

PhD #: ZEBRIGHT *micro*: Optimizing an *instant, high throughput* and *integrative* vertebrate model to decipher the interplay of factors controlling host-microbiota interactions along development at the interface of health/disease.

The intestinal microorganisms hosted by humans and other vertebrates play a central role in maintaining their hosts in healthy conditions. However, when the host encounters a physiological stress, the microbiota ecosystem equilibrium is broken, allowing opportunistic microbial strains to induce negative effects on the host, including physiological disturbances on neuroendocrine functions and epigenetics modifications. During host development, a stressed microbiota might induce irreversible consequences on host physiology, including brain development and neural functions, affecting mental health. The relationship between these complex systems are still poorly understood. To learn more about host-microbiota interactions and their impact on host physiology and development, *we must develop models and tools with which we can accurately control the variables, relevant to the environment, in a laboratory setting.*

This PhD project objective is to develop a fish experimental model in which we can control factors (nutrition, contaminants/toxins, xenobiotics, bacterial strains, phages, viruses) that modulate host-microbiota functional interactions and measure the impact on the microbiota evolution, host gene expression, epigenetic patterns and brain function.. To reach this goal, two **specific aims** are needed: to develop **i)** a protocol to produce routinely axenic larvae of zebrafish (*Danio rerio*), **ii)** synthetic microbiota (5 to 10 strains) to conventionalize axenic zebrafish larvae. This PhD project will involve a transdisciplinary approach combining physiology, bacterial genomics and transcriptomics analyses of horizontal gene transfer in bacterial strains, and epigenetics analyses on developing host. Also, the PhD candidate will have the invaluable opportunity to closely interact with sister projects focusing on optogenetics control and monitoring of gut microbiota, optogenetics monitoring of neural function.

Qualifications and Requirements

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

Salary

20 000\$/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 **August 31, 2019**.

Nicolas Derome, PhD

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