

PhD position: Black Soldier Fly *microbiomics*: Developing an *instant, high throughput and integrative* insect larvae model to decipher the interplay of factors controlling host-microbiota interactions in a context of biotransforming waste biomass into high value biochemicals.

The black soldier fly (BSF) larvae, *Hermetia illucens* L. (Diptera: Stratiomyidae), consumes a wide range of organic material and has a great potential to be used in agricultural waste management. Therefore, the development of BSF larvae as a sustainable tool to produce high value biochemicals such as proteins, lipids and bioactive substances is definitely promising. However, most of the research efforts are dedicated to the optimization of rearing conditions to increase the yield of the bioconversion process, whereas many microbiological aspects related to the insect health status and physiological performance, are still neglected.

To this respect, the intestinal microorganisms hosted by insects play a central role in maintaining their hosts in healthy conditions, either by producing antimicrobial molecules and/or by stimulating host immune defense. However, when the host encounters a physiological stress, such as malnutrition, the gut microbiota ecosystem equilibrium is broken, allowing opportunistic microbial strains to induce negative effects on the host, including physiological disturbances. During host development, a BSF larvae stressed microbiota might induce irreversible consequences on its ability to convert agri-food waste into valuable bio-agents such as animal feed ingredients, soil amendment for horticulture biofungicides.

This PhD project objective is to develop a BSF larvae experimental model in which we can control factors (nutrition, contaminants/toxins, xenobiotics, bacterial strains, viruses) that modulate host-microbiota functional interactions and measure the impact on microbiota ontogeny, and on host gene expression related to immune response and metabolism. To reach this goal, two *specific aims* are needed: to develop *i*) a protocol to produce routinely axenic BSF larvae *ii*) synthetic microbiota to conventionalize axenic BSF larvae. This PhD project will involve a transdisciplinary approach combining physiology, genomics and transcriptomics, horizontal gene transfer detection in bacterial strains, and epigenetics on developing host.

Qualifications and Requirements

- Relevant background in Molecular Evolution, Microbial Ecology, Molecular Biology, Biochemistry or Cell Biology with related laboratory experience.
- Basic molecular techniques such as bacterial culture, PCR, sequencing library preparation.
- Background in bioinformatics (phylogeny, population genetics, genomics, metagenomics), insect and bacteria manipulation will be considered as an asset.
- Excellent written/verbal communication skills and organizational skills.
- Demonstrated ability to work in a team environment.

Salary

21 000\$/year, 3 years

Application Procedures

To apply for this position, please forward a current CV, a covering letter and two support letters via e-mail to Nicolas DEROME nicolas.derome@bio.ulaval.ca by April 30, 2019.