MOLECULAR STUDY OF APHID FARNESYL DIPHOSPHATE SYNTHASE: IMPLICATIONS FOR THE DEVELOPMENT OF BIORATIONAL INSECTICIDES TARGETING JUVENILE HORMONE AND E-ß-FARNESENE BIOSYNTHESIS

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Aphids are some of the most destructive agricultural pests known. They are responsible of several types of damage on crop plants due to their sap-sucking activities but also as virus vectors. Chemical control of certain aphid species is becoming extremely difficult due to resistance to insecticides. In this context, disruption of one or more steps in juvenile hormone (JH) biosynthesis seems to be a promising method for developing new pest control agents.

In insects, farnesyl diphosphate synthase (FPPS) is a key enzyme involved in the biosynthetic pathway of juvenile hormone. This hormone plays an important role in maintaining juvenile characters during the development of insects but also in maturation of the reproductive system. In some aphid species, FPPS generates the immediate precursor of E-β-farnesene (EBF), a major component of the alarm pheromone. The study of aphid FPPS will allow us to better understand these two important processes of aphid biology and represents a promising target for the development of new biorational insecticides with a reduced impact on non-target organisms.

We cloned and sequenced FPPS cDNAs from four aphid species (*Aphis fabae*, *Acyrthosiphon pisum*, *Megoura viciae* and *Myzus persicae*). A comparison of the aphid sequences with those of all other known FPPSs – cloned from various organisms ranging from *Drosophila melanogaster* to *Homo sapiens* – revealed a percentage of similarity around 50%. Our results also indicated that the aphid, *Myzus persicae*, contains two genes encoding FPPS (MpFPPS1 and MpFPPS2) and sharing a high level of sequence similarity. For the gene MpFPPS1, we isolated two different cDNAs, which vary by the presence or absence, in the N-terminal extension, of a mitochondrial targeting motif.