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# PESTWEST 411

NEWSLETTER

DID YOU KNOW...

80% of all animals are insects.

When a housefly is flying its wings beat in the key of F.

Before a housefly is able to fly it jumps in the air using the output from its tergotrochanteral muscles.

## Drain flies, Scuttle flies and Fruit Flies The menace around the kitchens



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### More than just a nuisance?

Pest control practices are changing. In recent years there has been a significant change in the way many pest control operators control pests, in particular cockroaches and other crawling insects.

Before the advent of gel baits routine spraying of areas where cockroaches had been sited or even where cockroaches would be likely to be found was normal practice.

Gel baits have transformed cockroach control. They are effective, targeted and easy to use. They can be applied where the cockroaches are likely to be found and they have the additional advantage that if a cockroach dies through being poisoned by such gels and the body is eaten by other cockroaches, they die also.

This has clearly led to a reduction in the application of surface spray chemical insecticides.

When the surface spray compounds were applied for the control of cockroaches and other crawling insects they also had a significant controlling effect on the flying insects in the environment. Such treatments were particularly effective in the control of the immature stages, the eggs, larvae and pupae, of many fly species.

Amongst the fly species which were routinely controlled by such techniques were fruit flies, fungus gnats, owl midges, scuttle flies and lesser dung flies, collectively often referred to as drain flies.

### Disease carrying potential of small flies.

There has been increasing concern over the role played by fruit flies and the other so-called "drain flies", (scuttle flies, fungus gnats, owl midges, etc.) in the spread of pathogenic micro-organisms to humans.

The fruit fly, *Drosophila*, is a fly which is distributed world wide and, from the details of its life-cycle given below, it can be seen that it inhabits areas during its breeding cycle where bacteria, fungi and viruses are likely to be located.

Likewise the "drain" flies breeding habits are extremely similar to the fruit fly.

The fruit fly adults are small yellowish/brown flies with darkly striped abdomen. The prominent compound eyes are generally red in colour, although darker variants occur. The wings have 2 clear notches in the front border, which can clearly be seen with a hand lens.

The eggs are white and 0.5 - 1mm long. Each females lays between 400 and 900 eggs in batches of 15 - 25 at a time. The eggs hatch generally within 24 - 30 hours.

The larvae which emerge feed on the decaying organic material. The areas where such food can be found can be extremely varied ranging from large areas of accumulated rubbish to small collections of debris between the cracks of floor tiles, ceramic wall tiles or work surfaces. Even what appear to be insignificant accumulations of debris can sustain substantial populations of *Drosophila* since the dietary requirements of the larvae are extremely limited. A crack of around 1 mm in depth and a few millimetres long can have a sufficient quantity of organic matter in it to provide sufficient food for a significant number of larvae.

The larval lifespan is between 5 and 6 days. Pupation occurs out of the feeding medium and lasts between 2 and 5 days.

The life cycle is rapid in warm conditions with development from egg to adult taking less than two weeks.

The fruit fly is distributed Worldwide. and frequently



associated with human food preparation and storage areas. Additionally it is also often found in bars, hotels and clubs. It is the alcohol within these premises which attracts the flies.

These flies are a source of annoyance in many kitchens, restaurants etc. Attraction to alcohol and waste fruit means they are frequently found in such areas and can build up to very large numbers. These flies are, in general, harmless to man and do not bite but recently there is evidence that fruit flies can carry pathogenic bacteria, etc.. Outbreaks of infestation are often indicative of less than adequate hygiene or drainage problems.

Puparia of *Drosophila* species are frequently found in milk bottles, where they are so firmly stuck to the glass, they come through the washing process intact (though killed by it). Some puparial cases may float off into the milk when bottles are refilled.

One recent study implicating fruit flies in the spread of disease is summarised below.

The work was entitled the "Fate of *Escherichia coli* O157:H7 on fresh-cut apple tissue and its potential for transmission by fruit flies" and was carried out by a group of workers in the U.S.D.A. Laboratories in Beltsville, USA (Janisiewicz, et al., 1999).

Pathogenic *Escherichia coli* O157:H7, as well as non-pathogenic strains, was found to grow exponentially in wounds on Golden Delicious apple fruit. The exponential growth occurred over a longer time period on fruit inoculated with a lower concentration of the bacterium than on fruit inoculated with a higher concentration. The bacterium reached the maximum population supported in the wounds regardless of the initial inoculum concentrations.

Experiments on the transmission of *E. coli* by fruit flies, collected from a compost pile of decaying apples and peaches, were conducted with strain F-11775, a fluorescent transformant of non-pathogenic *E. coli* ATCC 11775. The fruit flies were easily contaminated externally and internally with *E. coli* F-11775 after contact with the bacterium source.



The flies transmitted this bacterium to uncontaminated apple wounds, resulting in a high incidence of contaminated wounds. Populations of the bacterium in apple wounds increased significantly during the first 48 h after transmission.

These laboratory based studies are of significant importance and they will form the basis of a field study to be carried out this summer where field populations of *Drosophila* will be sampled to ascertain the levels of bacterial populations they carry.

Owl midges or bathroom flies which belong to the family Psychodidae are other small flies which occupy the same sort of breeding areas as fruit flies. They breed in decaying organic matter and require high humidity for development. They also commonly occur on the biological filters of sewage works. Their continued presence in a domestic or industrial premises is indicative of drainage problems, or perhaps the presence of other damp residues.

Scuttle flies, family Phoridae, although not as common as owl midges or fruit flies have a similar life cycle. The adult flies are around 3 - 4 mm in length with a wingspan of 9 - 10 mm. The thorax of the flies is usually dark brown/tan in colour with a distinctive humped appearance.

Close examination of the wings with a hand lens is the best way to confirm and identification of these flies. The wings have no cross veins and apart from the two veins on the

leading margin of the wings, there are only four veins leading from the hindmost of the veins on the leading edge to the hind margin of the wing.

Each female fly lays approximately 40 eggs, one at a time over a period of around 12 hours, on decaying organic matter. The larvae will emerge from the egg after approximately 24 hrs and feed for between 8 and 16 days depending upon environmental factors.

It is often the case then for the larvae to crawl to a drier spot to pupate and adults to emerge after a few days. In ideal conditions the life cycle is complete in approximately 14 days but when conditions are not perfect, in cooler temperatures, it may take nearer 40 days.

As mentioned above these flies are found in association with moist decaying organic matter. They are often indicative of blocked or broken drainage systems. The adult flies have a characteristic habit of, instead of immediately taking wing when disturbed, scuttling in a fast run hence their name "scuttle flies".

### Conclusions

Because all these flies, the fruit flies, owl midges and scuttle flies, frequent unsanitary sites there is always the potential of these insects carrying disease-causing bacteria.

These bacteria could be spread onto food handling and serving sites within domestic kitchens, public houses, retail shops, bakeries and any such premises.

Recent studies carried out at the University of Birmingham, UK have highlighted the role of these "drain" flies in the possible spread of pathogenic bacteria.

### Further reading

Janisiewicz W.J., Conway W.S., Brown M.W., Sapers G.M., Fratamico P., Buchanan R.L. 1999. Fate of *Escherichia coli* O157:H7 on fresh-cut apple tissue and its potential for transmission by fruit flies. *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*, Vol.65, No.1, pp.1-5.

# Challenging Situations and Environments: *Sphaerocerid* Flies

**As pest management and environmental health professionals, we find ourselves in many challenging situations. Especially challenging pests are small filth flies. Whether a Fruit fly, Phorid fly, Moth fly, Cheese Skipper, Fungus gnat, or Sphaerocerid fly, one must possess a unique understanding of its biology and behavior to both mitigate and prevent population pressures in and around facilities.**

One of the more challenging species is the Sphaerocerid fly, aka; Lesser Dung fly. These flies are quite small, measuring approximately 1/8 of an inch in length. Their coloration is darker with a lesser robust structure than the Fruit fly. Adults have long, stiff bristles dorsally and the arista is several times longer than other antennal segments.

Taxonomically one can identify Sphaerocerid flies by the tarsi of the hind leg. Tarsi are the distal five segments of the leg, with the first one enlarged.

Sphaerocerid flies are classified within the large family Sphaeroceridae that contains more than 200 species in the United States and 2500 species globally. These flies have a predominantly scavenging larval feeding habit. Spatial niches inhabited are quite diverse. Larvae have been found in decaying vegetable matter, sewage, dung, dung beetle broods, seaweed, fungi, slime, carrion, and bromeliad cups (plants of the pineapple family). Marshes and ponds support literal clouds of these flies.

Typically breeding within animal scats and manure, these flies often infest poultry houses en masse. Infestation potentials exist within food processing facilities, bakeries, and restaurants. Interior locations of infestation include arenas of organic decay and resultant fermentation. Such sub-structure arenas include under kitchen components at the support-floor transition, floor drains, elevator pits, trash cans,

dumpsters and other sites combining nutrient compounds and available water.

It is important to understand that larvae are moisture substrate dependent. Such areas should be of focal importance during the inspection and investigation stage of the IPM discovery process.

Elimination of infestations is directly related to locating and physically removing all existing and potential breeding media. Both locating these sites and correct identification of the fly species are critical to the success of the mitigation and prevention of infestations.

Equally important is the cooperation of the facility operator whom is responsible for removing and cleaning of resource sites. Sanitation is also critical to prevent future infestations.

PestWest's Intelligent Pest Management will assure your success regardless of how challenging the environment in which you find a pest pressure. Environmentally responsible products should be used to achieve Biological Source Reduction (BSR) safely and quickly. Through using products that break down (digest) the organic debris that attract pests, such as built up material around and in a drain, pest problems can be dramatically reduced.

While there will always be a need for pesticides, techniques used to control pests must be environmentally responsible, taking into consideration the chemistry and the formulation of materials.

Through good inspection techniques, the use of high quality products and equipment, and the judicious use of pesticides where necessary, any impact on the environment is lessened. That is the very essence of Intelligent Pest Management and the greenest approach to pest control.



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### SMALL DUNG FLIES Sphaeroceridae

#### FEATURES

Small dark flies with short fat hind metatarsi.  
200 species in the us  
1/8 inch in length  
arista is several times longer than the antennae

#### CONTROL

PestWest units will attract these flies.

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