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The Newsletter of the
Newfoundland & Labrador Beekeeping Association

September 28, 2017

DEAR READERS

Another beekeeping season has come and gone. Our summer was late getting to us, but I think we can all agree it was a great one. The Newfoundland & Labrador Beekeeping Association would like to wish all our members a short and successful winter.

WHAT ADVICE WOULD YOU GIVE A FIRST YEAR BEEKEEPER?

As we all know, our first year can be quite the learning curve, and sometimes rather worrisome. We asked our members to share a piece of advice they would give a first year beekeeper. Here are some of the responses:

- Shelley writes – “Attend a training session with local producers and see what they are using and what works before you get into it. There are a lot of materials on the market these days. A lot of it is just a waste of money or will not work for us. I love the design that Gerard Smith has come up with for additional ventilation in the hive and it works great. Read lots of books. Check out recommendations from other producers for suggestions.”
- Regina writes – “I would never approach a beehive without a smoker and proper protective clothing! I have lived to regret this mistake!”
- Jeff writes – “Don't buy all the gear and gadgets. The bees don't need it and neither do you. This includes things like full bee suits (jackets with veil would suffice), frame spacer tools, fancy feeders, frame gripping tool or frame stand, etc. Most of these things were invented for people to make money and you think you need them. Spend less time in exploring your bees than you want versus what you need. They know what they need for the most part. Your only purpose is to supplement their needs to get them through the first winter (feeding, insulation, ventilation). Mostly just feed the snot out of them. Personally, I do not even use smoke. I have not even lit my smoker this year. It's a personal choice, but I feel adding smoke to the hive disrupts it and sets them back a day or two. That adds up if the queen is disrupted every two weeks. As a nuc grows, you need to manipulate foundation/frames to encourage wax placement on foundation. The same applies for drawing out honey super comb. Once the bees pull one or two frames, I like to checkerboard foundation and frame to encourage comb to get drawn out. Last but not least, is feed. Whether prepping for winter or building nucs, feed often and feed early. Also, if planning to harvest honey, do not feed production colonies. If you feed colonies (nucs) that are building, feed in such a way to not encourage robbing. This

Editor Cody Reid, (communications committee)

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Contributors:

Peter Armitage Dr Barry Hicks

Catherine Dempsey

Thanks to members of the NLBKA who shared some experiences.

The NLBKA is looking for article submissions to appear in future issues. Share handy tips, review a book, ask questions!



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includes reducing entrance size, not spilling syrup around nucs to attract foragers from larger colonies, etc.”

- Dean writes – “Start earlier in life. I build all my own equipment and I take great pride in it. And cannot be short on supplies (just time). I made my own veil — the only protective gear I use other than kitchen gloves. Although it looks a little odd, it's a source of pride. Advise I would give to others is to not be afraid to try it yourself; you can do anything you want to do. Certainly, do not listen to others trying to tell you that you cannot do it because you know yourself best. Finally, like with all woodworking, measure twice, and then check your measurements (or plans) once more for good measure.

Thanks to all who wrote in to share their thoughts!

FALL TIPS – Cody Reid

Unfortunately, for those of us who enjoy those warm summer days, it's all coming to an abrupt end. This is the time of year when you should be checking your hives to ensure you have a successful winter.

I've compiled some tips on what you can do to improve chances of hive survival through our long winter months:

- Keep feeding your hive a 2:1 sugar syrup mix up until the bees won't take it anymore due to cold. This encourages the queen to continue laying, meaning younger bees going into winter. In saying this, you want to be careful not to make your bees “honey bound”. This is when they start putting the syrup where brood should go. You may also want to feed them a pollen substitute.
- Your hive should have approximately 120 pounds of honey, or about 12 full frames of honey going into winter. Some hives may consume more, and some less. This all depends on genetics and weather.
- During your last inspection of the year, take any empty frames that the bees have not drawn, and move them to the outer sides of the hive, keeping the frames of capped honey in the center.
- Consider combining your weaker hives together. If you feel a hive is weak and will not stand the winter months, you may want to pinch that queen and combine them. Alternatively, some people reduce to one brood box and stack them with on top of other colonies, providing them with warmth.
- Some people wrap their hives with bee cozys or roofing felt, and some choose not to. This is personal preference, as we've seen success with both here. What I will suggest if you do choose to wrap, is to consider ventilation. Don't overwrap your hives. When bees move about consuming honey in the winter, they create moisture. You need to create a way for that to escape. Some beekeepers provide ventilation by placing popsicle sticks around the rim of the upper deep, between the deep and the inner cover, creating a small gap and allowing moisture to escape.
- Some others choose to combat moisture by using “moisture quilts”. Plans to build these can be found online, and they're relatively simple to make. I simply use an inner cover

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with a few extra holes drilled in it, covered with wire mesh and a ventilation rim filled with wood shavings.

- If you feel your bees don't have enough honey stores, you may want to consider supplementary feeding. I've found success in using candy boards. Plans for these can also be found online. You can add these on a nice, sunny day through the winter.
- Protection from wind is also an important topic. Consider moving your hives to a well-protected area, or set up a wind barrier around your hives.

Remember, if you have any questions, feel free to reach out to other members on our Facebook page or Forum (BBS). If you'd like to contribute to our "Tips" section in the newsletter, feel free to e-mail me at Brandon-c@hotmail.com

BENEFICIAL FLORA – GOLDENROD (*Solidago*) – Cody Reid

Given the time of year, I thought *Solidago*, or more commonly known as Goldenrod, would be a fitting flower to discuss as beneficial flora.

Goldenrod blooms in Newfoundland and Labrador in late August, and continues to bloom well into the later parts of September, or even early October for many parts of the province. It's especially important to our honey bees because it is one of the last blooming flowers of the season. Therefore, it's the bees last major food source for the year. You can often see bees coming in with yellow pollen this time of year, most likely from this flower. If you take a stroll through a Goldenrod patch near your hive, you'll most certainly confirm this.



1. photo courtesy Dean Klemola

There are several types of Goldenrod here in our province including Canada Goldenrod (*Solidago canadensis*), Lance-leaved Goldenrod (*Solidago graminifolia*), Northern Goldenrod (*Solidago multiradiata*), and Rough-stemmed Goldenrod (*Solidago rugosa*). In many parts of Europe, and Asian countries such as Japan and China, it has been considered an invasive plant. Apparently it's even growing in abandoned rice fields near Fukushima.

As many of you know, it's very well established on the Island of Newfoundland. It can be spotted growing abundantly beside ditches and open fields near our communities and highways.

I've taken notice that there isn't much Goldenrod near my apiary. You can purchase seed online (be careful not to introduce invasive plants here!), or you experiment like me. Once the Goldenrod is pollinated, and dies off in late autumn, the flowers will turn a whitish color. If you look closely you can see its seeds waiting to be blown around by the wind. I'm collecting these seeds and distributing them near my colonies to germinate over the winter. If you try this, be sure to share your results with us next fall!

OUR BEE FRIENDS – Dr. Barry Hicks

Digger Bees

These bees belong to a family of bees known as the Andrenidae. All species nest in the soil and most of them are strictly solitary in habits. All Newfoundland and Labrador members of the family belong to the genus *Andrena* and 14 species have been recorded. They are small to medium-sized bees that may be mistaken as honeybees by the untrained eye (Fig. 1). The bees carry the pollen on hairs of the hind legs but do not have a pollen basket as seen in honey bees and bumble bees. The females line the brood cells with secretions from the Dufour's gland at the end of the abdomen which gives a waxy appearance to the walls of the cells.



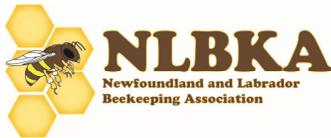
Fig. 2. *Andrena milwaukeensis* female.
One of the first bees to be seen in the
spring. See the pollen on her back legs
(photo courtesy Barry Hicks).

WORD FROM OUR PRESIDENT

Well, after a late start, what a summer we had! From reports I have heard that many people's hives have been doing really well. For a number of people this has been their first year taking some honey for themselves. Of course, you won't be taking honey if you have been feeding sugar syrup to your bees, because the honey will not taste like meadow flowers. So that means you should not take honey in your first year. Dr. Dan Price's advice for an established hive is to feed in the spring until forage are coming, let the bees forage without feeding syrup in the summer, take your honey in August, and then feed them to build up their stores for the winter. A hive should have about 120 pounds of honey in it going into the winter. That is about 12 full frames in the deeps.



Other reports are now coming in about wasp problems and robbing at their hives. I am glad to have heard of a few people who have been able to get robber screens on and to handle the wasp problem. We had a large wasp nest that formed on the side of a shed near our hives. My husband destroyed it, and so the few wasps that are still around have been manageable for



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us. Wasp traps help, and if you can put them out in the spring you might prevent a nest from forming that will be a bigger problem in the autumn. Remember to close down your entrance size so the guard bees have an easier time fighting off the wasps. And don't spill a drop of sugar syrup while filling your hives!

The upcoming big event for the Association is the third annual Workshop which will be held November 3, 4 and 5th at the Mount Peyton Hotel in Grand Falls-Windsor. The Association recognized from the beginning that we have a province-wide membership, and that it might make it easier for people in Central and Western Newfoundland to join us if we hold the meeting in their areas every so often. The tentative schedule we would like to work towards is Avalon, Central, Avalon, Western, Avalon Central, etc. Central means about four hours driving from the St. John's area. I hope we get a good turnout from Western and Central, as well as from brave Avaloners who will venture past the overpass!

Our lineup of topics and speakers looks really interesting. Dr. Robyn McCallum from Perennia in Nova Scotia will talk about what it takes to develop a Tech Transfer Program for Newfoundland & Labrador. Fletcher and Mary Colpitts have been keeping bees for 30 years in New Brunswick. They also contract to do hive inspections for the New Brunswick government. They are looking forward to sharing their experiences with us.

We also have our own experts. Entomologists Dr. Julie Sircom and Dr. Barry Hicks will bring us information on their research. Our experienced beekeepers will talk about different techniques for swarm control, and our NLBKA Research Committee will report on the survey the association conducted early this summer. And, our Provincial Apiarist, Karen Kennedy, will bring an update on the Province's work regarding beekeeping and explain the implications of the results of the Canadian National Honey Bee Health Survey.

Thanks to Joan Veitch, the MUN Botanical Garden has a thriving honey bee colony on display in its pollinator garden. She has been tending the bees there with help from some of the Garden staff.

I want to thank all of the people who helped us sell bulbs for our fundraiser. Between us all, we sold over \$3,000 worth of bulbs, which will contribute \$1,500 to the NLBKA funds. More importantly, it puts a lot more crocuses and early season plants out for forage for both honey bees and native pollinator species. The bulbs will be delivered about the third week of October.

The Association has had a number of requests to put displays in various agriculture fairs, as well as participate in school programs. Thanks to Paul Dinn, Sharon Tilley, Aubrey Goulding, Eric Leonard, Dan Price, Karen Youden Walsh, Maggie Keiley, Rodney Reid, Brad Smith, and Cody Reid for taking the lead on a number of these activities, but we have had to refuse participation in a few events because we don't have enough members to do them all. The Association is going to come up with a more pro-active plan for next year. We really welcome members to come out and help for a couple of hours here and there so that we can continue to build our beekeeping community.

I look forward to seeing you at the Workshop. Be sure to register soon!

Catherine Dempsey



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WORKSHOP DETAILS

Annual NLBKA Workshop:
November 3rd, 4th and 5th
Mount Peyton Hotel, Grand Falls-Windsor.

Friday, November 3, 2017

12:00 – 3:00	Registration		Mount Peyton Hotel
2:00	Early Bird Practical Workshops		Mount Peyton Hotel
	A. How Inspections Work	Mary Colpitts	
4:30 – 10:00	Visit to Exploits Farm Apiary BBQ and Meet and Greet	Rodney Reid & Brad Smith	Exploits Farm, Bishop's Falls

Saturday, November 4, 2017

Mount Peyton Hotel

8:00	Registration & Breakfast		
8:45	Welcome	Catherine Dempsey	President NLBKA
9:00	Keynote Address Sustainable Beekeeping Challenges in an Isolated Location	Fletcher Colpitts	Beekeeper, New Brunswick
9:45	Results from NLBKA beekeeper survey	Dr. Stephen Walsh	NLBKA Research Committee
10:15	Bee research at Grenfell Campus	Dr. Julie Sircom	Asst. Prof. Mun Grenfell
10:45	Nutrition Break		
11:00	Panel Discussion Overwintering Practices and Disease and Pest Management	Gerard Smith Dr. Robyn McCallum Karen Kennedy Fletcher Colpitts	
12:00	Luncheon & Prov. Presentation Effects Of New Crops Plantings For Bees, And Encouraging Commercial Beekeeping	Agrifoods Rep	Invited Dave Jennings
1:00	The Lighter Side of Beekeeping	Mary Colpitts	
1:30	Provincial Report on Beekeeping	Karen Kennedy	Provincial Apiarist
2:00	Swarm Management Techniques Demaree method Swarm Traps	Peter Armitage Dr. Dan Price Fletcher Colpitts Jeff Harris	
3:00	Nutrition Break		
3:30	Pathogen Crossover and Pollination (Native Pollinators and Honey Bees)	Dr. Barry Hicks Dr. Robyn McCallum	
4:15	End of Afternoon Session		
7:00	Banquet Developing a Tech Transfer	Dr. Robyn McCallum	



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Program for Newfoundland

Sunday, November 5, 2017

8:00	Breakfast	
8:30	Hive Comparisons	Fletcher Colpitts
	The Pros and Cons	
9:15	Urban Regulations for Beekeepers	Catherine Dempsey
9:45	Priorities for next Workshop/Regional Discussions	

Presenters:

Fletcher and Mary Colpitts

Fletcher Colpitts is a third generation beekeeper from the Petitcodiac area in New Brunswick. His love, understanding and ability to work and keep bees is a lifetime passion. Fletcher and his wife Mary have practical beekeeping experience from their many years of maintaining hundreds of hives. They have been able to sustain their operation by producing their own bees and equipment. They have produced for sale bees, wax, candles, natural wax foundation and liquid or comb honey. They also rent their hives out for pollination services to the blueberry growers in New Brunswick. Fletcher and Mary are contracted by the Department of Agriculture, Aquaculture and Fisheries of New Brunswick. Fletcher is the Chief Apiary Inspector responsible for hive health in the province. They enjoy meeting and working with their fellow beekeepers to help them maintain strong healthy colonies.

Dr. Robyn McCallum

As part of the Atlantic Tech Transfer Team for Apiculture (ATTTA), Robyn works with beekeepers and lowbush blueberry growers to improve the pollination capacity within the region. She is focused on improving bee health and nutrition, improving disease and pest monitoring and management, and improving overwintering success. Robyn is involved in both research and extension work as part of ATTTA. She has recently finished her PhD (Biology) where her thesis focused on enhancing lowbush blueberry systems for native pollinators and natural enemies. Robyn and her partner farm about 600 acres in northeastern New Brunswick. She is a Director with the New Brunswick Young Farmers' Forum and has participated in the Canadian Young Farmers' Forum national roundtable discussions. She is a professional agrologist, and is passionate about agriculture.

Nosemosis (*Nosema* disease) - Peter Armitage¹

Editor's note: this is the first in a five part series discussing diseases that may affect honey bees in Newfoundland and Labrador. In future newsletters, we'll cover American Foulbrood, Chalkbrood, European Foulbrood, and Sacbrood Virus.

The germ theory of disease wasn't even an idea back in 1617 when honey bees were first brought to the Island of Newfoundland (Crane, 1999). We owe it to pioneering 19th century scientists like Robert Koch and Louis Pasteur to prove that infectious diseases are caused by germs, micro-organisms — bacteria and viruses. Not surprisingly, then, our knowledge of honey bee pathogens is a product of the bioscientific revolution. Gershom Franklin White is credited with groundbreaking pathogen research related to honey bees having demonstrated conclusively in 1907 that the bacterium *Bacillus larvae* is the cause of American Foulbrood (AFB) disease (White, 1907). *Nosema apis* was described by Enoch Zander in 1909, and Sacbrood Virus in 1913, again by White (Huang, 2011; Pernal and Clay, 2013, p.23).

The domestic Newfoundland and Labrador (NL) honey bee stock(s) has several apparently endemic pathogens, many if not all of which may have arrived with our beekeeping pioneers going back to the 1970s. Prior to the Canadian National Honey Bee Health (CNHBH) Survey in 2016 (NBDC, 2016), the domestic stock of honey bees in Newfoundland and Labrador (NL) was surveyed for various pathogens, pests and disease in 2004, 2007, 2009 (Williams, et al., 2010, p.585), and 2010 (Shutler, et al., 2014). Rogers' informal surveys in 2004 detected AFB, Chalkbrood, and European Foulbrood, but not Tracheal mites or *Varroa destructor* mites (Williams, et al., 2010, p.585). *Nosema apis* was detected for the first time in 2007 (Williams, 2010, p.3). Additional testing in 2009 confirmed the presence of *Nosema apis* in the NL honey bee stock and the absence of Tracheal and *Varroa* mites (Williams, et al., 2010, p.586).

The belief, therefore, that the domestic NL honey bee stock is “clean” is wrong. What sets this stock apart from the rest of North America, however, is the current absence of *Varroa destructor*, Wax Moth, Small Hive Beetle, and Tracheal Mite. The domestic NL stock appears also to be free of Acute Bee Paralysis Virus, Chronic Bee Paralysis Virus, Israeli Acute Paralysis Virus, and Kashmir Bee Virus, as well as AFB, although there have been outbreaks of the latter as recently as 15 years ago.

This article focuses on two common, closely related and potentially serious honey bee pathogens – *Nosema apis* and *Nosema ceranae*. Much has been written about these pathogens, and readers are referred to the beekeeping and scientific literature for more information (e.g., Dyce Lab for Honey Bee Studies, nd.; Fries, 2009, 1997; Huang, 2011; Pernal and Clay, 2013; Pettis, et al., 2015; Ritter, 2015; Sammataro and Avitabile, 2011).

Nosema apis* and *Nosema ceranae

Nosema spp. are a spore-forming fungi that invade the digestive epithelium (cell lining) of the honey bee midgut. The pathogen may remain as a “covert” or “inapparent” infection with no

¹ **Cautionary note.** Like many if not most matters apicultural, this topic is very complex. The author is a beekeeper who reads a lot, not an expert on honey bee pathogens or diseases. Please consult the relevant beekeeping and scientific literature for more detailed information. The references for this article are a good starting point. Thanks to George Carayanniotis, Catherine Dempsey and Dan Price for helpful comments on an earlier draft of this article.

clinical symptoms for years, and for that reason it is often overlooked by beekeepers. However, it may erupt into a severe “overt” infection (Nosemosis, *Nosema* disease) depending on a combination of factors, and may threaten colony survival. *Nosema* is transmitted horizontally among, and vertically within, colonies by way of trophallaxis (exchange of regurgitated liquids), common water sources and packaged or caged queens, in comb, honey and pollen, and by drifting and robbing foragers contacting fecal material on frames and combs in neighbouring hives.² Spores are viable in fecal material for more than a year, and it takes only a few of them to infect bees (Pernal and Clay, 2013, p.17; Sammataro and Avitabile, 2011, pp.190-191).

Nosema apis affects colonies mostly in later winter and spring when bees have been confined to the hive for lengthy periods of time, not able to leave on cleansing flights. Poor nutrition and cold, wet weather appear to aggravate the disease. *Nosema ceranae* infection peaks in the spring and early summer but is a risk to colonies throughout the year. The major difference between the two species is that heavy *Nosema ceranae* infections do not cause the fecal staining associated with *Nosema apis*, which is why it is sometimes referred to as the “dry *Nosema*” (Penn State Cooperative Extension, nd.). Furthermore, *Nosema ceranae* “can cause a bee colony to die within eight days after exposure, much faster than with *N. apis*. It appears to affect foraging bees the most, killing them while they are outside and leaving the home colony weak” (ibid., p.193). *Nosema apis* proliferates only in older bees, but *Nosema ceranae* will also proliferate in “shorter-living summer bees, and thus causes typical symptoms, especially crawling bees, throughout the year” (Ritter, 2015). For reasons that remain unclear, it appears that *Nosema ceranae* quickly becomes the dominant, more prevalent species wherever it becomes established (Pettis, et al., 2015, p.843; Ritter, 2015).

Testing of NL bees sampled in 2010 was negative for this species (Shutler, et al., 2014). However, the researchers who conducted the testing could not “state with absolute certainty that *N. ceranae* is absent in Newfoundland honey bees due to our initial positive detection in two colonies. Constant vigilance is therefore required” (ibid., p.7). Testing in 2016 as part of the CNHBH Survey confirmed the presence of *Nosema ceranae*.³

Symptoms and Diagnosis

The classic symptom of a full-blown, severe *Nosema apis* infection is fecal matter splattered all over the front of hives, landing boards and frames. However, there are a large number of additional symptoms that beekeepers should consider when compiling evidence for an outbreak of either of the two *Nosema* species. They are summarized in Table 1.

² In a somewhat outdated article about Nosemosis (ca. 2009), Randy Oliver noted that no one had yet discovered the means of transmission of *Nosema ceranae*, given that dysentery is not associated with infection by this species (Oliver, nd).

³ *Nosema ceranae* was detected in samples from four of five apiaries in the survey (NBDC, 2016).

Table 1. Symptoms of *Nosema apis* and *Nosema ceranae* infection (from Dyce Lab for Honey Bee Studies, nd.; Penn State Cooperative Extension, nd.; Ritter, 2015; and Sammataro and Avitabile, 2011).

<i>Nosema apis</i>	<i>Nosema ceranae</i>
<ul style="list-style-type: none"> • Feces on combs, top bars, bottom boards, inside and outside walls of hives • Bee crawling aimlessly on bottom board, near entrance or on ground; some drag along as if their legs are paralyzed • Bees unable to fly or able to fly only short distances • K-wing • Swollen and greasy abdomens • Bees not eating when fed syrup • Reduced brood production • Queen supersedure • Reduced worker lifespan • Reduced honey production • Increased winter mortality • Reduced spring build up • Dwindling colony strength • Heavy winter losses 	<ul style="list-style-type: none"> • Usually asymptomatic (i.e., no dysentery). • Crawling bees seen in front of the hive • Swollen and greasy abdomens • Queen supersedure • Reduced brood production • Reduced honey production • Decreases in colony strength can be slow or sudden • Bees often die while foraging • Early death of foragers • Bees not eating when fed syrup

Nosemosis can be hard to diagnose given that other diseases or colony conditions may have similar symptoms (e.g., dysentery), and the fact that colonies may have infections of both *Nosema* species simultaneously.⁴ The standard method of testing colonies for *Nosema* infection, whether symptomatic or not, has been to examine and count spores using a microscope and hemocytometer. A spore count >1 million has been the threshold at which beekeepers would treat the disease.⁵ However, symptoms of disease have been observed with far lower spore counts, and conversely no disease symptoms have been observed with far higher counts.⁶ In the absence of diagnostic equipment, beekeepers sometimes attempt diagnosis by examining honey bee midguts, although this approach is unreliable. “If the midgut (ventriculus) is swollen and a dull grayish white, and the circular constrictions of the gut (similar to constrictions on an earthworm’s body) are no longer evident, then nosema is the culprit....The normal gut is brownish red or yellowish, with many circular constrictions” (Sammataro and Avitabile, 2011, p.192).

⁴ One of five apiaries tested positive for both species in the CNHBH Survey in 2016 (NBDC, 2017:20).

⁵ The 2007 survey to investigate *Nosema* sampled 21 colonies of which 14 were positive for *Nosema* spp. Eleven colonies had bees with spore counts >1 million, with the bees in one colony having 7.5 million spores (Geoff Williams, personal communication, 28 Oct. 2016).

⁶ Paul Kozak, Provincial Apiarist, Government of Ontario, personal communication, Sept. 8 Sept. 2017.

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Heavy dysentery stains on the walls of a hive point to Nosemosis but are not a sure indicator of this disease (photo from Huang, 2011, p.3; see also Webster, 2010).

Nosema ceranae cannot be distinguished reliably from its cousin species without the application of molecular biology methods, namely, polymerase chain reaction (PCR) (OIE, 2013). To-date PCR has been able to determine reliably the presence (+) or absence (-) of the species. However, quantitative PCR (qPCR) that quantifies the amount of pathogen RNA in samples (e.g., 2.21E+09 copies/bee) is not supported by data allowing us to determine a threshold at which the infection is covert and therefore a serious health problem for a colony.

Nosemosis management

The scientific community and beekeepers have much to learn about *Nosema apis* and *Nosema ceranae* given their complex modes of infection, epidemiology and pathology. Nonetheless, beekeepers have developed a number of Integrated Pest Management practices to minimize disease outbreaks and control them when the need arises. These include the following (from Fries, 2009; Perennia, 2016; Pettis, et al., 2005, p.843; Pernal and Clay, 2013; Ritter, 2015; Sammataro and Avitabile, 2011, pp.193-194):

- Maintain strong colonies, and in the fall provide them with young, prolific queens, and a large population of young bees;
- Do not place hives on the ground to prevent ill bees, getting back into the hives (especially crawlers);
- Offer good forage to colonies to the greatest extent possible thereby preventing summer bees getting too old;
- Select good apiary locations with good sun exposure, protection from prevailing cold winds, and good ventilation (i.e., not damp spots that trap moisture);
- Insulate hives for winter and position them facing south to promote cleansing flights when weather permits;
- Provide good hive ventilation during winter (e.g., minimally an upper entrance);
- Supply colonies adequately with carbohydrates (honey, sugar syrup) and pollen or pollen substitute;
- Feed heavy sugar syrup (2:1) in the fall;

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- Provide fresh, clean water to colonies;
- Dispose of comb that is soiled with fecal material, and/or treat combs of dead colonies with 60% acetic acid over a sponge cloth or some other absorbent material;⁷
- Given that *Nosema ceranae* is vulnerable to freezing, freeze comb from infected hives in a deep-freezer (~-18 deg. C) for at least one week.⁸

It is common practice across North America for beekeepers to monitor their colonies routinely for *Nosema* and use chemotherapy in the form of fumagillin to treat their bees when they get spore counts >1 million. Many beekeepers treat with fumagillin prophylactically, whether they have high spore counts and disease symptoms or not.⁹

In conclusion, it is reasonable to expect that news of pathogens and diseases in our domestic NL honey bees comes as a surprise to many novice beekeepers. However, our test results for *Nosema* should not be cause for alarm. They should be cause for vigilant monitoring and education so that we can learn how to prevent, identify and manage *Nosema* disease in the future. Let's work together on these matters for the benefit of our honey bees as well as ourselves as members of a supportive beekeeping community.

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⁷ 120 ml of 60% acetic acid are required for 10 frames of comb (Ritter, 2015).

⁸ See Fries (2009) and Ritter (2015). It appears that freezing comb does not kill 100% of the *Nosema ceranae* spores (Randy Oliver, BEE-L post, 26 Sept. 2017). Nonetheless, freezing appears to terminate significant numbers of the spores, and therefore, appears to be a useful management tool to control the pathogen. Note that freezing, at least at household deep-freezer temperatures, does not kill *Nosema apis* spores, and hence this management option does not apply to that species.

⁹ Fumagillin (Fumagilin-B) is available through many beekeeping supply companies. Consult the relevant beekeeping literature for information about how to administer this drug should you ever need to use it.



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