

IOBC-NRS NEWSLETTER

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Fast Forward to Cedar Creek

In chapter three of, 'The Origin of Species', Charles Darwin discussed the role that ecological complexity plays in shaping species traits. It was in this general context that he seemed to formulate the hypothesis that species diversity at the plant level begets diversity of both herbivores and predators. He was remarking on an estate of one of his relatives that contained two distinct habitats. One was, "an extremely barren heath, which had never been touched by the hand of man", and the other, "had been enclosed twenty-five years previously and been planted with Scotch fir". He went on to describe some of the differences between these habitats:

The change in the native vegetation of the planted part of the heath was most remarkable, more than is generally seen in passing from one quite different soil to an

cont. pg 4



Cedar Creek Research Station, where the effects of plant diversity on natural enemies has been measured for 11 years.

***Your membership is crucial to our society!
If you have not renewed your membership for 2009, please
take a moment to do so! Contact Stefan Jaronski
(bug@midrivers.com) with questions.***

Joint IOBC – Nearctic and Neotropical Regional Sections Conference
“Biocontrol in the Americas: Past, Present, and Future”

Niagara Falls, Ontario, Canada, May 11-13, 2010

The Nearctic and Neotropical Regional Sections of the IOBC are hosting a scientific conference to promote awareness and networking of biocontrol issues of common interest among the Americas. The keynote speaker for the meeting will be Dr. Jacques Brodeur, President of IOBC Global, who
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MESSAGE FROM THE PRESIDENT:

**Annual IOBC-NRS Meeting and A Joint Meeting
Between the Nearctic and Neotropical Sections**

*Please plan to attend
two upcoming IOBC
-NRS meetings!*

Time is flying by and it will soon be time for our annual meeting at the ESA meeting in Indianapolis. James Hagler and Jonathan Lundgren have done a great job in putting together an interesting and informative symposium on "Advances in the Application of Molecular and Biochemical Methods for Biological Control Research". Molecular and biochemical techniques are certainly playing a more important role in biological control research today in helping us to better understand the interactions that are occurring in these complex ecosystems. At our business meeting before the symposium, we will also have a presentation by Dr. Menelaos Stavrinos, our 2009 awardee for the Robert J. O'Neil Award for Outstanding PhD. Student, on "Understanding How Management Practices can Influence Biological Control of Spider Mites in California Vineyards". Our Distinguished Scientist for 2009, Dr. Ted Center from the USDA Invasive Plant Research Laboratory in Ft. Lauderdale, FL, will also make a presentation on his research on biological control of invasive plants. In addition, Joop van Lenteren, General Secretary for IOBC Global, will be speaking at our business meeting on the Access and Benefit Sharing (ABS) report that the IOBC Commission on ABS prepared for FAO. This is an important issue for biocontrol workers especially for the exploration of natural enemies in other countries.

A more detailed presentation will be made by Jacques Brodeur, President of IOBC Global, at the keynote talk for the Joint IOBC - Nearctic and Neotropic Regional Sections Conference "Biocontrol in the Americas - Past, Present and Future" at Niagara Falls, Canada in May 2010. For more information on the meeting and the scientific program visit our new IOBC-NRS website "www.iobc-nrs.com". As you can see, there is a lot happening in the Nearctic Regional Section and IOBC Global. I encourage everyone to attend our NRS business meeting and symposium Tuesday night, and look forward to talking to you at the mixer afterwards.

*Les Shipp
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Sweet Tooth of Natural Enemies

Numerous field studies evaluate the impacts of floral diversification on biological control with the expectation that parasitoids are feeding from the floral nectar. More recently, lab bioassays of field-collected parasitoids have been used to confirm their sugar feeding status. Cold and hot anthrone assays measure fructose and total sugar levels. Sugar feeding can be determined by comparing the levels of field-collected parasitoids to newly emerged unfed parasitoids. This method is easy, may cost \$6-8 K for supplies, and the lipid and glycogen levels of the insect can also be simultaneously assayed. However, this method will not pinpoint the source of sugar that the insect has fed on. For a more detailed analysis of sugar feeding, high performance



***Cotesia glomerata* drinking nectar from a buckwheat flower.**

liquid chromatography (HPLC) will provide a sugar profile of insects which can be matched to various

sugar sources. Feeding on honeydew can be determined if the honeydew contains a 'signature sugar' that is not found in the floral nectar or synthesized by the insect. The HPLC method, however, requires more expensive equipment and more training.

*Jana Lee
USDA-ARS
Corvallis, OR*

Anthrone technique:

Olson, Fadamiro, Lundgren & Heimpel. 2000. *Physiol Entomol* 25: 17-26.

Anthrone on field-collected wasps:

Lee, Andow & Heimpel. 2006. *Ecol Entomol* 31: 470-480.

HPLC technique:

Stappuhn & Wäckers. 2004. *Funct Ecol* 18: 812-819.

New Strategies for Pitting Entomopathogens Against Asian Long-horned Beetle.

We've been working on felt-like fiber bands impregnated with cultures of entomopathogenic fungi (= fungal bands) for control of Asian longhorned beetle (ALB), *Anoplophora glabripennis* (Coleoptera: Cerambycidae). This Chinese beetle was first found infesting trees in Brooklyn in 1996, and since then invasive populations have also been found in the Chicago area, New Jersey, Toronto and Worcester, MA, as well as four European countries and Japan. ALB is a polyphagous tree-killer, frequently attacking maples, poplars and willows. ALB adults are reluctant flyers, often walking on tree trunks and branches. We wrap fungal bands around trunks or branches and ALB become contaminated with infective spores when walking across bands, preferably during their pre-maturation feeding period, before oviposition begins. Field studies conducted in China demonstrated that fungal bands

shortened the lives of ALB adults, and both lab and field studies have shown that spores can be horizontally transmitted to other beetles and infection decreases female fitness. ALB adults emerge from trees asynchronously, often remain high in tree canopies and are thought to frequently live for over a month in the field. During the 2004 summer, to investigate the effective longevity of fungal bands, bands with *Metarhizium anisopliae* strain F 52 were attached to trees in Queens, New York City. We found that fungal bands are effective for several months, and although densities of viable conidia diminished over 112 days, they never dropped below the LC₅₀ for *M. anisopliae* F 52. Our next goal will be applying fungal bands on trees along with attractants to increase ALB's exposure to the fungus.

Ann Hajek
Cornell University
Ithaca, NY



Asian long-horned beetle, target of entomopathogenic fungus in NY.



Advances in Molecular Gut Content Analysis: IOBC-

IOBC-NRS will host its annual governing board meeting and scientific symposium on Tuesday evening at the ESA Annual Meeting in Indianapolis. This year's topic are the recent advances in biochemical and molecular methods used for diagnosing the feeding behavior of natural enemies in the laboratory and in the field. Specific topics to be

covered by leading scientists in this field include new developments and application in the use of serological and genetic techniques to study predation in the field (Hagler, Lundgren & Harwood), and biochemical techniques for studying sugar feeding by natural enemies (Wäckers). The meeting/symposium will begin at 6 PM in

the Regency Ballroom EF. **Note that this is in the Hyatt Regency Hotel, not the main convention center.** A mixer will follow the symposium, so save your appetite. Please mark your calendars, and we hope to see you there!

James Hagler & Jonathan Lundgren
USDA-ARS
Maricopa, AZ Brookings, SD

IOBC Meeting– Niagara Falls, cont.

will provide an update on the IOBC Commission on "Biological Control and Access and Benefit Sharing". The three day conference will include symposia topics ranging from invasive pests, risks and benefits of exploration for biocontrol agents in the Americas, ecosystem land-

scapes and habitat management for IPM, challenges and successes for commercialization and implementation of biocontrol agents, microbial biological control, weed biocontrol, biological control with egg parasitoids and more. Poster presentations are welcomed.



For more information, contact
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Or visit our website:
www.iobcnrs.com

Announcements

First Announcement: Blueprint for the Future of Arthropod Rearing and Quality Assurance

The objective of the workshop is to address the audacious goal of moving from "bug farms" to industrial production of high-quality insects, mites and nematodes for biological control, SIT, research and other current and future applications.

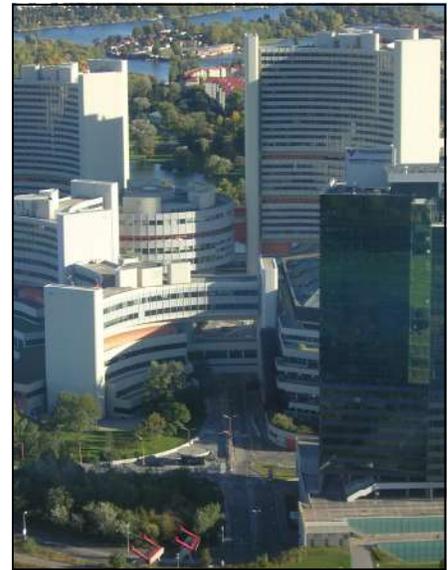
The workshop will focus on all issues related to the rearing of entomophagous and phytophagous insects and mites, and entomopathogenic nematodes, and to principles and practices of quality assurance. The program will consist of invited papers presenting an overview of selected topics (to be announced later) and contributed presentations on the different aspects of arthropod rearing as it relates to quality control. Papers will serve as a basis for

discussion and exchange, with the final aim of improving collaboration among scientists and practitioners.

**Vienna International Center, Austria
October 19-22, 2010**

Limited financial assistance for young IOBC members is available. All upcoming information on the program, registration and accommodation will be available on the AMRQC (www.AMRQC.org), ANBP (www.ANBP.org) and IAEA (to be announced later) websites. A circular for registration and call for papers will be sent in spring 2010.

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Biocontrol Musing (cont.): Fast Forward to Cedar Creek...

other: not only the proportional numbers of the heath-plants were wholly changed, but twelve species of plants (not counting grasses and carices) flourished in the plantations, which could not be found in the heath. The effect on the insects must have been still greater, for six insectivorous birds were very common in the plantations, which were not to be seen on the heath: and the heath was frequented by two or three distinct insectivorous birds.

I expect that we all have our favorite conservation biological control project that supports what seems to be Darwin's basic premise, but a recent analysis of a long-term study at the University of Minnesota's Cedar Creek Ecosystem Science Reserve has added an exclamation point of support to other tests of the hypothesis that increased plant diversity leads to increased diversity at higher trophic levels. The Cedar Creek experiment started in 1994 on abandoned farm fields, and it consisted of manipulating the diversity of native prairie plants to vary between 1 and 16 species in small but well-

replicated plots. A number of studies over the years have shown that the species richness of both herbivores and predators tends to be higher in the plots with a higher diversity of plants. This matches Darwin's observations as well as a number of other studies. In the most recent offering from this experiment though, Nick Haddad and colleagues were able to compile data from 11 continuous years of research and this yielded some remarkable patterns that go beyond Darwin's conjectures and actually connect more directly to conservation biological control. A key finding of the new study concerns abundance, rather than diversity, of herbivorous and predatory arthropods, and is therefore more directly relevant to herbivore suppression and plant protection. Haddad and colleagues found that the ratio of predatory to herbivorous arthropods increased substantially with plant species richness. Previous work had shown that plant biomass increases with species richness and this had typically been attributed to increased

niche complementarity or facilitation effects in mixtures of plant species. The current study points to a different explanation – increased suppression of herbivores when there are more species of plants. It will be clear to readers of this newsletter that this is the essence of conservation biological control by habitat manipulation. Thus far the Cedar Creek studies have not addressed ecological mechanisms directly – here's to hoping that this study spurs experiments testing hypotheses linking plant diversity to trophic structure!

George Heimpel
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St. Paul, MN

Darwin, C., 1859. *The Origin of Species*. Middlesex, UK: Penguin Books.

Haddad et al., 2009. *Ecol Letters*, **12**, 1029-1039.



RESEARCH BRIEFS

Bacterial Symbionts in Biological Control

Encarsia inaron represents a textbook success story of biological control, decimating populations of ash whitefly (*Siphoninus phyllyreae*) throughout its introduced range in the Western and Southeastern U.S. However, even within this well-described system we have discovered a mystery in the course of our work on bacterial symbionts. We have examined populations of *E. inaron* from Tucson, AZ and Reno, NV and found that both populations were fixed for the bacterial symbiont *Wolbachia*, which is maintained in the populations by cytoplasmic incompatibility (a reproductive manipulation that promotes the spread and maintenance of the symbiont). However, when we examined putative source populations of *E. inaron* from Italy and Israel, *Wolbachia* was absent. Three possibilities exist: 1) source popu-



Encarsia inaron, an introduced parasitoid of ash whitefly (photo by Alex Wild)

lations have lost *Wolbachia*, 2) *Wolbachia* was acquired since introduction in the US, or 3) source populations are variable in their symbiont composition.

We favor the latter hypothesis, and intend to conduct more thorough surveys of Mediterranean *E. inaron*. The implication is that a rare symbiont in the native range may have become fixed in quarantine, resulting in a difference between native and introduced populations of *E. inaron*. Our results underscore the dynamic nature of symbiont infections, and suggest that an awareness of symbionts during the early stages of importation is important, particularly in cases where symbionts cause substantial costs or benefits to their hosts and may influence the efficacy of a potential agent.

Jen White
University of Kentucky
Lexington, KY

Molly Hunter
University of Arizona
Tucson, AZ

NEWSLETTER WRAP-UP

Another year has passed, and the IOBC-NRS continues to thrive as an organization, and provide new benefits to members. The most recent of these is the dramatic overhaul given to the IOBC website (www.iobcnrs.com). Please visit and give us some feedback on this new tool for promoting biological control. If you have ideas for content or links, don't hesitate to drop me an e-mail.

Other exciting developments that continue to mature are the IOBC Education Curriculum and Development Award (yes, IOBC sponsors biocontrol-related educational opportunities!). 2009's sponsored short course titled Basic and Applied Ecology of the Coccinellidae was very successful. Ten students from seven states convened at a prairie restoration site in Amboy IL, where six world leaders in lady beetle ecology (Seagraves, Kajita, Vandenberg, Evans, Obrycki, and Lundgren) led units ranging from current phylogenetics to nocturnal predation observations to reproductive physiology and behavior. One planned course for 2010 will possibly focus on Insect Pathology and be led

by Lee Solter (lsolter@illinois.edu). Details on this course will be forthcoming. Future courses will focus on spider and carabid taxonomy and ecology (likely 2011 for these). Additional course concepts are welcomed enthusiastically.

Finally, IOBC-NRS continues to partner with other IOBC regional sections and biocontrol-related organizations to promote our discipline. Our relationship with ANBP (Association of Natural Biocontrol Producers) has grown stronger this past year, and the upcoming meeting in Niagara Falls is an exciting opportunity to network with our Neotropical colleagues.

These and other news (along with free food) will be discussed at the December ESA meeting in Indianapolis. Please plan to attend the IOBC-NRS annual meeting and scientific program on Tuesday evening.

Jonathan Lundgren
IOBC-NRS Newsletter Editor
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Terry Moyer (IL) led a tour of Richardson Wildlife Foundation, a habitat restoration project in central IL where the coccinellid course was held.



Yukie Kajita (KY) & Ted Evans (UT) led a laboratory exercise on the importance of egg surface chemistry on IGP by coccinellids.

International Organization for Biological Control of Noxious Animals and Plants. Nearctic
Regional Section
Organisation Internationale de Lutte Biologique Contre Les Animaux et Les Plantes Nuisibles:
Section de la Region Nearctic

Visit our new website:www.iobcnrs.com



The International Organization for Biological Control—Nearctic Regional Section Newsletter is published 3 times a year in February, June, and October to provide information and further communication among members of the Region (Bermuda, Canada, and the United States).

Send items for the IOBC-NRS Newsletter

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