Do bacterial symbionts influence the foraging behaviour of their insect hosts?

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Abstract

The majority of eukaryote species are involved in durable and intimate associations with symbiotic microorganisms. Microbial endosymbionts are able to modify the ecology and the evolution of their host by inducing various effects on its phenotype. More recently, an increase body of evidence on different animal species indicates that microbial symbionts can also influence the behaviours of their hosts. Such effects would have profound consequences on organism's fitness when affecting behaviours associated with resources foraging.
In Behavioural Ecology, the Optimal Foraging Theory has been developed by considering individuals as 'unique' organisms. As almost all animal individuals harbour symbiotic microbes, it is important to study how those symbionts influence the host foraging behaviours and their optimality. For this purpose, we investigate the impact of bacterial symbiosis on nutritional resources foraging in the pea aphid (*Acyrthosiphon pisum*). This insect hosting simple and easily manipulable symbiotic associations, it is a good biological model to study the effects of symbionts on foraging behaviours.
By considering aphid lines differing only by their bacterial secondary symbionts consortium, three experiments were conducted. Depending on environmental conditions, aphids can produce two different morphs in their offspring: winged or wingless individuals. We first tested whether symbionts have an impact on dispersal capacity by comparing the proportion of winged offspring in lines with or without symbionts. Secondly, we studied symbiont's influence on the time needed to reach a nutritional resource (a plant) in different challenging environment. Finally, we investigated whether symbionts affected their plant preference and acceptance in a choice test experiment by using different aphid lineages with distinct host plant preferences. All the results obtained will be discussed in the light of the 'historical' Optimal Foraging Theory.

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