



# Insectary Notes

## November / December 2011

### From the Editor



I sit quietly at my desk, waiting for the other shoe of winter to drop on my head. I know that the mild holiday temperatures will move on as January blusters to our doors.

As many Canadians dream of visiting a warmer climate, Gina has written an article on the Monarch butterfly genome project and its connection to the butterfly's remarkable migration.

Just in case you were sure that all the insects had gone "away," the western conifer seed bug has wandered in to prove you wrong.

'Til next time,

*Jacqui*

Editing . . . a Rewording Activity

### Say What and Quotes



A closed mouth gathers no foot.

A flying particle will seek the nearest eye.

Boldly going forward because we cannot find reverse.

*Afternoon: that part of the day we spend worrying about how we wasted the morning.*

Assumption is the mother of all foul-ups.

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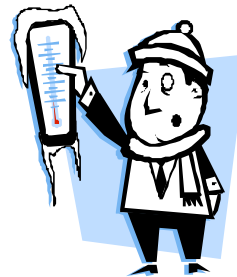
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*Bare feet magnetize sharp metal objects so they always point upward from the floor.*

An object at rest will always be in the wrong place.

*An object in motion will always be headed in the wrong direction.*

Any horizontal surface is soon piled up.

*Always try to stop talking before people stop listening.*

## Provincial Forest Entomologist's Overview

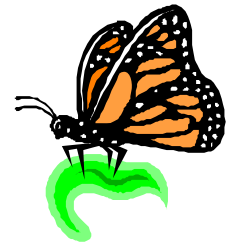
### ..... What's the Buzz?

Gina Penny

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#### Monarch Butterfly Genome Sequenced - Provides Clues to Migration

In a step toward understanding its remarkable navigational prowess, neurobiologists from the University of Massachusetts Medical School have decoded the genetic blueprint (A.K.A. genome) of the iconic monarch butterfly (*Danaus plexippus*) (Johnson, 2011). The monarch is the first butterfly species to have its genome sequenced (Anonymous B, 2011) and it is the first complete genome of any animal that migrates long-distance (Anonymous D, 2011).



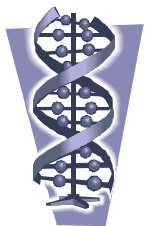
#### Monarch Migration

The lengthy monarch migrations, up to 4,000 kilometres, have long fascinated researchers, who have wondered exactly how animals know to undertake such epic journeys, and how they find their way (Johnson, 2011). Each fall, millions of monarch butterflies take a remarkable journey south which spans generations and countries (Johnson, 2011). Migratory monarchs leave from the Northeast and head for the mountains of Mexico where they spend the winter, roosting in a pine-fir forest. As winter comes to an end, they begin flying back northward laying their eggs on the milkweed plants in the Southern United States, living for nine months. Their offspring then make the next leg of the journey north before mating

and laying their eggs, dying after about a month. Their offspring repeat the process, moving farther north, until an environmental signal - perhaps fewer daylight hours – tells one generation to head south (Johnson, 2011, Anonymous B).

How do these insects know where to go? They've never been to the overwintering sites before and have no relatives to follow. So there must be a genetic component underlying the butterflies' migratory behaviour (Harmon, 2011, Anonymous C, 2011). The researchers at the University of Massachusetts have been studying the migration of monarchs for years, and are mostly interested in how their brains incorporate information in time and space to help guide them (Anonymous, 2011).

#### How Did They Sequence the Monarch's Genome?



The research team focused their genome analysis on pathways known to be critical for monarch migration, including those responsible for vision, the circadian clock and oriented flight. The genome also revealed the complete set of genes required for synthesizing juvenile hormone. Changes in that hormone are required for migrating butterflies to shut down reproduction and extend their lifespan up to nine months. By comparison, non-migrating monarchs only live for about a month (Anonymous D).

To determine how monarch butterflies make the epic journey the researchers used a variety of approaches and were particularly interested in how the butterflies' brains incorporate information in time and space to find their way (Anonymous D). They sampled wild female butterflies and used next-generation technologies to decode their DNA, they tethered butterflies in an insect flight simulator, operated on butterfly brains the size of a pin, and studied hundreds of the orange-and black-winged butterflies captured at various spots along their migration route (Johnson, 2011).

## What Did They Find?

The monarch's genomic sequence provides the raw material for understanding the remarkable behavioral and physiological adaptations that enable its long-distance migration (Anonymous C).

Within the monarch's genetic blueprint the researchers found several gene groupings that help to explain how they know where to go. Compared with other genetically sequenced insects, the monarchs have different genetic patterns in visual areas, which might help them gather cues from the sun to guide their route. The research also found genetic clues about how the circadian clocks of

monarchs differ from those of other animals, which might help them respond differently to light during their travels (Harmon, 2011).

The researchers also compared the monarch's genome with sequences from a dozen other insects including the silkworm (*Bombyx mori*) and two mammals. Along with insights into similarities and differences between the monarch and silkworm genomes, the team found evidence that the Lepidoptera, the order that contains moths and butterflies, has evolved more quickly than other insect orders characterized to date (Anonymous B).

## Why does it Matter?

Understanding the genetic basis of long-distance migration in the monarch may help the researchers understand these mechanisms more generally in other migrant animals, including migratory birds and sea turtles (Anonymous C, Anonymous B, Johnson, 2011).



A more precise understanding of how the butterfly's remarkable circadian clock functions may also shed light on human disease, e.g., heart attacks, major depression and seasonal affective disorder. Research has made it clear that circadian rhythms play a pivotal role in human health, and the butterfly's clock may provide a simpler, but similar, clock to study (Johnson, 2011, Anonymous C, 2011).

## References

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## Bits and Pieces

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### Western Conifer Seed Bug

Jeff Ogden

The western conifer seed bug, *Leptoglossus occidentalis*, is a species of true bug (Hemiptera) in the family Coreidae or leaf-footed bugs. The adults average between 1.5 - 2.0 cm in length and approximately 0.5 - 0.7 cm in width. Most of their body varies in color from a reddish brown to a grey brown with a wavy white line across their forewings. This species has previously been considered a western species and is a recent addition to Nova Scotia with the first adults appearing in the early 2000's. Both the nymphs and the adults feed on the seeds of the pines throughout the summer. It has not yet been reported as a pest in this region. *L. occidentalis*, is most noticeable when it starts showing up in homes in late fall or early winter where it is attempting to escape the weather and overwinter. It cannot breed in houses and is not known to be harmful to people. In houses no chemical control is necessary. Simple removal of the insect from the house as well as ensuring doors and

windows are properly screened and sealed, to prevent entry, should eliminate the problem.

As this is a new potential pest to the province more information we have on the species the better. Please forward any specimens of this insect to the Insectary so we may get a better idea of their distribution.

#### Reference

Swann, J. 2003. Western Conifer Seed Bug. Pest Diagnostic Clinic, University of Guelph: <http://www.uoguelph.ca/pdc/Factsheets/Insect/WesternConiferSeedBug.htm>



**Fig. 1** Western conifer seed bug (enlarged).

### Welcome to New Forest Health Personnel

Jim Rudderham.

We are pleased to announce that Tanya Borgal has joined Forest Health as one of our full time Forest Health Specialists. Tanya worked with the Department of Natural Resources for three fire seasons on the Waverley Firecrew and with Forest Protection during the Forest Health Conference in 2010. She graduated from Forestry (UNB) in 2003 and brings knowledge of various forest pests from previous work experience.

We welcome Tanya to the section and look forward to her new ideas and enthusiasm for our work.

### Whitemarked Tussock Moth Egg Mass (WMTM)

Tanya Borgal

In the late fall and early winter, Pest Detection Officers, Forest Health Specialists, and Forest Protection Officers were out looking for WMTM egg masses (Figure 2) as part of our overwintering surveys. The information collected is used to estimate where problem spots could be in the coming year. Results are being compiled and will be presented in the next newsletter.

Thanks to all who helped out with this survey!



**Fig. 2** Whitemarked tussock moth egg mass (enlarged).



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## Project Updates

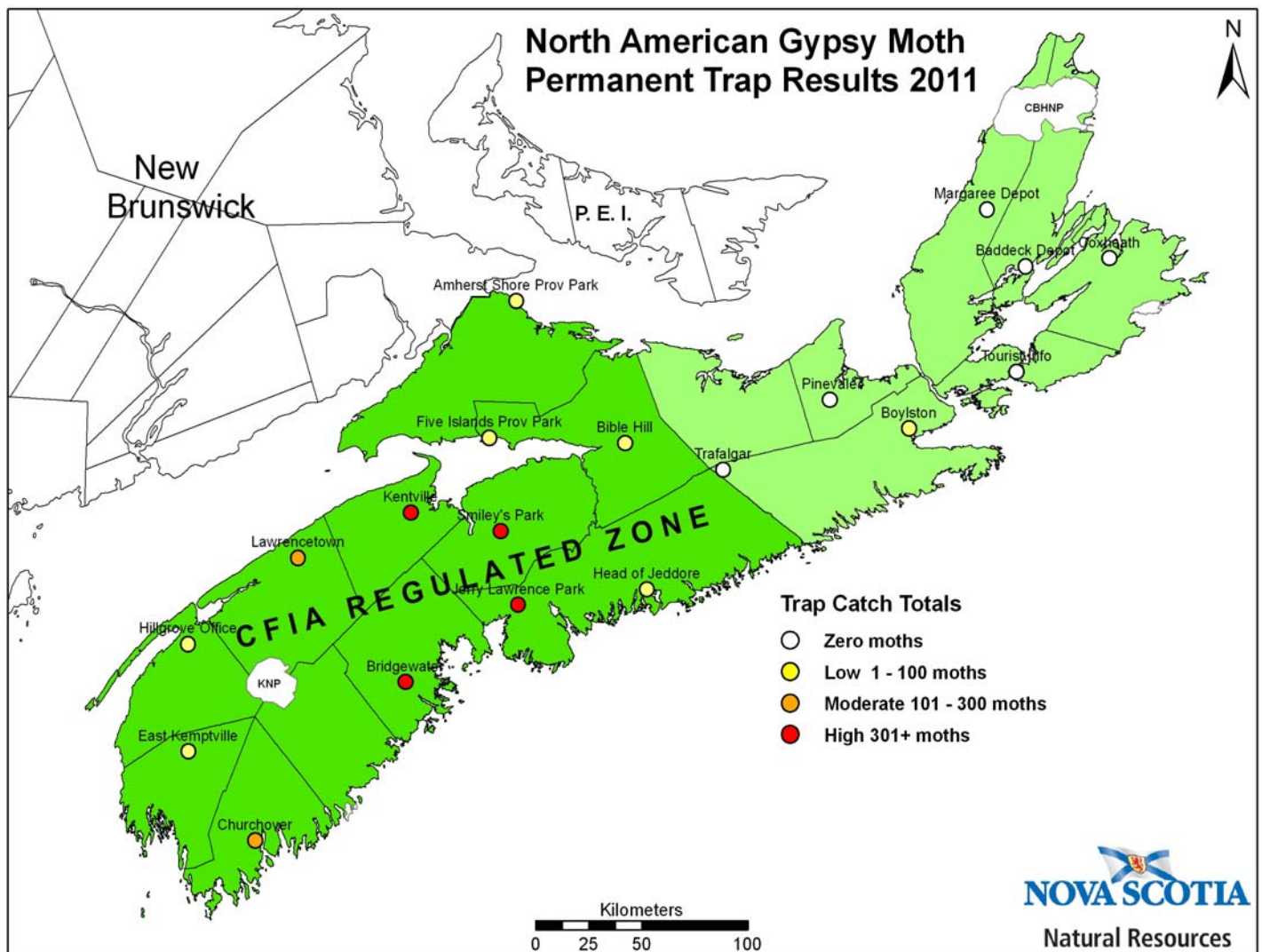
### Gypsy Moth Pheromone Trap Surveys

The gypsy moth pheromone trap survey is done in two parts. The permanent (Multiplier) traps are placed across the province to provide a snapshot of the current years population (see map, Figure 1.) Cardboard Delta traps are also placed but this part of the survey is done in the area outside the Canadian Food Inspection Agency (CFIA) Regulated Zone (see map, Figure 2). Both types of traps are placed by the Pest Detection Officers.

### Permanent Traps

This year catches continue to be high in Hants, Lunenburg, and Kings Counties. The trap in Halifax County increased from a Moderate rating to a High rating (2010 = 115 moths, 2011 = 741 moths). The trap in Annapolis County dropped from a High rating to a Moderate rating (2010 = 311 moths, 2011 = 159 moths). All other traps remained consistent with 2010 catches.

There were no reports of defoliation.



**Fig. 3 Gypsy moth permanent trap (Multiplier) results, 2011.**

The information on this map may have come from a variety of government and non government sources and is subject to change without notice. The Nova Scotia Department of Natural Resources accepts no liability for errors, deficiencies, or faults on this map.

### Delta Traps

Delta traps are placed to monitor population spread outside the CFIA regulated area. The catch information is shared with the CFIA to assist them with their population assessments.

Ten traps were placed in each town or community. The location to note this year is New Glasgow. Since 2009, the trap catches and trap catch average have dropped . . .

Table 1: COMPARISON OF GYPSY MOTH TRAP RESULTS FROM NEW GLASGOW, NS, 2009-2011

Location	2009		2010		2011	
	Total catch	Average catch	Total catch	Average catch	Total catch	Average catch
New Glasgow	<b>195</b>	<b>19.5</b>	<b>139</b>	<b>13.9</b>	<b>82</b>	<b>9.1</b>

All other locations' catches remained consistent with 2010 data.  
Thanks to the Pest Detection Officers who participate in this survey.

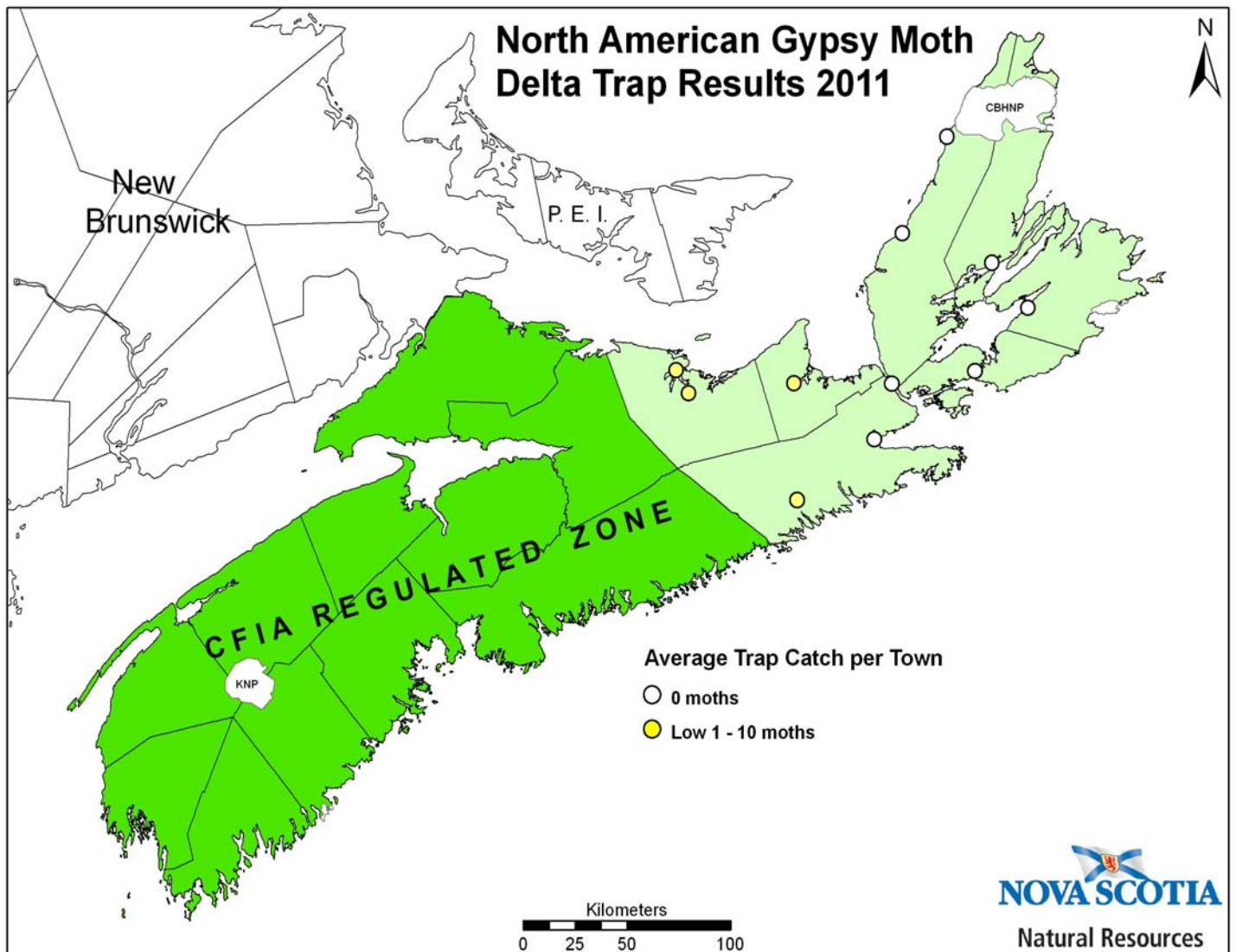


Fig. 4 Gypsy moth delta trap survey results, 2011.

The information on this map may have come from a variety of government and non government sources and is subject to change without notice. The Nova Scotia Department of Natural Resources accepts no liability for errors, deficiencies, or faults on this map.

# The Last Laugh . . .

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## Lessons to Learn from a Snowman



- ✧ Wearing white is always in style - even after Labor Day.
  - ✧ Getting outside in the winter is good for your health.
  - ✧ It's fun just to hang out in your front yard.
  - ✧ We're all made up of mostly water.
  - ✧ Accessories don't have to be expensive.
  - ✧ Don't get too much sun!
- ✧ If you're a little bottom heavy - hey, that's okay!
  - ✧ You know you've made it when they write a song about you.
  - ✧ If you look down and can't see your feet - you're probably not very active.
  - ✧ Sometimes sweating too much can have disastrous results.

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## Travel Tactics

Mr. Smith was a traveling salesman and was always careful to mark his luggage so that no one would mistakenly take his bags. He used bright ribbons and tape, so he was quite surprised to see his bags grabbed by a well-dressed man.

Mr. Smith pointed out the coloured ribbons tied to the handle and the fluorescent tape on the sides.



"Were your bags marked like this?" he asked.

"Actually," the man replied, "I was wondering who did this to my luggage."

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## Family Duet

Little Harold was practicing the violin in the living room while his father was trying to read in the den. The family dog was lying in the den, and as the screeching sounds of little Harold's violin reached his ears, he began to howl loudly.



The father listened to the dog and the violin as long as he could. Then he jumped up, slammed his paper to the floor and yelled above the noise, "For goodness sake, can't you play something the dog doesn't know?"