

## **Report on the 32th Annual Meeting of the Working Group “Beneficial Arthropods and Entomopathogenic Nematodes”**

The 32<sup>th</sup> Annual Meeting of the Working Group “Beneficial Arthropods and Entomopathogenic Nematodes” of DPG and DGaE was held on 9<sup>th</sup> to 10<sup>th</sup> of December 2013 at the Institute for Biological Control, Julius Kühn-Institut Darmstadt. The Working Group “Beneficials & Entomology” of the JKI organized the meeting and we were happy to welcome more than 50 participants. This time, 23 talks were given during the two days of the meeting. We would like to thank all contributors and especially those who submitted their abstracts for publication.

With financial support by the DGaE we were able to invite also an expert from the Netherlands, Dr. Antoon Loomans, Netherlands Food and Consumer Product Safety Authority. Antoon gave us a presentation on “Environmental benefits and risks of biological control” which was discussed during the meeting and also later when having a beer at Darmstadt’s “Grohe Brauerei”. Again, we would like to thank the steering committee of the DGaE of the generous encouragement for this special event.

In 2014 we will meet together with the “Arbeitstagung Biologische Schädlingsbekämpfung”. The meeting will take place from 25<sup>th</sup> - 26<sup>th</sup> of November 2014 at Veitshöchheim. Please expect our invitation – as usual – end of August 2014!

Dr. Annette Herz & Prof. Dr. Ralf-Udo Ehlers

### **Resistance of codling moth against *Cydia pomonella* granulovirus: New findings on its distribution and inheritance**

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The codling moth (CM, *Cydia pomonella* L.) is a nearly worldwide distributed insect pest in apple, pear and walnut growing areas. Since the late 1980s, *Cydia pomonella* granulovirus (CpGV) products have become an important biological control agent for control of CM in both organic and integrated pome fruit production. Since 2005 about 38 commercial orchards with CM populations with a decreased CpGV susceptibility have been identified in several European countries including Germany, France, Italy, Switzerland, The Netherlands, Austria and the Czech Republic. Meanwhile, resistance overcoming CpGV isolate have been identified and are registered for an improved CM control. Bioassays were established to test the virulence of different resistance overcoming CpGV isolates to different resistant CM populations that have been reared in the laboratory. These tests revealed a varying susceptibility of several populations, indicating some genetic heterogeneity in the response of these populations to the viruses. These observations were confirmed by two different patterns of inheritance of CpGV resistance patterns. Our

results demonstrate that the response of CM to CpGV is not homogenous due to some genetic factors. However, the diversity of naturally occurring CpGV isolates is sufficient to control all known resistant CM populations.

### **Temporal transcriptional analysis of *Cydia pomonella* granulovirus in the midgut of codling moth by using microarray analysis**

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The *Cydia pomonella* granulovirus (CpGV) is the most widespread commercially used baculovirus and a cornerstone in the control of codling moth, *C. pomonella* L., in both, organic and integrated pome fruit production. Recently, codling moth populations resistant to CpGV products have been located in Europe. However, only limited information on the infection process of CpGV is available. To gain a better understanding of the interaction between CpGV and its host, a microarray analysis of the transcription of CpGV genes in the midgut of codling moth was performed. So far, on transcriptional level, there have been microarray analyses of infected cell lines with Group I and II Alphabaculoviruses only. First, an oligonucleotide based, 15k microarray covering the complete genome of CpGV was developed. Then, codling moth larvae were infected with CpGV and RNA samples were taken from midguts between 0 and 120 h post infection. The obtained microarray data were also compared to reverse transcription quantitative PCR. Microarray analysis of the different time points resulted in a detailed overview of the temporal chronology of the transcription of all 143 CpGV genes. Five representative gene clusters were identified by performing a k-means clustering. Thereby, it was also possible to group undescribed CpGV genes according to their transcriptional profile. First transcriptional signals were detected between 12 and 24 h followed by a transcription boost of CpGV genes at 48 h; highest transcription activity was detected at 96 h post infection. A delayed and limited transcriptional activity of CpGV was observed in midguts of codling moth strains resistant to CpGV.

### **Endophytic establishment of the entomopathogenic fungus *Beauveria bassiana* in grapevine *Vitis vinifera***

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Fungal entomopathogens are important antagonists of arthropod pests and have attracted increased attention as biocontrol agents in integrated pest management programs. In addition to colonizing arthropods, evidence has accumulated that some entomopathogenic fungi like *Beauveria bassiana* (Bals.) Vuill. (Ascomycota: