



NSERC-CANPOLIN

CANADIAN POLLINATION • INITIATIVE •

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**HAPPY
HOLIDAYS
FROM
NSERC-
CANPOLIN**

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MESSAGE FROM THE DIRECTOR

NSERC-CANPOLIN is entering its final year. What a fantastically productive 4 years we have had! Overall research productivity is accelerating. Over 20 graduate students have graduated. Peer-reviewed publications number 70, and more are in progress. We have participated in national and international workshops and recognized for the excellence of our collaborations. When together at meetings, ideas flow as collaborations evolve. We have excellent relations with business and not-for-profit sectors. Those contribute funds closely matching the NSERC grant itself. Overall, our inclusive policy to help all-comers has developed into the true network envisioned and described in the original proposal to NSERC.

With success on-going, we need to plan our legacy. What's next? Our scientific findings must be used in the larger contexts of general awareness of the importance of pollination to Canada and the world, how pollination issues need to be part of economics and planning, and be promoted to business and government.

CANPOLIN is planning a book that could be as influential in Canada as has been the "Status of Pollinators in North America" in the USA. Further, we will call on our scientists for short, non-technical précis for media release. Those already prepared have been well received. Some of us have written for and made presentations to the public and industry. We are doing well at spreading the word. As Jeremy Kerr stated recently, we are in a position to release a tsunami of accomplishments, featuring utility and implications to natural, forest and agricultural ecosystem function and sustainability.

With thoughts of legacy in mind, many of us are casting our eyes to what may happen when CANPOLIN officially concludes. Undoubtedly, many of the partnerships established as a result of CANPOLIN activities will continue to bear fruit. The Arthur Dobbs Institute is a newly incorporated not-for-profit that shares many of the same aims and objectives of CANPOLIN, and may provide an effective launching point for future joint projects. Stay tuned for more details as this exciting initiative evolves.

Happy New Year to all,

Peter Kevan

COURSE ANNOUNCEMENTS

HONEYBEE DIAGNOSTICS

In conjunction with our partners at AAFC and Grant Prairie Regional College, CANPOLIN will offer a 5-day course next summer in diagnostic training for graduate students working in the field of bee health. The course, to be held at the new **National Bee Diagnostics Centre** in Beaverlodge, AB, August 26 – 30, 2013, will provide training in molecular techniques developed by Network researchers to identify and/or quantify bee pathogens such as *Nosema* spp, viruses and American Foulbrood. Space will be limited and travel funds will be offered for graduate student participants. Watch for a call for applications in early 2013.

GPRC



POLLINATION BIOLOGY FIELD COURSE

The 2013 edition of the International Pollination Biology Course will take place next fall in Lençóis, Brazil (exact dates to TBA). This popular course covers topics ranging from the diversity of pollinators, floral classification, floral advertisement, floral rewards, pollinator foraging, abiotic pollination, evolutionary ecology, breeding systems, and agricultural applications. The course format includes daily lectures and discussions, field excursions, lab activities, and completion of an individual research project. For the third year in a row, CANPOLIN will provide travel support for up to four Network graduate students to attend the two-week course. Watch for a call for applications in the spring.



THE "BEE COURSE"

The BEE Course is an internationally renowned 9-day taxonomic workshop offered by the Southwestern Research Station in Arizona. Instructed by a team of leading taxonomists, the course covers the classification and identification of more than 60 bee genera of North and Central America. CANPOLIN is pleased to offer travel assistance for up to 3 graduate students from the Network who are accepted into the course. (Note: This course is run independently from CANPOLIN. Students must first be accepted into the course before they can apply for CANPOLIN travel funds.) More information will follow when the details of 2013 course are announced. It is usually held in August each year.



© Bee Tribes of the World



CANPOLIN HOSTS POLLINATION & LAND REHABILITATION WORKSHOP

Incorporating pollinators into land rehabilitation and restoration activities is an area of rapidly growing interest in ecology. By fostering pollinator populations, degraded sites can regenerate and become self-sustaining faster than by conventional landscape horticulture. In addition, restoration activities can also play an important role in pollinator conservation – a growing concern given the global decline of both managed and wild pollinators. On September 29 & 30, 2012, CANPOLIN hosted a workshop in Columbus, Ohio, dedicated to exploring the role of pollination in land rehabilitation. The workshop provided a timely opportunity to assess the current state of knowledge and to identify research priorities. Approximately 30 pollination biologists, conservationists, and restoration ecologists from international academia and non-governmental organizations participated. Following a day of presentations on a range of topics, the group split into three breakout groups, each focused on pollination and restoration in a different type of environment: **agricultural**, **natural** and **urban**. Each group was charged with identifying key knowledge gaps and, where appropriate, making recommendations to address these gaps. The full workshop report (including abstracts of presentations) can be [downloaded](#) from the CANPOLIN website.



(Left) The “agro-ecosystem” breakout group at the Pollination and Land Rehabilitation Workshop; (middle) Pollinator monitoring with a malaise trap at a former gravel pit in southwestern Ontario; (right) trap nest for pollinators at the same location (photos by E. Tikhmenev and A. McGraw-Alcock)

CANADIANS RECOGNIZED FOR POLLINATOR ADVOCACY & CONSERVATION



Carol Dunk (middle) pictured with her award and NAPPC Executive Director Laurie Davies Adams (left) and Vicki Wojcik, Research Program Manager (right)

Carol Dunk of Barrie, ON, is this year's recipient of the Pollinator Advocate Award from the National Pollinator Protection Campaign (NAPPC). This award recognizes individuals that have made major contributions to pollinator protection and conservation and to public education on the importance of pollination. The award was presented in October at the annual NAPPC meeting in Washington, DC.

Carol spearheads the “Roadsides” project that encourages the creation of bee habitat along roadsides, and other unused patches of land. The first “Pollinator Patch” was planted by Carol in May of 2010. What began as a small rural initiative is now growing into a network of roadside plantings that promises to transform the transportation corridors of Southern Ontario. To read more about Carol's efforts, visit www.roadsides.caroldunk.com.

NAPPC also issues its first Canadian Farmer-Rancher Pollinator Award to Don and Marie Ruzicka of Sunrise Farm in Killam, AB, in recognition of their efforts to develop new shelterbelt designs to optimize the landscape for pollinators.



Research Buzz

New publications and research results are regularly posted on the CANPOLIN website. If your institution does not have access to any of the publications listed, please email canpolin@uoguelph.ca for assistance.

Hamiduzzaman, M.M., A. Sinia, E. Guzman-Novoa and P.H. Goodwin. 2012. [Entomopathogenic fungi as potential biocontrol agents of the ecto-parasitic mite, *Varroa destructor*, and their effect on the immune response of honey bees \(*Apis mellifera* L.\)](#). Journal of Invertebrate Pathology, 111(3): 237-243.

Colla, S., F. Gadallah, L. Richardson, D. Wagner and G. Lawrence. 2012. [Assessing declines of North American bumble bees \(*Bombus* spp.\) using museum specimens](#). Biodiversity and Conservation, DOI: 10.1007/s10531-012-0383-2

Szabo, N.D., S. R. Colla, D. L. Wagner, L. F. Gall and J.T. Kerr. 2012. [Do pathogen spillover, pesticide use, or habitat loss explain recent North American bumblebee declines?](#) Conservation Letters, Early View: DOI: 10.1111/j.1755-263X.2012.00234.x

Desai, S.D., Y.-J. Eu, S. Whyard and R.W. Currie. 2012. [Reduction in deformed wing virus infection in larval and adult honey bees \(*Apis mellifera* L.\) by double-stranded RNA ingestion](#). Insect Molecular Biology: DOI: 10.1111/j.1365-2583.2012.01150.x

Ratti, V., P.G. Kevan and H.J. Eberl. 2012. A mathematical model for population dynamics in honeybee colonies infested with *Varroa destructor* and the Acute Bee Paralysis Virus. Canadian Applied Mathematics Quarterly, Pre-print ([PDF](#)).

Morse, A., P.G. Kevan, Shipp, L., S. Khosla and B. McGarvey. 2012. [The impact of greenhouse tomato floral volatiles on bumble bee \(*Hymenoptera: Apidae*\) pollination](#). Environmental Entomology 44(4):855-864



Many flower flies resemble bees, an act of mimicry that helps protect them from predators. Have you ever wondered why some flies are poorer mimics than others? WG1 researcher Jeff Skevington and colleagues may have found the answer.

Penny, H. D., Hassall, C., Skevington, J. H., Abbott, K. R. and T. N. Sherratt. 2012. [A comparative analysis of the evolution of imperfect mimicry](#). Nature, 483: 461-464



AGM ANNOUNCEMENT

The final General Assembly Meeting for CANPOLIN researchers, graduate students and partners will be held in conjunction with the 150th Annual Meeting of the Entomological Society of Canada, in Guelph, ON.

October 20-23, 2013

MARK YOUR CALENDARS!



A graphic of a spotlight with a yellow beam of light shining down from the top left corner of the page.

Spotlight on Research: *Through the Eyes of a Pollinator*

Insect vision has long been a question of interest to entomologists. For insects that pollinate, visual cues play an important role in locating flowers and distinguishing between different species of plants. But bee vision is different than human vision, so what does a bee really see when it is foraging for floral resources?



“Unlike humans, bees can see ultraviolet light. Many flowers have UV absorbing pigments that create a floral pattern visible to bees,” says Jana Vamosi, a plant ecology researcher at the University of Calgary, and member of CANPOLIN Working Group 5. “These patterns can be important in attracting pollinators and guiding them to the nectar source, and may influence other elements of pollinator behaviour as well.”

Vamosi and U of Calgary honours student Jason Rae were interested in the impact of UV patterns on pollinators in type of flower in particular—the yellow monkey flower, *Mimulus guttatus*. It is a plant that has become an important model species in studies of evolution and ecology.

Using both regular and ultraviolet camera lens, Rae first photographed *M. guttatus* flowers in the field. The UV lens revealed a marked contrast between the lower petal, which had low UV reflectance, and the side and top petals, which had very high UV reflectance. The duo was surprised to discover that the UV pattern did not overlap with or complement any of the nectar guide markings that were visible to the human eye.

Rae then coated flowers with a light sunscreen spray to see how pollinators would respond if the UV pattern was disrupted. Control flowers received almost 5 times more visits from pollinators (which were mainly bumble bees in the study sites). The results, say Vamosi, suggest that the contrast provided by the UV pigments in *M. guttatus* helps pollinators locate the flowers against a sea of background vegetation.

Once a pollinator located a *M. guttatus* flower, Rae and Vamosi found that UV reflectance continued to impact its behaviour. Bees visiting control flowers almost always oriented themselves correctly on flower, landing on the lower petal with their heads pointed towards the source of nectar. In contrast, pollinators landing on treatment flowers oriented correctly only half of the time. The rest of the time they landed on the wrong petal or faced the wrong direction.

What happens next may be just as important, at least to *M. guttatus* flowers hoping to be cross-pollinated. Whether or not a bee oriented successfully on its first visit also had a big impact on how many other monkey flowers it visited in the study quadrat. Vamosi says that bees that stumbled in their first attempt find nectar were 10 times more likely to leave the flower patch.

The results shed interesting light on the role of UV reflectance in the pollination ecology of *M. guttatus*. “Much progress is being made towards mapping the *M. guttatus* genome, and this could soon open the door to exciting studies that examine how fast plant species can evolve to changing pollinator conditions. An important step can include estimating the number of genes involved in the development of floral traits such as UV reflectance” says Vamosi.



Top: CANPOLIN researcher Jana Vamosi; Bottom: *M. guttatus* in the field and (inset) as seen through a UV lens (photos courtesy of J. Vamosi)

CROP POLLINATION BMP GUIDE NOW ONLINE

CANPOLIN's new website on best management practices for crop pollination is now live!

Visit www.pollinator.ca/canpolin to learn more about the breeding systems and pollination requirements of 35 of Ontario's crops, along with recommendations for using managed pollinators and encouraging native bee populations.

This project was made possible through funding from OMAFRA and the website is hosted by our partner organization Seeds of Diversity.

In Memoriam

It is with great sadness that CANPOLIN mourns the passing of one of its graduate students, Sarah Gunderson. Sarah was a MSc student at Trent University under the supervision of Marcel Dorken and Erica Nol. Originally from Thompson, North Dakota, Sarah did her BSc at the University of Minnesota and was planning to pursue a PhD after she finished her MSc next spring. Sarah was driving home for the holidays when her vehicle was struck by another car. Sarah was a much beloved member of her lab and will be remembered for her sense of humour and eagerness to learn. Donations can be made in Sarah's name to a conservation society of your choosing, or to the Agassiz National Wildlife Refuge: USFWS – Sarah F. Gunderson Memorial (Agassiz NWR, 22996 290th Street NE, Middle River, MN 56737).

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