

The role of microbes in life history of social insects

In *Drosophila melanogaster* microbes influence life history traits like growth, fecundity and longevity through specific interaction with the TOR/Ins network (Storelli et al., 2011; Shin et al., 2011; Téfrit and Leulier, 2017). It does not seem far fetched that microbes could play a similar role in social insects.

If microbes played a similar role in life history of social insects, we would expect that the abundance of certain microbes or microbial gene sets correlates with life history. The Research Unit would be an ideal framework to test for correlations between microbes and life history across species and castes. For bacteria this can be done by 16S rRNA gene community profiling, which is a standard working procedure in my lab and relatively cheap (~1200 Euros for 400 samples). Additionally, shotgun sequencing data from different species and castes could provide information on microbial community composition and function.

You might already be in possession of relevant data and/or samples that could be analyzed from a microbial perspective. Please let me know if you have such data and are interested in a collaborative project. Relevant data would be:

- shotgun DNA sequencing data
- RNA-seq data, especially data that was generated without poly A enrichment

Relevant samples would be:

- samples collected across ages and/or castes

In order to test whether different microbial communities are a cause and not just a consequence of life history, candidate microbes will be isolated, mono-associated with *D. melanogaster*, and life history traits will be measured (development time, fecundity, longevity). Sterile and gnotobiotic techniques for mono-association are established in my lab. Alternatively, your favorite organism can be exposed to candidate microbes following antibiotic treatment.

If I receive positive feedback, I will write a proposal for the second round of funding of the Research Unit.

References

Shin SC, Kim S-H, You H, Kim B, Kim AC, Lee K-A, *et al.* (2011). *Drosophila* Microbiome Modulates Host Developmental and Metabolic Homeostasis via Insulin Signaling. *Science* **334**: 670–674.

Storelli G, Defaye A, Erkosar B, Hols P, Royet J, Leulier F. (2011). *Lactobacillus plantarum* Promotes *Drosophila* Systemic Growth by Modulating Hormonal Signals through TOR-Dependent Nutrient Sensing. *Cell Metab* **14**: 403–414.

Téfrit MA, Leulier F. (2017). *Lactobacillus plantarum* favors the early emergence of fit and fertile adult *Drosophila* upon chronic undernutrition. *J Exp Biol* jeb.151522.