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IOBC-NRS NEWSLETTER

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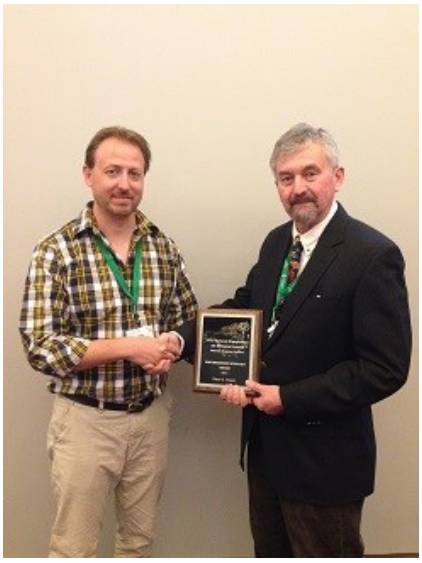
IOBC Distinguished Scientist Award: Peter Mason



Peter (right) receives award from Past President Jon Lundgren

Peter Mason is currently at the Agriculture and Agri-Food Canada, Research Centre. He has contributed extensively to the knowledge and management of insect biological control agents and insect pest targets, working on a diverse range of insects, including bertha armyworm, Lygus plant bugs, cabbage seedpod weevil, and leek moth. His research on these and other systems has made applied contributions in pest management and in the regulation of biological control, which are of great significance in Canada and worldwide.

Peter has been instrumental in developing procedures for testing biological control

(Mason cont. on p. 5)

IOBC Early Career Award: Mary Gardiner

Mary Gardiner joined as a faculty member of Ohio State University in 2009, where she has developed a diverse, forward-thinking, and well-funded research and extension program. Mary's program examines how habitat management and landscape composition and configuration influence the richness, abundance, and activity of arthropods. These relationships are studied within three research themes: Arthropod-Mediated Ecosystem Services within Changing Urban Landscapes, Beneficial Insect Conservation, and Landscape-Scale Integrated Pest Management.

Mary Gardiner (right) receives award

At Ohio State, her program has numerous projects. She received a USDA NIFA AFRI

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Message From the President:
Threats to biological control ... and opportunities

Don Weber

IOBC-NRS President
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Those of us studying and practicing biological control are aware of its broad biological scope, from bacteriophages to vertebrates, and its equally wide applicability, to target (prey and host and competitor) arthropods, plant pathogens, weeds, and others. Yet the public, and even our fellow scientists, often seem oblivious to biological control, and some of the fundamental ecological precepts which underpin it.

The average American or Canadian has little knowledge of agriculture and pest management, for instance, recognizing perhaps a few **key words** such as **organic, GMO, pollinators, bees, and monarch butterflies**. Are these important issues? Sure. But they are also ALL connected closely with biological control, and give opportunities to bring biological control, and its benefits, into ongoing higher-profile discussions about agriculture.

Along with interiorscapes and greenhouses, **organic agriculture** is perhaps the strongest niche for biological control as a leading component of truly integrated pest management. This offers an opportunity for demonstration of innovative biological controls which can then prove useful outside the "niche as incubator."

Bees and other insect pollinators share many vulnerabilities with important natural enemies in agroecosystems, and they currently have a much higher profile with the public and policy-makers. Researchers and practitioners and advocates of conservation biocontrol are slowly changing this, but not fast enough. Conservation programs and practices need to leverage regionally-specific floral and other cultural strategies for pollinator and beneficial insect conservation and enhancement, yet these strategies also need a stronger scientific underpinning, which can only be achieved with careful research.

The Monarch, our archetypal charismatic arthropod, is now under consideration (*Danaus p. plexippus*, the migratory North American population) for listing as threatened or endangered by US Fish and Wildlife Service. The recent near-collapse of monarch populations coincides with extensive deployment of herbicide-resistant **transgenic crops (GMOs)**, coupled with vast broad-spectrum herbicide applications. Populations of monarchs, pollinators, and natural enemies are all jeopardized by the resulting landscape monoculture. Conversely, practices and policies which reverse or mitigate these large-scale trends will yield multiple benefits, including enhanced ecosystem services from biological control.

The **biggest threat** to the success of biological control is lack of support engendered by lack of knowledge. The cure for this is to raise the profile of biological control at all levels, from public to academic, and from grade school to graduate school. IOBC and its members are part of the solution.

Our next two annual meetings and companion symposia offer unique opportunities (at joint ESA meetings with Tri-Societies and as part of the ICE) to raise and broaden the profile of

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Robert J. O'Neil Outstanding PhD Student Award: Andrew Frewin

Andrew Frewin received his PhD at the University of Guelph with Dr. Robert Hanner and Cynthia Scott-Dupree. Andrew's PhD research is focused on developing the use of DNA barcoding as a standardized method for the identification of pest and beneficial organisms for various IPM applications. The primary objectives of his research have been to: 1) Develop protocols for using DNA barcoding and related molecular methods for the identification of pest organisms; 2) Demonstrate the utility of standardized molecular methods for providing insight into the dynamics of pest complexes consisting of cryptic-species; 3) Development DNA barcoding as a quality management tool for industry and research use of biological control agents, and 4) Determine the utility of DNA barcoding for the identification of pest interceptions at national borders.

His research is cutting edge and valuable to the greenhouse industry in terms of developing the DNA barcoding methodology that enables individuals to rapidly determine the presence of invasive insect species and distribution of insect biotypes in greenhouses - ultimately resulting in the choice of the proper IPM tactics to mitigate potentially devastating situations.

Aside from research, Andrew always takes the time to mentor new undergraduate and graduate students that begin their studies in both my lab and Dr. Hanner's, helping with methodology, statistical analysis or writing. He has been involved as a Teaching Assistant in courses throughout his M.Sc. and PhD. Twice, he has done an outstanding job as a teaching assistant in an Integrated Management of Invasive Insect Species

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Outstanding Masters Student Award: Ryan Schmid

Ryan Schmid received his M.S. at North Dakota State with Jon Lundgren, and is currently a PhD student at Kansas State University. As an undergraduate, he ran an independent project to study how microbial gut symbionts influence the dietary breadth in the field cricket, *Gryllus pennsylvanicus*. For his M.S. project he continued to focus on the topic of gut ecology with carabid beetles and crickets. He mastered bacterial cell culture, genetic analysis of bacterial diversity, insect rearing and laboratory assays, field experimental design and implementation, and identified entire communities of both insects and plants within several habitats in eastern South Dakota.

The future of biological control depends on understanding how BC agents fit within complex communities; how they interact with other organisms on a molecular scale all the way up to a landscape scale. Ryan's research will be an important instigator for additional research in how gut bacterial communities

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Ryan Schmid (left) receives award from President Don Weber

Musings—Rhinocyllus Reconsidered

George Heimpel

University of Minnesota

As most readers of this newsletter will be aware, *Rhinocyllus conicus* is a notorious 'bad boy' of biological control. Originally released in North America to control the musk thistle, this weevil was found feeding on native thistles, with serious effects on the abundance of some species. Experimental and modeling studies by Louda and co-workers over the past 15 years or so have left little doubt that the non-target effects of the introduction of *R. conicus* in the United States are real. I have always been frustrated though, that the documentation of the potential benefits of this weevil (through suppression of invasive thistles) have been much less well-studied than have the risks. Without being able to balance the risks of a biological control introduction against the benefits, it is difficult to determine what the net effects of the introduction were. In the case of *R. conicus*, if effective suppression of musk thistle has led to significant environmental benefits – through reduced spread into natural areas, or reduced herbicide use – it is conceivable that the benefits could outweigh the risks. The problem is we don't have enough information on the benefits side.

Rhinocyllus conicus
Photo credit: Loke T. Kok, www.bugwood.org

However, a recent paper coming out of Katriona Shea's lab at Penn State has addressed this problem to some extent. These researchers found that *R. conicus* feeding on musk thistle seedheads has a stronger effect on spread dynamics of musk thistle than had been previously recognized. The larvae feed within the seed head and not only kill seeds outright but also damage the structures that would allow seeds to disperse. This latter bit is the new part, and decreased dispersal occurs through the formation of scar tissue that impedes seeds from separating from the seed heads, and damage of dispersal structures ('thistle down') that causes seeds to drop straight down rather than become airborne and disperse far from the parent plant. These *R. conicus* - induced impediments together cause an estimated 46% reduction in the spread rate of musk thistle. This is a significant reduction in spread of a noxious weed attributable to this biological control agent and it suggests a substantial benefit of *R. conicus*.

What does this mean for the balance between risks and benefits of biological control? That is still hard to say since it is difficult to translate these dispersal estimates to broader environmental benefits. Additionally, these effects on dispersal could very well apply to the native thistles as well, so the non-target effects may have been underestimated as well. So – while a robust comparison of risks and benefits remains beyond reach – understanding the effect of *R. conicus* on thistle spread rates should bring us closer to that goal.

Louda SM, Kendall D, Connor J & Simberloff D (1997) Ecological effects of an insect introduced for the biological control of weeds. *Science* **277**: 1088-1090.

Marchetto KM, Shea K, Kelly D, Groenteman R, Sezen Z & Jongejans E (2014) Unrecognized impact of a biocontrol agent on the spread rate of an invasive thistle. *Ecological Applications* **24**: 1178-1187.

(Mason cont. from p. 1)

agents against non-target species. The changes in perception of the safety of introduced natural enemies for classical biological control of pest insects led governments in North America to implement new regulations that required extensive testing.

Through his work, Peter and collaborators have developed scientifically-sound approaches to meet the non-target testing regulations. These include procedures for the selection of key species for non-target testing, the recognition of potential conflicts between weed and arthropod biological control agents, and the development of non-target testing lists for insect biological control projects that are pre-approved by regulatory agencies. As chair of the Canadian Biological Control Review Committee, which oversees the importation of biological control agents into Canada, Peter has been instrumental in assisting entomologists to meet these guidelines. These approaches are being adopted by the international community of biological control practitioners.

Peter has been instrumental in the promotion of biological control approaches to insect pest management. His book "Biological Control Programmes in Canada, 1981-2000", and a new volume in the series, "Biological control Programmes in Canada 2001 – 2012", highlight biological control programmes and practices in Canada and provide a much-needed justification for ongoing support of these programmes, including programmes in entomology.

In addition, Peter has over 60 published research papers, with an average citation rate in excess of 3 per title. He served as the President of the Entomological Society of Canada, leads scientists in the Biodiversity section of Agriculture, Agri-Food Canada, and co-supervises or is a committee member for graduate students in Canada, China and Europe.

David Gillespie

Agriculture and Agri-Food Canada

(Gardiner cont. from p. 1)

grant to expand her soybean aphid research by investigating how the distribution of common buckthorn influenced aphid dispersal into soybean fields. For cucurbit pest management, Mary has examined how floral strip addition, strip tillage, extended-duration row covers, and trap cropping influence biocontrol services in cucurbits with regional collaborators and support from USDA SARE, USDA NRCS, and USDA NIFA SCRI. Mary and her M.S. student Chelsea Smith have found the declining native lady beetle *Hippodamia convergens* experience significantly greater egg predation than exotic competitors.

Among all of her research though, Mary is clearly most passionate about the study of predators and their activity in urban ecosystems. The city of Cleveland, OH contains 20,000 vacant lots totaling over 3,600 acres of land. With an NSF Early Career Award, she is examining the value of vacant land to support beneficial arthropods and how plant species and functional trait diversity influence predator biodiversity-ecosystem function relationships. This research led to the publication of "Vacant land conversion to community gardens: influences on generalist arthropod predators and biocontrol services in urban greenspaces" in the journal *Urban Ecosystems* in 2014.

Mary is active in Extension by making a video, popular book and database for community data collection. Recently, she led a team consisting of researchers examining how the accuracy of citizen science influenced researcher interpretations. Mary was also a contributor to a smart phone application, GoodBugs+ that focused on natural enemy ID, life cycles, prey, and habitat requirements.

Mary is active in teaching with several courses although she does not have a formal teaching appointment. As of August 2014, Mary will be major advisor to eight current graduate students. She has published 21 peer-reviewed publications, 2 book chapters, and 8 Extension publications in her career.

Dan Herms

Ohio State University

(Frewin cont. from p. 3)

course.

Andrew has published two papers from his M.S., and two papers from his PhD with three more in preparation. He has received the MITACS Accelerate Scholarship. He presents his work widely with ten conference papers on his PhD research and he has been an invited speaker on nine occasions.

Andrew is truly engaged with biological control and biosurveillance, and passionate to this field of research.

Cynthia Scott-Dupree
University of Guelph

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biological control. Workshops such as the upcoming Insect Pathology IOBC Workshop, while more intensive and specialized, are equally important. Our President-Elect, Jim Nechols, is working with colleagues to address the critical need for Biological Control curricula to be widely available at the graduate and undergraduate levels.

As a small membership organization, our Nearctic Regional Section of IOBC needs to partner strongly with IOBC Global as well as other IOBC regional sections. I believe we also should seek opportunities to partner with associations such as ANBP and Xerces Society, to promote our shared interests in education and promotion of the enormous value of all facets of biological control. Please share with me any initiatives and thoughts you have!

(Schmid cont. from p. 3)

affect the reliability of BC agents as pest consumers.

Ryan has published three manuscripts from his M.S. work. He has presented both oral and poster presentations at national and international meetings, and he has helped with community outreach events. Quite frankly, he probably could have earned a PhD at SDSU given the amount of work he has completed in the past 2.5 years.

Jon Lundgren
USDA-ARS, SD

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

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