



INLAND BEEEMAIL

Monthly newsletter of the Inland Empire Beekeepers Association

Volume 10, Issue 12 — December 2005 — www.inlandbeemail.com

Presidents
Corner:

Inland Empire Beekeeper Association Members:

Come one, come all to the IEBA Christmas Potluck and gift exchange. The feast begins at 6:30 PM, 9 December 2005 at the extension office. **Bring a salad, side dish or dessert, and a good appetite.** IEBA volunteers will provide ham, turkey, drinks, rolls, and more. **Anyone wishing to participate in the gift exchange should bring a wrapped gift with a value between \$10.00 –\$15.00.** If you are a queen bee, bring a gift for a queen bee, drones for drones. I understand this was not discussed at the last meeting but hope most of you remember previous years and are ready.

December is also the month that new association officers are elected. Roger Carney is our 'Nominating Officer' once again. Please come and participate.

This is our last meeting of the year and in the spirit of the Christmas season lets try to have a short, positive, record setting business meeting. I will present the 2005 Budget Results and present the 2006 Budget Guidance for your review and approval. In January I will lay out the entire budget based on this guidance. I would suggest we stuff ourselves first, have a speedy meeting, then get to the gift exchange. After the gift exchange we can go for seconds on the desserts.

If you cannot attend then let me take this opportunity to wish you a Merry Christmas and a Honey of a New

Honey bee viruses – A balancing act of nature by Frank Seiler

Viruses are parasites, that completely rely upon a host cell for replication. Among bees, around 20 viruses are known, that can harm the brood as well as adult bees.

What are viruses?

It's largely an anthropomorphic (or biopomorphic?) position to say that a virus is alive. We would be more comfortable with them if they were, but by the rules established in science, they are not. They clearly cannot respire, grow or reproduce on their own. By this definition, viruses cannot be considered true living organisms. The only biological reactions are those that are necessary for reproduction, and these are secured through the host cell.

Viruses consist of their genetic material, as well as proteins forming a capsid. Some also have an additional outer sheath. They are classified according to the type of genetic material they contain (DNA or RNA, single or double stranded), the shape of its capsule, and whether or not the sheath is present.

Viruses can only be seen with an electron microscope. During the stage of their replication cycle when they are free and infectious, viruses do not carry out the usual functions of living cells, such as respiration and growth; however, when they enter a living plant, animal or bacterial cell, they make use of the host cell's chemical energy and protein- and nucleic acid-synthesizing ability to replicate themselves. Viral nucleic acids are single- or double-stranded and may be DNA (deoxyribonucleic acid) or RNA (ribonucleic acid). After viral components are made by the infected host cell, virus particles are released; the host cell is often dissolved. Some viruses do not kill cells

(Continued on page 9)

Please come early for our
Christmas Turkey, Ham and Potluck Dinner
to be held at 6:30 pm Friday December 9th.
Please bring your choice of accompanying side dishes and deserts

Price of Queen Bees - *by Frank Seiler*

Beekeepers can be quite creative and analytical. The following information was generated by Frank Pendell, a queen breeder in northern California. He admits that the relation between the price of honey bee queens and almond pollination rental is purely coincidental, but it is intriguing.

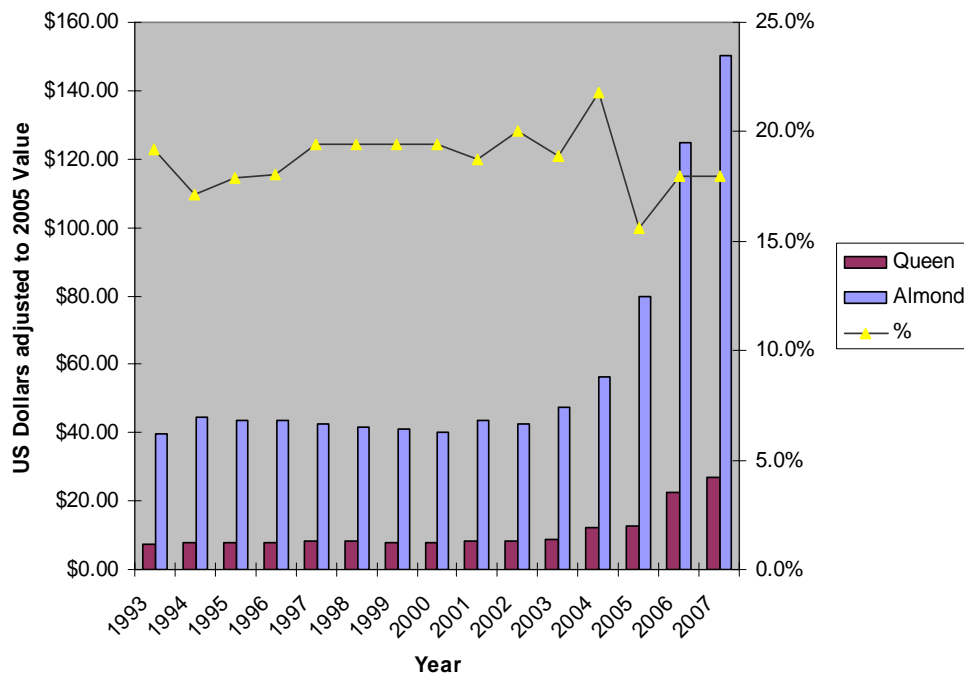
Frank's data may have to be adjusted, according to the info passing over the grape vine. Prices for strong colonies of honey bees for next year's almond pollination are at \$ 150.00, right now.

It also remains to be seen if beekeepers would be willing to pay over \$20 for a commercially produced queen. However, this past season, the demand for queens never dropped off throughout the year. A number of queen breeders have decided to taper back on that part of the operation, hold back on bees that would have gone into packages, and bring the bees to almonds, where they can make the most money for their efforts.

Year	Queen	Almond	%
1993	\$5.75	\$30.00	19.2%
1994	\$6.00	\$35.00	17.1%
1995	\$6.25	\$35.00	17.9%
1996	\$6.50	\$36.00	18.1%
1997	\$7.00	\$36.00	19.4%
1998	\$7.00	\$36.00	19.4%
1999	\$7.00	\$36.00	19.4%
2000	\$7.00	\$36.00	19.4%
2001	\$7.50	\$40.00	18.8%
2002	\$8.00	\$40.00	20.0%
2003	\$8.50	\$45.00	18.9%
2004	\$12.00	\$55.00	21.8%
2005	\$12.50	\$80.00	15.6%
2006	\$22.50	\$125.00	18.0%
2007	\$27.00	\$150.00	18.0%

I took this data, adjusted the numbers to account for inflation to the year 2005 and came up with the following chart. It is interesting to see that when inflation is taken into account, prices remained pretty constant until large bee problems came to light. Reports in the last few years of major bee operations collapsing, a shortage of bees for pollination, and rising prices for tree nut crops are really evident in this graph.

Queen Prices VS Almond Pollination Fees per hive



Source Material from Eric Mussen's Apicultural Newsletter, Sept/Oct 2005 with charts and graphs by Frank Seiler.
<http://entomology.ucdavis.edu/faculty/mussen/SeptOct2005.pdf>
 Inflation Adjustment Calculator: <http://www.westegg.com/inflation/infl.cgi>

November Minutes

—Linda Carney, Secretary
November 11, 2005

Four turkeys and trimmings and lots of good food were available at this meeting! We even had a separate dessert table because there were so many goodies. Those of you who were not able to make this meeting sure missed good food and friends and a fine presentation by Jim Miller.

Vice-President Joe Jovanovich presided over our Thanksgiving meeting. (President Swenson is in California with his bees.) Our short meeting was held during our meal.

Treasurer’s Report—Colette Lehinger, our Treasurer, reported \$12,028.59 in our account. The Treasurer’s report was accepted as read.

October Minutes—Then Linda Carney, our Secretary, read the minutes of the October meeting and they were accepted as read.

Fair Reports—We had no fair reports this month

WSBA Report – Jerry Tate, President of WSBA, said the line up of speakers at the Newport, Oregon convention was probably one of the better group of speakers. There was good insight into queen rearing from Dr. Marla Spivak from the University of Minnesota. Ty lenin has been accepted in WA and we are awaiting a Section 18 for Check Mite and Api-Life Var.

Committee Reports—There were no reports this month

Vice-president Joe Jovanovich reminded us that the election of officers is next month, and will take place at the December dinner meeting. There will be an opening on the Joy of Beekeeping Committee and anyone wanting to run for an office can notify Mr. Roger Carney at 448-4566.

4 Corners Report - West- Jim Miller is not pleased with what is happening with his hives. They are short on honey and he has been feeding. North- Bob Arnold feed in Sept and October. He is now satisfied with his hives and thinks they will do fine for the winter. East- Travis Sammons has 9 hives in Post Falls, Idaho. (200 of his hives are now in CA) “They were finding pollen from somewhere last Wednesday,” he said. “They were loaded with it.” South- There is snow in Moscow! Last weekend Joe Jovanovich noticed his bees bringing in some pollen. Joe is also feeding his bees.

Old Business - There was no old business

New Business - There was no new business

Vern Stack was asked to make his traditional motion to adjourn the meeting. Our meeting was adjourned.

National Honey Board Issues Request for Production Research Proposals Studying Bee Colony Health

NHB is requesting research proposals regarding honey bee colony production. The goal of this research area is to help honey producers maintain colony health, while preserving honey quality. The primary objective is to control such pests as the Varroa destructor, Acarapis woodi and the small hive beetle. In 2004, NHB began exploring research opportunities to help beekeepers maintain colony health, without adversely affecting the production of quality honey. During the past few years, NHB has funded seven such projects. Research proposals should be sent to NHB on or before Dec. 31, 2005. <http://www.nhb.org/buzz/release102805-ResearchRFP.html> - FOR MORE DETAILS SEE

2005/2006 Program



DECEMBER

Potluck dinner
Election of officers
Inland Empire

JANUARY

Beekeepers Association
Annual Class on Beekeeping

Every Friday Evening January 13th to
March 17th, at the WSU/Spokane
County Extension Office
222 N Havana
6:00 to 7:30 pm
Instructor/Coordinator -Jim Miller

The class registration fee is \$30 for an individual or \$40 per family whose members all live at the same address. There is no age limit, but small children are discouraged because of class disruption.

For more information, go to inlandbeemail.com, or contact Toni Fitzgerald at (509) 477-2164, tjfitz@wsu.edu or Jerry Miller (509) 838-6347

December 4, 2005

Notes on Wintering Bees - by Bob Arnold

What a change in the weather since the week before Thanksgiving! A week before Thanksgiving the bees were bringing in small amounts of pollen. This morning the temperature is at 13°F and we have 8" of snow! Well that is the way weather can change as we go into a new season.

If you think about the way bees live without us beekeepers it can illuminate how we can help them survive the winter in their artificial homes. Bees like old hollow trees to make their homes. The bees had access to the hollow center often through a knot hole. Usually these trees were 2 to 3 feet in diameter and had lots of wood surrounding the hollow cavity the bees took up residence in. The access hole could be small or quite large.

The tree's cavity offered excellent protection from the environment. In Wisconsin, where I grew up, we would frequently have a week or two every winter where the temperature would not get above 0°F for the entire week. Excursions to -30°F were the usual in January and February. Bees will survive these temperatures in hollow trees just fine. The hollow tree provides a cavity that can easily be kept warm and dry for the bees. If the bees have put up sufficient winter stores you can bet that tree will issue a number of great swarms in May.

So why do we have so much trouble getting our bees through the winter? Currently mites, mostly the varroa mite and associated viruses that it vectors but also the tracheal mite, have become the most difficult problem. If these mite problems are not under control wintering is almost impossible. Your bees must have mites at acceptable levels during the August thru fall period so that ample healthy young bees and good winter stores are present for winter.

The tree cavity provides a volume that will not have a cold ceiling. This is a major advantage over our hives. Our hives have a top and an inner cover that is perhaps 1" of wood and an air space of 3/8". This is a poor equal to that of a tree. Even a tree of small diameter will have a solid amount of wood above the combs of honey and bees providing great insulation from the cold. This prevents the most difficult condition for the bees from ever occurring. As the bees consume honey water is expelled producing moist air. This moisture laden air rises in the cavity and will condense on a cold surface causing water or ice to form on the surface. This moisture will eventually drip back down on the cluster chilling the bees.

Providing an upper entrance for the bees is necessary but not a solution. The bees do not need a cold draft to live in for the winter. They do need fresh air that flushes the hive and a dry environment. The best way to provide this is to prevent cold surfaces above the cluster. Our hive lids usually will become soaking wet during the winter period and provide a very cold surface for the rising warm air from the cluster. Insulating this surface from the cold and wet will prevent most of this problem.

I have used a cover that has a small 3/8" x 2" upper entrance and a 3/4" air cavity above the top of the frames. The cover is made of 1/2" plywood. Above the cover I put a flake of straw and then cover the straw with black plastic. The black plastic is wrapped like a Christmas present half way down the top box and nailed with some cleats to the hive. A small hole is cut in the plastic at the location of the upper entrance in the plywood rim. The bottom entrance is kept at the full hive width 3/8" high.

I have taken this wrapping off in mid winter to exam what the cluster looks like. The bees are filling a 10" to 15" diameter cluster in the 3/4" top space and are nice and dry. The lower hive box usually has wet or frosty side frames. Overall winter losses of 5 to 10% are typical from all causes. I have not had any hives die from lack of food in the last two years as the bees can move around and find food much easier with the warm space at the top of the hive. Usually winter losses are from queens that die or become drone layers.

Later on in the winter I will take a few pictures of a hive taken apart to show you what the bees do. The best insulation you can use is the 2" thick aluminum faced foam that is available in most of the home supply stores. This insulation does not absorb the moisture and can easily be used over and over again each winter. Put the aluminum foil surface nearest the cluster. The straw will work fine but does tend to absorb moisture and will not be as good. Eventually I will be using the foam but the expense is the issue currently. The black plastic serves to keep water from getting into the hive and to warm the hive when the sun is out. Make certain the water drips off the black plastic and not runs down the hive sides. You can still insulate your hives now if you want to as the disturbance to the hive will not equal the negative effects of three months of cold moisture dripping onto the cluster.

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Giant honey bees: *Apis dorsata* Photo © Z. Huang

Giant Bees

A giant honey bee nest on the eaves of a library (about 30 ft from ground), the nest is about 6 ft across. Xishuangbanna, Yunnan, China. April 2002.

Contact: Zachary Huang, (517) 353-8136 or bees@msu.edu; or Sue Nichols, University Relations, (517) 353-8942, nichols@msu.edu

New pheromone creates buzz about the clout of older bees

EAST LANSING, Mich. – A recent discovery unveils the chemical secret that gives old bees the authority to keep young bees home babysitting instead of going out on the town.

A hard-to-detect pheromone explains a phenomenon Michigan State University entomologist Zachary Huang published 12 years ago – that somehow older forager bees exert influence over the younger nurse bees in a hive, keeping them grounded until they are more mature, and thus more ready to handle the demands of buzzing about. The work that identifies the chemical, “Regulation of Behavioral Maturation in Honey Bees by a New Primer Pheromone” is publishing in Proceedings of the National Academy of Science Biological Sciences, Population Biology, Early Edition the week of Nov. 29.

“If the older ones don't keep them in check, the young ones can mature too quickly,” Huang said. “It's kind of the same thing as with people, you need the elders to check on the young, even if the young are physically able to go out on their own, it's not the best situation for anybody and now we know how it works.”

Huang worked with a team that spanned from the United States, France and Canada to explain how the bees kept an exquisitely consistent balance between the ones that go out to collect nectar and pollen and defend the hive, and those that stay home and nurture the larvae. Huang had documented that this balance is controlled by the elder bees, those that typically spend the final one to three weeks of their five-week lifespan out in the field. Experiments showed that if a significant number of forager bees didn't come home, the young nurse bees would mature ahead of schedule and head out to become foragers themselves. If the older bees were kept inside more

than usual – as in an extended rain shower – fewer young bees would mature, but instead stick to brood care.

But the question was always, why? Pheromones are a chemical signal emitted by animals, insects and humans. Some, called releaser pheromones, are like a quick conversation that changes behavior, such as those that inspire sexual attraction.

Since releasers change behaviors immediately, they historically have been easier to identify. Hundreds of releaser pheromones have been chemically identified, whereas only four (including this new one) have been identified as primer pheromones. Primer pheromones are more difficult to work with because they impart behavioral changes in a much longer time scale, taking days or sometimes weeks to see an effect.

Huang and his associates spent years futilely searching for a primer pheromone. After many dead ends, the group came upon a crucial difference between forager bees and nurse bees: Forager bees carry a mother load of a chemical called ethyl oleate in the abdominal reservoir in which they store nectar.

That, Huang said, led them to identify ethyl oleate as another kind of pheromone – called primer pheromone. Forager bees load up on ethyl oleate when they're buzzing about gathering food, but don't digest it. The forager bees feed the chemical to the worker bees, and the ethyl oleate keeps them in a teenage state, sort of like being grounded to watch the younger siblings.

As the old bees die off, the chemical no longer is fed to nurse bees. Eliminate ethyl oleate and the bees mature into foragers.

“This provides clear insight into how a bee colony works,” said Gene Robinson, G. William Arends professor of integrative biology and director of the neuroscience program at the University of Illinois at Champaign-Urbana. “What's most impressive about a honey bee colony is it is able to respond to changing conditions and alter its division of labor. When you think of that type of

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Tate's Honey Farm has all of your extracting and packaging needs as well as spring packages and queens. Woodenware for all your winter projects and spring needs. Shop hours are 8:30—2:00 every Saturday at E. 8900 Maringo, Millwood. Contact us at 509-924-6669 or online at www.tateshoneyfarm.com

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Classified Ads

(Continued from page 5)

flexibility and adaptability, you immediately think, 'who's in charge'? People from many scientific and engineering endeavors are fascinated by localized decentralized decision making."

Huang said the system makes sense for the health of the hive. Young bees – those in the first two to three weeks of life – are biologically better suited for brood care, thanks to some boosted blood protein. Bees forced out too early aren't great navigators, and since foraging is dangerous, they risk dying before their time.

"Our idea has never been disproved, but the lack of mechanism drove me crazy," said Huang. "Now we know the specific chemical that controls the behavior of honey bees for the good of the whole population."

In addition to Huang and Robinson, the paper's authors are Isabelle Leoncini, Yves Le Conte, Didier Crauser, Guy Costagliola and Jean-Marc Bécard, of the National Institute of Agricultural Research in Avignon, France; Mianwei Wang, Erika Plettner and Keith Slessor of Simon Fraser University in Burnaby, Canada; and Amy Toth of the University of Illinois at Urbana-Champaign.

The research was funded by the National Institute of Health. Huang's research also is supported by the Michigan Agricultural Experiment Station.



A honey bee worker (top left corner) feeds four others simultaneously. Honey bee social feeding was long thought to involve the exchange of communicative substances, in addition to food. The report in the *Proceedings of the National Academy of Sciences* is the first discovery of a primer pheromone produced by adult worker honey bees that is thought to be transferred via food exchange. (Photo courtesy of Zachary Huang.)

MSU entomologist Zachary Huang.

Huang's home page: <http://www.msu.edu/~bees/>

To learn more about honey bees and honey bee research: <http://cyberbee.msu.edu/>



Recipe of the Month

Cranberry Oat Bread - Makes 2 loaves -

Ingredients

- 3/4 cup honey
- 1/3 cup vegetable oil
- 2 eggs
- 1/2 cup milk
- 2-1/2 cups all-purpose flour
- 1 cup quick-cooking rolled oats
- 1 teaspoon baking soda
- 1 teaspoon baking powder
- 1/2 teaspoon salt
- 1/2 teaspoon ground cinnamon
- 2 cups fresh or frozen cranberries
- 1 cup chopped nuts



Directions

Combine honey, oil, eggs and milk in large bowl; mix well. Combine flour, oats, baking soda, baking powder, salt and cinnamon in medium bowl; mix well. Stir into honey mixture. Fold in cranberries and nuts. Spoon into two 8-1/2 x 4-1/2 x 2-1/2-inch greased and floured loaf pans.

Bake in preheated 350°F oven 40 to 45 minutes or until wooden toothpick inserted near center comes out clean. Cool in pans on wire racks 15 minutes. Remove from pans; cool completely on wire racks.

Web Site of the Month

Each month IEBA member Bob Hegerberg is going to share the latest in his favorite web sites on Beekeeping. Take some time to check this month's selections out.

<http://photo.bees.net/gallery/>
Zach's Bee Photos

<http://www174.pair.com/birdland/Breeding/>
Ohio State University

<http://www.honeybeeworld.com/diary/articles/fdnvsdrawn.htm>
New vs. Used Bee Equipment

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IEBA Website

www.inlandbeemail.com

WSBA Website

www.wasba.org

DECEMBER AGENDA —TED SWENSON

Agenda
12/9/05

Welcome!

Reports:

- The Secretary's Report - Linda
- The Treasurer's Report - Ky
- Joy in Beekeeping Report - N/A
- Fair Reports N/A
- Inland Beemail Report – Dave / Frank
- WSBA Report – Jerry
- Four Corner Bee Reports - All

Old Business:

IEBA Charter/Constitution Update – Nothing to report.

New Business:

- Election of Association Officers
- 2005 Budget Results
- 2006 Budget Guidance

Meeting Adjourned

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Giant Bees



A newly emerged *Apis dorsata* on my thumb. Just like all honey bees, newly emerged bees do not sting and cannot fly.

Giant honey bees: *Apis dorsata* Photo © Z. Huang

Hive Care :

December

The Bees.

Snow is on the ground, and the bees have settled into their winter cluster. Until next month, there will likely be no brood present.

The Beekeeper.

The beeyard needs not much attention except for three critical areas:

(1) be sure to keep entrances clear of snow to allow bees to make cleansing flights on warm days.

(2) many beekeepers also use an upper entrance allowing for flight, but more importantly ventilation. Condensation building up and then dripping on the cluster is deadly.

(3) Check the weight of hives by tipping up a corner. If hives are light, you can still help them out with 2:1 sugar syrup. On a warm day, add an empty super and place a couple of inverted jars of syrup right on the top bars. Work quickly so that heat loss is minimal.

Now is also the time to sit back, read a good bee book, make some candles or equipment, and plan out your upcoming beekeeping year.

Request for Production Research Proposals October, 2005

The National Honey Board is requesting proposals for research dealing with honey bee colony production. The goal of this research is to help producers maintain colony health while assuring the maintenance of honey quality. Approximately \$60,000 has been earmarked for practical studies, with control of Varroa destructor, Acarapis woodi and small hive beetle the primary objectives. Other projects will be considered and research outside the U.S. is possible. The amount of funds available for a particular proposal will depend on the number and merit of proposals finally accepted. The funds will be available for approved projects for the duration of the calendar year 2006 and may be carried into early 2007 if necessary; the duration of projects being funded should generally not exceed 12 months.

The submission protocol (below) falls between a full-blown grant proposal to the government and closer to the nearly informal process conducted by some state beekeepers' organizations. Proposals can be reasonably short, as long as they include the seven items specified in the submission criteria below.

Proposals need to be sent **directly to the National Honey Board Office** on or before **December 31, 2005**. Copies of proposals will be distributed to Research Committee members for review, and final decisions will be made by the end of January, 2006. Since the USDA oversees these projects, a **Research Service Agreement** between the National Honey Board and the research university or agency must be approved by the USDA and signed before funding becomes available. Funds are distributed to the researchers, periodically, upon receipt of progress reports and a final report, as delineated in the contract. Reasonable restrictions exist on dissemination of research information, etc. (see **Research Rights Issue Statement** - below).

How to Submit a Proposal

Proposals may be submitted either electronically or by hard copy.

Send by e-mail to:
charlotte@nhb.org

Send by mail to:
National Honey Board
390 Lashley St.
Longmont, CO 80501
Attention: Charlotte Jordan, Project Manager

Proposal: To be considered for funding, please include all of the following

I. Objectives, Materials and Methods, Experimental Design, Intended Outcome.

The proposal should be the detailed outline of the research project. It should include general objectives, an overview of procedures and methods, and an outline of

expected results. A 2-5 page outline will be sufficient.

II. Publications and Presentations

The proposal should also specifically indicate the researcher's plan to present the findings at a professional meeting or conference [indicate which one(s)] or to publish the results in scientific, trade or other publications (be specific).

III. Project Calendar

The proposal should include a proposed timetable for the project.

Periodic progress reports (based on the agreed upon timetable) and a final report are required. Details will be outlined in the final contract.

IV. Budget

The total budget should be included. The budget should be presented by calendar year, as the National Honey Board works on a calendar year budget. **Please note that it is the policy of the National Honey Board not to support indirect costs associated with grants and contracts.**

V. Research Rights Issue Statement

Except for contracts with USDA's Agricultural Research Service and U.S. universities, all non-proprietary information collected as part of the project will be the property of the NHB. The NHB reserves the right to review in advance publication of research results. Please refer to the form provided (below) and contact Charlotte Jordan with any questions.

VI. Optional Attachments

Literature Review: A review of current colony health practices as they relate to the proposed study.

Investigators Summaries: Detailed biographical data from researchers need not be provided. However, researchers are welcome to include a short CV and information on relevant experience or publications.

VII. Contact Information

Please include full contact information for the primary investigator: mailing address, phone and fax and e-mail.

Criteria for Selecting Proposals

The National Honey Board Research Committee will review all proposals and make a decision based on the following:

1. Compatibility with the National Honey Board's objectives outlined in the project description.
2. Overall scientific merit and originality.
3. Proposed dissemination of findings.
4. Total budget.
5. Researcher's and institution's relevant experience.

For further information or assistance:

Please contact Charlotte Jordan, Project Manager, National Honey Board, at (800) 553-7162, fax: (303) 776-1177 or e-mail: charlotte@nhb.org.

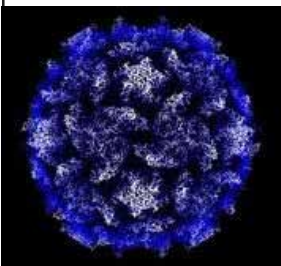
(Continued from page 1)

but transform them into a cancerous state; some cause illness and then seem to disappear, while remaining latent and later causing another, sometimes much more severe, form of disease. Viruses, known to cause cancer in animals, are suspected of causing cancer in humans. Viruses also cause measles, mumps, yellow fever, poliomyelitis, influenza and the common cold in humans and many other diseases in animals.

Host cells that are little damaged by viruses serve as a virus reservoir. The balance between a virus and its host's ability to keep it in check is an important factor in serious outbreaks. The slightest changes in the virus or its infection rate can have serious consequences for the population of the host or the virus itself.

Honey bee viruses

Most of the known honey bee viruses are similar to the Picornavirus (similar also to the Polio virus). They are small viruses of less than 40 nm diameter, and its genetic material is a simple RNA string. This is contained in a capsid of three main proteins. When dividing, the host cell reads the information coded on the RNA string and synthesizes the proteins of the capsid as well as the enzyme to build new RNA strings. These form new infectious viruses and are released when the cell wall of the host breaks.



*Human Polio virus, photo:
Hogle Labs at Harvard*

Among honeybees, there are approximately 20 described viruses. This number is an estimate, as there are certainly viruses that are not yet known, and some viruses are perhaps only geographic variants of others.

Commonly seen viral infections

The first described virus is the Sacbrood Bee Virus (SBV). The symptoms of Sacbrood have been recognized for a long time. As the virus replicates in the larva and is killed, the larva turns into a yellow sack filled with remnants of the tissues and millions of new viruses. The disease affects primarily, the larva, however infected adult bees have been shown to have a shortened lifespan. Generally, the hive controls this disease as the bees are able to identify and remove infected larva at the early stages of infection. Interestingly, two studies report a high infection of SBV found in dead adult bees that were heavily infested with Varroa mites.



Side view of dead larva killed by sacbrood virus. Notice the discoloration and hardening of cuticles near the head. Photo by Prof. M.V. Smith, University of Guelph.

The second discovered virus is Acute Bee Paralysis Virus (ABPV). It was discovered after injecting young bees or larva with extracts of otherwise seemingly healthy bees. This means that ABPV was carried by apparently healthy bees as a host without infecting them. This virus also appears to hasten the death of colonies that are heavily infested by Varroa. Kashmir Bee Virus (KBV) has a physical appearance so similar to ABPV that sometimes the two are confused with each other in laboratory tests, KBV exhibits more virulence and is equally present in apparently healthy adult bees. It causes epidemics in colonies affected with Varroa, but is certainly also present in Varroa free colonies. The Kashmir Bee Virus is a natural disease of the eastern honeybee *Apis cerana*. After the introduction of the western honeybee *Apis mellifera* into the distribution range of *A. cerana* in southern Asia, the virus made a "species-jump" and began to parasitize its new host.

One of the most distributed viruses in Great Britain is known as cloudy wing virus (CWV). It creates no other damage or visible symptoms. Closely related, Deformed Wing Virus (DWV) causes the malformation of wing structures as the pupa matures. Even though generally associated with heavy Varroa mite infestation, studies have shown that in Europe, DWV has been present much longer than the Varroa mite. The typical symptoms in the form of deformed wings however are much more prevalent in colonies with high mite infestations. Symptoms and effects of the virus on bees infected as adults are not known.

The black queen cell virus (BQCV) leads to the death of queen larva and to a blackening of the cell walls. The infection in adults is associated with the parasite *nosema apis* and reduces the life expectancy of the adult bee without other symptoms. Most sources advise controlling nosema, and thusly BQCV with Fumidil-B™.

The chronic bee paralysis virus (CBPV) is usually identified by trembling bees at the entrance that are unable to fly, and sometimes also are black and hairless. This disease can quickly decimate the entire colony. It appears that CBPV is independent of Varroa and exclusively an adult disease. The appearance of this disease is often associated with high population density together with a lack of

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**Inland Empire
Beekeepers
Association**

**Next Meeting:
Friday December 9th
6:30 pm**

Christmas Turkey & Ham Dinner

The Inland Empire Beekeepers Association (IEBA) meets the 2nd Friday of every month at the Spokane County Ag Extension office by the County Fairgrounds, at 222 N. Havana. The association is affiliated with the Washington State Beekeepers Association (WSBA). IEBA membership dues are \$5.00 for an individual or \$10.00 for the entire family. This includes your receiving the *Inland Beemail*, which is published by the association every month.

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food sources.

As a summary one could say that most viruses in the colonies are present in the form of non-symptomatic infections. Noticing the symptoms depends on the dose of infection, the stage of development of the bee, and the general health of the colony. The exact mechanisms of infection are not known. It appears that the appearance of Varroa has altered the balance between virus and bee. The Varroa can transmit viruses at the pupal stage whereas the Varroa itself weakens the adult bees. Varroa have the ability to change the rate of infection, and also the method of transmittance. In laboratory tests. It was found that the number of ABPV viruses necessary to cause infection is 100,000 times smaller when injected as opposed to contact and a million times smaller as compared to ingestion.

Where do we go from here?

As mentioned, this list is not comprehensive. Viral infections and mechanisms in honey bees are poorly understood, and unfortunately there is not much research that is currently being done in the United States. The few studies that exist and are ongoing have opened up more questions, and some of these are being pursued mainly in European laboratories. As can well be imagined, funding in viral research usually goes to more pressing human needs such as ebola and bird flu.

What does this mean for the average beekeeper? Viral infections cannot be directly treated. No vaccines or medications are available for any of the honey bee viruses. Therefore, good sanitation practices are the key to prevention. Comb replacement and requeening are the best practical responses to a virus infection. Good management practices that reduce the stress level on the colony will help keep the balance tipped in the bees' favor. Effective Varroa control appears

vital as the mites open up additional pathways for the virus to enter their hosts on a large scale.

Sources:

General Discussion: Berthoud H., Imdorf A., Charriere J.D., Hauter M., Fluri P., (2005) Bienenviren – ein wenig bekanntes Gebiet. *Schweizerische Bienen-Zeitung* 128 (8) 19-22.

Personal Notes Based on talk given by Dr. Lynn Royce at the Northwest Corner Fall Beekeepers Convention in Newport, Oregon Oct. 2005.

For more on the mechanisms of the Picorna Virus family: <http://www.tulane.edu/~dmsander/WWW/335/Picornaviruses.html>

Kashmir Bee Virus: http://www.agf.gov.bc.ca/apiculture/factsheets/230_kashmir.htm

Varroa mite virus vectoring: *Apidologie* 35 (2004) 441-448 Transmission of