



The Buzzword

May 2009 Vol. XII No. VII

West Sound Beekeepers Association
westsoundbees.org

May Refreshments

Drinks:
Paul Lundy

Snacks:
Michelle McMillen

Next meeting:

Tuesday, May 19, At The Stedman's

5:45 PM Journeyman Studies

6 PM Bee-ginners Class

7 PM Regular Meeting

Queen Rearing Group meets after the Regular Meeting

George's Raspberry Starts

Nuc Box Handout (see page 2)

Congratulations New Officers!

President, Journeyman Study Group Leader
Jim Dunbar .360-286-5359

VP
Kayla Wentworth .360 598 3867

Secretary
Michelle McMillen ????

Treasurer
Lori Christie .360 830 5509

Educational Materials
Barbara Stedman .360 692 9453

Education Chairman
Paul Lundy .360 297 6743

Librarian
Peggy Dunbar .360-286-5359

Newsletter Editor
Basil Gunther .360 297 5075

Webmaster
George Purkett .360 895 9116

Queen Rearing Group Leader
David Mackovjak .360 698 5228

What's Inside:

George's Raspberry Starts.....	1
WSBA Spring Events.....	2
Message From The President...3	3
At The Last Meeting.....	4
Undertaker Bees.....	6
The 'S' Word.....	8
NW Beekeeping Basics.....	9
WSU Field Day.....	10
Synergism.....	12

George's Raspberry Starts

Raspberry Alert...At the next meeting there will be thornless red raspberry starts available , There will be a donation box so you can decide what they are worth to you. Although we do not know the variety of raspberry starts, they do produce large delicious berries starting about fathers day and lasting about a month. There are at least 3 starts in each pot. These may go pretty fast.



The flower of the raspberry hangs downward and hence the nectar is protected from rain: often the bees are seen visiting the flowers in light rain when other flowers are ignored. The raspberry flowers in June, in what some beekeepers refer to as, the `hungry gap'; before the clover/blackberry flow.

West Sound Beekeepers Association's Calendar of Beekeeping Events –Spring 2009

May 19, Tuesday: Regular Monthly Meeting at Stedman's
George's Raspberry Starts
Nuc Boxes for next month's June 16 nuc making distributed

May 23, Saturday: Beginner Field Day at Stedman's "Spring Management" 12:00 Noon
Queen Rearing Group Grafting Session #1 1:00 – 3:00 PM at Stedman's

June 2, Tuesday: Queen cells from Session #1 placed into nucs

June 6, Saturday: Queen Rearing Group Session #2 1:00 at Judy and Basil's*

June 10, Wednesday: Queen Rearing Group Session #3 Time & Place to be announced on the Yahoo Group

June 12-13, Friday–Saturday: Field Day Washington State University, Pullman, Wa (**see Back Cover**)

June 16, Tuesday: Regular Monthly Meeting at Stedman's
Queen Cells from Session #2 distributed and placed into nucs and taken home by WSBA members

June 20, Saturday: Beginner's Field Day at Stedman's "Spring Management" 12:00 Noon
Nuc Making afterwards with Session #3 Queen cells

Queen Rearing Group events:

You may remember a question posed at the last meeting or sent out to the Yahoo group email distribution, wanting to know the interest level from members if the queen group could provide empty nuc boxes and directions at the May meeting, to bring back the nuc boxes to the June meeting with bees ready for a queen cell which the queen rearing group would have available. Well, The response was great. We have about 20 members interested in receiving queen cells, and the interest is for a total of 50 Queen Cells. That looks like a great challenge for the Queen Rearing Group. There has also been new interest in learning more about queen rearing with the Queen Rearing Group.

Logistics for Nuc boxes have not been finalized yet. We will have some available to loan out but maybe not enough. Fortunately they are not actually needed until June 16. Having them available sooner will make distribution of them easier. If anyone has some to loan, please bring them to the meeting if possible.

May 23, Queen grafting session 1-3pm at Stedman's (Immediately following Beginner Field Day at Stedman's) The basis for most queen production is transferring worker larva of the correct age into queen cell cups and provide them to a colony manipulated to have a huge desire to raise queens. 10 days later, the queen cells are placed into small nuc hives for the queens to emerge and mate. We will be transferring the larva in this session which is called grafting. Please take advantage of this opportunity to either watch or participate in grafting.) This will be the warm-up session for grafting to see what we remember from last year and see what we have forgotten. Maybe we need to add short demo on how to make up a nuc box as well. (This is Memorial Day Weekend,)

June 6 Judy and Basil have offered a queen grafting session at their place. (Basil will move one of the association hives to his place in advance to support the process). Basil has been working on several techniques he wishes to share with the group. Other Queen Grafters are encouraged to graft on this day as well, on their own. Larvae Grafted on this day will be ripe queen cells on June 16 for the June Meeting distribution of Queen Cells to members. Hopefully we will have an abundance of queen cells ready.

*To attend: contact editor@westsoundbees.org for directions and more info.

Message From The President

Greets to all the wonderful peeps of the West Sound Beekeepers Association!

Under new management, I have a vision (slightly blurry and out of focus). Already tasked with writing a 'message from the president' opening dialog, I feel the strain of office and wonder why I was so sympathetic to George's impending breakdown. Truth be known, I just can't handle seeing a grown man cry (or whine). Anyway, I look at the names of the 'new' officiating roster and I see the same names I came into the bee scene with and keep thinking to myself "they saw us coming". For better or worse, preferably better, the group put us here, and now they are stuck with us.

Great stuff so far! Michelle did a bang job at Ecofest representing the WSBA, had a good display and great attitude. The kids loved the live bee exhibit and bit-o-honeys, some even tasted the local honey, and none wanted to take me up on my offer of letting a bee sting them (I had the privilege of relieving Michelle from her public duties for a few minutes and even got to talk about bees to some curious folks). Peggy and Lori were in full support, keeping me away from the general public as best they could and answering questions about the 'visible frame-o-bees' on exhibit, as was Michele's daughter. Now, if it had not been raining and had I been able to breathe without a gurgle and wheeze in my lungs I imagine it might have been even more fun.

I am not sure what the association is going to expect from the new officers, so the table is open for options! If you want the group to go in a particular direction, then state so at the meeting (or mention it to one of the new officers) and lets see where we can go with it. We are going to talk about bees this next meeting – I am sure somewhere it is stated we HAVE to cover the finances, so expect that to be about a VERY short-lived discussion. Personally, I want to know what the experienced are doing to get honey. We saw maybe one or two frames of gathered nectar in the western, but that really is it. So, to the experienced, be prepared to explain yourselves!

On closing, I want/need/am going to push integrated pest management. I'm fighting to keep a hive from further wrath of the Varroa Destructor. Still seeing a healthy yield of mite fall, this hive has been under formic acid fumigation for nearly two weeks now. The West Sound Beekeepers Association has a significant amount of tribal knowledge, accessible via several key individuals within the group. Only recently has the amount of experienced talent really made itself evident, including some unique methods for solving difficult pest management issues. Just recently, a member lost his hive to tracheal mites, and now varroa mites are on the rise. It is not a matter of determining IF you have mites, but how bad the infestation. Successful beekeeping requires a broad spectrum of pest management, minimizing loss of colonies and increasing the life span of the bee.

Therefore, to bring essential pest management practices into light, I propose we start documenting efforts to contend with hive pests (other than the big biped that keeps entering the hive). As a good start, Jason Deal posted in the yahoo group an articulate process he uses for varroa. There are a number of methods used to contend with pests, as presented by Paul Lundy. As a group, I believe it in our best interest to support this effort, and steer our members towards successful beekeeping. The cost of a yearly replenishing of packaged bees begins to take its toll on the moral of the beekeeper, and has even had me asking 'is this actually sane?'

I hope to see you all at the next meeting, and are prepared to share your bee stories with the group!

Jim Dunbar, a George Purkett sympathizer and newly elected President of the West Sound Beekeepers Association.

At The Last Meeting

(As Seen in the Yahoo Group)

Meeting Minutes April 21, 2009

West Sound Beekeeper's Association

George Purkett presided

Treasurer's Report

George gave the report in Dennis' absence.

Currently we have 78 Paid Members.

In March we spent

\$10 on Apiary Registration with Washington State

\$156 on Newsletter printing and mailing

\$38 on Xmas Dinner Honey contest prizes

\$300 on books for beginner class

\$163 on 2 Packages of bees for Apiary

In March we received

\$600 for member dues

\$190 on Books for beginner class

\$50 for Scholarship fund in honor of Al

Current Balance: \$7226

Fronted 332.85 to Basil for Phacelia seed order.

Old Business

Journeyman's Group Report

The Journeyman have been meeting to study materials and are making plans to take the first set of tests during an upcoming field day

Beginning Beekeeper's Class

Paul Lundy reported that tonight's topic was, "Spring Management." Paul spoke on the newly received packages.

Queen Rearing Group

George gaged the interest of members of receiving empty nuke boxes to bring back in June with a few frames of bees to receive a queen

Ten members were interested in one nuke, five in two nukes, and one in five nukes.

Swarm Control List

Tim Seleski reported that the list is being compiled of those interested with the final list being ready in about two weeks. There will be two lists. One list will be for the general public with only phone numbers listed. The second will be for 911 operators and will include additional contact information.

Non-Profit Status

Lori Christie will look into requirements for non-profit status for our association.

NEW BUSINESS

2009 Budget

The 2009 budget was presented by George. Paul Lundy motioned to accept the budget Lori Christie seconded the motion. It was approved with no opposition or abstentions. View the budget here <http://pets.groups.yahoo.com/group/westsoundbees/files/>

Eco-Fest

The association is a sponsor of [Eco-Fest](#) at Still Water Environmental Center May 2nd.

Contact [Michelle](#) to help with our table.

West Sound Bees will have a booth at the event.

Elections

Paul Lundy presided over the election of new officers. Peggy Dunbar volunteered to be the Librarian Michelle McMillen was elected as secretary, Lori Christie as treasurer, Kayla Wentworth as vice-president, Jim Dunbar as president. The adoption of new officers was voted on, there were no objections.

NECROPHORESIS

From Winchester and District Beekeepers Association Newsletter Aug 2008

From Beekeeping Study Notes by J D & B D Yates Module 6 - Bee Behaviours.

“During the summer months most worker bees die away from the hive on their last foraging trip. However, some do die in the nest or hive and the number has been estimated to be between 20 and 200 hundred per day in a strong full sized colony., it has been estimated that about 1% of the bees in such a colony (say about 400) are undertaker bees spending their time removing the dead bees in the colony. Only one or two dead bees are likely to be found in a colony at any one time.

A dead bee produces a chemical odour about 15 minutes after death and the odour (pheromone...) elicits the required behavioural effect from the undertaker bees. The dead are generally removed within an hour during the day and the corpses are carried between 10 and 100 metres away from the nest. Winter bees that die during the clustering period are removed on good flying days, more particularly in the spring.

We have not been able to discover the general ages of undertaker bees. This behaviour is an effective response system for minimising the spread of disease. Necrophoresis is slower in inclement weather and small colonies. The same undertaker bees also remove dead brood. Because the dead brood is removed as quickly as adult corpses it makes it difficult to see the dead larvae of EFB and Sacbrood except when brood outnumber the adult bee population.”

Biochemical Buzz on Career Changes in Bees

ScienceDaily (Apr. 14, 2009) — Adults facing unexpected career changes, take note. Scientists from Brazil and Cuba are reporting that honey bees — a mainstay for behavioral research that cannot be done in other animals — change their brains before transitioning to that new job. The research provides valuable insight into the biochemistry behind the behavior, feats of navigation, and social organization in these animals.

In the study, Marcelo Valle de Sousa and colleagues point out that worker bees begin adult life by performing tasks in the nest such as brood nursing. By 2-3 weeks of age, however, these females — equivalent to middle age in human years —switch to foraging for nectar and pollen. Foraging requires a new skill set that includes uncanny ability to navigate to and from feeding sites, communicating the location of food to other bees, and flights of hundreds of miles in a lifetime.

The researchers collected and analyzed hundreds of bee brains, comparing the proteins scripted by the genes in nurses and foragers in order to find proteins related to the genetic and behavioral shifts during these career transitions. The brains of nurse bees have higher levels of certain "royal jelly" proteins involved in caste determination. Experienced foragers, in contrast, over expressed proteins linked to energy production and other activities.

“Our study demonstrated clear brain proteome differences between honey bee nurse and forager subcastes with distinct social roles,” the study says.

Study Sheds New Light on Middle-Aged

‘Undertaker’ Bees Science Daily (Sep. 10, 1997) — CHAMPAIGN, Ill. - It's a dirty job and only about 1 percent do it at any one time. But middle-aged honey bees that serve as undertakers -- removing dead bees from the hive -- appear to be a distinct cadre of workers that are developmentally ahead of their peers.

In this social world known for its division of labor, there also were unexpected discoveries by researchers: Undertakers don't get better with experience, and they don't do well working together.



Gene Robinson looked to the honeybee brain to find genes involved in bee behavior.

Photo: Zachary Huang,
<http://cyberbee.msu.edu/>

The findings are detailed in papers by Gene E. Robinson, a University of Illinois entomologist, and his former postdoctoral researcher Stephen T. Trumbo, now a professor at the University of Connecticut in Waterbury, Conn. The study on development, also written by U. of I. entomologist Zhi-Yong Huang, appears in the September issue of Behavioral Ecology and Sociobiology. The research on the undertakers' learning, or lack thereof, will be published in the fall in the journal Ethology.

The work -- which involved identifying the undertakers, marking them with tiny, colored and numbered plastic tags, and following them closely through middle age -- provides the first close look at undertakers. Since bees' nests are built in cavities, such a specialty is important for keeping the nests clean.

"Undertakers had very similar activity levels as other bees," Trumbo said. "They just do a little bit less of the other middle-aged tasks, like building the comb and storing food brought in by older foragers. They also remove debris, which fits in nicely with undertaking."

Undertakers also develop slightly faster than other middle-aged bees, moving on to foraging before food storer and hive builders. Middle age lasts about 10 days. Undertakers usually removed dead bees for a day or two, but "one extraordinary bee remained at the task for 13 days," Trumbo said.

Undertakers respond to the odor of the dead, locating the bodies and carrying them out of the hive for 50 to 100 meters before dropping them. The researchers also monitored how swiftly undertakers worked.

"We didn't find any evidence for learning for this particular task," Trumbo said. "This rules out one of the major hypotheses that has been put forward for middle-aged specialization: That social insects will get better and better at what they do."



Gene Robinson, entomologist at the University of Illinois at Urbana-Champaign. Robinson studies honeybee behavior.

Photo: Bill Wiegand 2004

[Read More:](#)

<http://publications.nigms.nih.gov/findings/feb04/sting.html>

Previous research had shown that learning is important for the older foragers, who get more efficient as they learn what flowers are producing nectar at what time. Not only did undertakers not improve in efficiency, Trumbo said, they also got in each other's way and slowed their efficiency.

Robinson had shown previously that some bees are genetically inclined to be undertakers. "We're beginning to get a clearer picture of the behavioral profiles of interesting types of specialist bees, such as undertakers," Robinson said. "Understanding the career choices of bees is a useful model for understanding behavior in general. This new information should enable us to develop new hypotheses about how neurons and genes in the brain function to produce the marvelously complex behavior seen in honey bee society."



Honeybees acquire different job descriptions as they age. Normally, it takes about 3 weeks for a baby bee to mature into an adult hunter, called a forager (left). Undertaker bees (right) are usually around 14 days old, in the transition from nursing to foraging. This undertaker bee is carrying a dead bee out of the hive.

Photo: Zachary Huang,
<http://cyberbee.msu.edu/>

THE "S" WORD

Kim Redmond

SWARMS...It's a fact of life when it comes to beekeeping...swarms happen. Whether it's over-crowding or a failing queen, at some point in your beekeeping life you will have a swarm. Last year we had at least five swarms in our little apiary. I say "at least" because they were probably sneaking out while we were at work. The amazing thing is, we never lost a hive to swarming, (I'll explain that in a minute.) In fact, due to good timing and dumb luck, we ended up with an extra hive.

I had seen signs of an impending swarm; over-crowding beyond my ability to keep pace, queen cells being built faster than I could remove them, so I set up a new hive and dropped in a few frames of capped brood-comb – with workers on board - from the swarm-bent hive. I was planning to scrape off most of the queen cells from one frame and then put it in the new hive. Then, as I was scrapping off queen cells, I handed a capped cell to my friend Daryl, who absent-mindedly started picking at it. Next thing you know he had pulled the cap off the end and, lo and behold, a virgin queen backed out into his hand! I quickly opened up the new hive and told him to put her in right away. By a stroke of good fortune (okay, it's that "dumb luck" thing) that hive established quickly and is now one of our best. And that was the only hive that DIDN'T swarm last year.

So, how did we not lose a hive with all that swarming? They kept coming back. No, really - they kept coming back! I know it's unheard of...it's just not done...but it was. And we still have those hives and they are still going strong (knock on wood.) We watched them go out on maneuvers, chase the neighbor lady and her two young kids from their pond into the house, and then circle right back around and march back into their hives. I have no explanation for their behavior but I'd like to think they just couldn't find any better accommodations than ours – or maybe they like us so much they just couldn't bear to move away...yes, that's what I'd like to think. But I know it was just luck. Jerry The Bee Manager is right – you have to be a good Bee Manager. You have to pay attention and learn to anticipate what your bees are secretly planning behind your back...or right under your nose. And if you are a good bee manager and you pay attention and you anticipate their every need and they still swarm? Keep your chin up and keep trying! Because it's a fact of life when it comes to beekeeping...swarms happen.

How you can make your swarm traps more

attractive to swarms: Research has shown: ∅ Swarms prefer nest cavity

volumes of at least 20 liters or greater. Traps 31 liters (about the size of a medium super) or greater in volume are highly attractive. ∅ Neither cavity shape, nor entrance shape is important. ∅ When given a choice between identical cavities, swarms will choose those which contain Nasonov pheromone. ∅ Traps are most effective at about 15 feet off the ground. ∅ Lures used in combination with old combs and hive residue odors such as propolis are very attractive. ∅ Swarms prefer an entrance hole $\frac{3}{4}$ to 1 inch in size located toward the floor of the cavity. ∅ Swarms prefer the entrance facing south.

Suggestions: ∅ Use hive body that contains wax and propolis residue, and set entrance reducer to the large position. ∅ Using a hive body (approx. 42 liters) and stacking more hive bodies (1 up to 4 deeps) is highly attractive. ∅ Lower trap elevations, and on the ground are fine if height cannot be attained easily. ∅ Smearing melted beeswax, propolis scrapings and pieces of old comb in the trap makes it more attractive. ∅ Frames with starter strips, beads of beeswax at 1 $\frac{1}{4}$ inch rows encourages comb-building in the desired direction. ∅ Place swarm traps near to large objects such as tree trunks, 'Y's in tree branches, sheds, fence rows and other landmarks and objects that serve as points of interest for scouting bees.

Found at this website: http://joebee.homestead.com/swarm_lure.htm Apparently sells swarm 'Lures'.

Northwest Beekeeping Basics

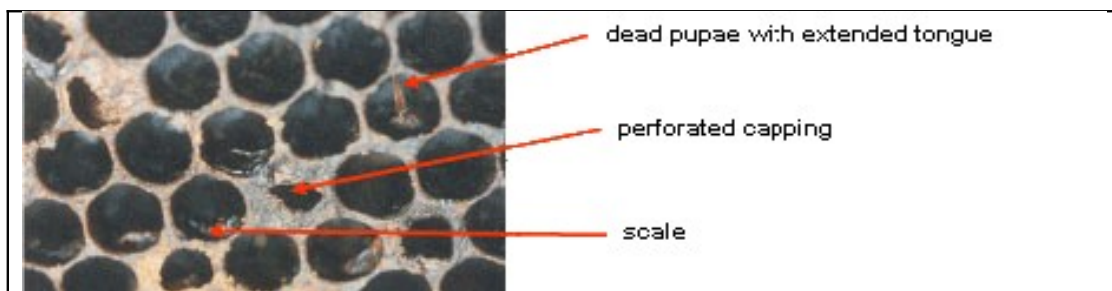
Inspired by Ron Bennett

May- Examine each colony every 9 days and treat as in April. Watch out for the lull in nectar production between the maples and the blackberries. Large colonies can quickly exhaust stores of honey and pollen during a week of inclement weather and cannibalize brood or starve! Feed syrup and pollen patties if necessary, especially bees started on foundation. Basically, feed until they stop eating (fat little bees!) Give the single story colonies getting full of bees a second story. Make sure you give the bees another box in time to prevent swarming. Give supers with foundation, but only to those colonies that are working in the supers. As long as there is nectar coming in, the bees will draw the foundation into comb. Place new supers directly over the queen excluder, if you are using one. Remove and extract the supers containing well ripened honey.

Order queens for July delivery. Requeening is your best management tool and losing a queen now or having a failing queen now will dramatically effect your honey crop. You will need queens to make your June nucs even if you do not plan to expand the number of hives you have. Having nucs on hand will allow you to successfully requeen colonies late into the year. Keep in mind that brood laid in late May are not going to be old enough to be field bees during the honey flow. So, have new strong queens on hand to make your nucs.

Keep on the lookout for American Foulbrood (AFB). You can spot it by piercing sunken capped brood with a tooth pick (or similar tool) and looking for "stringy" filling in place of brood. A second method is to hold the comb by the top bar at an almost flat angle, with the sun to your back, look for dark or black scale on the bottom of cells in the brood area. AFB can be treated different ways. If using antibiotics, wait until honey supers are off to avoid contaminating honey. The comb may have AFB spores, that is something to think about!

Check your stored comb for possible wax moth infestation - like rust, wax moths never seem to sleep. Make your plans for your county and state fair entries.



Signs of American Foulbrood

WSU Honey Bee Field Day Topics June 12-13, 2009

WSU Campus Pavilion and Apiaries

Dr. W. Steve Sheppard

Friday evening beginning at 7 p.m. :

Honey bee film(s) and wine and cheese social gathering in the Livestock Pavilion

Poster set-up (all associations invited to produce a poster about their club activities/bee forage and locales—see note below)

Mead tasting – all invited to bring their local mead for tasting

Honey exchange – all participants invited to bring 2 bottles of honey for exchange table (see note below)

Saturday beginning at 8:30 a.m. :

Pests and Diseases – lab diagnosis

Identifying pests/diseases in the field

Queen rearing – timing, stock selection, mating yard/activities

Assessing colonies/splitting colonies/moving hives/transferring colony from a box hive/feral nest to frame hive

Queen pheromone demonstration/drones and workers/gloveless beekeeping – understanding the threshold concept

Bee building tour, equipment. woodenware dipping, extracting plant

Note for beekeeper participants (new interactive items for 2009):

1) bring two 1 lb jars of your honey for exchange table. Leave two of yours there and take away two of jars of your choice left by other beekeepers

2) for any interested participants that bring unpainted woodenware (boxes, lids, bottoms) – they can try out the hot dipping tank (linseed oil/beeswax) to explore a “paintless” approach. Be sure to bring some old newspaper to use to protect vehicle from drips on the trip back

3) All local associations are invited to produce a beekeeping/local “apicultural conditions” poster for display at the field day. Can be reclaimed at the end of the field day for use in local fairs, etc. or donated for temporary display in the WSU bee lab until the next field day.

4) Lunch will be provided at noon on Saturday at the Livestock Pavilion.

2009 WSU/WSBA Beekeeper Field Day Registration

June 12-13, 2009 WSU Pavilion, Diagnostic Lab, and apiaries

Dr. Steve Sheppard and WSBA invite all interested beekeepers to come to Pullman, WA for an informative and fun day of beekeeping activities and socializing! See the next document for all the details, including activity plan, driving directions, and accommodation resources.

Please send your registration form with your check made out to WSBA to:

Paul Hosticka

Treasurer, WSBA

517 S. Touchet Rd.

Dayton, WA 99328

We look forward to seeing you, so please let us know that you’ll be joining us as soon as possible!

Name: _____

Address: _____

City: _____ State _____ Zip _____

Email: _____

(or your phone # if no email, in the event we need to contact you with schedule changes)

Registration Fee: \$ _____ (One person \$10, family \$20)

Total number in your party: _____

Will you be attending the Friday Wine & Cheese Social? (circle one) Yes No

WSU/WSBA Beekeeping Field Day 2009

Schedule of Events:

Friday, June 12, Livestock Pavilion

7 p.m. Wine & cheese social

Saturday, June 13, Livestock Pavilion, Diagnostic Lab Building, and Apiaries

8:30 a.m.-12 noon beekeeping topics and activities

12 noon Lunch provided by WSBA

1:00 p.m.-4 p.m. more beekeeping activities

4:00 p.m. WSBA Executive Board Meeting (start-time approximate, all are welcome to attend)

Don't forget to bring your veil, boots, & coveralls. Leave your hive tool at home, thank you!

Getting There From Seattle and western Washington:

- Travel east on Interstate-90 over Snoqualmie Pass to Vantage.
 - Cross the bridge over the Columbia River and take exit #137 to Highway 26.
 - Take highway 26 approx. 130 miles to Colfax.
 - At Colfax, turn right onto Main St. (highway 195).
 - Continue on highway 195 to Pullman.
 - Turn left at signs to Pullman, and then right on Davis Way (highway 270).
 - Follow Davis Way until it intersects with N. Grand Ave. in downtown Pullman.
- From Tacoma:** Travel northeast on Highway 18 until it intersects Interstate 90. Follow "from Seattle" directions.

From Spokane:

- Take Interstate 90 to Colfax/Pullman exit (#279).
- Take the Pullman/Colfax exit (#279) to highway 195.
- Take highway 195 south through Colfax to Pullman.
- Turn left at signs to Pullman, and then right on Davis Way (highway 270).
- Follow Davis Way until it intersects with N. Grand Ave. in downtown Pullman.

Important:

Upon arriving in Pullman, go to the WSU Visitor's Center at the corner of Davis Way and Grand to purchase a Visitor's Parking Permit. The cost is \$4.80 per day. You will probably not need a permit for Saturday, but ask at the office when you purchase Friday's permit. It is very important that you get a permit and display it properly in your vehicle. Parking Regulations are rigorously enforced on campus.

Once on Campus:

The Livestock Pavilion is located just off Grimes Way, not far from the football stadium. From Grand Ave., turn east onto Stadium Way. Turn east onto Grimes Way. On your left across a soccer field, you will see two large wooden buildings. One is a giant restored barn (now the alumni center) and the other is a large former livestock pavilion (still called the livestock pavilion). Take the first left that you find on Grimes Way (Quad Services Rd.). If you would like to see maps of the campus generated by WSU, go to: <http://www.campusmap.wsu.edu/index.html> The close-up of the campus center, to the right of the stadium, shows Grimes playfield and the Livestock Pavilion. Zoom in to see it. The Bee Diagnostic lab is just down the road to the east, past the greenhouses.

Link To WSU Campus Map: <http://www.campusmap.wsu.edu/campus-map/FULL/index.html>

Synergism

Dr. Eric Mussen, UC Davis Mar/Apr 2009

Since years of study on colony collapse disorder (CCD) of honey bees have not produced the smoking gun (a single cause) for the malady, scientists are turning to potential multiple causes. The studies are designed to try to find synergistic interactions of chemicals in the hive that may be damaging the bees.

The dictionary definition of synergism is: interaction of discrete agencies or agents such that the total effect is greater than the sum of the individual effects. In other words, one plus one equals more than two. The question is, —Can pesticide residues, infectious agents, and/or malnutrition combine to be much worse for the bees than simply the additive effect of each alone?

Remember, I am not a biochemist or toxicologist, so this is just a synthesis of things I have put together from various sources. It may or may not be the way things really are happening.

Most pesticides (insecticides, fungicides, and herbicides for this discussion) are formulated to disrupt vital bio-chemical pathways in the target organism enough to stop it from growing or to kill it. In some cases, the biochemical pathways are specific to the targeted pest. But, many of the disrupted pathways are common to life, in general, and the toxicants are not very specific. When we talk about those disruptions, we are discussing modes of action.

Many pesticides of animals are designed to damage some portion of the nervous system. Some damage the nerve cells, directly, but most of them interfere in one way or another with the flow of electric impulses from nerve to nerve. Although the dendrites (like rootlets on a plant) of nerve cells are extremely close together, they don't touch. So, a chemical mediator, acetylcholine, is released from one cell. If enough accumulates, the impulse moves along. Then an enzyme quickly breaks down the acetylcholine, so that the nerve does not fire excessively. The insecticides that are acetylcholine esterase inhibitors do not let the breakdown enzyme work, so the nerve cells in the body keep firing, muscles contract permanently, and the insect dies. Insecticides relying on this mode of action are the organophosphates (coumaphos) and the carbamates.

When nerve cells fire, there are some subtle, but extremely important, changes in permeability of portion of the cells. Calcium, sodium, and chloride ions can move in and out of cells through channels (act more like pores with valves, as I see it). So, keeping the channels permanently open or closed inhibits normal nerve function. The pyrethroids (fluvalinate), abamectin, and many of the older chemicals like DDT use this mode of action.

Recently, insecticides have been formulated that function by combining, physically, with receptors for acetylcholine right on the nerve cells. They either can block the receptors (antagonists) or keep the receptors acting as though they are receiving acetylcholine even though they are not (agonists). The neonicotinoids and spinosad belong here.

Another group of acaricides and insecticides works in the mitochondria (small, but critically important cell organelles) where adenosine diphosphate and adenosine triphosphate interact to produce energy for the cells and organs to function. These pesticides usually interfere one way or another with oxidative phosphorylation.

There are inhibitors of chitin formation. Chitin is the meshwork exoskeleton of insects. There are hormone disruptors so that molts do not take place normally. Now, there are inhibitors of lipid synthesis (spiromesifen) and muscle paralyzers (flubendiamide).

Amitraz is in its own class of octopaminergic agonists. Octopamine is involved in many functions in insects, but the nervous tissue functions are targeted for insect control.

Journal articles have been published that report synergism between certain fungicides and certain insecticides. Early reports on residues of agrichemicals in beeswax and stored pollens (bee bread) from CCD colonies listed fungicides as one of the commonly occurring group of pesticides. While we don't usually think of fungicides as being toxic to adult honey bees, we know we have problems with some of them with immature bees. Modes of action of fungicides fall into specific groups compiled by the Fungicide Resistance Action Committee: A. Nucleic Acid Synthesis; B. Mitosis and Cell Division; C. Respiration; D. Amino Acid and Protein Synthesis; E. Signal Transduction; F. Lipid Membrane Synthesis, Cell Wall Deposition; G. Sterol Biosynthesis Inhibitors (SBI fungicides); H. Glucan Synthesis; I. Melanin Synthesis in Cell Wall; M. Multi Site Action; P. Host Defense Inducer; and U. Recent Molecules.

As the names imply, some of these groups target fungal cell walls and probably would not affect bees. However, many other targeted metabolic pathways are shared with bees. Documented losses have occurred with captan (Group M – phthalamides), ziram (Group M – dithiocarbamates and relatives) and iprodione (Group E3 – dicarboximides).

It appears to me that there should be more research on the two largest groups of fungicides: the ones that affect respiration and the sterol biosynthesis inhibitors. At molecular levels, respiration is pretty similar in plants, fungi, and bees. At the molecular level plants, fungi, and bees wind up with lanosterol as a precursor to ergosterol (fungi) or cholesterol (bees). The fungi-cides act by preventing demethylation of lanosterol-related precursors of essential sterols, which eventually become critical cell membrane components and hormones of bees. A common problem with exposure to fungicides is loss of brood, as larvae, or as pupae that cannot molt properly to adults. That sounds to me like a hormone problem. We have a lot of work ahead of us to prove or disprove possible synergisms.

In late breaking news (Journal of Economic Entomology, 102(2); 474-479, 2009) R. Johnson, H. Pollock and M. Berenbaum from the University of Illinois published —Synergistic Interactions Between In-hive Miticides in *Apis mellifera*. The miticides studied were fluvalinate and coumaphos. Their studies suggest that both chemicals are detoxified through biochemical pathways requiring cytochrome P450 monooxygenase enzymes (P450s). Similar to the relative paucity of genes for producing immunological peptides, honey bees seem to be pretty low in producing P450s. So, too high a dose of either chemical, or especially both together, can be problematic.

In these studies the researchers showed that two of three enzyme inhibitors made coumaphos more toxic to bees than normal, while all three made fluvalinate more toxic. Next, by pre-treating four day old bees with coumaphos or fluvalinate, it took less than normal amounts of the other chemical to kill the bees (in one case 32.1 times less).

I still think it would be a good idea to get rid of the heavily fluvalinate and coumaphos-contaminated (and whatever else may have been used) brood nest combs that have served through the *Varroa* wars.

Another Imidacloprid Study

Also in that recent issue of the Journal of Economic Entomology (Vol. 102 (2): 616-623, 2009) is a study sponsored by the Agricultural Department of the Walloon Region of Belgium. Beekeepers in that region have been experiencing abnormally high winter losses of colonies. Although no sunflowers or canola are grown there, they

do have bees around fields of corn, some of which are planted with seed treated with imidacloprid. So, a set of ten researchers, from government agencies, the University of Liege, and the Institute of Tropical Medicine joined forces to look at the question: —Does Imidacloprid Seed-treated Maize Have an Impact on Honey Bee Mortality?□

The researchers analyzed a total of 48 honey, bee, and beeswax samples for pesticide residues and recorded colony mortality from apiaries located in ever increasing diameter circles from corn fields that were or were not treated with imidacloprid.

The residue results were fairly similar to those reported from our CCD studies in the U.S. The most common residue in the Belgium honey was rotenone, an —organic□ miticide/insecticide that isn't registered for use in hives in that country. The next most common detection was flusilazole, an azole fungicide not registered in the U.S. Next was methiocarb sulfoxide, a carbamate fungicide not registered in the U.S. Trifloxystrobin, a fungicide produced by Bayer and sold in the U.S. as Flint® or Stratego®, was detected six times, while imidacloprid was detected four times. But, it is important to state that rotenone,

at 15.2 ppb was at much higher concentrations than the later mentioned chemicals. The later chemicals were between the limit of detection (LOD) and limit of quantification (LOQ), or very low levels. Coumaphos topped the list in amount of residue in honey – 128 ppb. One bee sample contained lindane.

The beeswax samples contained many residues with flusilazole most frequent, four *Varroa* control products next, then many agrichemicals, but no imidacloprid.

Colony mortality, interestingly, was not related to imidacloprid exposure in the manner that might be expected. The colonies with the most exposure to pollen from imidacloprid seed-treated corn fields survived the best. In fact, there was a very strong correlation: very limited exposure to imidacloprid-treated corn acreage resulted in colony mortalities up to nearly 60%, while, with one exception, colonies exposed to nearby, large areas of treated corn suffered practically no losses.

There was another interesting correlation – simply the proximity to corn plantings was a favorable aspect of the study. The farther away from corn plantings, the less well the colonies survived, suggesting a beneficial effect of consuming corn pollen, despite the residual chemicals.

A third interesting correlation existed between winter loss and number of colonies in the apiary. No colonies were lost in apiaries of three to six colonies. Losses picked up at eight colonies per apiary and averaged around 50% for 14 to 42 colonies.