



Australian Government

**Cotton Research and
Development Corporation**

TRAVEL, CONFERENCE or SCIENTIFIC EXCHANGE REPORT 2016

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: QUT1604

**Project Title: (Travel Related to) Diversity, Dynamics and
Evolution of Baculoviruses**

Project Commencement Date: 14/07/2016 **Project Completion Date:** 31/07/2016

CRDC Research Program: 2 Industry

Part 2 – Contact Details

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Signature of Research Provider Representative: _____

Date Submitted: _____

Part 3 – Travel, Conference or Scientific Exchange Report

(Maximum two pages)

1. A brief description of the purpose of the travel.

The Society for Invertebrate Pathology annual meeting is the leading forum for the review of research and development of biopesticides and invertebrate pathology. Biopesticides based on baculoviruses such as Vivus and Gemstar have been of significant benefit to the cotton industry in management of *Helicoverpa* spp, but there remain very few researchers in Australia experienced in baculovirus biology. The conference encouraged new linkages between myself and international researchers in the field, increasing the flow of information into Australia. I showcased research through a presentation on the application of next generation sequencing and bioinformatics in the characterisation of diversity and evolution of the Australian baculoviruses in commercial production by AgBiTech Australia. This work has implications for the stability of virus isolates used in the Australian cotton industry and in the registration of this and other isolates as biopesticides.

2. What were the:

a) major findings and outcomes

b) other highlights

1. The function of P10 in baculoviruses was discovered. No P10 in the baculovirus genome results in no cell lysis which prevents the release of the virus from the cell.
2. Transgenic sterile insect technique was developed. The process introduces a gene into the male insect population that reintroduces susceptibility to a target biopesticide within the offspring.
3. A commercial product by Biobest called the 'Flying Doctors Hive' is now available for purchase and is a tool for insect vectoring of crop protection products using bumblebees.
4. Application of a *Helicoverpa zea* nudivirus mutant (HzNV2) to sterilise *H. zea* populations.
5. The use of multiple pathogens as biocontrols are more effective than one.
6. Low diversity biocontrols are more likely to produce resistance within the target insect.
7. Synthetic baculoviruses can be produced by replacing genes with homologs from different baculovirus strains.
8. Viral particles devoid of DNA are produced in the ovaries of the wasp *Venturia canescens* and protects the egg from the host insects host encapsulation defence mechanism. These particles have been called Virus-Like-Particles and are the result of the integration of a virus into the wasp genome approx. 100 million years ago.

3. Detail the persons and institutions visited, giving full title, position details, location, duration of visit and purpose of visit to these people/places. (NB:- Please provide full names of institutions, not just acronyms.)

- Conference Mixer at the Hotel de Ville de Tours – 24/07/2016, duration – 4hrs.
- Conference day one at Le Vinci – 25/07/2016, duration – 8.5hrs.
 - Attended the Founders lecture, Virus session 1, Microbial Control session 1, Postdoctoral opportunities in the EU and US and Plenary Symposium: Insect for Food and Feed.
 - Presented the talk "Genotype Detection and Abundance within Baculoviruses using Next Generation Sequencing".
 - Discussed with Dr. Martin Andermatt of Andermatt Biocontrol about the presentation I completed as well as the software pipeline and the implications of the pipeline as a quality control measure during biopesticide development.
 - Discussed with Dr. Ben Raymond from the University of Exeter about his transgenic sterile technique and its potential adaptation to other insects.
- Conference day two at Le Vinci – 26/07/2016, duration – 4.5hrs.
 - Attended Bacteria 2 and Virus 3 session, Special Symposium "Human impact on pathogens-honeybee interactions" and Symposium Microbial Control Division "Next Generation Biopesticides"
- Conference Garden Party at the Domaine de Cande – 26/07/2016, duration – 5.5hrs
- Conference day three at Le Vinci – 27/07/2016, duration – 9.5hrs.

Please email your report 30 days after travel/conference to: research@crdc.com.au