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Title:

Molecular detection of (E)-beta-farnesene by aphids and their predators is mediated by a highly conserved Odorant Binding Protein

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Introduction: The sesquiterpene (E)-beta-farnesene is the principal component of the alarm pheromone of many aphid species. In addition, it serves as kairomone for several aphid natural enemies such as the ladybird *Harmonia axyridis* and the hoverfly *Episyrphus balteatus*, which use it to localize their prey and oviposition sites, respectively. In the context of the development of more efficient and environmentally friendly pest controlling strategies, insect olfactory systems are often exploited or even manipulated and therefore there is considerable interest in a better understanding of the olfactory mechanism of aphids and their natural enemies.

Methods: In this study, we cloned a gene coding for a putative odorant binding protein named OBP3, from the grain aphid *Sitobion avenae* and the two aphid predators *H. axyridis* and *E. balteatus*. Ligand-binding experiments were performed using recombinant proteins, in an effort to investigate the specificity to the sesquiterpene (E)-beta-farnesene and ecologically relevant compounds.

Results: Sequences reported here share more than 90% identity at the amino acid level, which is unusual among insect OBPs. Binding assay experiments showed that at pH 7, EBF is the only chemical compound bound.

Discussion: We report that the recognition of EBF in aphids and in the aphid predators *H. axyridis* and *E. balteatus* is mediated by a highly conserved OBP (named OBP3) capable to specifically recognize the principal component of the aphid alarm pheromone. To our knowledge this is the first evidence that insect species belonging to distinct Orders display the same discriminatory recognition strategy for a common semiochemical.