Widespread presence of Wolbachia in an Alpine population of the viviparous leaf beetle Oreina cacaliae (Coleoptera: Chrysomelidae)

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Abstract
Oreina cacaliae (Coleoptera: Chrysomelidae) is a rare example of viviparous insect, able to feed on toxic plants and sequester toxic compounds. Here we present the results of a study on the microbiota associated with O. cacaliae, based on 16S rRNA bacterial gene sequencing. Wolbachia resulted as the dominant bacterium, both in males (100%) and in females (91.9%). Based on multilocus sequence typing, the detected Wolbachia was described as a new sequence type (Wolbachia Ocac_A_wVD0). Phylogenetic analyses assigned Wolbachia Ocac_A_wVD0 to supergroup-A. In situ hybridization and electron microscopy confirmed the presence of Wolbachia within O. cacaliae oocytes, indicating its transovarial transmission. PCR specific for Wolbachia was performed on representatives of six species of Oreina; the presence/absence of Wolbachia was then mapped on a cladogram representing the phylogeny of the insect host. Finally, since viviparous species of Oreina were either infected or non-infected by Wolbachia, we cannot derive any conclusion about the possibility that this symbiont played some role in the evolution of viviparity.