsaw in 1974—1978, and in the Mazovian Lowland in 1976—1978, by means of Moericke's traps suspended in tree crowns. Five- and nine-day samples were collected continuously over the growing season. Also included are materials collected for more than 20 years by means of traditional methods such as sweeping, light traps, and catching by entomological net. In addition, unpublished materials from the collection of Sznabl, caught almost 100 years ago in Mazovia and Warsaw, have been used.

In the Mazovian Lowland, flies were caught by Moericke's traps in the following localities: Hamernia (oak-hornbeam forest and carr), Radziejowice (park), Wola Mrokowska, Młochów, and Kampinos forest (mixed coniferous forest, and pine forest).

In Warsaw, the following sites were sampled by the same method. The suburbs: Ursynów (park), allotments near Okęcie, Bielany (oak-hornbeam forest), Jelonki and Białołęka Dworska (oak-hornbeam forest, mixed coniferous forest, and pine forest); urban parks: Łazienki, Saxon Garden, Praga, and Cemetery of Soviet Soldiers; green areas of housing estates: Wierzbno and Stawki; the centre of the town: Konstytucji Square and the courtyards at Koszykowa street and at the Institute of Zoology at Wilcza street.

The study area, methods and underlying premises are characterized in detail elsewhere [1, 2, 4, 8].

## SPECIES COMPOSITION

In the Mazovian Lowland, 22 species of *Calliphoridae* parasitica have been recorded, or 68.7% of these flies known from Poland. In Poland, 52 species have been recorded so far, including 32 parasitic species (Table 3).

In Warsaw, 18 species of *Calliphoridae* parasitica have been recorded, which account for 81.8% of these flies known from the Mazovian Lowland.

The Mazovian Lowland and all types of green urban areas have five species in common. These are *Bellardia biseta*, *B. pusilla*, *Pollenia rudis*, *P. varia*, and *Protocalliphora azurea chrysorrhoea*.

In the suburbs of Warsaw 13 species have been recorded, and in urban green areas 17 species, including 16 in urban parks. The parasitic *Calliphoridae* occurring in green areas of housing estates are poor, only eight species being recorded there, thus only one species more than in the centre of the town. At Konstytucji Square only single specimens of three species, *Pollenia rudis*, *P. varia*, and *Bellardia pusilla*, were caught. Only two species of the genus *Pollenia* R.-D., recorded from Mazovia and other regions of Poland in wet habitats, are absent in Warsaw.

## ZOOGEOGRAPHICAL ANALYSIS

In both the Mazovian Lowland and Warsaw, the European element is represented by the greatest number of species (Table 1).

In the suburbs and in all types of urban green areas, the number of species belonging to particular zoogeographical elements drops, while the proportions among them are similar to those in Mazovia. Only the Euro-Siberian element has been eliminated from green areas of housing estates and from the centre of Warsaw.

## ECOLOGICAL ANALYSIS

The Mazovian Lowland is predominated by parasitic *Calliphoridae* associated with wooded areas (92.3%), while the species associated with

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

| Zoogeographical elements | Mazovia | | Warsaw | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Suburbs | | Urban green areas | | | | | | | |
| | | | | | Total | | Parks | | Housing estates | | Town centre | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| Holarctic | 3 | 13.6 | 2 | 15.4 | 2 | 11.8 | 2 | 12.5 | 2 | 25 | 1 | 14.3 |
| Palaearctic | 3 | 13.6 | 2 | 15.4 | 2 | 11.8 | 2 | 12.5 | 2 | 25 | 1 | 14.3 |
| Euro-Siberian | 2 | 9.1 | 0 | 0 | 1 | 5.9 | 1 | 6.3 | 0 | 0 | 0 | 0 |
| European | 14 | 63.6 | 9 | 69.2 | 12 | 70.6 | 11 | 68.8 | 4 | 50 | 5 | 71.4 |

open areas account for only 7.7%. Also the suburbs and urban green areas of Warsaw are dominated by parasitic *Calliphoridae* associated with wooded habitats. They account for 80% of all the species of this family.

Adult parasitic *Calliphoridae* are melliphages. Their main food consists of nectar and pollen of more than ten plant families, as well as of honeydew produced by aphids and scale insects. Their larvae parasitize earthworms, snails, frogs, toads, and birds.

In Mazovia and in all types of urban green areas, most of the species represent *Calliphoridae* the larvae of which parasitize earthworms, much less species parasitize other groups (Table 2).

In the Mazovian Lowland, 13 species of earthworms have been recorded [3], of which two species, *Allolobophora chlorotica* and *A. caliginosa* are hosts of flies of the genera *Pollenia* R.-D., and one species, *Eisenia foetida*, is parasitized by flies of the genus *Onesia* R.-D. *Lucilia bufonivora*, a parasite of *Bufo bufo* (L.), *Rana temporaria* L., and *R. esculenta* L., has been caught only in the Mazovian Lowland; it has not been recorded even from the suburbs of Warsaw. Parasites of snails are known from Mazovia and from urban green areas, except from the centre of the town.

Most of the parasitic *Calliphoridae* are more abundant in Mazovia, the suburbs, urban parks, and green areas of housing estates, than in the centre of Warsaw.

*Bellardia pusilla* is more abundant in the suburbs, urban parks, and green areas of housing estates of Warsaw than in the Mazovian Lowland. *Pollenia rudis* is a dominant in Mazovia and urban green areas of Warsaw.

## SPECIES NEW TO POLAND

*Pollenia mayeri* Jacentkovsky, 1941

98 specimens. Mazovian Lowland: Żwir (Ratajewo), 7 July, 1951; Hamernia, oak-hornbeam forest, 23 April — 3 May, 1977; carr, 14—19 October, 1977. Wola Mrokowska, 24 June — 5 July, 1977. Młochów, 21 September — 25 October, 1977. Warsaw: Białołęka Dworska, pine forest, 22 April — 2 May, 1977, 26—31 August, 1977, 23—28 September, 1977 and 7—12 October, 1977; mixed coniferous forest, 12—31 October, 1977, 3—12 August, 1977, 14—23 September, 1977, 28 September — 7 October, 1977; oak-hornbeam forest, 30 August — 9 September, 1977. Bielany, oak-hornbeam forest, 14—19 July, 1977 and 6—20 October, 1977. Ursynów, 20 September — 29 October, 1974. Łazienki, 14—30 September, 1974. Cemetery of Soviet Soldiers, 10—24 September, 1974. Saxon Garden, 25 September — 9 October, 1974. Institute of Zoology PAS (light trap), 23—24 August, 1977. The species so far recorded from Central and Eastern Europe.

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Table 2. Proportions of trophic groups in *Calliphoridae* parasitica of Warsaw and non-urban habitats of Mazovia (N — number of species)

| Hosts of the larvae: | Mazovia | | Warsaw | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Suburbs | | Urban green areas | | | | | | | |
| | | | | | Total | | Parks | | Housing estates | | Town centre | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| *Lumbricidae* | 17 | 77.3 | 10 | 77.0 | 13 | 76.5 | 12 | 75.0 | 5 | 62.5 | 6 | 85.7 |
| *Mollusca* | 2 | 9.1 | 1 | 7.7 | 2 | 11.8 | 2 | 12.5 | 1 | 12.5 | — | — |
| *Bufo bufo* (L.), *Rana* L. | 1 | 4.5 | — | — | — | — | — | — | — | — | — | — |
| *Aves* | 2 | 9.1 | 2 | 15.3 | 2 | 11.8 | 2 | 12.5 | 2 | 25.0 | 1 | 14.3 |

Table 3. Check-list of *Calliphoridae* parasitica (*Diptera*) species occurring in Warsaw and Mazovia

| No. | ○ — literature data<br>● — proved literature data<br>+ — unpublished data<br>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 | *Onesia austriaca* (Vill.) | + | + | — | — | — | — |
| 2 | *Onesia sepulcralis* (Meig.) | ● | — | + | — | — | ○ |
| 3 | *Bellardia agilis* (Meig.) | + | — | — | — | — | — |
| 4 | *Bellardia biseta* (Kram.) | + | + | + | + | + | + |
| 5 | *Bellardia pusilla* (Meig.) | + | + | + | + | + | + |
| 6 | *Bellardia stricta* (Vill.) | + | — | — | — | — | ● |
| 7 | *Melinda cognata* (Meig.) | + | + | + | + | — | + |
| 8 | *Melinda gentilis* R.-D. | ● | — | + | — | — | + |
| 9 | *Lucilia bufonivora* Mon. | ● | — | — | — | — | — |
| 10 | *Pollenia atramentaria* (Meig.) | + | + | + | — | + | + |
| 11 | *Pollenia dasypoda* (Portsch.) | + | — | + | — | — | — |
| 12 | *Pollenia intermedia* Macq. | + | + | + | — | — | — |
| 13 | *Pollenia mayeri* Jacentk. | + | + | + | — | + | — |
| 14 | *Pollenia pallida* Rohd. | + | — | — | — | — | — |
| 15 | *Pollenia pectinata* Grun. | + | — | + | — | — | — |
| 16 | *Pollenia rudis* (Fabr.) | ● | + | + | + | + | ● |
| 17 | *Pollenia vagabunda* (Meig.) | + | + | + | + | — | + |
| 18 | *Pollenia varia* (Meig.) | ● | + | + | + | + | ● |
| 19 | *Pollenia vespillo* (Fabr.) | + | + | + | — | — | — |
| 20 | *Pollenia vera* Jacentk. | + | — | — | — | — | — |
| 21 | *Protocalliphora azurea azurea* (Fall.) | + | + | + | + | — | — |
| 22 | *Protocalliphora azurea chrysorrhoea* (Meig.) | + | + | + | + | + | — |

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## PASOŻYTNICZE *CALLIPHORIDAE* (*DIPTERA*) WARSZAWY I MAZOWSZA

STRESZCZENIE

Na Nizinie Mazowieckiej stwierdzono występowanie 22 gatunków pasożytniczych *Calliphoridae*, co stanowi 68,7% fauny tych muchówek znanych z Polski. W Warszawie złowiono 18 gatunków (w tym jeden nowy dla fauny Polski — *Pollenia mayeri*), co stanowi 81,8% fauny tych muchówek znanych z Mazowsza.

W suburbium Warszawy występuje 13 gatunków pasożytniczych *Calliphoridae*, w zieleni miejskiej 17 gatunków, w tym w parkach miejskich — 16, w zieleni osiedlowej — 8, a w centrum — 7 (na placu Konstytucji tylko 3 — *Bellardia pusilla*, *Pollenia rudis* i *P. varia*).

Zarówno na Nizinie Mazowieckiej jak i w Warszawie najwięcej gatunków należy do elementu europejskiego.

Większość gatunków pasożytniczych *Calliphoridae* Mazowsza i Warszawy związanych jest z terenami zadrzewionymi.

Na Mazowszu oraz we wszystkich typach zieleni miejskiej pod względem gatunków przeważają *Calliphoridae*, które w stadium larwalnym są pasożytami dżdżownic; pasożyty ślimaków nie występują jedynie w centrum Warszawy, natomiast pasożyty ropuch i żab stwierdzono tylko na Nizinie Mazowieckiej.

Większość gatunków pasożytniczych *Calliphoridae* liczniejsza jest na Mazowszu niż na terenach zurbanizowanych — natomiast *Bellardia pussilla* liczniejszy jest na przedmieściach Warszawy i w zieleni miejskiej niż na Mazowszu. *Pollenia rudis* jest najliczniejszym gatunkiem zarówno na Mazowszu jak i w środowiskach zurbanizowanych.

## ПАРАЗИТИЧЕСКИЕ *CALLIPHORIDAE* (*DIPTERA*) ВАРШАВЫ И МАЗОВИИ

РЕЗЮМЕ

В Мазовии констатировано 22 вида паразитических *Calliphoridae* в Варшаве 18 видов. Количество видов в пределах города характеризуется значительной дифференциацией: в субурбиях есть их 13, в городской зелени 17, в парках 16, в зелени жилых микрорайонов 8, в центре города 7. Паразиты дождевых червей (17) выказывают численное превосходство по сравнению с паразитами брюхоногих (2) и жаб и лягушек (1).