

## Hover flies (Diptera: Syrphidae) of the coastal and marine habitats of Poland

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**Abstract.** The results of a five-year study on hover flies (Diptera: Syrphidae) of the saline habitats of the Polish coast are reported. During study seasons (1999-2003), in twelve localities representing beaches and coastal brackish habitats, 56 species of these flies were collected. Among them, 43 are new to these areas. The dominance structure of syrphid communities, their phenology and abundance in the saline habitats are characterized.

**Key Words:** Diptera, Syrphidae, dominance structure, phenology, abundance, saline habitats, Poland.

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### INTRODUCTION

The Syrphidae is a large family, which belongs to the higher Brachycera and occurs almost all over the world. They are absent only from Antarctica and subantarctic islands. Hover flies are divided into three subfamilies (Syrphinae, Microdontinae and Eristalinae) and about 6000 species have been described, so far (THOMSON & ROTHERAY 1998). In Poland, there are only 370 species known (SOSZYŃSKI 1991).

Most larvae of hover flies are terrestrial, however typical aquatic larvae belong to the tribe Eristalini and they are mostly connected with fresh water. The seashore is not a suitable habitat for Syrphidae, but some hover flies are able to adapt to the fluctuations of salinity. For example, preimaginal stadium of *Eristalinus aeneus*, *Eristalis abusive* and *Eristalis tenax* may occur on salt marsh shores, whereas *Lejops vittata* is associated with *Scirpus maritimus*, growing in marshes (DOLEZIL & ROZKOŠNÝ 1997).

In Poland, we know a little about Syrphidae of the saline habitats. SZADZIEWSKI (1983), investigating Diptera of these areas, found 25 species. 21 were collected in inland saline areas, and 16 in coastal brackish ones. Only two species were noticed on beaches of the Baltic Sea. All of these species were haloxenes, i.e. species, which occur and develop more often and more numerous in specific non-saline habitats than in saline ones. As his research was carried out almost 25 years ago, I wanted to study the current condition of syrphid fauna of beaches and coastal brackish areas of the Polish coast.

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#### MATERIAL AND METHODS

Material was collected in twelve localities, different in sizes. Ten of them represented marine habitats of the western and eastern sections of the Polish Baltic coast. On the eastern section, localities were situated near the Gulf of Gdańsk [Gdynia - Wzgórze Świętego Maksymiliana, Gdynia - Redłowo, Gdynia - Orłowo (UTM: CF44), Sopot, Gdańsk - Jelitkowo, Gdańsk - Brzeźno (UTM: CF43)], as beyond the Gulf of Gdańsk [Władysławowo (UTM: CF37), Jastrzębia Góra (UTM: CF27), Stegna (UTM: CF72)]. On the western section, flies were caught in Międzyzdroje on the Pomeranian Bay (UTM: VV67).

On beaches, flies were collected near the cliffs and in the supralittoral and epilittoral zones. The cliff situated near Gdynia has its bottom part overgrown with *Tussilago farfara*, *Cirsium arvense* and *Hippophae rhamnoides*, whereas that near Władysławowo – with *Achillea millefolium*, *Festuca rubra*, *Rumex acetosella*, *Trifolium campestre* and *Sedum acre*. The beaches adjacent to the Gulf of Gdańsk, Hel Peninsula and the Pomeranian Bay are flat and sandy. Their grey dune zones are overgrown with *Rosa rugosa*, *Salix arenaria* and *Salix daphnoides* (HERBICH et al. 1997).

Gdańsk - Górki Wschodnie, representing a brackish area of the coastal type, is situated at the mouth of the Wisła Śmiała River. Flies were collected in bulrushes, brackish marshes and brackish meadows. These areas were overgrown with such halophytes as for example *Aster tripolium*, *Triglochin maritimum*, *Glaux maritima*, *Artriplex hastatum* var. *salinarium* and *Elymus arenarius*.

In the Bay of Puck, flies were caught in brackish marshes and meadows along the waterside. The bay banks were covered with *Phragmites communis*, whereas the meadows were overgrown with *Triglochin maritimum*, *Atriplex hastatum* var. *salinum*, *Aster tripolium*, *Glaux maritima* and *Spergularia salina* (SZADZIEWSKI 1983).

Hover flies were collected from the beginning of April to the end of October, in the years 1999-2003. Material was collected once or twice a week by sweeping (using an entomological net), under soils, plants overgrowing dunes and cliffs, and in halophyte com-

munities growing near the saline water reservoirs. All specimens are stored a "pin collection" and the material contained 525 imagines.

To describe the dominance structure of communities, a dominance index ( $D$ ) was used (DURSKA 2001):

$$D = n/N \times 100\%$$

where:

$n$  = the abundance of a given species

$N$  = the accumulated abundance of all syrphid species.

The dominance index ( $D$ ) classified the species into four classes:

- eudominants (over 15.0% of whole collection);
- dominants (from 5.1% to 15.0%);
- subdominants (from 1.1% to 5.0%);
- accessory species (up to 1.0%).

All hover flies were collected by the author; the material collected in 1999-2001 were identified by Bogusław Soszyński, others (2002-2003) – by the author.

## RESULTS AND DISCUSSION

### I. Systematic review of species

#### Subfamily Syrphinae

##### *Dasysyrphus albostratus* (FALLÉN, 1817)

###### Material examined

1♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 3.07.2003.

###### Distribution, ecology

Europe; the former USSR; Asia: Mongolia and Japan (PECK 1988). In Poland, this species is very common and occurs from May to September (BAŃKOWSKA 1963).

##### *Dasysyrphus hilaris* (ZETTERSTEDT, 1843)

###### Material examined

2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 13.06.2001.

###### Distribution, ecology

Europe; former USSR: Central European territory, East Siberia and Far East; Asia: Mongolia (PECK 1988). In Poland, this species occurs from May to July and it is known in Pomerania, Silesia (BAŃKOWSKA 1963), Sudety and Bieszczady (BAŃKOWSKA 1971).

*Dasysyrphus lunulatus* (MEIGEN, 1822)**Material examined**

1♀, Gdańsk - Górki Wschodnie, 28.07.2003.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, East and West Siberia, Far East; Asia: Mongolia, Japan, China; Nearctic Region (PECK 1988). In Poland, the species is observed from April to August, and noticed in Tatra Mts., Sudety, Bieszczady, Silesia and Pomerania (BAŃKOWSKA 1963, 1971).

*Dasysyrphus tricinctus* (FALLÉN, 1817)**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 18.06.2001.

**Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Transcaucasus, Middle Asia, East and West Siberia, Far East; Asia: Mongolia and Japan (PECK 1988). The species is very common in Poland (BAŃKOWSKA 1971).

*Didea alneti* (FALLÉN, 1817)**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 1♂, Międzyzdroje, 4.08.2003.

**Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, Korea, Japan; Nearctic Region (PECK 1988). In Poland, *D. alneti* occurs from May to September, and is known in Pomerania, Nida Valley, Sudety, Bieszczady and Tatra Mts. (BAŃKOWSKA 1971). This species was collected in dune zones of beaches in Sweden (ARDÖ 1957).

*Episyrphus balteatus* (DE GEER, 1776)**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 1.09.1999; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 3.09.1999; 7♂♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 19.05.2000; 3♀♀, Gdynia - Wzgórze Św. Maksymiliana, 7.07.2000; 1♂, 3♀♀, Gdańsk - Jelitkowo, 8.07.2000; 3♀♀, Władysławowo, 25.07.2000; 6♂♂, Władysławowo, 26.07.2000; 5♂♂, Władysławowo, 27.07.2000; 1♂, 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 1.08.2000; 2♂♂, 9♀♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 2♂♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 3♀♀, Gdynia - Wzgórze Św. Maksymiliana, 18.06.2001; 1♂, 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 10.08.2001; 1♂, 1♀, Gdynia -

- Wzgórze Św. Maksymiliana, 16.08.2001; 3♀♀, Gdańsk - Górki Wschodnie, 17.06.2002; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 4.07.2002; 3♀♀, Gdańsk - Górki Wschodnie, 4.07.2002; 1♂, Gdańsk - Brzeźno, 13.07.2002; 2♂♂, Gdańsk - Górki Wschodnie, 16.07.2002; 1♀, Sopot, 25.07.2002; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 25.07.2002; 2♂♂, Gdynia - Orłowo, 27.07.2002; 1♂, Puck, 8.08.2002; 1♀, Władysławowo, 3.09.2002; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 19.09.2002; 5♀♀, Gdynia - Wzgórze Św. Maksymiliana, 3.07.2003; 1♀, Puck, 7.07.2003; 26♂♂, 13♀♀, Gdańsk - Górki Wschodnie, 28.07.2003; 7♂♂, 1♀, Sopot, 29.07.2003; 3♂♂, Gdynia - Wzgórze Św. Maksymiliana, 30.07.2003; 1♀, Międzyzdroje, 4.08.2003; 1♀, Gdańsk - Górki Wschodnie, 5.08.2003; 1♂, 2♀♀, Międzyzdroje, 5.08.2003; 2♂♂, 2♀♀, Międzyzdroje, 6.08.2003; 1♀, Międzyzdroje, 7.08.2003; 1♀, Puck, 22.08.2003; 1♀, Puck, 25.09.2003.

#### **Distribution, ecology**

Europe; all parts of former USSR; Asia: Afghanistan, Mongolia, China, Japan; North Africa: Algeria, Egypt; Azores; Canary Islands; Oriental Region and Australia (PECK 1988). In Poland, the species is very common and occurs from April to October (BAŃKOWSKA 1963). *E. balteatus* was collected in dune zones of beaches in Denmark (ARDÖ 1957), and on salt marshes in Ireland (HEALY 1975).

#### ***Melangyna (Melangyna) umbellatarum* (FABRICIUS, 1794)**

##### **Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana. 6.09.1999.

##### **Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Transcaucasus, Middle Asia, West and East Siberia, Far East; Asia: Mongolia; Nearctic Region (PECK 1988). In Poland, this species is noticed from May to September, and occurs in Tatra Mts., Kraków district, Pomerania, Silesia (BAŃKOWSKA 1963), and Bieszczady (BAŃKOWSKA 1971).

#### ***Melangyna (Meligramma) cincta* (FALLÉN, 1817)**

##### **Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 1♂, Gdynia - Orłowo, 3.05.2001.

##### **Distribution, ecology**

Europe; former USSR: North and South European territory, Transcaucasus, Far East (Primorye Territory) (PECK 1988). In Poland, the species occurs from June to September, and is known in Tatra Mts., Pomerania, Białowieża Primeval Forest, Silesia (BAŃKOWSKA 1963), Sudety, Bieszczady (BAŃKOWSKA 1971) and Mazovia (BAŃKOWSKA 1989). *M. (M.) cincta* was collected in dune zones of beaches in Denmark (ARDÖ 1957).

*Meliscaeva auricollis* (MEIGEN, 1822)**Material examined**

2♂♂, Władysławowo, 5.07.2001; 1♀, Gdańsk - Górki Wschodnie, 16.07.2002.

**Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Transcaucasus, Middle East; North Africa: Morocco; Canary Islands (PECK 1988). In Poland, this species is collected from April to August, and occurs in Pomerania, Warsaw district, Tatra Mts. (BAŃKOWSKA 1963), and Bieszczady (BAŃKOWSKA 1971).

*Metasyrphus (Metasyrphus) corollae* (FABRICIUS, 1794)**Material examined**

3♂♂, Gdańsk - Jelitkowo, 8.07.2000; 1♀, Gdańsk - Górki Wschodnie, 9.07.2000; 3♀♀, Władysławowo, 25.07.2000; 1♂, Sopot, 6.07.2002; 2♀♀, Gdańsk - Górki Wschodnie, 24.07.2002; 3♀♀, Gdańsk - Górki Wschodnie, 28.07.2003.

**Distribution, ecology**

All parts of Europe and former USSR; Asia: Iran, Mongolia, North China, Japan; North Africa: Morocco, Algeria, Tunisia, Egypt; Oriental Region and Tasmania (PECK 1988). The species is very common in Poland, and occurs from April to September (BAŃKOWSKA 1963). It was collected in saline habitats of Poland: in Mątwy near Inowrocław, Ciechocinek, Aleksandrów Kujawski, Gdańsk - Górki Wschodnie, the Gulf of Puck and the Gulf of Gdańsk (SZADZIEWSKI 1983). *M. (M.) corollae* was caught in dune zones of beaches in Denmark (ARDÖ 1957) and on beaches of the Bulgarian Black Sea coast (BEŠOVSKI 1972).

*Metasyrphus (Metasyrphus) latifasciatus* (MACQUART, 1829)**Material examined**

1♂, Gdańsk - Górki Wschodnie, 24.07.2002; 3♂♂, Władysławowo, 5.06.2003.

**Distribution, ecology**

All parts of Europe and former USSR; Asia: Syria, Afghanistan, Mongolia; Nearctic and Oriental Region (PECK 1988). In Poland, this species is noticed from April to September, and occurs in Pomerania, Silesia, Tatra Mts., Tuchola Forest and Kampinos Primeval Forest (BAŃKOWSKA 1963). *M. (M.) latifasciatus* was collected on the European beaches (BRAUNS 1959) and on salt marshes in Ireland (HEALY 1975).

*Metasyrphus (Metasyrphus) nitens* (ZETTERSTEDT, 1843)**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 3.09.1999.

**Distribution, ecology**

All parts of Europe and former USSR; Asia: Afghanistan, Mongolia, Korea and Japan (PECK 1988). In Poland, the species occurs from April to September, and is known in Pomerania, Kampinos Primeval Forest, Nida Valley and Tatra Mts. (BAŃKOWSKA 1963).

*Parasyrphus nigratarsis* (ZETTERSTEDT, 1843)

**Material examined**

1♂, 3♀♀, Gdańsk - Górki Wschodnie, 24.07.2002.

**Distribution, ecology**

Europe; former USSR: North and Central European territory, Transcaucasus, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, Japan; Nearctic Region (PECK 1988). In Poland, this species is observed from May to September and occurs in Pomerania (BAŃKOWSKA 1963).

*Scaeva pyrastris* (LINNAEUS, 1758)

**Material examined**

1♀, Władysławowo, 24.07.2000; 1♂, 2♀♀, Gdańsk - Górki Wschodnie, 28.07.2003; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 30.07.2003.

**Distribution, ecology**

Europe, former USSR: from Petersburg region to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Afghanistan, Mongolia, North China, Japan; North Africa: Algeria, Egypt; Madeira; Canary Islands; Nearctic Region (PECK 1988). The species is very common in Poland and occurs from May to October (BAŃKOWSKA 1963). In saline habitats, *S. pyrastris* was collected in Mątwy near Inowrocław, Ciechocinek and the Gulf of Puck (SZADZIEWSKI 1983). It was caught in dune zones of beaches in Denmark and Sweden (ARDÖ 1957), on beaches of the Bulgarian Black Sea coast (BEŠOVSKI 1972, 1975), and on salt marshes in Ireland (HEALY 1975).

*Scaeva selenitica* (MEIGEN, 1822)

**Material examined**

1♀, Gdańsk - Jelitkowo, 8.07.2000; 1♀, Jastrzębia Góra, 15.07.2003.

**Distribution, ecology**

Europe, former USSR: from Petersburg region to Transcaucasus, Middle Asia, West and East Siberia; Asia: Far East, Afghanistan, Mongolia, China; Madeira; Oriental Region (PECK 1988). In Poland, the species is very common and observed from May to October (BAŃKOWSKA 1963).

*Sphaerophoria loewi* ZETTERSTEDT, 1843**Material examined**

1♂, Gdańsk - Górki Wschodnie, 16.07.2002.

**Distribution, ecology**

Europe; former USSR: North and Central European territory, Kazakhstan, Middle Asia; Asia: Mongolia (PECK 1988). In Poland, this species is known in Pomerania, and noticed from May to July (BAŃKOWSKA 1963). In saline habitats, *S. loewi* was collected in Gdańsk - Górki Wschodnie and Uznam Island (SZADZIEWSKI 1983).

*Sphaerophoria menthastri* (LINNAEUS, 1758)**Material examined**

18♂♂, 3♀♀, Gdańsk - Górki Wschodnie, 4.07.2002.

**Distribution, ecology**

All parts of Europe; former USSR: North, Central and South European territory, Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, China, Japan; North Africa: Morocco, Egypt; Azores; Canary Islands (PECK 1988). In Poland, this species is very common and occurs from May to August (BAŃKOWSKA 1963). *S. menthastri* was collected in dune zones of beaches in Denmark (ARDÖ 1957), on beaches in France (TSACAS 1959), and on salt marshes in Ireland (HEALY 1975).

*Sphaerophoria rueppellii* (WIEDEMANN, 1830)**Material examined**

1♂, Gdańsk - Górki Wschodnie, 16.07.2002; 1♀, Gdańsk - Górki Wschodnie, 9.07.2003; 2♀♀, Międzyzdroje, 4.08.2003.

**Distribution, ecology**

Europe; former USSR: from Estonia to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Syria, Afghanistan, Mongolia, China, Korea; North Africa: Algeria, Egypt; Canary Islands (PECK 1988). In Poland, this species is observed from May to August and known in Tatra Mts., Pomerania, Sącz and Warsaw districts (BAŃKOWSKA 1963). In saline habitats, *S. rueppellii* was collected in Mątwy near Inowrocław, Janikowo, Ciechocinek, Aleksandrów Kujawski and Gdańsk - Górki Wschodnie (SZADZIEWSKI 1983). It was also caught on beaches of the Bulgarian Black Sea coast (BEŠOVSKI 1972).

*Sphaerophoria scripta* (LINNAEUS, 1758)**Material examined**

2♀♀, Władysławowo, 24.07.2000; 2♀♀, Władysławowo, 25.07.2000; 1♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 1♀, Gdańsk - Górki Wschodnie, 20.08.2000; 2♂♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 7.06.2001; 1♀, Puck, 28.06.2001; 1♀,



Władysławowo, 3.07.2001; 1♀, Władysławowo, 5.07.2001; 2♂♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 2♂♂, 2♀♀, Władysławowo, 25.06.2002; 7♂♂, 7♀♀, Gdańsk - Górki Wschodnie, 4.07.2002; 2♂♂, Stegna, 10.07.2002; 1♂, Gdańsk - Górki Wschodnie, 16.07.2002; 1♀, Gdańsk - Górki Wschodnie, 24.07.2002; 1♀, Gdynia - Orłowo, 27.07.2002; 2♀♀, Puck, 8.08.2002; 2♂♂, Gdynia - Wzgórze Św. Maksymiliana, 30.07.2003; 2♀♀, Międzyzdroje, 4.08.2003; 2♀♀, Międzyzdroje, 5.08.2003; 2♀♀, Międzyzdroje, 6.08.2003; 1♀, Międzyzdroje, 7.08.2003; 5♂♂, Puck, 22.08.2003.

#### **Distribution, ecology**

Europe; former USSR: from Kola Peninsula to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Syria, Afghanistan, Mongolia; North Africa: Morocco, Algeria, Tunisia, Egypt; Azores; Madeira; Canary Islands; Nearctic and Oriental Regions (PECK 1988). In Poland, this species is very common and observed from May to September (BAŃKOWSKA 1963). In saline habitats, it was collected in Mątwy near Inowrocław, Janikowo, Ciechocinek, Aleksandrów Kujawski and Gdańsk - Górki Wschodnie (SZADZIEWSKI 1983). *S. scripta* was caught in dune zones of beaches in Norway, Denmark and Sweden (ARDÖ 1957), and on beaches of the Bulgarian Black Sea coast (BEŠOVSKI 1972, 1975).

#### ***Sphaerophoria taeniata* (MEIGEN, 1822)**

##### **Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 19.05.2000; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 31.08.2001; 1♀, Puck, 4.09.2001.

##### **Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, China, Japan; Canary Islands (PECK 1988). The species is common in Poland (PECK 1988).

#### ***Syrphus ribesii* (LINNAEUS, 1758)**

##### **Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 3.09.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 19.05.2000; 1♀, Gdańsk - Jelitkowo, 8.07.2000; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 1♀, Gdynia - Redłowo, 14.05.2002; 1♀, Jastrzębia Góra, 22-23.05.2003; 1♀, Gdańsk - Górki Wschodnie, 28.07.2003; 1♀, Międzyzdroje, 4.08.2003; 1♀, Międzyzdroje, 6.08.03.

##### **Distribution, ecology**

Europe; former USSR: from Kola Peninsula to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Afghanistan, Mongolia, Japan; Nearctic Region (PECK 1988). The species is common in Poland and occurs from April to September

(BAŃKOWSKA 1963). It was noticed in localities adjacent to the Gulf of Gdańsk (SZADZIEWSKI 1983) and on beaches in France (TSACAS 1959).

***Syrphus torvus* OSTEN-SACKEN, 1875**

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 22.09.2000; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 4.05.2001; 1♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 31.08.2001; 1♂, Sopot, 6.07.2002; 1♂, Gdańsk - Górki Wschodnie, 24.07.2002; 2♀♀, Władysławowo, 3.09.2002; 1♂, Puck, 7.07.2003; 1♂, Międzyzdroje, 5.08.2003.

**Distribution, ecology**

Europe; former USSR: from Petersburg region to Transcaucasus, Kazakhstan, West and East Siberia, Far East; Asia: Mongolia, China, Japan; Nearctic and Oriental Regions (PECK 1988). In Poland, this species is common and observed from April to September (BAŃKOWSKA 1971). *S. torvus* was collected in dune zones of beaches in Denmark (ARDÖ 1957).

***Syrphus vitripennis* MEIGEN, 1822**

**Material examined**

1♀, Sopot, 25.08.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 1.09.1999; 3♀♀, Gdynia - Wzgórze Św. Maksymiliana, 6.09.1999; 5♂♂, Władysławowo, 26.07.2000; 3♂♂, Władysławowo, 27.07.2000; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 5♀♀, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 22.09.2000; 1♂, Gdańsk - Górki Wschodnie, 24.07.2002.

**Distribution, ecology**

Europe; former USSR: from Kola Peninsula to Transcaucasus, Middle Asia, Siberia and Far East; Asia: Mongolia, Iran, Afghanistan, Japan; Nearctic and Oriental Regions (PECK 1988). The species is common in Poland and observed from April to September (BAŃKOWSKA 1963). *S. vitripennis* was collected in dune zones of beaches in France (TSACAS 1959).

***Baccha elongata* (FABRICIUS, 1775)**

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 3.07.2003; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 19.08.2003.

**Distribution, ecology**

Europe; former USSR: from Petersburg region to Transcaucasus; Nearctic Region (PECK 1988). *B. elongata* is common in Poland, and noticed from May to October (BAŃ-

KOWSKA 1963).

*Chrysotoxum cautum* (HARRIS, [1776])

**Material examined**

1♂, Władysławowo, 5.06.2003.

**Distribution, ecology**

Europe; former USSR: from Petersburg region to Transcaucasus, Kazakhstan, Middle Asia, West Siberia (Altaj) (PECK 1988). In Poland, the species occurs from May to September and is known in Pomerania and Nida Valley (BAŃKOWSKA 1963).

*Melanostoma mellinum* (LINNAEUS, 1758)

**Material examined**

1♂, 1♀, Puck, 4.09.2001; 1♂, Gdynia - Orłowo, 27.07.2002; 1♀, Sopot, 1.09.2002; 1♂, Władysławowo, 5.06.2003; 1♂, Międzyzdroje, 5.08.2003; 1♂, Puck, 22.08.2003; 5♂♂, 1♀, Puck, 25.09.2003.

**Distribution, ecology**

All parts Europe and former USSR; Asia: Mongolia, Iran, Afghanistan, Japan; North Africa: Morocco; Madeira; Canary Island; Nearctic Region (PECK 1988). The species is common in Poland and occurs from June to October (BAŃKOWSKA 1963). It was collected in inland saline habitats, i.e. Mątwy near Inowrocław, Ciechocinek and Aleksandrów Kujański (SZADZIEWSKI 1983). *M. mellinum* was caught on beaches in Sweden (ARDÖ 1957), on the Bulgarian Black Sea coast (BEŠOVSKI 1972, 1975) and on meadows, extending along the coast of north Norway (DAHL 1968).

*Melanostoma scalare* (FABRICIUS, 1794)

**Material examined**

1♂, 2♀♀, Gdynia - Orłowo, 24.07.1999; 2♂♂, Władysławowo, 27.07.2000; 1♀, Puck, 28.08.2000; 1♂, Władysławowo, 25.07.2000; 1♀, Gdynia - Orłowo, 12.05.2001; 2♂♂, 4♀♀, Gdynia - Wzgórze Św. Maksymiliana, 10.08.2001; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 1♀, Gdańsk - Górki Wschodnie, 4.07.2002; 1♂, 1♀, Puck, 22.08.2003.

**Distribution, ecology**

Europe; former USSR: from Petersburg region to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia and Far East; Asia: Mongolia, Afghanistan, China (Seczuan, East Tibet), Japan; Afrotropical and Oriental Regions (PECK 1988). In Poland, this species occurs from May to October and it is known in Pomerania, Warsaw district, Białowieża Primeval Forest and Bieszczady (BAŃKOWSKA 1971). *M. scalare* was collected on meadows of the coast in north Norway (DAHL 1968).

*Xanthandrus comtus* (HARRIS, [1780])**Material examined**

1 ♀, Gdynia - Wzgórze Św. Maksymiliana, 13.06.2001; 1 ♂, Puck, 22.08.2003.

**Distribution, ecology**

Europe; former USSR: from Petersburg region to Transcaucasus, Kazakhstan, West and East Siberia, Far East; Asia: Mongolia, Korea, Japan; Oriental Region (PECK 1988). In Poland, the species is common and collected from June to October BAŃKOWSKA 1971). *X. comtus* was caught on beaches near Roscoff (France) (TSACAS 1959), and on the Bulgarian Black Sea coast (BEŠOVSKI 1975).

*Platycheirus albimanus* (FABRICIUS, 1781)**Material examined**

1 ♀, Puck, 28.06.2000.

**Distribution, ecology**

Europe; former USSR: from Kola Peninsula to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia and Far East; Asia: Mongolia; Nearctic and Oriental Regions (PECK 1988). The species is common in Poland and noticed from April to September (BAŃKOWSKA 1963).

*Platycheirus angustatus* (ZETTERSTEDT, 1843)**Material examined**

1 ♂, 1 ♀, Władysławowo, 25.07.2000; 3 ♂♂, Gdynia - Wzgórze Św. Maksymiliana, 4.07.2002; 3 ♂♂ Gdańsk - Górkki Wschodnie, 4.07.2002; 1 ♂, 1 ♀, Puck, 25.09.2003.

**Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, Japan; Nearctic Region (PECK 1988). In Poland, this species occurs from May to September, and it is known in Skierniewice district (BAŃKOWSKA 1963). *P. angustatus* was collected in saline habitats by BRAUNS (1959).

*Platycheirus clypeatus* (MEIGEN, 1822)**Material examined**

4 ♀♀, Gdynia - Orłowo, 24.07.1999; 3 ♀♀, Gdynia - Wzgórze Św. Maksymiliana, 19.05.2000; 7 ♀♀, Władysławowo, 23.07.2000; 1 ♀, Gdańsk - Górkki Wschodnie, 23.07.2000; 1 ♀, Puck, 28.08.2000; 1 ♀, Gdańsk - Górkki Wschodnie, 20.08.2000; 1 ♂, 1 ♀, Puck, 4.09.2001; 1 ♀, Władysławowo, 25.06.2002; 1 ♀, Stegna, 10.07.2002; 5 ♂♂, Puck, 25.09.2003.

**Distribution, ecology**

Europe; former USSR: from Petersburg region to South European territory, Transcaucasus, Middle Asia, West and East Siberia and Far East; Asia: Mongolia, Japan and Afghanistan; Nearctic Region (PECK 1988). The species is common in Poland and noticed from May to September (BAŃKOWSKA 1963). In saline habitats in Poland, it was collected in Gdańsk - Górkki Wschodnie and the Gulf of Puck (SZADZIEWSKI 1983). *P. clypeatus* was caught on beaches in Norway, Sweden (ARDÖ 1957) and on salt marshes in Ireland (HEALY 1975).

***Platycheirus fulviventris* (MACQUART, 1829)**

**Material examined**

1♂, Puck, 22.08.2003.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Middle Asia and Far East; Asia: Mongolia (PECK 1988). In Poland, this species occurs from June to September and it is known in Pomerania, Białowieża Primeval Forest and south part of the country (BAŃKOWSKA 1963). *P. fulviventris* was collected on beaches of the Bulgarian Black Sea coast (BEŠOVSKI 1972).

***Platycheirus peltatus* (MEIGEN, 1822)**

**Material examined**

1♀, Puck, 8.08.2000; 3♀♀, Władysławowo, 25.06.2002; 3♀♀, Gdańsk - Górkki Wschodnie, 4.07.2002; 2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 17.07.2002; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 15.08.2002; 1♂, Puck, 22.08.2003; 3♀♀, Puck, 25.09.2003.

**Distribution, ecology**

All parts of Europe; former USSR: North and Central European territory, Transcaucasus, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, Japan; Nearctic Region (PECK 1988). The species is common in Poland and noticed from May to September (BAŃKOWSKA 1963). In saline habitats, it was collected in Janikowo and the Gulf of Puck (SZADZIEWSKI 1983). *P. peltatus* was caught on the meadows of the coast in north Norway (DAHL 1968).

***Platycheirus scutatus* (MEIGEN, 1822)**

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 3.09.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 6.09.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 1♂, 1♀, Puck, 7.07.2003.

**Distribution, ecology**

Europe; former USSR: North and Central European territory, Transcaucasus, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, Japan, Afghanistan; Nearctic Region (PECK 1988). This species is common in Poland and observed from July to September (BAŃKOWSKA 1963).

**Subfamily Eristalinae*****Cheilosia canicularis* (PANZER, [1801])****Material examined**

1♂, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001.

**Distribution, ecology**

Europe; former USSR: North European territory, Transcaucasus, West and East Siberia, Far East; Asia: Japan (PECK 1988). In Poland, the species is observed from July to September and is known in Pomerania, Silesia, Sudety, Bieszczady and Tatra Mts. (BAŃKOWSKA 1971).

***Cheilosia chrysocoma* (MEIGEN, 1822)****Material examined**

1♂♂, Gdańsk - Jelitkowo, 3.05.2002; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 8.05.2002; 1♀♀, Gdynia - Wzgórze Św. Maksymiliana, 3.07.2003.

**Distribution, ecology**

Europe; former USSR: North and Central European territory, West and East Siberia (PECK 1988). In Poland, the species is known in Bieszczady (BAŃKOWSKA 1971).

***Cheilosia frontalis* LOEW, 1857****Material examined**

1♂, 1♀, Sopot, 1.05.2002.

**Distribution, ecology**

Europe; former USSR: North and Central European territory (PECK 1988). In Poland, this species is observed from April to July and noticed in Pomerania, Silesia, Kraków district, Białowieża Primeval Forest (BAŃKOWSKA 1963) and Bieszczady (BAŃKOWSKA 1971).

***Cheilosia melanopa* (ZETTERSTEDT, 1843)****Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 4.10.2002.

**Distribution, ecology**

Europe; former USSR: North European territory (PECK 1988). In Poland, the species occurs from April to July (BAŃKOWSKA 1963).

*Cheilosia mutabilis* (FALLÉN, 1817)

**Material examined**

1♀, Władysławowo, 25.07.2000; 1♀, Władysławowo, 25.06.2002.

**Distribution, ecology**

Europe; former USSR: from Arkhangelsk region to Transcaucasus, West and East Siberia (PECK 1988). In Poland, the species is caught from April to September and is known in Pomerania, Mazovia, Bieszczady and Tatra Mts. (BAŃKOWSKA 1971). *Ch. mutabilis* was collected on beaches of the North Sea (KARL 1930) and in dune zone of the coast in Sweden (ARDÖ 1957). It is recognized as xerophilous species (KARL 1930).

*Cheilosia pagana* (MEIGEN, 1822)

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.06.2000; 1♂, 1♀, Sopot, 1.05.2002; 7♂♂, 8♀♀, Gdańsk - Jelitkowo, 3.05.2002; 1♀, Władysławowo, 25.06.2002; 1♀, Sopot, 6.07.2002; 1♂, 3♀♀, Puck, 8.05.2003; 1♀, Władysławowo, 5.06.2003.

**Distribution, ecology**

Europe; former USSR: from Solovets Islands to Transcaucasus, West and East Siberia, Far East; Asia: Mongolia; Nearctic Region (PECK 1988). This species is common in Poland and occurs from April to September (BAŃKOWSKA 1963).

*Cheilosia variabilis* (PANZER, [1798])

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 13.06.2001; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 31.05.2002.

**Distribution, ecology**

Europe; former USSR: North, Central and South European territory, Middle Asia and West Siberia (PECK 1988). The species is common in Poland and observed from May to September (BAŃKOWSKA 1963).

*Cheilosia vulpina* (MEIGEN, 1822)

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 13.06.2001; 1♀, Gdynia - Redłowo, 31.05.2002.

**Distribution, ecology**

Europe; former USSR: Central and South European territory (PECK 1988). In Poland, this species occurs from May to August and it is noticed in Pomerania, Warsaw district, Nida Valley, Sudety, Pieniny and Bieszczady (BAŃKOWSKA 1971).

***Volucella inanis* (LINNAEUS, 1758)****Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 6.09.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 30.07.2003; 1♀, Gdynia - Orłowo, 6.09.2003.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, Middle Asia, West and East Siberia, Far East; Asia: Syria, Afghanistan, Mongolia, China (PECK 1988). In Poland, the species is collected from May to October and is known in Tatra Mts., Silesia (BAŃKOWSKA 1963), Sudety (BAŃKOWSKA 1964), Bieszczady (BAŃKOWSKA 1971) and Mazovia (BAŃKOWSKA 1989).

***Volucella pellucens* (LINNAEUS, 1758)****Material examined**

1♂, Sopot, 6.07.2002.

**Distribution, ecology**

Europe; former USSR: from Arkhangielsk to Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, China, Korea, Japan; North Africa: Tunisia; Oriental Region (PECK 1988). In Poland, *V. pellucens* is common and collected from May to October (BAŃKOWSKA 1963). This species was caught in dune zones of beaches in Sweden (ARDÖ 1957).

***Volucella zonaria* (PODA, 1761)****Material examined**

2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, Middle Asia, West Siberia and Far East; Asia: Mongolia and Iran; North Africa: Tunisia (PECK 1988). In Poland, the species is observed from May to October and occurs in Pomerania, Tatra Mts. (BAŃKOWSKA 1963) and Mazovia (BAŃKOWSKA 1981).



*Eristalinus (Lathyrophthalmus) aeneus* (SCOPOLI, 1763)

**Material examined**

2♀♀, Gdańsk - Górkki Wschodnie, 18.08.2003.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, Kazakhstan, Middle Asia, Far East; Asia: Mongolia, China, Syria, Arabian Emirates, Afghanistan; North Africa: Morocco, Algeria, Tunisia; Canary Islands; Nearctic, Afrotropical and Oriental Regions; Australia; Hawaii (PECK 1988). The species is common in Poland and is collected from early spring to late autumn (BAŃKOWSKA 1963). *E. (L.) aeneus* was collected on beaches of the Baltic, North (KARL 1930) and Black Seas. It is recognized as halophilous species (BEŠOVSKI 1975).

*Eristalis (Eoseristalis) pertinax* (SCOPOLI, 1763)

**Material examined**

2♀♀, Gdynia - Wzgórze Św. Maksymiliana, 6.09.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 30.09.1999.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus (PECK 1988). In Poland, this species is observed from April to September (BAŃKOWSKA 1963) and is known in Pomerania, Mazovia, Białowieża Primeval Forest, Bieszczady, Sudety, Pieniny and Tatra Mts. (BAŃKOWSKA 1971).

*Eristalis (Eristalis) tenax* (LINNAEUS, 1758)

**Material examined**

1♂, Gdynia - Wzgórze Św. Maksymiliana, 18.08.1999; 1♀, 3♂♂, Gdynia - Wzgórze Św. Maksymiliana, 1.09.1999; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 28.04.2000; 1♂, Gdańsk - Jeltkowo, 8.07.2000; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 1.08.2000; 1♀, Sopot, 6.08.2000; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 15.09.2000; 2♂♂, Władysławowo, 4.07.2001; 1♂, 1♀, Gdynia - Wzgórze Św. Maksymiliana, 10.08.2001; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 3♂♂, Gdynia - Wzgórze Św. Maksymiliana, 31.08.2001; 1♂, Puck, 22.08.2003.

**Distribution, ecology**

Europe; former USSR: from Kola Peninsula to Transcaucasus, from Baltic Sea to Far East; Asia: from Turkey to Japan; North Africa; Madeira; Canary Islands; Azores. Cosmopolitan (PECK 1988). The species is common in Poland and occurs from April to September (BAŃKOWSKA 1963). *E. tenax* was collected in Gdańsk - Górkki Wschodnie (SZADZIEWSKI 1983), in dune zones of beaches in France (TSACAS 1959) and on the Bulgarian Black Sea

coast (BEŠOVSKI 1973, 1975).

***Helophilus (Anasimyia) lineatus* (FABRICIUS, 1787)**

**Material examined**

1 ♀, Gdańsk - Górkki Wschodnie, 8.05.2000.

**Distribution, ecology**

Europe; former USSR: North, Central and South European territory, West and East Siberia, Far East; Asia: Mongolia (PECK 1988).

***Helophilus (Helophilus) parallelus* (HARRIS, [1776])**

**Material examined**

4 ♂♂, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 1 ♂, Gdańsk - Górkki Wschodnie, 9.07.2003.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, Kazakhstan, Middle Asia, West and East Siberia, Far East; Asia: Mongolia, China, Iran, Afghanistan (PECK 1988).

***Helophilus (Helophilus) pendulus* (LINNAEUS, 1758)**

**Material examined**

1 ♂, Gdynia - Wzgórze Św. Maksymiliana, 18.08.1999; 1 ♂, Gdańsk - Górkki Wschodnie, 20.08.2000; 1 ♂, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001; 1 ♂, Gdańsk - Jelitkowo, 3.05.2002; 1 ♂, 1 ♀, Puck, 7.06.2002; 1 ♂, Puck, 8.08.2002; 1 ♀, Jastrzębia Góra, 15.07.2003; 1 ♂, Górkki Wschodnie, 28.07.2003; 1 ♂, Puck, 22.08.2003.

**Distribution, ecology**

Europe; former USSR: from Kola Peninsula to Crimea, Transcaucasus, West and East Siberia, Far East (PECK 1988). The species is common in Poland and noticed from May to October (BAŃKOWSKA 1963). In saline habitats, *H. (H.) pendulus* was collected in Gdańsk - Górkki Wschodnie and the Gulf of Puck (SZADZIEWSKI 1983). It was caught in dune zones of the coast in Sweden (ARDÖ 1957).

***Myatropa florea* (LINNAEUS, 1758)**

**Material examined**

1 ♂, Gdańsk - Brzeźno, 11.06.2000; 2 ♀♀, Gdynia - Wzgórze Św. Maksymiliana, 16.08.2001.

**Distribution, ecology**

Europe; former USSR: from Arkhangielsk region to Crimea, Transcaucasus, Middle

Asia, Siberia from Ural to Southern Primorye; Asia: Afghanistan; North Africa: Algeria; Canary Islands; Azores (PECK 1988). The species is common in Poland and occurs from spring to late autumn (BAŃKOWSKA 1963). *M. florea* was collected on the beaches near Roscoff (France) (TSACAS 1959), and on the Bulgarian Black Sea coast (BEŠOVSKI 1972).

***Syrirta pipiens* (LINNAEUS, 1758)**

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 30.09.1999; 1♂, Władysławowo, 23.07.2000; 1♂, Władysławowo, 25.07.2000; 1♀, Puck, 8.08.2000; 1♂, Puck, 28.06.2001; 1♀, Gdynia - Wzgórze Św. Maksymiliana, 4.07.2002; 1♀, Sopot, 6.07.2002; 1♂, Gdańsk - Brzeźno, 13.07.2002; 2♂♂, 2♀♀, Puck, 8.08.2002; 1♂, Władysławowo, 5.06.2003; 1♂, Puck, 7.07.2003; 2♂♂, Międzyzdroje, 6.08.2003; 3♂♂, Puck, 22.08.2003.

**Distribution, ecology**

Europe; all parts of former USSR; Asia: Mongolia, China, Turkey, Iran, Afghanistan; North Africa: Morocco, Algeria; Madeira; Canary Islands; Nearctic and Oriental Regions (PECK 1988). This species is common in Poland and is caught from April to October (BAŃKOWSKA 1963). In saline habitats, *S. pipiens* was collected in Gdańsk - Górki Wschodnie and the Gulf of Puck (SZADZIEWSKI 1983). The species was observed in dune zones of the coasts in Norway, Sweden (ARDÖ 1957) and France (TSACAS 1959). *S. pipiens* was collected also on beaches of the Bulgarian Black Sea coast (BEŠOVSKI 1972, 1973, 1975).

***Tropidia fasciata* MEIGEN, 1822**

**Material examined**

1♀, Puck, 7.06.2002.

**Distribution, ecology**

Europe; former USSR: Far East (PECK 1988). In Poland, this species is known in Pomerania and is noticed from May to July (BAŃKOWSKA 1963).

***Xylota segnis* (LINNAEUS, 1758)**

**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 13.06.2001; 1♂, Gdynia - Wzgórze Św. Maksymiliana, 2.09.2003.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, Kazakhstan, West and East Siberia; Asia: North China; North Africa: Morocco; Canary Islands; Madeira; Azores; Nearctic Region (PECK 1988). The species is common in Poland and it occurs from May to September (BAŃKOWSKA 1963).

*Xylota sylvarum* (LINNAEUS, 1758)**Material examined**

1♀, Gdynia - Wzgórze Św. Maksymiliana, 18.08.2000.

**Distribution, ecology**

Europe; former USSR: Central and South European territory, Transcaucasus, Kazakhstan, West and East Siberia, Far East; Asia: Mongolia (PECK 1988). In Poland, this species is observed from June to August (BAŃKOWSKA 1963).

**II. Faunistic reviews****1. Species composition and seasonal dynamics of hover flies**

The saline habitats of the Polish coast are a source of food for a large number of hover fly species. There are not many species closely associated with these areas and which accomplish their whole developmental cycle there, but there are species, which are attracted by the surrounding habitats.

During the five-year study, 525 specimens of hover flies belonging to 56 species were collected. The group of species associated with saline habitats mainly consists of aphidophagous species of the genera *Episyrphus*, *Sphaerophoria*, *Platycheirus* and *Syrphus*. Phytophagous species are most abundantly represented by flies of the genus *Cheilosia*, whereas saprophagous ones – by coprophagous *Syritta* and *Eristalis*. The larvae of the last genus develop in water and migrate to the study areas from surrounding habitats (BAŃKOWSKA 1989) (Tab. 1).

In the collection, *E. balteatus* (142 specimens, e.g. 27.05% of material) and *S. scripta* (55 specimens – 10.48%) were the most numerous. These species are very common in Poland and are noticed during the whole vegetative season, e.g. from April to October (BAŃKOWSKA 1963) (Tab. 1). Moreover, predaceous larvae of *E. balteatus* and *S. scripta* having a short developmental cycle, reach maturity within 4-5 weeks from oviposition and flies can produce 3-4 generations a year in temperate zones, if the thermal conditions are favourable (BAŃKOWSKA 1989). Therefore, these species reached a high abundance in the study sites.

Peak abundance of the hover fly in the saline habitats of the Polish coast was recorded in July (Tab. 1, 2, Fig.). On the Polish coast, July is the warmest and sunniest month of the year. In these study months, the dune zones, cliffs and brackish meadows were overgrown with many species of halophilous plants, where the imagines of hover flies could have fed. In that time the larvae of the hover flies had also the largest supply of easily accessible food. In July, *E. balteatus*, *M. (M.) corollae*, *S. vitripennis*, *S. menthastri*, *S. scripta* and *P. clypeatus* were the most numerous. Their larvae are aphidophagous and their seasonal changes are closely correlated with the occurrence of their host. In Poland, for example on meadows, the peak abundance of aphids takes place in June, and during this month syrphid larvae have a lot of available food. In July, hover flies emerge from pupae and produce a

new generation (BAŃKOWSKA 1989). This situation is analogous to the seasonal dynamics of the most numerous hover fly species in saline habitats. Moreover, imagines of these species are common in Poland and occur in all terrestrial habitats, including the saline ones (BAŃKOWSKA 1981).

**Table 1.** Check-list of hover flies collected in 1999-2003, their abundance in successive months of vegetation seasons, and their percentage in the whole collection.

L.p.	Species	IV	V	VI	VII	VIII	IX	X	Sum	%
1	<i>Dasysyrphus albostratus</i> (FALL.)				1		2		3	0.58
2	<i>Dasysyrphus hilaris</i> (ZETT.)			2					2	0.38
3	<i>Dasysyrphus lunulatus</i> (MEIG.)				1				1	0.19
4	<i>Dasysyrphus tricinctus</i> (FALL.)			2			1		3	0.58
5	<i>Didea alneti</i> (FALL.)					2			2	0.38
6	<i>Episyrphus balteatus</i> (DEG.)		8	3	88	32	11		142	27.05
7	<i>Melangyna (Melangyna) umbellatarum</i> (FABR.)						1		1	0.19
8	<i>Melangyna (Meligramma) cincta</i> (FALL.)		1			1			2	0.38
9	<i>Meliscaeva auricollis</i> (MEIG.)				3				3	0.58
10	<i>Metasyrphus (Metasyrphus) corollae</i> (FABR.)				13				13	2.48
11	<i>Metasyrphus (Metasyrphus) latifasciatus</i> (MACQ.)			3	1				4	0.76
12	<i>Metasyrphus (Metasyrphus) nitens</i> (ZETT.)						1		1	0.19
13	<i>Parasyrphus nigratarsis</i> (ZETT.)				4				4	0.76
14	<i>Scaeva pyrastris</i> (L.)				5				5	0.95
15	<i>Scaeva selenitica</i> (MEIG.)				2				2	0.38
16	<i>Sphaerophoria loewi</i> ZETT.				1				1	0.19
17	<i>Sphaerophoria menthastri</i> (L.)				21				21	4.00
18	<i>Sphaerophoria rueppellii</i> (WIED.)				2	2			4	0.76
19	<i>Sphaerophoria scripta</i> (L.)			8	27	20			55	10.48
20	<i>Sphaerophoria taeniata</i> (MEIG.)		1			1	1		3	0.58
21	<i>Syrphus ribesii</i> (L.)		3		3	5	2		13	2.48
22	<i>Syrphus torvus</i> O.-S.		1		4	3	3		11	2.10
23	<i>Syrphus vitripennis</i> MEIG.				9	3	11		23	4.38
24	<i>Baccha elongata</i> (FABR.)				1	2			3	0.58
25	<i>Chrysotoxum cautum</i> (HARR.)			1					1	0.19

26	<i>Melanostoma mellinum</i> (L.)			1	1	2	9		13	2.48
27	<i>Melanostoma scalare</i> (FABR.)		1		7	10			18	3.43
28	<i>Xanthandrus comtus</i> (HARR.)			1		1			2	0.38
29	<i>Platycheirus albimanus</i> (FABR.)			1					1	0.19
30	<i>Platycheirus angustatus</i> (ZETT.)				8		2		10	1.91
31	<i>Platycheirus clypeatus</i> (MEIG.)		3	1	13	2	7		26	4.95
32	<i>Platycheirus fulviventris</i> (MACQ.)					1			1	0.19
33	<i>Platycheirus peltatus</i> (MEIG.)			3	5	3	3		14	2.67
34	<i>Platycheirus scutatus</i> (MEIG.)				2		3		5	0.95
35	<i>Cheilosia canicularis</i> (PANZ.)					1			1	0.19
36	<i>Cheilosia chrysocoma</i> (MEIG.)		2		1				3	0.58
37	<i>Cheilosia frontalis</i> LW.		2						2	0.38
38	<i>Cheilosia melanopa</i> (ZETT.)							1	1	0.19
39	<i>Cheilosia mutabilis</i> (FALL.)			1	1				2	0.38
40	<i>Cheilosia pagana</i> (MEIG.)		21	3	1				25	4.76
41	<i>Cheilosia variabilis</i> (PANZ.)		1	1					2	0.38
42	<i>Cheilosia vulpina</i> (MEIG.)		1	1					2	0.38
43	<i>Volucella inanis</i> (L.)				1	1	2		4	0.76
44	<i>Volucella pellucens</i> (L.)				1				1	0.19
45	<i>Volucella zonaria</i> (PODA)				2				2	0.36
46	<i>Eristalinus (Lathyrrophthalmus) aeneus</i> (SCOP.)					2			2	0.36
47	<i>Eristalis (Eoseristalis) pertinax</i> (SCOP.)						3		3	0.58
48	<i>Eristalis (Eristalis) tenax</i> (L.)	1			3	11	5		20	3.81
49	<i>Helophilus (Anasimyia) lineatus</i> (FABR.)		1						1	0.19
50	<i>Helophilus (Helophilus) parallelus</i> (HARR.)				1	4			5	0.95
51	<i>Helophilus (Helophilus) pendulus</i> (L.)		1	2	2	5			10	1.90
52	<i>Myathropa florea</i> (L.)			1		2			3	0.58
53	<i>Syrirta pipiens</i> (L.)			2	6	10	1		19	3.62
54	<i>Tropidia fasciata</i> MEIG.			1					1	0.19
55	<i>Xylota segnis</i> (L.)			1			1		2	0.36
56	<i>Xylota sylvarum</i> (L.)				1				1	0.19
	<b>Sum</b>	<b>1</b>	<b>47</b>	<b>39</b>	<b>242</b>	<b>126</b>	<b>69</b>	<b>1</b>	<b>525</b>	<b>100.00</b>
	<b>Percentage</b>	<b>0.19</b>	<b>8.95</b>	<b>7.43</b>	<b>46.1</b>	<b>24</b>	<b>13.14</b>	<b>0.19</b>	<b>100.00</b>	

The years 1999 and 2001 were exceptional. In 1999, most syrphids were collected in September (21 specimens, or 67.74% of all material). In 2001, the peak of abundance was found in August (38 specimens, e.g. 55.07% of collection) (Tab. 2, Fig.). The summer months of 1999 and 2001 were very rainy, and the weather's improvement happened in late summer, which was sunny and the ambient environmental temperatures were high – almost 20°C.

During the five years of study, hover flies were collected from May to September. In saline habitats of the Polish coast in April and October, syrphids are very rare. In these months, only two specimens were caught: in April 2000 - *Eristalis (Eristalis) tenax* and in October 2002 - *Cheilosia menalopa* (Tab. 1, 2). As the species are haloxenes, thus their so early abundance in localities can be recognized as accidental.

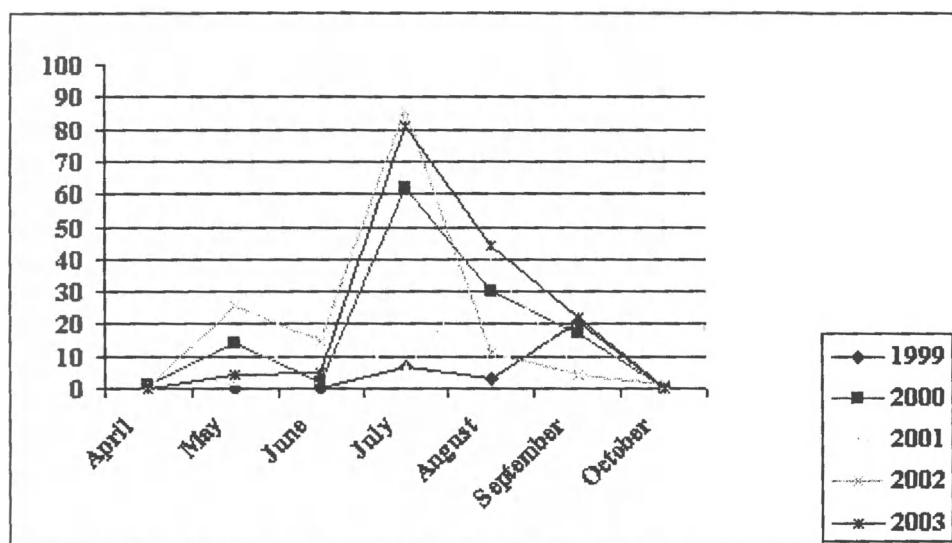


Fig. Seasonal changes in hover fly abundance in the saline habitats of the Polish coast in 1999-2003.

**Table 2.** Seasonal changes in hover fly abundance and percentage in the saline habitats of the Polish coast in 1999-2003.

Month Year	IV	V	VI	VII	VIII	IX	X	Sum
1999	0	0	0	7	3	21	0	31
%	0.00	0.00	0.00	22.58	9.68	67.74	0.00	100.00
2000	1	14	2	62	30	17	0	126
%	0.79	11.11	1.59	49.21	23.81	13.49	0.00	100.00
2001	0	3	17	6	38	5	0	69
%	0.00	4.35	24.64	8.69	55.07	7.25	0.00	100.00
2002	0	26	15	86	11	4	1	143
%	0.00	18.18	10.49	60.14	7.69	2.80	0.70	100.00
2003	0	4	5	81	44	22	0	156
%	0.00	2.56	3.21	51.92	23.21	14.10	0.00	100.00
Sum	1	47	39	242	126	69	1	525

## 2. Hover flies of beaches and coastal brackish areas – a comparison

During the five-year study, hover flies were collected in two types of saline habitats of the Polish coast. On beaches, there were caught 47 species, while in brackish habitats of the coastal type – 32. 23 species were common for both habitats, 24 were noticed on the beaches, and 9 – in coastal brackish areas only (Tab. 3, 4).

In both types of habitats, eurytopic and polytopic species were collected. The eurytopic species were represented by *E. balteatus*, *M. (M.) corollae*, *S. vitripennis* and *S. scripta*. The polytopic species group (with a little lower tolerance) includes *M. (M.) latifasciatus*. *Ch. canicularis* and *X. sylvarum* were caught only on beaches. These species belong to the group of oligotopic and hygrophilous species. Moreover, larvae of the genus *Cheilosia* are typical rhizophagous and mine leaves and stems of herbaceous plants. Larvae of *Xylota* are phyto-saprophagous and feed on plant detritus and dead wood (BAŃKOWSKA 1981). Therefore, these species were collected on beaches, where the larvae had favourable conditions for feeding and breeding. The species caught only in saline habitats of the coastal type were very rare in this material. There were mainly 1-4 specimens (Tab. 1).



Table 3. The hover flies of beaches and extensive brackish areas – a comparison of results of SZADZIEWSKI (1983) and KACZOROWSKA (Hx – haloxene species, Hph – halophilous species).

No.	Species	Ecological group	SZADZIEWSKI (1983)		1999-2003	
			Beaches	Extensive brackish areas	Beaches	Extensive brackish areas
1	<i>Dasysyrphus albostratus</i> (FALL.)	Hx	-	-	+	-
2	<i>Dasysyrphus hilaris</i> (ZETT.)	Hx	-	-	+	-
3	<i>Dasysyrphus lunulatus</i> (MEIG.)	Hx	-	-	-	+
4	<i>Dasysyrphus tricinctus</i> (FALL.)	Hx	-	-	+	-
5	<i>Didea alneti</i> (FALL.)	Hx	-	-	+	-
6	<i>Episyrphus balteatus</i> (DEG.)	Hx	-	-	+	+
7	<i>Melangyna</i> ( <i>Melangyna</i> ) <i>umbellatarum</i> (FABR.)	Hx	-	-	+	-
8	<i>Melangyna</i> ( <i>Meligramma</i> ) <i>cincta</i> (FALL.)	Hx	-	-	+	-
9	<i>Meliscaeva auricollis</i> (MEIG.)	Hx	-	-	+	-
10	<i>Metasyrphus</i> ( <i>Metasyrphus</i> ) <i>corollae</i> (FABR.)	Hx	+	+	+	+
11	<i>Metasyrphus</i> ( <i>Metasyrphus</i> ) <i>latifasciatus</i> (MACQ.)	Hx	-	-	+	+
12	<i>Metasyrphus</i> ( <i>Metasyrphus</i> ) <i>nitens</i> (ZETT.)	Hx	-	-	+	-
13	<i>Parasyrphus nigratarsis</i> (ZETT.)	Hx	-	-	-	+
14	<i>Scaeva pyrastris</i> (L.)	Hx	-	+	+	+
15	<i>Scaeva selenitica</i> MEIG.	Hx	-	-	+	-
16	<i>Sphaerophoria loewi</i> ZETT.	Hx	-	+	-	+
17	<i>Sphaerophoria menthastri</i> (L.)	Hx	-	-	-	+
18	<i>Sphaerophoria rueppellii</i> (WIED.)	Hx	-	+	+	+
19	<i>Sphaerophoria scripta</i> (L.)	Hx	-	+	+	+

20	<i>Sphaerophoria taeniata</i> (MEIG.)	Hx	-	-	+	+
21	<i>Syrphus ribesii</i> (L.)	Hx	+	-	+	+
22	<i>Syrphus torvus</i> O.-S.	Hx	-	-	+	+
23	<i>Syrphus vitripennis</i> MEIG.	Hx	-	-	+	+
24	<i>Baccha elongata</i> (FABR.)	Hx	-	-	+	-
25	<i>Chrysotoxum cautum</i> (HARR.)	Hx	-	-	+	-
26	<i>Melanostoma mellinum</i> (L.)	Hx	-	-	+	+
27	<i>Melanostoma scalare</i> (FABR.)	Hx	-	-	+	+
28	<i>Xanthandrus comtus</i> (HARR.)	Hx	-	-	+	+
29	<i>Platycheirus albimanus</i> (FABR.)	Hx	-	-	-	+
30	<i>Platycheirus angustatus</i> (ZETT.)	Hx	-	-	+	+
31	<i>Platycheirus clypeatus</i> (MEIG.)	Hx	-	+	+	+
32	<i>Platycheirus fulviventris</i> (MACQ.)	Hx	-	+	-	+
33	<i>Platycheirus peltatus</i> (MEIG.)	Hx	-	+	+	+
34	<i>Platycheirus scutatus</i> (MEIG.)	Hx	-	-	+	+
35	<i>Pipizella virens</i> (FABR.)	Hx	-	+	-	-
36	<i>Cheilosia canicularis</i> (PANZ.)	Hx	-	-	+	-
37	<i>Cheilosia chrysocoma</i> (MEIG.)	Hx	-	-	+	-
38	<i>Cheilosia frontalis</i> LW.	Hx	-	-	+	-
39	<i>Cheilosia melanopa</i> (ZETT.)	Hx	-	-	+	-
40	<i>Cheilosia mutabilis</i> (FALL.)	Hx	-	-	+	+
41	<i>Cheilosia pagana</i> (MEIG.)	Hx	-	-	+	+
42	<i>Cheilosia variabilis</i> (PANZ.)	Hx	-	-	+	-
43	<i>Cheilosia vulpina</i> (MEIG.)	Hx	-	-	+	-
44	<i>Volucella inanis</i> (L.)	Hx	-	-	+	-
45	<i>Volucella pellucens</i> (L.)	Hx	-	-	+	-
46	<i>Volucella zonaria</i> (PODA)	Hx	-	-	+	-

47	<i>Lejogaster splendida</i> (MEIG.)	Hx	-	+	-	-
48	<i>Eristalinus (Eristalinus) sepulchralis</i> (L.)	Hx	-	+	-	-
49	<i>Eristalinus (Lathyrrophthalmus) aeneus</i> (SCOP.)	Hph	-	+	-	+
50	<i>Eristalis (Eoseristalis) arbustorum</i> (L.)	Hx	-	+	-	-
51	<i>Eristalis (Eoseristalis) pertinax</i> (SCOP.)	Hx	-	-	+	-
52	<i>Eristalis (Eristalis) tenax</i> (L.)	Hx	-	+	+	+
53	<i>Helophilus (Anasimyia) lineatus</i> (FABR.)	Hx	-	-	-	+
54	<i>Helophilus (Helophilus) parallelus</i> (HARR.)	Hx	-	-	+	+
55	<i>Helophilus (Helophilus) pendulus</i> (L.)	Hx	-	+	+	+
56	<i>Myathropa florea</i> (L.)	Hx	-	-	+	-
57	<i>Syrirta pipiens</i> (L.)	Hx	-	+	+	+
58	<i>Tropidia fasciata</i> MEIG.	Hx	-	-	-	+
59	<i>Xylota segnis</i> (L.)	Hx	-	-	+	-
60	<i>Xylota sylvarum</i> (L.)	Hx	-	-	+	-
Sum			2	16	47	32

Up to date, the only research on dipterous fauna of saline habitats in Poland was conducted by SZADZIEWSKI (1983). During his investigation on the Polish coast, the author collected 17 syrphid species. 16 species were caught in coastal brackish areas, while only 2 on beaches.

In my present study, I collected 47 species on beaches (23.5 times more than the result of SZADZIEWSKI 1983) and 32 (twice more) – on the saline habitats of the coastal type (Tab. 3, 4). It is important to emphasize that my study was conducted in a similar number of localities.

During this investigation, I did not collect *Pipizella virens*, *Lejogaster splendida*, *Eristalinus (Eristalinus) sepulchralis* and *Eristalis (Eoseristalis) arbustorum*, which were caught by SZADZIEWSKI (1983). All of these species are recognized as haloxenes and collected individually, so their occurrence in study areas could be only accidental.

Similarly to the work of SZADZIEWSKI, I collected *M. (M.) corollae* in both types of habitats, and *S. loewi*, *P. fulviventris* and *E. (L.) aeneus* in coastal brackish areas. The re-

remaining species caught in the earlier study, were collected by me not only in saline habitats of the coastal type, but also on beaches (Tab. 3).

In my collection, only *E. (L.) aeneus* is recognized as halophilous. The remaining species are haloxenes, which use study areas as a place of breeding and feeding.

### 3. Dominance structure

On the beaches, there were one eudominant, four dominants, twelve subdominants and thirty accessory species recognized. In saline habitats of the coastal type, one eudominant, four dominants, nine subdominants and eighteen accessory species were collected. In both types of habitats, *E. balteatus* was recognized as eudominant. It is the most common, partly synanthropized, eurytopic species, which occurs in all terrestrial habitats of Poland (BAŃKOWSKA 1981), and it was very numerous in this collection. Its larvae are aphidophagous and they feed on aphids occurring in halophilous vegetation. Similarly, *E. balteatus* was identified in dune zones of the Danish coast (ARDÖ 1957) and on salt marshes in Ireland (HEALY 1975).

*S. scripta*, which larvae are also aphidophagous (BAŃKOWSKA 1989), was a dominant in marine and coastal habitats. Earlier, this species was collected in the same habitats by SZADZIEWSKI (1983), on beaches of Scandinavia (ARDÖ 1957), and on the Bulgarian Black Sea coast (BEŠOVSKI 1972, 1975). On beaches three species were dominants, namely *S. vitripennis* (noticed also on the coast of France, see TSACAS 1959), *Ch. pagana* (common in Poland), and *E. (E.) tenax* (collected in saline habitats of coastal type by SZADZIEWSKI 1983, on beaches in France by TSACAS 1959, and on the Bulgarian Black Sea coast by BEŠOVSKI 1973, 1975). Moreover, larvae of *S. vitripennis* are aphidophagous and those of *Ch. pagana* – phytophagous, so they had very good feeding conditions in researched areas. Larvae of *E. tenax* are aquatic and saprophagous, while their imagines numerously visit dune zones overgrown with flowers, cliffs and salt meadows. This species is recognized as ubiquitous (BAŃKOWSKA 1989), therefore it occurred in this collection.

In coastal brackish habitats *S. menthastri*, *P. clypeatus* and *S. pipiens* were recognized as dominants. The first two species are connected with moist meadows and their predatory larvae are aphidophagous (BAŃKOWSKA 1989), therefore they were noticed in high abundance during this research. Larvae of *S. pipiens* are terrestrial and saprophagous (BAŃKOWSKA 1989). Their high abundance can be caused by cattle grazing near the study meadows. Moreover, all three species were collected in saline habitats earlier. *S. menthastri* occurs on European beaches (ARDÖ 1957, TSACAS 1959), and in salt marshes in Ireland (HEALY 1975). *P. clypeatus* was collected in coastal brackish areas (SZADZIEWSKI 1983), in salt marshes of Ireland (HEALY 1975), and on beaches in Norway and Sweden (ARDÖ 1957). *S. pipiens* was very numerous in saline habitats of the coastal type in Poland (SZADZIEWSKI 1983), and it occurred on beaches of Scandinavia (ARDÖ 1957), France (TSACAS 1959) and the Bulgarian Black Sea coast (BEŠOVSKI 1973, 1975) (Tab. 4).

Table 4. Abundance, percentage and dominance structure of the hover flies community of the saline habitats of the Polish coast.

No.	Species	Abundance on the beaches	%	Dominance structure	Abundance in coastal brackish areas	%	Dominance structure
1	<i>Dasysyrphus al-</i> <i>bostratus</i> (FALL.)	3	0.89	accessory	0	0.00	-
2	<i>Dasysyrphus hiliaris</i> (ZETT.)	2	0.60	accessory	0	0.00	-
3	<i>Dasysyrphus lunula-</i> <i>tus</i> (MEIG.)	0	0.00	-	1	0.53	accessory
4	<i>Dasysyrphus tricinc-</i> <i>tus</i> (FALL.)	3	0.89	accessory	0	0.00	-
5	<i>Didea alneti</i> (FALL.)	2	0.60	accessory	0	0.00	-
6	<i>Episyrphus balteatus</i> (DEG.)	90	26.79	eudominant	52	27.51	eudominant
7	<i>Melangyna</i> ( <i>Melan-</i> <i>gyna</i> ) <i>umbellata-</i> <i>rum</i> (FABR.)	1	0.30	accessory	0	0.00	-
8	<i>Melangyna</i> ( <i>Meli-</i> <i>gramma</i> ) <i>cincta</i> (FALL.)	2	0.60	accessory	0	0.00	-
9	<i>Meliscaeva auricol-</i> <i>lis</i> (MEIG.)	2	0.60	accessory	1	0.53	accessory
10	<i>Metasyrphus</i> ( <i>Meta-</i> <i>syrphus</i> ) <i>corollae</i> (FABR.)	7	2.08	subdominant	6	3.17	subdominant
11	<i>Metasyrphus</i> ( <i>Meta-</i> <i>syrphus</i> ) <i>latifas-</i> <i>ciatus</i> (MACQ.)	3	0.89	accessory	1	0.53	accessory
12	<i>Metasyrphus</i> ( <i>Meta-</i> <i>syrphus</i> ) <i>nitens</i> (ZETT.)	1	0.30	accessory	0	0.00	-
13	<i>Parasyrphus nigri-</i> <i>tarsis</i> (ZETT.)	0	0.00	-	4	2.12	subdominant
14	<i>Scaeva pyrastris</i> (L.)	2	0.60	accessory	3	1.59	subdominant

15	<i>Scaeva selenitica</i> (MEIG.)	2	0.60	accessory	0	0.00	-
16	<i>Sphaerophoria loewi</i> ZETT.	0	0.00	-	1	0.53	accessory
17	<i>Sphaerophoria menthastri</i> (L.)	0	0.00	-	21	11.11	dominant
18	<i>Sphaerophoria ruep- pellii</i> (WIED.)	2	0.60	accessory	2	1.06	accessory
19	<i>Sphaerophoria scripta</i> (L.)	30	8.93	dominant	25	13.23	dominant
20	<i>Sphaerophoria taeniata</i> (MEIG.)	2	0.60	accessory	1	0.53	accessory
21	<i>Syrphus ribesii</i> (L.)	12	3.57	subdominant	1	0.53	accessory
22	<i>Syrphus torvus</i> O.-S.	9	2.68	subdominant	2	1.06	accessory
23	<i>Syrphus vitripennis</i> MEIG.	22	6.55	dominant	1	0.53	accessory
24	<i>Baccha elongata</i> (FABR.)	3	0.89	accessory	0	0.00	-
25	<i>Chrysotoxum cautum</i> (HARR.)	1	0.30	accessory	0	0.00	-
26	<i>Melanostoma mel- linum</i> (L.)	4	1.19	subdominant	9	4.76	subdominant
27	<i>Melanostoma sca- lare</i> (FABR.)	14	4.17	subdominant	4	2.12	subdominant
28	<i>Xanthandrus comtus</i> (HARR.)	1	0.30	accessory	1	0.53	accessory
29	<i>Platycheirus albi- manus</i> (FABR.)	0	0.00	-	0	0.53	accessory
30	<i>Platycheirus angus- tatus</i> (ZETT.)	5	1.49	subdominant	5	2.65	subdominant
31	<i>Platycheirus clypea- tus</i> (MEIG.)	16	4.76	subdominant	10	5.29	dominant
32	<i>Platycheirus fulviventris</i> (MACQ.)	0	0.00	-	1	0.53	accessory
33	<i>Platycheirus peltatus</i> (MEIG.)	6	1.79	subdominant	8	4.23	subdominant
34	<i>Platycheirus scutatus</i> (MEIG.)	3	0.89	accessory	2	1.06	accessory

35	<i>Cheilosia canicularis</i> (PANZ.)	1	0.30	accessory	0	0.00	-
36	<i>Cheilosia chrysocomma</i> (MEIG.)	3	0.89	accessory	0	0.00	-
37	<i>Cheilosia frontalis</i> LW.	2	0.60	accessory	0	0.00	-
38	<i>Cheilosia melanopa</i> (ZETT.)	1	0.30	accessory	0	0.00	-
39	<i>Cheilosia mutabilis</i> (FALL.)	2	0.60	accessory	0	0.00	-
40	<i>Cheilosia pagana</i> (MEIG.)	21	6.25	dominant	4	2.12	subdominant
41	<i>Cheilosia variabilis</i> (PANZ.)	2	0.60	accessory	0	0.00	-
42	<i>Cheilosia vulpina</i> (MEIG.)	2	0.60	accessory	0	0.00	-
43	<i>Volucella inanis</i> (L.)	4	1.19	subdominant	0	0.00	-
44	<i>Volucella pellucens</i> (L.)	1	0.30	accessory	0	0.00	-
45	<i>Volucella zonaria</i> (PODA)	2	0.60	accessory	0	0.00	-
46	<i>Eristalinus</i> ( <i>Lathyrrophthalmus</i> ) <i>aeneus</i> (SCOP.)	0	0.00	-	2	1.06	accessory
47	<i>Eristalis</i> ( <i>Eoseristalis</i> ) <i>pertinax</i> (SCOP.)	3	0.89	accessory	0	0.00	-
48	<i>Eristalis</i> ( <i>Eristalis</i> ) <i>tenax</i> (L.)	19	5.65	dominant	1	0.53	accessory
49	<i>Helophilus</i> ( <i>Anasimyia</i> ) <i>lineatus</i> (FABR.)	0	0.00	-	1	0.53	accessory
50	<i>Helophilus</i> ( <i>Helophilus</i> ) <i>parallelus</i> (HARR.)	4	1.19	subdominant	1	0.53	accessory
51	<i>Helophilus</i> ( <i>Helophilus</i> ) <i>pendulus</i> (L.)	4	1.19	subdominant	6	3.17	subdominant
52	<i>Myathropa florea</i> (L.)	3	0.89	accessory	0	0.00	-

53	<i>Syrpitta pipiens</i> (L.)	9	2.68	subdominant	10	5.29	dominant
54	<i>Tropidia fasciata</i> MEIG.	0	0.00	-	1	0.53	accessory
55	<i>Xylota segnis</i> (L.)	2	0.60	accessory	0	0.00	-
56	<i>Xylota sylvarum</i> (L.)	1	0.30	accessory	0	0.00	-
	Sum	337	100.00		188	100.00	

### CONCLUSIONS

The present paper sums up all the data on the occurrence of syrphids in saline habitats of the Polish coast. The number of hover fly species known from these areas is 56, this accounting for 15% of the syrphid species of Poland. 47 species were recorded on beaches, and 32 species in saline habitats of the coastal type. In both types of areas, a peak abundance of hover flies was in July. In this material, the species, which larvae are aphidophagous, were dominant. It is clear, that the seasonal changes in their abundance are closely connected with those of aphids.

Beaches and brackish coastal areas are predominated by these syrphids species, which occur in all terrestrial habitats of Poland, namely *Episyrphus balteatus*, *Syrphus vitripennis*, *Sphaerophoria scripta*, *Sphaerophoria menthastri*, *Platycheirus clypeatus* and *Eristalis tenax*. Moreover, the majority of these species represent eurytopic or polytopic species characterized by an extended ecological amplitude, whereas *Eristalis tenax*, *Episyrphus balteatus* and *Syrpitta pipiens* (also numerous in my collection) are partly synanthropized (BAŃKOWSKA 1981).

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