

- Presentation sheet :

Laboratoire Microorganismes : Génome et Environnement, UMR 6023 CNRS-Université Clermont Auvergne (D. Debroas)

PhD supervisor : Frédéric Delbac (Pr UCA), co-supervisor Marie Diogon (MCU UCA)
frederic.delbac@uca.fr; marie.diogon@uca.fr

Impact of the co-exposure of honeybees to SDHI fungicides targeting the respiratory chain and to the intestinal parasite *Nosema ceranae*

High mortality rates have been reported in honey bee colonies for several decades. Their origin is considered to be multifactorial, with a strong emphasis on both pathogens and pesticides, including insecticides, fungicides and herbicides. One of the fungicides frequently detected in beehive matrices is boscalid, a molecule belonging to the SDHI (Succinate Dehydrogenase Inhibitors) family, some inhibitors of the respiratory chain. The aim of the project is to clarify the toxicity of different SDHIs in bees infected or not with the intestinal parasite *Nosema ceranae*. We will analyze the impact of these stressors alone or in combination on bee survival, oxidative balance and energy metabolism. The transcriptional response at the gut level will be measured by RNAseq sequencing and quantitative PCR (qPCR) approaches. RNA interference (RNAi) approaches will also be considered. Finally, the impact of these stressors on microbial communities in the midgut will be assessed by high throughput sequencing and qPCR. These studies will be carried out in laboratory conditions on caged bees and in semi-field conditions using bee colonies maintained under tunnels. The ANR program "SoEcoHealth" 2021-2024 will support this study.

Paris et al. (2020) Honeybee gut microbiota dysbiosis in pesticide/parasite co-exposures is mainly induced by *Nosema ceranae*. *J Inv Pathol* 172:107348

Paris et al. (2018) Effects of the gut parasite *Nosema ceranae* on honey bee physiology and behavior. *Cur Opin Insect Sci*, 26:149-154.