MSc thesis/intership

Manipulating reproduction:
Effect of *Wolbachia* endosymbiont on sex determination

Group: Laboratory of Entomology
Thesis: 24-36 credits
Supervisor: Eveline Verhulst
Starting date: from now on, flexible

Description: Many arthropods, including a huge number of insects, are infected with endosymbionts, of which *Wolbachia* is the most common. *Wolbachia* is only transmitted to the next generation through the cytoplasm in the egg, and it has developed many strategies to optimize its transmission. In most cases this is achieved by reproductive manipulation of the host to ensure the maximum number of daughters is produced. As such, in many haplodiploid species *Wolbachia* causes feminization or asexual reproduction, but male killing or cytoplasmic incompatibilities are also observed, especially in diploid systems. In the case of feminization or asexual reproduction, the mechanism by which this is achieved is often not known. In most cases of asexual reproduction, *Wolbachia* is both responsible for the duplication of the genome set to maintain diploidy, as well as the feminization step. However it is unknown if these two steps happen at the same time or are evolved separately.

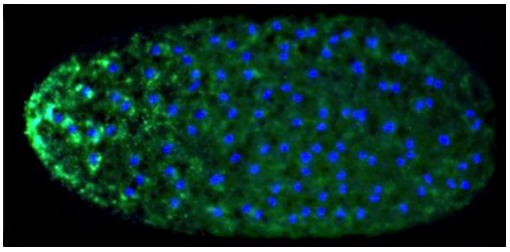

Figure 1 Newly laid insect embryo with Wolbachia (green) and nuclei (blue).

Muscidifurax uniraptor is parasitic wasp of fly pupae and infected Wolbachia causing a asexual reproduction. The shift to asexuality in *M. uniraptor* has resulted in the degeneration of sexual traits, making the *Wolbachia*-induced thelytoky irreversible. However, males can still be produced after curing *Wolbachia* infection with antibiotics. Using increasing levels of antibiotics concentration, the number of produced males increases as well. However, the ploidy of these males is unknown. To better understand the mechanism that *Wolbachia* employs to manipulate its hosts, we need to know if asexual reproduction caused by *Wolbachia* is a one-stage or two-stage manipulation.

Used skills: The experimental work will include breeding and observing parasitic wasps; quantitative-PCR to estimate Wolbachia density, flowcytometry to determine ploidy.

Requirements: Fundamental and Applied Biology of Insects (ENT-30806) and either Molecular and Evolutionary Ecology (GEN-20306) or Molecular Aspects of Biointeractions (PHP-30806).

More information, questions: eveline.verhulst@wur.nl