

An Ecological Cost associated with Protective Symbionts of the Pea Aphid



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Context

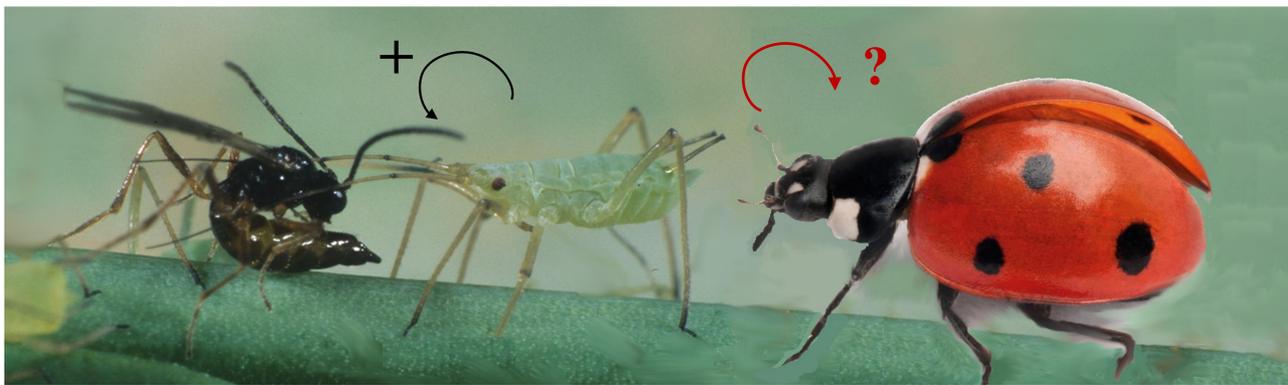
Symbiotic relationships usually confer **advantages** to the host individual. Recent studies however revealed **symbiosis-associated costs**, and especially direct physiological costs. But what about the indirect costs of the symbiosis, such as ecological costs (i.e. fitness losses expressed in other inter-specific interactions)?



Question

The pea aphid *Acyrtosiphon pisum* receives **strong protection** against its main enemy, the **parasitoid** *Aphidius ervi* from the defensive symbiont *Hamiltonella defensa* alone or in a common association with another bacteria, PAXS.

The **ecological cost** of symbiont-conferred resistance to parasitism in aphids was investigated in case of **predation**.

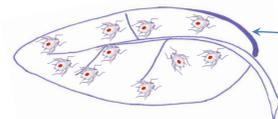


Please, have a look at the the **dropping aphids** with the flip-book !



Material & Method

Eleven green clones of the pea aphid originated from alfalfa were selected according to their symbiotic status.



Adalia bipunctata, 4th larval instar

x 10 repetitions per clone

- Without facultative symbiont



x 4 clones

- With *Hamiltonella defensa*



x 3 clones

- With both *H. defensa* and PAXS



x 4 clones

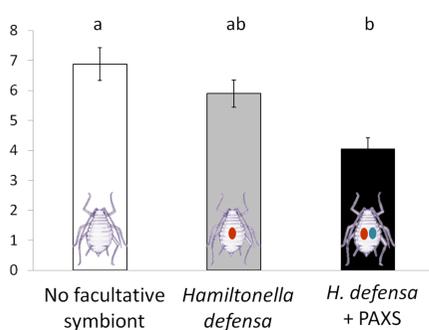
A ladybird larva was introduced in a 10 aphids-colony. Aphid defensive behaviours were recorded during 1 hour and the final predation rate estimated.



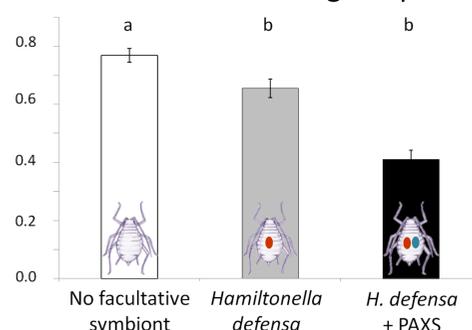
Results

Significance according to GLMMs

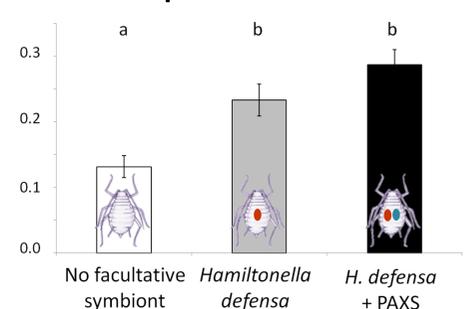
Number of **evasive events**



Rate of **attack abortion** owing to aphid's defence



Overall **predation rate**



Aphids hosting defensive symbionts show reduced behavioural responses ...

... leading to an ecological cost of symbiosis.



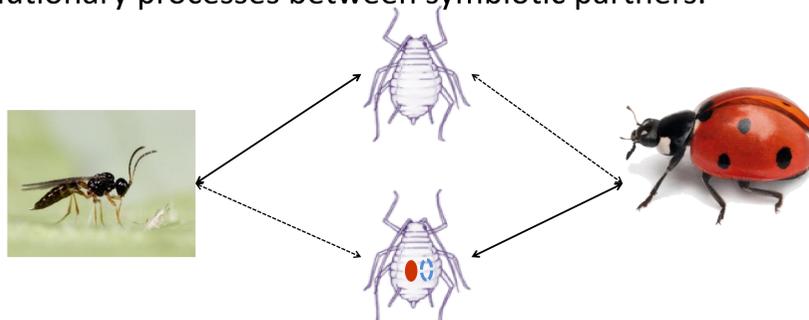
Discussion and Perspectives

Aphid populations would be favoured in case of parasitism if they harbour protective symbionts and in case of predation if they do not. **The prevalence of protective bacteria** would therefore be dependant upon the nature of **the selective pressures exerted by natural enemies**. This underlined ecological cost might affect the **population dynamics** of symbionts, aphids and enemies and the co-evolutionary processes between symbiotic partners.



Find more information at :

<http://goo.gl/lbjd7W>



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