Evolutionary arms race in an insect-fungus interference competition

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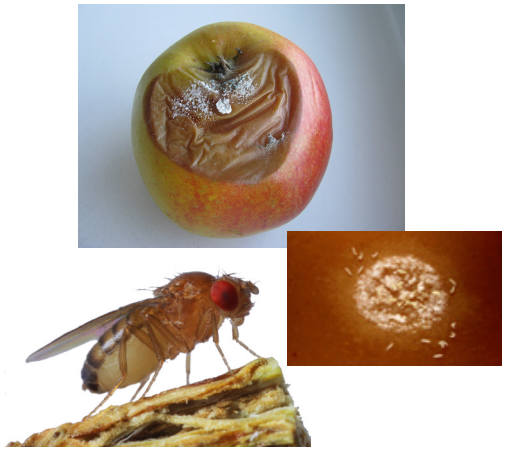

While mobile organisms can get embroiled in physical conflicts to defend their territory, resources and themselves, sessile organisms do not have these opportunities, nor can they run away. However, by no means this implies that sessile organisms such as fungi are defenceless victims to their competitors, parasites and predators. Filamentous fungi produce a vast variety of noxious substances that they use as a chemical defence against other microbes ('antibiotics') yet also against higher organisms like insects ('mycotoxins'). Saprotroph insects like *Drosophila melanogaster* utilise decaying organic material as breeding substrate; here they encounter a range of toxin producing microbes. In the course of evolutionary arms race, insects acquired highly sophisticated detoxification mechanisms and behavioural adaptations to avoid and cope with the detrimental impacts of toxic fungal secondary metabolites.

In this project we are studying the chemical warfare of filamentous fungi and *D. melanogaster*. We investigate the reciprocal consequences of confrontation between these two organisms and are particularly interested in the counter-defence mechanisms that *D. melanogaster* evolved. We further study resistances in *D. melanogaster* towards insecticides, based on their potentially common evolutionary origin.To disentangle the involved mechanisms we employ divers approaches, ranging from behavioural observation, viability tests, screening for developmental deformities, experimental evolution, whole shotgun transcriptomics, and comparative genomics to study the evolutionary dynamics of involved gene family members.

Students that are interested in the evolutionary ecological dynamics of insect-fungus interaction and motivated to develop their MSc-project along our line of research are welcome to discuss current project opportunities with us.

Methods: behavioural observation, viability tests, experimental evolution, transcriptomics, comparative genomics

Literature: Trienens M., Kraaijeveld K., Wertheim B., 2017. Defensive repertoire of *Drosophila* larvae in response to toxic fungi. Molecular Ecology 26:5043–5057.

Trienens M., Rohlfs M., 2011. Experimental evolution of defense against a competitive mold confers reduced sensitivity to fungal toxins but no increased resistance in *Drosophila* larvae. BMC Evolutionary Biology 11:206.

Starting date: open