

## Virus discovery in mass reared insects

In insect production, viral infection can have a negative impact on production. In the European house cricket, *Acheta domesticus*, *Acheta domesticus* densovirus (AdDV) infections can result in a slow growth rate, decreased lifespan, reduced weight, reduced oviposition rate, and the infection can lead up to 100% mortality in a short period of time. In the greater wax moth, *Galleria mellonella*, *Galleria mellonella* densovirus (GmDV) infections can result in abnormal or absent of pupation and the infection can lead up to 100% mortality. In the Yellow mealworm, *Tenebrio molitor*, iridescent virus 29 (IIV-29) infections can result in hypertrophy and death (Maciel-Vergara and Ros, 2017).

However, in other insect-rearing systems like the Black Soldier Fly (BSF), *Hermetia illucens*, or the Mediterranean fruit fly (medfly), *Ceratitidis capitata* no viral infections have been recorded to have obvious negative impacts on the rearing.

In the Insect Doctors several projects have, utilized high-throughput sequencing has boosted the discovery of RNA viruses infecting insects to increase our knowledge of the virome. Hernández-Pelegrín et al (2022) used transcriptome mining, and expanded the medfly RNA virome to from 9 to 13 viruses. They found two novel positive ssRNA viruses and two novel dsRNA viruses. It is the first detection of dsRNA viruses in medfly. Pienaar et al (2022) also used available data and newly generated data on BSF genomes and transcriptome mining and discovered that BSFs bear traces of past interactions with several viral families and of present interactions with the exogenous HiTV1. We also discovered an iflavirus and a negevirus in tsetse fly colonies (*Glossina morsitans morsitans*) using RNA sequencing, and demonstrated using fluorescent probes (see Figure) that these viruses appear in numerous tissues, including salivary glands, milk glands and reproductive organs (Meki, Huditz et al (2022). In addition to that, a potentially novel densovirus was detected from metagenomic analyses of mass reared *T. molitor*. Ongoing effort include performing bioassay to determine if the virus poses as potential threat to the industry of mass insect rearing.

Virus discovery is the first step and then future research is currently ongoing to reveal how these novel discovered viruses interact with their hosts and whether they have any negative impact on the production.

References:

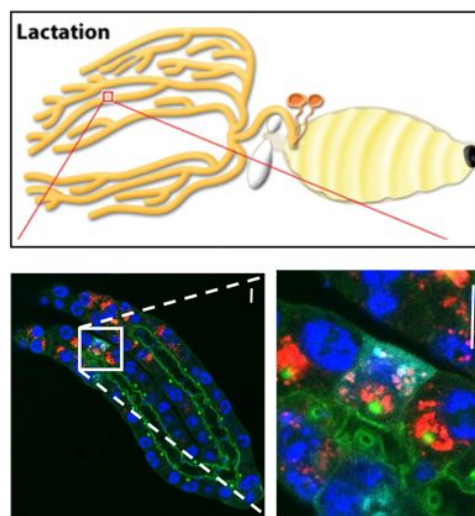
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Detection of Iflavirus (red) and Negevirus (cyan) in milk glands of tsetse flies using FISH Technology. Nuclei are stained in blue, F-actin in green. Image modified from *Viruses*. 2021; 13::2472. doi: 10.3390/v13122472

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