Microbial warfare between competing Drosophila species shapes niche partition

Antoine Rombaut*†[1], Qitout Kenza[1], Robin Guilhot[1], Patricia Gibert[2], and Simon Fellous‡[1]

[1]Centre de Biologie pour la Gestion des Populations (CBGP) – Institut national de la recherche agronomique (INRA), Institut National de la Recherche Agronomique - INRA – 755 avenue du Campus Agropolis, 34988 Montferrier sur Lez, France

[2]Laboratoire de Biométrie et Biologie Evolutive – Université Claude Bernard Lyon 1, Institut National de Recherche en Informatique et en Automatique, Centre National de la Recherche Scientifique : UMR5558 – France

Abstract

Deciphering the mechanisms of niche separation between species is a central question in ecology. However, the influence of symbiotic microbes on competitive interactions remains seldom studied. Microbe-mediated niche partitioning may be particularly important in Drosophilid flies, which larvae rely on exo-symbiotic microbes for fruit consumption. We previously demonstrated how the invasive pest *Drosophila suzukii* facilitates fruit infestation by *D. melanogaster* through the wounding of fruits by ovipositing females, and the subsequent cultivation of bacteria and yeast by offspring larvae.

We now demonstrate that ovipositing *D. suzukii* females avoid fruits previously exposed to *D. melanogaster*. Using axenic strains, we further show that microbes carried by *D. melanogaster* are responsible for this repellency. Additional experiments reveal that the avoidance of *D. melanogaster* by *D. suzukii* relies on short-scale taste perception. Comparison among *D. suzukii* populations indicates the behavior is present in populations from both the native and invasive ranges but depends on previous fly experience. On-going experiments test the hypothesis that *D. suzukii* females avoid fruits infested by *D. melanogaster* because its symbionts would create conditions unfavorable for *D. suzukii* progeny.

Our study highlights how symbiotic microbes may determine interspecific interactions and niche partitioning through facilitation and competition ; the results further suggest natural repellents may provide innovative and sustainable biocontrol solutions against agricultural pests.

*Speaker

†Corresponding author: antoine.rombaut@protonmail.com

‡Corresponding author: simon.fellous@inra.fr