July/August 2008

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Newsletter E-mailed to You

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Send an e-mail addressed to **listproc@ucdavis.edu**. Leave the Subject line empty. In the body of your message put in the following: sub ucdavisbeenews <your first name (without these "brackets" around it)> <your last name>. On the next line, insert two hyphens, not underscores (underlines). If I were subscribing, it would be:
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The hyphens are there to tell the subscription software on the server not to be confused by any following information that occurs, such as a "signature frame" (or signature block, as I call it).

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Who Landed the Big Grant?

A number of competitive proposals were submitted to the federal government to determine how best to spend the approximately $4 million earmarked to aid the ailing beekeeping industry. The winning proposal was submitted by Dr. Keith Delaplane, Professor of Apiculture at the University of Georgia, Athens. He drew together 19 scientists from 17 institutions around the country to work on finding ways to keep colonies healthy and to disseminate that information to the nation's beekeepers.

Those institutions include Purdue University, University of California - Riverside, Connecticut Ag Experiment Station, Cornell University, Kentucky State University, University of Maine, University of Massachusetts, Michigan State University, University of Minnesota, University of Nebraska – Lincoln, Pennsylvania State University, University of Tennessee, USDA Baton Rouge Bee Lab, USDA Weslaco Bee Lab, and Washington State University.

Canadian Winter Losses

Although the colony losses do not quite resemble those that we in the U.S. are calling CCD, overwintering losses of colonies in Canada the last couple years have been considerably higher than normal. In a statement issued by the Canadian Association of Professional Apiculturists, the losses in the spring of 2008 were about twice the normal average of long-term trends.

With the introduction of *Varroa destructor* into their beekeeping industry, the average winter loss had been around 15%. In 2007 around 29% of the colonies perished. This spring it was around 35%.

Similar to the U.S., not all Canadian beekeepers were affected equally. Regional losses were higher in some locations: Vancouver Island (43%); Peace River District of BC (70%); Peace River District of Alberta (56%); and a cluster of northeastern Saskatchewan producers (50%).

Not surprisingly, the provincial apiarists have been visiting the afflicted operations to try to determine the cause(s) of the losses. Three principal causes seem to be involved: 1. Ineffective control and mismanagement of *Varroa destructor*; 2. Inadequate *Nosema* control (*N. apis* and *N. ceranae* about equal); and 3. Starvation.

Similar to the U.S., Canadian researchers are trying to follow *N. ceranae* infections to determine seasonal occurrence and attempting to develop methods to manage the parasite, including novel therapeutic agents. Researchers are evaluating alternative control options for varroa mites. And there is ongoing research on breeding honey bee stocks that can better tolerate all the stresses currently facing the colonies.

CCD Research

I imagine that many beekeepers and concerned citizens would hope that all the time and effort devoted to trying to discover the root cause(s) of CCD would have revealed something by now.

Actually, there have been thousands of samples examined for organisms and chemicals, and many organisms and chemicals have been found. However, up to this point, there still is no definitive, individual cause that appears to be the culprit.

Recently, researchers using the IVDS instrument in Missoula, Montana, have found a couple previously **unknown to the U.S.** viruses, but they are not new to the bee research literature. The researchers just released the identity of one of the viruses – *Varroa destructor virus 1*. I had mentioned that virus in a previous newsletter, stating that it was discovered in Europe and was capable of replicating in bees as well as in *Varroa destructor*. Does it cause a disease of honey bees? We don't know. Is it a biocontrol for *Varroa*? We don't think so.

With one more virus to be announced, it is likely that there will be even more found as we refine our ability to determine their presence in bee tissues and extracts. Will one of them be the cause of CCD? It is hard to say, but it appears as though we have many more viruses in our bees than we know about. Viruses and insects have been together for millions of years, so it is not surprising.

We do not have a reasonably priced antibiotic for controlling virus diseases in honey bees. So, how are we going to deal with these infections?

Just as honey bee larvae and adults respond to infections of bacteria and fungi, they respond to viral infections. However, the physiological changes in their bodies differ with the microbe. Bees usually produce peptides or enzymes in response to the larger microbes. Viruses aren't affected much by those chemicals. Viruses stimulate an anti-virus process that interferes with viral replication in the infected cells. The cells respond by forming a double stranded copy of the RNA (a common bee virus type) which is single stranded in the infectious virus. The double stranded RNA interferes with single stranded RNA production. The question is, "Is there a way to stimulate this process before infection?"

In mammals, we inject a denatured virus into the skin and form antibodies to the virus. Since honey bees don't form antibodies, will inoculation work? And, how do you inoculate every bee? That would take an awful lot of needles and patience in a hive full of bees and brood.

Researchers are working on that process right now. A company working in that area has a Web site that you can visit: beeologics.com. With many creative minds, and a little luck, someone or a team of someone's, may come up with an answer. We, certainly, are being challenged by many beekeeping problems today, but we have a lot of creative minds involved with trying to find solutions.

If we can find a way to stimulate the anti-viral response in bees, then we should ask the molecular biologists to find out what genes are involved, so that we can survey our stocks and see which ones respond best to stimulation. We would favor those stocks in future selection programs.

And the final question: "Is CCD backing off on its own?" Although it is just too early to say much about how our bees are going to winter this year, many beekeepers with whom I have spoken are telling me that their bees haven't looked this good for many years.

Looking back at aberrant high colony losses over the last 300 years, it seems that the epizootics, or whatever they are, tend to go away on their own, and we never really know what the problem actually was. For the beekeepers' sake, I hope this problem is nearly over. For some of us, however, we will continue to have that nagging feeling of never really being able to determine just what went wrong, AGAIN!

<u>*Nosema ceranae* Control</u>

For months beekeepers have been calling, or contacting me by e-mail, asking me how best to use Fumagilin-B® to reduce *Nosema* spore counts in their colonies.

Before *Nosema ceranae*, we did not have spores in our bees late into the spring and into the summer, but we do now. In fact, the levels of infection can be way above those we considered intolerable with *Nosema apis*. With *N. apis*, high spore levels in the spring meant colonies that slogged along and were lucky to build up to any size by honey production time. However, with *N. ceranae*, we can find spring colonies loaded with infected bees and high spore counts. Those colonies are building normally and even swarming.

Are we about to be devastated by the infections this fall, as the Spaniards tend to think about their bees, or are we going to slip by? We'll have to wait and see.

As for recommendations, all that I can do is regurgitate the instructions on the labels. Do you get control following the label instructions? The answer depends upon whom you ask. In some cases, treatments reduced spore counts just like "normal." In many cases, they did not.

There is a fairly long article, to be published in the next issue of the American Bee Journal, in which Randy Oliver is going to share his preliminary results of trying various treatments for *Nosema* control using the "drench" method. Please read the article carefully. The results are interesting and not terribly predictable. Some beekeepers feel that the tested dosages are just too low.

I believe that it is still true that if you can get the bees to take the medicine at the prescribed dose, it will impact *Nosema* organisms. The trick is to get the dose into the bees. At this time, researchers (and beekeepers) are trying Fumagilin-B in powdered sugar, in pollen substitute, in grease patties, and mixed with all sorts of other ingredients.

I contacted Medivet directly to try to find answers to a few frequently asked questions concerning Fumagilin-B mixed in syrup. These were the responses.

1. The active ingredient in solution can lose 20-30% of its activity in about four weeks of storage. With significantly longer storage, the activity will drop to 50% or less. The company states that the potency will not diminish nearly that quickly, if the bees have taken up the syrup, processed, and stored it.

2. The company is running its own studies, and is working in cooperation with other researchers, to determine if the product is equally effective, or more so, in other delivery formulations, including drenches.

Almond Information

Burchell Nursery, a major supplier of bare root almond trees, sent a little brochure that listed 18 currently producing and 8 non-bearing varieties for 2008. Not surprisingly, Nonpareil has the most acres in production (194,774) and the most non-bearing acreage (31,965). The data for average production, in pounds per acre, shows that Nonpareil is middle of the pack, with 1,762. Butte, Carmel, Fritz, Livingston, Monterey, Padre, Plateau, and Ruby all produce over 2,000 pounds per acre. Aldrich, Avalon, Mission, Price, Sonora, and Wood Colony hover around Nonpareil production.

With around 660,000 acres currently in production, and branches bent nearly to the ground on many trees, the industry is due to set another record in nut production (1.46 billion pounds) and production income. Similarly to last year, the nut numbers are going to be enormous, but the nuts are going to be smaller than desired.

Some very serious decisions have to be made about almond trees, right now, concerning what will happen next year. The trees need to be irrigated in order to set the bloom for next season. Is there enough water to do this? Will there be water for the trees next year? Do the growers cut back on water and rogue some trees to keep their better trees going? Some growers have many acres in non-almond crops. The water for those crops can be used for almonds, if annual crops aren't planted. Growers with solid almond acreages do not have that relief supply. In fact, it may be that many orchards will not have water for next season, and the growers won't need to rent bees for pollination. This year it is just as important for beekeepers to keep track of the growers' intents as it is for growers to keep an eye on the condition of the bees.

Almond Pollination and Ozone

At a small group meeting at the Harris Ranch last week, I was asked by an almond grower whether or not I thought that ozone might have prevented the honey bees that he rented from visiting his trees. The colonies were populous and flying, but his trees were not being visited.

He got this interesting idea from a story about research conducted at the University of Virginia. The full text of the May 5, 2008, Washington Post article by Juliet Eilperin is carried on Page 18 of the Summer 2008 issue of the California Bee Times.

Dr. Jose Fuentes and graduate students Quinn McFrederick and James Kathilankal developed a mathematical model that included how wind carries flower aromas and how quickly pollutants destroy them (that was already known to happen). The model suggests that before the 1800's, floral aroma could travel 3,280 to 4,000 feet. But, today, the aromas can travel only about 650 to 1,000 feet around LA, the District of Columbia, or Houston before being destroyed. The researchers feel the consequences are that the bees are not finding available food, not rearing brood well, and have declining populations. That negatively impacts commercial crop pollination.

That idea was less than convincing to Dr. John Burand at the University of Massachusetts. His team is studying the microbes carried by honey bees pollinating apples, squash, and pumpkins. The microbes from apparently healthy colonies will be compared to those colonies that are failing in the same apiary sites.

I am afraid that I had to tell the grower that I did not think that ozone was the problem. His bees were visiting orchards all around his orchard extremely heavily. I suggested that his trees were not providing rewards to the bees, neither nectar nor pollen, but that I had no idea of why not. He had some other growers and beekeepers look at his orchard, and they could not come up with a reasonable explanation, either.

Immune Stimulation and Learning

Researchers at the University of Leicester (England), led by Dr. Eamonn Mallon, injected a group of bumble bees with a lipopolysaccharide. The substance triggers the immune system to respond, as if to an infectious microbe. Then they watched the bees during their first ninety flights to see how long it took them to determine which color feeder, yellow or blue, contained the sugar syrup reward.

The artificially "sickened" bees took a lot longer to learn which color had the reward. Although this sort of impaired response was known for infected bees, it was not known whether the infection or the immune response was responsible for the impacted behavior. So, at least a portion of the effect is due to immune stimulation.

Still to be discovered is why immune stimulation impacts learning. Is it due to the immune system using components necessary for memory formation or are there damaging effects of an activated immune system on the nervous system? These questions may relate to some of the problems that we are seeing with CCD.

To non-bee people, this research is important because it shows that some interactions between the immune and nervous systems, suspected in adult humans as well, can be demonstrated in invertebrates. Also, we can run many

experiments on bees that wouldn't be so acceptable with humans.

If you would like to see this article on the Web, the url is: www.eurekalert.org/pub_releases/2008-07/uol-bg071508.php.

Cinnamon and Honey

Joe Traynor sends me all sorts of stuff to look at that he has found on the Web, or someone has sent to him. This was a long one, but I'm willing to share the complete text with you, if I still have it on my hard drive. Just e-mail me.

The person who sent it to Joe claims that he made some decaf coffee with one tablespoon of honey and a quarter teaspoon of cinnamon, with milk, and it made his feet get warmer after he drank it. Those feet had been cold (poor circulation?) for four months previous to this "treatment." He also put honey on an infected finger and "I could see it improving as I watched."

Here's what else honey and cinnamon were stated as being able to assist:

1. cures most diseases
2. heart disease – make a paste of honey and cinnamon powder, apply to bread, and consume daily – reduces cholesterol, revitalizes arteries and veins
3. arthritis – two tablespoons (I guess) of honey and one teaspoon of cinnamon powder in a cup of hot water, twice daily, will cure chronic arthritis – at Copenhagen University, one tablespoon of honey and a half teaspoon of cinnamon powder before breakfast made pain go down within a week and within a month the non-ambulatory became ambulatory
4. bladder infections – two tablespoons of cinnamon powder and one teaspoon of honey destroyed the microbes in the infection
5. toothache – one teaspoon cinnamon powder and five teaspoons of honey applied to the tooth three times a day until the pain ceases
6. cholesterol – two tablespoons honey and three teaspoons of cinnamon powder in 16 ounces of tea reduces cholesterol by 10%
7. colds – one tablespoon lukewarm honey with ¼ teaspoon cinnamon powder daily for three days – cures cough, cold, clogged sinuses
8. upset stomach – no doses, but clears ulcers, also
9. gas – no doses given
10. immune system – no doses, but strengthens immune system, especially white blood cells that fight bacteria and viruses
11. indigestion – two tablespoons of honey with cinnamon powder sprinkled on it – take BEFORE gorging yourself – relieves acidity and digests heaviest meals

I will only list the others, but you can see that, although unproven, some people fervently feel that it is highly possible that consuming honey (in this case mixed with cinnamon powder) will have one or more positive effects on your physiology. If it turns out not to be the case, it is worth it anyway, because honey tastes good and in moderation should not hurt anyone who is not on a restricted sugar diet.

Other positive effects relate to: influenza, longevity, pimples, skin infections, weight loss, cancer, fatigue, bad breath, and hearing loss.

The "Other" Pollinators

While the honey bee folks have been tearing their hair out over short-lived queens and CCD, the non-*Apis* pollinator folks have

had the luxury of forging ahead with really good demonstration plots of habitat modification for pollinators and in producing excellent publications on those topics.

If you haven't paid much attention, a number of different organizations have joined together to form a coalition that is very productive in their efforts. One of the groups is the Xerces Society and their Pollinator Conservation Program. I have mentioned their Pollination Conservation Handbook, before. Their second very nice booklet is Farming for Bees: Guidelines for Providing Native Bee Habitat on Farms. Their brochure, Farming for Pollinators contains a summary of the habitat requirements of crop pollinators and where their habitat may be found in the area around a farm. Xerces also has a number of Fact Sheets for Gardeners: Nests for Native Bees; Plants for Native Bees of the Pacific Northwest; California Bee Plants; Plants for Native Bees in the Upper Midwest; Plants for Native Bees in North America; Native Pollinators on the Farm: What's in it for Growers; Native Bee Pollination of Watermelon; Native Bee Pollination of Cherry Tomatoes; Native Bee Pollination of Sunflowers for Hybrid Seed Production; and a series of Agroforestry Notes published by the USDA Agroforestry Service: Sustaining Native Bee Habitat for Crop Pollination; Improving Forage for Native Bee Crop Pollinators; Enhancing Nest Sites for Native Bee Crop Pollinators; and Pesticide Considerations for Native Bees in Agroforestry. You can download copies of many of these materials at: www.Xerces.org.

Another group is the Pollinator Partnership (423 Washington St., San Francisco) that works with the North American Pollinator Protection Campaign (NAPPC). The Partnership is printing a series of Ecoregional Planting Guides for gardeners wishing to attract pollinators into their gardens. The intention is to have 35 guides in print. Currently there are guides for:

1. Adirondack
2. American Semi-desert
3. Arizona New Mexico
4. California Coastal Steppe
5. Cascade Mixed Forest
6. Central Appalachian Broadleaf Forest
7. Chihuahuan Desert
8. Eastern Broadleaf Forest Continental
9. Eastern Broadleaf Forest Oceanic
10. Laurentian Mixed Forest
11. Middle Rocky Mountain Steppe
12. Outer Coastal
13. Pacific Lowland
14. Prairie Parkland

Each of these Guides is available for downloading at the Web site: www.pollinator.org/guides.htm.

Why am I pointing out these non-honey bee resources to you? Because, people are going to ask you, "How can I help save the honey bees?" You can ask them to not use bee-toxic pesticides around their properties, then what? You can tell them to plant some bee forage plants, but what list do you give them?

Fortunately, nearly everything in those non-*Apis* publications pertains to our bees, too. Whatever is done to help "wild" bees is going to be of benefit to our feral (and sometimes commercial) colonies. So, keep track of these resources and use them to our advantage whenever possible.

<u>Beekeeping Safari - South Africa</u>

Join Robin and Stella Mountain, former south African beekeepers, on a beekeeping safari that runs from December 2-15, 2008. Beekeepers and non-beekeepers are invited.

Briefly, the tour will include:
Beekeeping in the *Apis m. scutellata* area
Lesedi Cultural Village (Cradle of Humankind)
Swaziland: Beekeeping, candle, glass factories
2-day safari in Kruger Nation Park
See the Big Five mammals, up close
Beekeeping in *Apis capensis* region
Cape Town, Cape Point, Table Mountain, Penguin Colony
Kirstenbosch Botanical Garden
Winelands and Stellenbosch

Full trip details can be seen at: www.ntabatours.com/beekeeping2008-itin.htm.

The price is a nearly all inclusive $5495.00, with shared accommodations. Add an additional $750 if you wish single accommodations.

Sincerely,

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