Identification of candidate biological control agents for filth flies

Due to the increasing ban on environmentally hazardous chemical insecticides there is a growing need for developing biological control methods for a larger array of pest insects. One example are filth flies, such as the common housefly *Musca domestica* and the stable fly *Stomoxys calcitrans*, that can reach high densities at livestock farms, where they cause harm and nuisance to the animals and people. The stable fly sucks blood from animals and the housefly is known as a vector of many diseases. For over 40 years biological control of stable flies has been practised and various companies exist worldwide that produce agents for controlling filth flies. Although there is a reasonably solid scientific basis for this industry, there are many open questions that need further investigation.

The number of species used as biocontrol agent for filth flies is very limited and it seems that all companies focus on the parasitoid wasp *Muscidifurax raptorellus* following an initial choice for this species. However, the species composition of filth fly populations may vary geographically, and so does the populations of their natural enemies. The Nagoya protocol prohibits releasing non-native species for biological control. Hence, a better picture is needed of the local pest species composition and their potential predators and parasitoids. This may lead to the identification of new candidate species as biocontrol agents and a better (local) matching between hosts and predators/parasitoids, which is needed to improve the efficiency of filth fly biocontrol programmes.

Multiple Master projects are available for in depth studies of potential predators and parasitoids of filth flies. We will set up cultures of these candidate biocontrol agents and measure their relevant life-history traits and foraging behaviour. We will then identify a number of promising candidate species and test their efficiency as biocontrol agents under laboratory conditions. These are not restricted to parasitoids, but can also include predatory flies (e.g. *Hydrotæa aenescens*) and beetles (e.g. Staphilinidae, Histeridae and Hydrophilidae) which may turn out be really valuable options.

We can take this further by testing various combinations of agents, to see whether they vary in control strategies, and whether they may act synergistically, or rather antagonistically. We can also try to mimic the natural conditions (manure pits, livestock stables) in more detail to test species in a more complex environment. Finally, we can do release experiments on farms and measure the efficiency of released parasitoids. The ultimate aim is to identify novel biocontrol species and design an integrated programme for filth fly biological control in Europe.

**Methods:** Field sampling, insect culturing, life history measurements, behavioural observations, biological control methodology

**Further reading:**

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**Daily supervisor:**  
**Expertise group:** Evolution, Genetics & Developmental Biology (EGDB)

**Type of project:**  
- ☑ Bioinformatics  
- ☑ Fieldwork  
- ☑ Laboratory  
- ☑ Theoretical  
- ☑ Marine Biology  
- ☑ Laboratory  
- ☑ Marine Biology  
- ☑ Laboratory  
- ☑ Marine Biology

**MSc program:**  
- ☑ Biology  
- ☑ Ecology and Evolution  
- ☑ Theoretical  
- ☑ Marine Biology  
- ☑ Behavioural and Cognitive Neurosciences

**ECTS:**  
- ☑ 30  
- ☑ 40  
- ☑ Dutch  
- ☑ English

**Start date:** Fall 2021  
**Location:** GELIFES - Linnaeusborg