



## Roles of salivary proteins in bacteria-mediated reproductive manipulation in spider mites\*

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Arthropods host a diverse range of microbes. Some symbiotic bacteria are important in influencing the performance of arthropods, especially when facing biotic and abiotic challenges. The symbiont *Wolbachia* is a genus of intracellular bacteria (Rickettsiaceae) found in about 40% of terrestrial arthropods. It causes a variety of reproductive alterations in arthropod hosts, such as inducing parthenogenesis, killing males, feminizing genetic males, and inducing cytoplasmic incompatibility (CI), and is well known as a reproductive manipulator in arthropods. Recent studies show that *Wolbachia* can also affect host fitness by mediating interactions between plant and herbivores. But it remains unclear whether saliva proteins are involved in this process. The two-spotted spider mite (*Tetranychus urticae*), a notorious cosmopolitan agricultural pest, harbors *Wolbachia* (Xie *et al.*, 2006). In this study, we explored the effects of *Wolbachia* on biological performance of *T. urticae* (Bing *et al.*, 2022). We showed that the *Wolbachia*-infected *T. urticae* decreased the number of deposited eggs but increased the egg hatching rate compared with *Wolbachia*-uninfected mites. With transcriptomic analysis data, we further demonstrated that *Wolbachia* infection upregulated the gene expression levels of many *T. urticae* salivary proteins, which include a cluster of *Tetranychidae*-specific, functionally uncharacterized SHOT1s (secreted host-responsive proteins of Tetranychidae). These *SHOT1* genes were highly enriched in the proterosomes (Jonckheere *et al.*, 2018) and were expressed more in the feeding stages (nymphs and adults) of mites than in eggs. RNAi experiments showed that knocking down *SHOT1s* could significantly decrease *Wolbachia* titer, increase the number of deposited eggs and decrease the egg hatching rate. Altogether, our results suggest that host salivary proteins are related to *Wolbachia*-mediated manipulations of host reproduction.

**Keywords:** *Tetranychus urticae*, *Wolbachia*, symbiont, spider mite, SHOT1, salivary protein

### References

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