

Title of the internship: Decrypting phenotypical and ecophysiological consequences of short-term temporal variations and repeated stress exposures on *Drosophila suzukii* development and thermotolerance.

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Summary (up to 300 words) :

The Spotted Wing *Drosophila* (SWD), *Drosophila suzukii*, is an invasive fruit pest. Temperature is the main driver of SWD distribution & seasonal phenology. Regarding SWD thermal ecology, there are still many knowledge gaps that hamper the accurate prediction of SWD field population dynamics. For instance, demographic and species distribution models for SWD are based parameters from constant temperatures in laboratory but they appear to be poor predictors. In nature, the environment fluctuates on temporal scales ranging from hours to days or seasons and there is an increasing awareness that performance of small insects under fluctuating regimes strikingly differs from constant regimes. In fact, rapidly fluctuating temperatures allow development and survival under conditions that otherwise would be considered as lethal. Over longer time scales, insects may be repeatedly exposed to thermal stress and these repeated exposures can be detrimental, or instead, they may allow an acclimation process. The goal of the internship is to decrypt the phenotypical and ecophysiological consequences of short-term temporal variations and repeated stress exposures to better understand and predict SWD thermotolerance. To assess the effects of ecologically-relevant rapid thermal changes, we will expose SWD to natural thermal variations in cages placed outside in experimental gardens in winter and spring. To correlate developmental rates with natural thermoperiods, development of each stage will be assessed. To assess how thermotolerance rapidly changes outside, insects will be sampled from cages and then scored at different intervals: from hours to days. To assess relevant biomarkers of the phenotypic changes (i.e. thermotolerance shifts), we will monitor i) energetic, ii) metabolomic and iii) lipidomic changes in subsamples of SWD flies.

Other informations :

Insertion within an ongoing research project (yes/no) : yes

If yes, please provide the information : **ANR Drothermal** : <https://www.drothermal.cnrs.fr/>

Publications on the field of research (up to 3) :

Colinet, H., Sinclair, B.J., Vernon, P., Renault, D. 2015. Insects in Fluctuating Thermal Environments. Annual Review of Entomology, 60: 123-140.

Colinet, H., Rinehart, J., Yocum, G., Greenlee, K. 2018. Mechanisms underpinning the beneficial effects of fluctuating thermal regimes in insect cold tolerance. Journal of Experimental Biology. 221, jeb164806.

Enriquez T., **Colinet, H.** 2019. Cold acclimation triggers lipidomic and metabolic adjustments in the spotted wing *Drosophila suzukii* (Matsumura). American Journal of Physiology-Regulatory, Integrative and Comparative Physiology. 316: R751–R763.

