

Exploring the place of the facultative symbiont *Serratia symbiotica* in ant-aphid mutualistic relationships

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BAPOA PARIS 2015

BIOLOGICAL CONTEXT

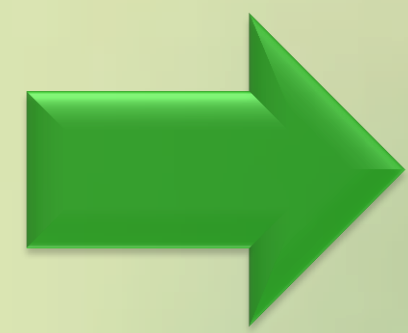
Symbiotic associations with bacteria are ubiquitous in insects and are regarded as a source of evolutionary innovations to colonize a wide variety of environments. Thanks to their well-studied association with a wide range of symbiotic bacteria, aphids represent a valuable model to study symbiotic relationships in insects. *Serratia symbiotica* is one of the most frequent facultative symbiont of aphids and includes endosymbiotic members as well as free-living strains. Despite the fact that biological roles of endosymbiotic *S. symbiotica* have been clarified (e.g. protection against heat shock and parasitoids), the role of the free-living strains remains unknown. *S. symbiotica* has already been detected in **ants** and recent studies have shown that the prevalence of this symbiont is much higher in aphid species that are tended by ants. Moreover, some bacteria are known to enhance ant-aphid relationships by releasing semiochemicals. Here, we present a strategy to explore the potential role of *S. symbiotica* in **ant-aphid mutualistic relationships**.



Axis 1 : Prevalence of *S. symbiotica* in an ant-aphid mutualistic relationship

- Is the prevalence of *S. symbiotica* higher in ants associated aphids vs non-associated aphids?
- Is *S. symbiotica* present in ants?

Samples
collection across
Belgium



1. DNA extraction
2. Diagnostic PCR
3. Sequencing



1. Determination of the *S. symbiotica* prevalence depending on ants presence.
2. Detection of *S. symbiotica* in ants.

Axis 2 : Localization of *S. symbiotica* and phylogeny

What kind of *S. symbiotica* (endosymbiotic vs free-living)? – Localization?

→ For those samples in which *S. symbiotica* is found, further experiments will be carried on:

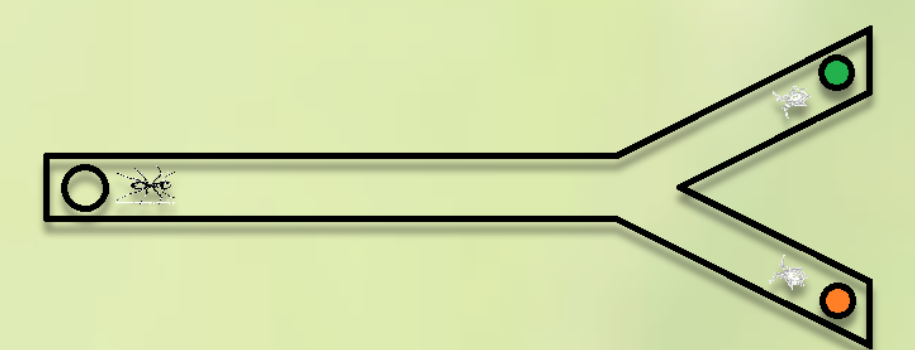
- Phylogeny of *S. symbiotica*.
- Fluorescence *in situ* Hybridization to determine the localization of *S. symbiotica*.
- Discrimination between free-living & endosymbiotic bacteria (diagnostic PCR).



Axis 3 : Determination of the *S. symbiotica* ability to enhance species association in ant-aphid mutualistic relationships

May *S. symbiotica* enhance species association in ant-aphid mutualistic relationships?

→ Olfactometry analysis will be carried on: ants will have to choose between aphids artificially inoculated with *S. symbiotica* at the gut level and aphids free from the symbiont.



→ These three axes should contribute to understand the potential role of *S. symbiotica* in the establishment of ant-aphid mutualistic relationships, as well as the prevalence of endosymbiotic vs free-living strains of *S. symbiotica* in nature.