

THE FLY FAUNA (DIPTERA: CYCLORRAPHA) ON ANIMAL FARMS

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ABSTRACT: Scientific interest in flies stems from their great importance as vectors of infectious diseases such as dysentery, anthrax, eye infections, and others. The damage that they cause on animal (stock) farms is primarily veterinary, but they also have a negative economic effect because flies are the greatest molestants there. During their activity, they disturb animals, irritate the cattle, and lead to results in low production of milk, poor growth and other consequences.

Animal farms have a specific microclimate that suits the fly population. The presence of a nutritious substrate for oviposition, larval development, and adult meals, as well as negligence of farm buildings account for the superabundance of flies on farms. The larvae of most species found during present study are coprophagous, detritophagous or necrophagous while adults are hematophagous (*Stomoxys calcitrans* L.), molestants, and have a vector role.

Flies of six families and nine genera were identified on stock farms during the present study. The following families were represented: Muscidae, Calliphoridae, Tachinidae, Sarcophagidae and Drosophilidae.

KEY WORDS: Flies, stock farms, molestants, vectors

INTRODUCTION

Flies are a group of insects that belong to one of the most species-rich orders, the order Diptera, suborder Cyclorrapha. The most important vectors of infectious diseases are members of this group. This fact explains their importance for human, animal, and communal hygiene. The problem becomes more severe as the number of these insects increases and the damage is veterinary or medical. This aspect of fly noxiousness is very obvious on stock farms, where, beside their

vector role, they are the greatest molestants. While searching for a feeding place and a place for oviposition, flies disturb the animals, which leads to aggressive behavior, decrease of milk production, and poor growth and has a negative economic effect.

Besides this, the importance of flies stems from the fact that they often come in contact with pathogenic fungi, bacteria, and viruses, and therefore carry infectious diseases such as dysentery, anthrax, and different kinds of conjunctivitis. The vector role is especially significant in the case of bloodsucking flies such as *Stomoxys calcitrans*. For all the mentioned reasons, fly control is of great importance in animal production, but also in communal hygiene.

Stock farms are very suitable habitats for flies because the microclimate is convenient for quick and abundant development. Large amounts of substrate for oviposition and larval development, as well as nonpersistent control measures, lead to greater abundance of these pests.

MATERIAL AND METHODS

The purpose of the present work was to determine the spectrum of fly species that inhabit stock farms. The experiment was conducted on two farms belonging to the AIC «Bečej» Company from May to October of 2000. Yellow dishes placed on the ceiling filled with water and detergent were used as a visual attractant. Every two weeks flies were collected and identified. The Russian key of BEI-BIENKO (1970) was used most often, but the keys of CHINERY (1984) and BOROR *et al.* (1992) were also employed for identification.

FLY FAUNA IN OBSERVED BUILDINGS

Six families with nine genera and seven species from the suborder Cyclorhapha, section Shizophora, group Caliptera, were identified during this experiment. The collected samples belonged to the following categories:

- Family Muscidae
 - Gen. *Fannia*
 - Gen. *Stomoxys*
 - Species *Stomoxys calcitrans* L.
 - Gen. *Musca*
 - Species *Musca autumnalis* De Geer
- Family Calliphoridae
 - Gen. *Calliphora*
 - Species *Calliphora erithrocephala* Meig.
 - Gen. *Lucilia*
 - Species *Lucilia sericata* Meig.
- Family Sarcophagidae
 - Gen. *Brachicoma*
 - Species *Brachicoma devia* Fn.
 - Gen. *Phylloteles*
 - Species *Ph. pictipennis* Loew

Family Tachinidae

Gen. *Billaea*

Family Drosophilidae

Gen. *Gitona*

In the cases of the genera *Fannia*, *Phylloteles*, *Billaea* and *Gitona*, identification was done to the level of genera because characters of both sexes were required for further recognition (identification).

The main characters for identification of the mentioned families are wing nerves and development of the postscutellum.

Family Muscidae

Flies of this family have a reduced postscutellum, a very visible hypopleural bristles, and more than one sternopleural bristle. The arista of most species is hairy, but only in the upper part (BEI-BIENKO, 1970).

This taxon includes around 700 species with cosmopolitan distribution. Many of these flies are mechanical vectors of diseases such as fever, dysentery, anthrax, and conjunctivitis (HARWOOD, 1959). Adults are molestants, while larvae of most flies are detritophagous, coprophagous, or carnivorous.

Important distinctive characters in identification of genera are wing nerves, presence of hairs on the hind tibia, and shape of the arista. On their basis, we identified three genera: *Fannia*, *Stomoxys* and *Musca*.

The genus *Fannia* (Fig. 1) is a cosmopolitan genus. The flies are mostly small insects, but they are greater molestants than the house fly. Larvae of this genus are detritophagous and



Fig. 1. *Fannia* sp.

coprophagous, live in excrements and feed on decaying organic material. Since they have an affinity for feces, they are common inhabitants of stables and bathrooms. Females lay eggs on feces and spittings of humans. Some can cause myiasis in the urogenital and digestive systems of mammals. For all those reasons, they have an important role in the epidemiology of stomach infections. Adults have a specific twinkling type of flight. These flies are more slender than species of *Musca* and have yellow stripes on the abdomen, which are more noticeable in the male (HARWOOD, 1959).

The M_{1+2} nerve reaches the wing margin, and the first tergite is shorter than the second one.

The genus *Stomoxys*. All the adults of this group are bloodsucking, so they are the greatest molesters and vectors on farms. Both sexes are noxious and feed on blood of mammals, disturb and hurt cattle, make them aggressive, lead to reduction of growth and milk production, and cause health problems.

We registered one species: *S. calcitrans* L. (Fig. 2). These flies have wide dispersion and a short life cycle. This is the only member of the genus that occurs in the New World (HARWOOD, 1959). They have several generations per year. Females are more dangerous and aggressive because they take several meals during the day, but only from dawn till dusk. They have a fecundity of around 600 eggs, which they lay in wet materials such as hay, straw, or garbage. The pupa hibernates. The greatest numbers of larvae of *S. calcitrans* were found in surface layers of materials next to walls and columns, where they are protected from being tread upon.



Fig. 2. *Stomoxys calcitrans* L.

The hind tibia has dorsal hair, the propleuron also has numerous small hairs, the arista is hairy on the upper part, and the hypopleuron is with fine thin hairs. This species has short maxillary palps, only 1/3 of mentum length, while other species have longer ones. The main distinguishing character of this genus is, of course, the type of mouthparts, which are modified for stabbing and sucking, sclerified, and with a long proboscis, but no distinct labellum.

The genus *Musca* has a large number of cosmopolitan species, many of which are present in our climate. We identified one species: *M. autumnalis* De Geer (Fig. 3). This fly is a cattle molestant. Adults fly and land on the heads of the cattle. Like most of these flies, females have a big reproductive capacity, up to 2000 eggs, which they lay on decaying organic material. This species prefers horse and cow dung. Larvae emerge in a few hours and the life cycle is short, so they have many generations per year. The whole cycle lasts about 10 days, depending on the temperature.



Fig. 3. *Musca autumnalis* De Geer

In addition to annoying man and animals, this species plays a role in pathogen transmission. It has been shown to be capable of transmitting the bacterium *Moraxella bovis*, the pathogen of keratoconjunctivitis-“pink eye”(HARWOOD, 1959).

The proboscis is adapted for licking, with a short mentum, and a soft labellum. The thoracic squama lies close to scutellum. There are dorsal hairs on the hind tibia, and the medial nerve diverges at an angle. This species has a bare propleural sag, while *M. domestica* has a hairy one.

Family Calliphoridae

These are metallic blue or green flies that have no postscutellum, but do have hypopleural bristles (BORROR *et al.*, 1992). Three notopleural bristles are present, rarely two. The arista is hairy at the base, and the thorax and propleuron are hairy. The propleural sag, ahead of the front coxa is hairy. These flies have wide dispersion and great economic importance. The larvae are necrophagous and feed on decaying tissues and corpses, thereby contributing to removal of animal

carcasses. But some members of the family Calliphoridae can be parasites and feed on living tissue, in which case their importance increases. For example, *Cochliomya hominivorax* Coq. lays eggs on wounds and the larvae bore into the tissue, causing disorders (wound myases).

Two genera *Calliphora* and *Lucilia*, were determined on the basis of body color and the type of bristles on the squama.

The genus *Calliphora*. The thoracic squama has dark bristles, the arista has long hairs, and the body is metallic gray to gold. The larvae of one identified species, *C. erythrocephala* Meig. (syn. *C. vicina*) (Fig. 4) are necrophagous, but can also be found on wounds and in the digestive system of mammals. Females lay eggs on different materials of animal origin, whether raw or boiled. The basicostal part is brown (while in *C. vomitoria*, it is black).

Flies of the genus *Lucilia* are metallic green. They have a bare thoracic squama. On the observed farms, *L. sericata* Meig. was identified (Fig. 5). Adults are mostly found on animal corpses, where they lay eggs. They can cause great damage to animal production because females also lay eggs on wounds (ŠTRBAC, 2002). The middle tibia has one dorsal hair (while in *L. illustris*, it has two to three).

Family Tachinidae

This family is very species-rich with 1300 identified species around the world, most of them cosmopolitan. Many of them are useful because larvae are specific parasitoids of Lepidoptera, Hemiptera, and some Orthoptera. They are therefore used in biological control of pests.

The postscutellum in insects of this family is well developed, and the arista is bare. Hypopleural bristles are well developed, and propleural bristles are visible. The medial nerve diverges towards the edge of the wing (CHINERY, 1984).



Fig. 4. *Calliphora erythrocephala* Meig.



Fig. 5. *Lucilia sericata* Meig.

The genus *Billaea* (Fig. 6) was also identified at the investigated farms. This fly has black legs, and the tibia of the first pair is bare. Only marginal hairs are present on the abdomen. The body is thick.

Family Sarcophagidae

These flies are easily recognized from the gray patch on thorax. They never have metallic glow. The inner, bottom part of the wing squama is straight, more or less parallel with the end of



Fig. 6. *Billaea* sp.

the scutellum. M_{1+2} nerve bending forward distally. The medial cell is long. The arista is bare or with fine hairs.

Adult flies feed on nectar, fruit juices, sugar solutions, or honey dew. Larvae are necrophagous, but can also feed on live animal tissue. Some are parasitoids of invertebrates. Females of these lay eggs in nests of some bees or wasps. It is not unusual to find them on corpses, feces, or decaying organic material, where the larvae live. They can also be seen on wounds of animals and humans.

Two genera were identified: *Brachicoma* and *Phylloteles*. In the case of the first one, the cheeks are located low, at less than half of eye height. Hairs on the cheeks are very well expressed, and the third part of the antennae (the flagellum) is twice as long as second part (the pedicel). The second genus, *Phylloteles*, is distinguishable from the first on the basis of the mentioned characters.

In the literature, we found only one determined species in both genera: *Brachicoma devia* Fn. (Fig. 7) and *Phylloteles pictipennis* Loew (BEI-BIENKO, 1970). But for further identification, characters of both sexes are required.

Family Drosophilidae

Small yellowish insects that feed on decaying material or plant tissue belong to this family. Only a couple of species are parasitoids of caterpillars.

The mesonotum is hairless, the arista is extremely long, and the anal cell on the wings is enclosed.

We identified the genus *Gitona* (Fig. 8). The wings have a dark patch on the terminal part, while R_{4+5} and M_{1+2} are parallel. Ocelli are present.



Fig. 7. *Brachicoma devia* Fn.



Fig. 8. *Gitona* sp.

CONCLUSION

The larvae of all species identified in this study, are detritophagous, necrophagous or coprophagous, except for some that are parasitoids of other insects. It is therefore obvious why this spectrum of flies was collected on stock farms, where there are plenty of substrates for oviposition, larval development, and adult meals. All these factors, together with irregular control of flies, led to a superabundance of these molestants.

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ФАУНА МУВА (DIPTERA, CYCLORRAPHA) НА ЖИВОТИЊСКИМ ФАРМАМА

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Интересовање за овај рад потиче од улоге мува као вектора инфективних болести попут дизентерије, антракса, конјунктивитиса и других. Штете које оне узрокују на сточним фармама су су првенствено ветеринарског карактера, али имају и негативни економски утицај јер су муве молестанти на тим објектима. Својом активношћу ометају нормалне активности стоке, иритирају је, што доводи до агресивног понашања које резултује смањењем млечности крава, смањењем прираста и друго.

Сточне фарме представљају систем са специфичним микроклиматом који погодује развоју мува. Изобиље хранљивог супстрата за полагање јаја и исхрану ларви, али и исхрану имага (*Stomoxys calcitrans* L.), као и запушеност појединих објеката погодује развоју ових штеточина, али и увећању њихове бројности. Ларве већине врста су копрофагне, детритофагне или некрофагне, док одрасли, осим врсте *S. calcitrans* која је хематофагна, имају молестантску и векторску улогу.

Детерминисани су представници шест фамилија и девет родова и то из фамилија Muscidae, Calliphoridae, Sarcophagidae, Tachinidae и Drosophilidae.

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