

Targeting insects using novel inhibitors of development and physiology

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Project Number: VG11000

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Final Report

Targeting insects using novel inhibitors of development and physiology

HAL Project No: VG11000

(25 June 2013)

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This final report provides all the experimental procedures and results obtained from the HAL-funded project VG11000 “*Targeting insects using novel inhibitors of development and physiology*”.

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Media Summary

A group of small ribonucleic acids (RNAs), known as microRNAs (miRNAs), have been found to play significant roles in the biology of all multicellular organisms, including insects. They are naturally produced in animal and plant cells and control key biological processes such as embryogenesis, differentiation, development, immunity, etc by regulating expression of various genes. Disruptions in miRNA production or activities have been shown to lead to abnormal development and cancer. In this project, we aimed to explore the possibility of disrupting the function of miRNAs in key insect pests, the cotton bollworm *Helicoverpa armigera* and the diamondback moth *Plutella xylostella*, by feeding their larvae with artificial inhibitors of a selected group of miRNAs that are highly produced in the insects. These were tested by incorporating synthetic miRNA inhibitors into their diet or producing them in transgenic plant leaves using transfection and transformation of model plants, *Arabidopsis* and cotton. Subsequently, insect development and survival was monitored. Results showed that the miRNA inhibitors could be successfully produced in plant tissues. Among the 11 miRNAs tested, only two of them affected larval survival. However, the results are preliminary and require further confirmation. In addition, there are tens of more miRNAs produced in insects that can potentially be targeted. This project was only a proof of concept research which successfully showed the possibility of over-producing miRNA inhibitors in plants that may affect insect development. As indicated, only a small number of miRNAs were tested here and therefore, the project can be expanded to test more miRNAs that can be targeted. In addition, the system can be optimized to produce higher quantities of the miRNA inhibitors compared to what was achieved in this pilot study.