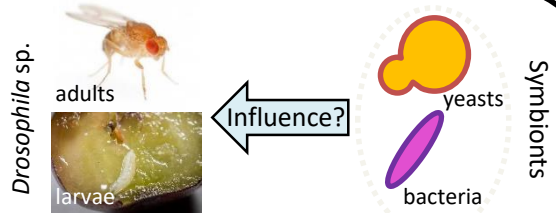


# How to partition the effects of symbionts on *Drosophila* resource acquisition and developmental plasticity and why it matters

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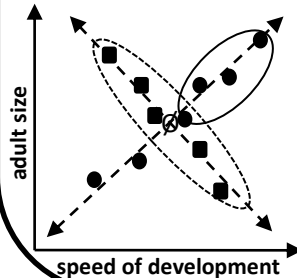
CONTEXT AND FRAMEWORK



- Resource ACQUISITION (↑↓ Fly food quality/quantity) [1]
- Resource ALLOCATION (Fly physiology) [2]

How symbionts affect fly traits can influence their (co)evolution!

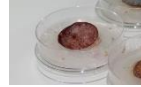
We used the trade-off size/speed of development to decipher symbiont effects on fly resource acquisition and allocation:



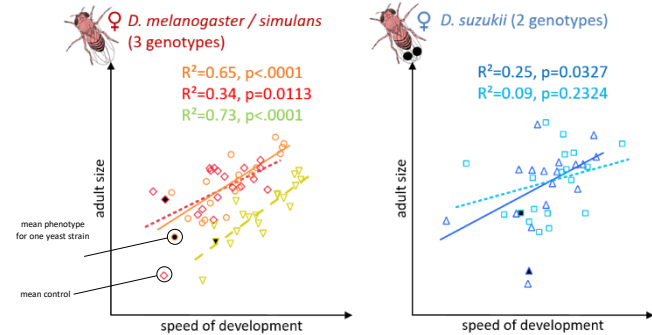
- Phenotypes induced by symbionts affecting mostly resource allocation
- " " mostly resource acquisition
- Phenotypes w/o focal symbionts
- Better fly fitness in all environments → evolved dependence
- Fitness depends on the environment → conditional mutualism

ILLUSTRATION

Measurement of fly phenotypes induced by 18 yeasts in field realistic conditions (halved grape berry, presence of bacteria)



## A. Simultaneous effects of yeast on the two traits



### ● *D. melanogaster/simulans*

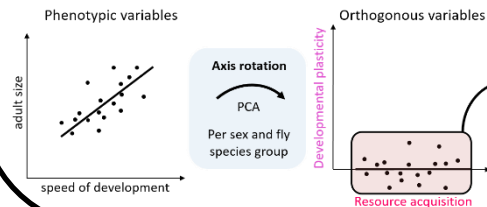
Positive relationships  
→ Yeasts mostly affect resource acquisition.

### ● *D. suzukii*

Poor relationships  
→ Yeasts vary both on their effects on resource acquisition and developmental plasticity (i.e. resource allocation).

How to quantify these variations?

## B. Construction of new composites variables



How yeast features do determine their effects on fly phenotypes?

One result:

Yeast density is not correlated with fly resource acquisition... Role of synthesis of nutrients? bioaccumulation? growth rate?

Future prospects:

- Framework: shape of the trade-off, dimensionality
- Agronomy: selection of microbial strains (e.g. SIT *D. suzukii*)

REFERENCES: [1] Bellutti, N. et al. 2018. Dietary yeast affects preference and performance in *Drosophila suzukii*. *Journal of Pest Science* 91(2): 651-660; [2] Shin, S.C. et al. 2011. *Drosophila* microbiome modulates host developmental and metabolic homeostasis via insulin signaling. *Science* 334(6056): 670-674.

Find a complete version of our work on [bioRxiv](https://doi.org/10.1101/2020.04.27.064667) (posted April 29, 2020)  
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