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VOLUME 150 NO. 3 MARCH 2010

Reflecting on 150 Years of Beekeeping
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Bee Smart

American Bee Journal

Volume 150 No. 3 March 2010

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March Cover Picture

Dan Eudy of Bullard, Texas captured this unusual photo of a honey bee taking water at a birdbath in February of 2009. Dan said that his son was the one who suggested the idea of combining photography with his beekeeping.

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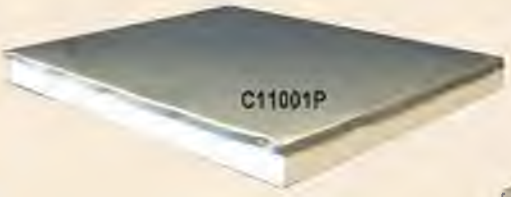

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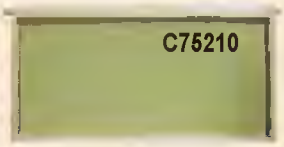

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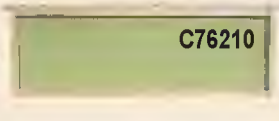

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Letters to the Editor

Send your letters to the editor, Attn: Joe Graham, Dadant, 51 S. 2nd Street, Hamilton, IL 62341, Fax: 1-217-847-3660, or email: abj@dadant.com.
Due to size and content, we may be unable to publish all information received. Thank You!

"SNOW APIARY"

"Snow Hives" built in Kansas

This is what happened when some teenage East Texas beekeepers see snow. We built a snow "apiary" while we were on vacation in Kansas. We built it the day after Christmas.

Mike
Kingfisher Apiaries
East Texas

MORE ON THE WHITE HOUSE HIVE

As regards the skeptical letter in the January issue of the *ABJ* "Honeygate?" I must respond.

The 130 pounds of surplus honey reported taken from The White House hive is an impressive yield for a single colony in the Chesapeake region.

However, Charlie Brandts, The White House beekeeper, is a member of our bee club. He is the most quiet and unassuming of beekeepers. If he says that 130 pounds of surplus honey were taken from The White House hive, you can take that to the bank.

I was able to take 120 pounds of honey from one of my colonies this summer, a colony I like to refer to as my "super colony". The writer of "Honeygate?" is correct in stating that in the Chesapeake region about one-quarter of that amount or about 30 pounds is the norm.

However, 2009 was no ordinary year in our region. The honey flow that began in May continued throughout June and July. My hive scale colony continued to gain weight until the fourth week of July.

In seven years of beekeeping, this 120 pound colony was a hum-dinger. This was an all-time record for me.

James Denny
Catonsville, Maryland

CAUCASIAN BEE SANCTUARY

Ile d'Yeu

France

The APISELECT Team and the breeding station Oya were founded on the island of Yeu in 1978. These partners do not only produce high quality Caucasian queens, but also aim at preserving the purity of the species. Accordingly, for the last 20 years, since 1986 to be exact, the center has been pursuing the creation of pure bee stocks of Caucasian queens whose ecotype is adapted to beekeeping countries in Europe and abroad. L'ile d'Yeu has become a unique sanctuary entirely and purely for Caucasian bees.

The island is located in the French high seas, 20 kilometers away from the coasts of Vendee (Atlantic coast). Furthermore, the island presents many features favorable to beekeeping. Consequently, the station benefits from a complete isolation and a natural protection against genetic pollution thanks to its insularity. Moreover, 65% of its surface is situated in a protected zone which allows the bees to gather nectar freely from the 780 different plants that grow on the island's various landscapes. As a consequence, l'ile d'Yeu is one of the most adapted reservoirs for central Europe.

The Caucasian bee presents many qualities, among which is the ability to be crossed successfully with other varieties. Many researchers have demonstrated an interest of such crossings. Mirza and Marcovici (1965) obtained an increase in honey production of 26.99% by crossing Italian/Caucasian bees. In France, Fresnay (1974) obtained a production increase of 40 to 50% with a third crossing with hybrids of the first generation (*A. m. mellifica*.X *A. m. caucasica*). He increased his output production by 116% with a triple combination (*A. m. ligustica* X *A. m. caucasica*) X *A. m. mellifica*. In Bulgaria, triple hybrids (local bees x *A. m. caucasica* x *A. m. carnica)*, gave a surplus of 60 to 70% more honey.

Furthermore, Nicole Russier has supported in her recently published thesis the fundamental role of Caucasian honey bees in high quantity honey production in the Pyrenees (NRA de Montfavet Avignon,

Mating yard on the French island of Yeu.

Etudes Approfondies de Génétique et Sélection Animale et Végétale). Moreover, she argues for the absolute necessity for a beekeeping center specializing in Caucasian genetic selection in an isolated area in order to maintain this variety of honey bee.

If you would like to correspond regarding our Caucasian bee breeding efforts, contact us at the address below.

APISELECT
Director, M. Vienne
Le marais salé
85350 Ile d'Yeu – France.
e-mail : **apiselect.yeu@free.fr**
Website : **www.apiselect.free.fr**

EGG TRANSFER NOT SO NEW

The December 2009 *ABJ* report on Apimondia includes Canadian veterinary researcher John Pollard's pioneering work on ways to ship honey bee germplasm—including the transfer of eggs with special forceps. To clarify, it is his device that is new, not the ability to transfer eggs.

To give credit where credit is due, the late Steve Taber published a paper on the subject almost 50 years ago: "Forceps for tranferring honey bee eggs". *J. Econ. Entomol.* 54 (2): 247-50, 1961. Alfred Dietz, professor emeritus, University of Georgia, published "The Effects of Positions on Hatching of Honey Bee Eggs in the Laboratory". *J. Econ. Entomol.* 57 (5): 392-395. Thanks to Dr. Dietz for the clarification.

M.E.A. McNeil

MORE ON "A CONTEMPORARY HIVE STAND"

This photo of the inside of a nuc stand (cut from 2x3's) shows the slats, the entrance, and the dados to receive the varroa screen and stickyboard. (Photo by J. Stafford)

I equipped my first hives with Screened Bottom Boards (SBB) that I purchased unassembled and modified for use with 8-frame hive bodies. They were ruggedly built of 2x4" lumber and strong enough to serve as stands. I often thought it would be interesting to combine the features of a Slatted Rack with those of a Screened Bottom Board in one assembly. However, doing so seemed like it would require the stand to be built from even larger wood, making it impractical in both cost and weight. The only way I could see this working out would be to have the entrance incorporated in the stand itself. By cutting the entrance into the stand, there is no room to install "slats" to provide additional cluster space. The entrance is routed at an angle to shed rain and it leads the bees onto the varroa screen. My 8-frame "SBB-Slatted Rack-Stands" are cut from 2x4's.

A Contemporary Hive Stand (Photo by J. Stafford)

My new stands may have an unconventional look, but they offer the following advantages:

- A smaller, more easily guarded entrance (used with upper entrances when desired)
- Slatted rack qualities are part of the SBB assembly
- Rugged construction eliminates the need for stands
- The hives can be placed in a level position

For readers who may not be familiar with Slatted Racks, Dr. Charles C. Miller is considered to be the inventor. Many years later, Carl E. Killion improved on the idea with the addition of the wide "front-board", which extends in, above the hive entrance. The purpose of the slatted rack was to increase ventilation in hives used in the production of comb honey. Air flow and cluster

SOME OF OUR RECORD 1951 COMB HONEY PRODUCTION

On this table is 55 supers (24 sections each) of comb honey. This represents only a small part of our record 1951 comb honey prodution in Illinois, which we wrote about in the February 2010 Letters to the Editor. We produced an average of 336 sections of comb honey from each of 100 colonies. At $8.00 per section for today's prices, I could have retired long ago! Unfortunately, in 1951 we sold the comb honey for $3.60 per case of 24 sections. That averages out to be only 15 cents per section of comb honey and each section weighed from 15 to 16 ounces apiece. (Eugene Killion, Killion & Sons Apiaries, Paris, IL)

space were both increased with their use. With the current use of screened bottom boards, I do not believe slatted racks do much to improve ventilation. There is still the additional cluster space which they provide, and the front-board may offer an obstacle to robbers and intruders

In place of the front-boards, some of my stands have an 8 mesh screen "mezzanine" which will allow mites to drop through or be covered with propolis to the bees' liking. I will eventually bevel the top edges of the stands to shed the rain and possibly add small landing-boards. I made a few for 5-frame nucs and 8-frame hives, and I am looking forward to testing them with bees in the spring.

Joseph Stafford
Cos Cob, CT

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BEES RECOGNIZE HUMAN FACES USING FEATURE CONFIGURATION

"Going about their day-to-day business, bees have no need to be able to recognize human faces. Yet in 2005, when Adrian Dyer from Monash University trained the fascinating insects to associate pictures of human faces with tasty sugar snacks, they seemed to be able to do just that. But Martin Giurfa from the Universite de Toulouse, France, suspected that the bees weren't learning to recognize people. 'Because the insects were rewarded with a drop of sugar when they chose human photographs, what they really saw were strange flowers. The important question was what strategy do they use to discriminate between faces,' explains Giurfa. Wondering whether the insects might be learning the relative arrangement (configuration) of features on a face, Giurfa contacted Dyer and suggested that they go about systematically testing which features a bee learned to recognize to keep them returning to Dyer's face photos. The team published their discovery that bees can learn to recognize the arrangement of human facial features on 29 January 2010 in the *Journal of Experimental Biology* at **http://jeb.biologists.org/**.

"Teaming up with Aurore Avargues-Weber, the team first tested whether the bees could learn to distinguish between simple face-like images. Using faces that were made up of two dots for eyes, a short vertical dash for a nose and a longer horizontal line for a mouth, Avargues-Weber trained individual bees to distinguish between a face where the features were cramped together and another where the features were set apart. Having trained the bee to visit one of the two faces by rewarding it with a weak sugar solution, she tested whether it recognized the pattern by taking away the sugar reward and waiting to see if the bee returned to the correct face. It did.

"So the bees could learn to distinguish patterns that were organized like faces, but could they learn to 'categorize' faces? Could the insects be trained to classify patterns as face-like versus non-face like, and could they decide that an image that they had not seen before belonged to one class or the other? To answer these questions, Avargues-Weber trained the bees by showing them five pairs of different images, where one image was always a face and the other a pattern of dots and dashes. Bees were always rewarded with sugar when they visited the face while nothing was offered by the non-face pattern. Having trained the bees that 'face-like' images gave them a reward, she showed the bees a completely fresh pair of images that they had not seen before to see if the bees could pick out the face-like picture. Remarkably they did. The bees were able to learn the face images, not because they know what a face is, but because they had learned the relative arrangement and order of the features.

"But how robust was the bees' ability to process the "face's" visual information? How would the bees cope with more complex faces? This time the team embedded the stick and dot faces in face-shaped photographs. Would the bees be able to learn the arrangements of the features against the backgrounds yet recognize the same stick and dot face when the face photo was removed? Amazingly the insects did, and when the team tried scrambling real faces by moving the relative positions of the eyes, nose and mouth, the bees no longer recognized the images as faces and treated them like unknown patterns.

"So bees do seem to be able to recognize face-like patterns, but this does not mean that they can learn to recognize individual humans. They learn the relative arrangements of features that happen to make up a face-like pattern and they may use this strategy to learn about and recognize different objects in their environment.

"What is really amazing is that an insect with a microdot-sized brain can handle this type of image analysis when we have entire regions of brain dedicated to the problem. Giurfa explains that if we want to design automatic facial recognition systems, we could learn a lot by using the bees' approach to face recognition."

Acknowledgement

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REFERENCE: Avargues-Weber, A., Portelli, G., Benard, J., Dyer, A. and Giurfa, M. (2010). Configural processing enables discrimination and categorization of face-like stimuli in honeybees. *J. Exp. Biol.* 213, 593-601.

THE ALMOND TREE'S SECRET WEAPON

The toxin called amygdalin that is found in almond tree nectar is in fact an evolutionary development intended to give that tree an advantage over others in its surroundings

The nectar of the almond tree produces an extraordinary and dangerous poison. This is the only known plant to have this poison in its flowers' nectar. A study carried out at the University of Haifa has revealed that bees are mysteriously drawn to the toxic substance.

Has the almond tree developed a unique way of drawing potential pollinators? A group of researchers at the Department of Environmental and Evolutionary Biology and the Department of Science Education at the University of Haifa-Oranim speculate that the toxin called amygdalin that is found in almond tree nectar is in fact an evolutionary development intended to give that tree an advantage over others in its surroundings.

Previous studies have already shown that amygdalin can be found in almond nectar at a concentration of 4-10 milligrams per liter. It is also known that the almond tree is the only plant to have this toxin in its flowers' nectar; in fact, the tree's subgenus classification is Amygdalus, after the toxin it produces. For small mammals this is a deadly substance and as it is highly concentrated in the seeds of unripe wild bitter almonds, these almonds are also dangerous for human consumption.

A group of researchers, headed by Prof. Ido Izhaki along with Prof. Gidi Ne'eman, Prof. Moshe Inbar and Dr. Natarajan Singaravelan, investigated why it is that this plant produces such a potent toxin - a by-product of which is cyanide - in its nectar. They explain that the presence of amygdalin in the nectar is seemingly incompatible with the nectar's purpose of attracting insects to the flower to extract food and pollinate it and thereby contribute to the plant's reproduction.

The researchers exposed honey bees to plates of nectar that had varying concentrations of the toxin and a plate of nectar without the toxin. The team first monitored four different amygdalin concentrations, resembling the natural levels of the toxin in almond tree nectar: 2.5-10 milligrams per liter. A second experiment monitored levels much higher than those found in the natural form: 5-50 milligrams per liter. In both cases and for each of the compositions, the bees preferred nectar containing amygdalin over the amygdalin-free option.

"It is difficult - and sometimes impossible - to determine the workings of evolution, but it is likely that amygdalin is produced in the almond nectar so as to give the almond tree an advantage in reproduction. Based on our observations, we can make a guess at which mechanisms come into play for amygdalin to provide this advantage," Prof. Izhaki explains. For example, even though amygdalin is poisonous for mammals, it is not poisonous for insects, such as the honey bee, and it even produces a stimulant that attracts such insects. Therefore, it is possible that the plant produces it so as to attract potential pollinators. Another possibility is that the almond tree has developed this substance in its nectar as a form of filter: it repulses "non-expert" pollinators, but gives access to the "experts" that have built up resist-

ance to the toxin while providing efficient pollination services for the plant.

The research team, in collaboration with Dr. Malka Halpern, Dr. Yoram Gerchman and research students Svetlana Friedman and Yana Gerstein, are presently examining the possibility of there being an additional mechanism in play: that the nectar toxin prevents inhabitation of bacteria that could spoil the nectar's quality and harm its appeal for potential pollinators, thereby impeding the tree's chances of pollination.

"Pollinating insects have always been lacking, so plants have had to develop ways to take the lead in attracting those that are available, in competition with other plants. Otherwise, they will not be able to reproduce. This is more than just a hypothesis: it is a very practical theory. For reasons that are not fully clear, there is a significant shortage of bees in the world. The worldwide scarcity of available pollinators severely harms agriculture and threatens supplies of produce for the human population. In California there are enormous almond groves that without bees will not produce fruit. Due to the scarcity of bees, the almond farmers in California are compelled to import - from as far away as Australia - truckloads of beehives during the almond's flowering season, so as to ensure pollination," Prof. Izhaki stated.

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agilat@univ.haifa.ac.il

HONEY-BEE VENOM CLINICAL TRIAL

Apimeds, Inc. is completing its first clinical trial in the United States. The trial is a Phase II study of whole honey-bee venom (Apitox) for the indication osteoarthritis. The study is being conducted in Chicago, Columbus and San Antonio. The study specifically excludes beekeepers as patients. According to Dr. Robert Brooks, the company's Chief Operating Officer, the company expects to conduct a Phase III clinical trial beginning in Mid 2010. Apitoxin has been approved for use in Korea since 2003 and has a 49,000 patient safety profile.

In early 2009 Apimeds filed a orphan drug designation request from the US Food & Drug Administration for Secondary Progressive Multiple Sclerosis as a subset of the disease. We were disappointed to receive a denial letter from FDA in July. The multiple sclerosis population exceeds the 200,000 patient limit for orphan status. The FDA did provide encouragement that their appeared to be enough clinical evidence to support a clinical trial. We explored submitting an orphan application for interferon failure, patients but after discussions with FDA abandoned this approach.

In 2009 a honey-bee venom product for veterinary use was approved in Korea.

JOURNAL OF APICULTURAL RESEARCH SPECIAL ISSUE: INTERNATIONAL STUDIES ON HONEY BEE COLONY LOSS

It has been unclear what has caused the recent global decline of honey bees. The Journal of Apicultural Research Special Issue published in January focuses on the latest evidence-based explanations of the extent and causes of honey bee colony losses. These peer-reviewed reports of current scientific thinking aid our understanding of recent eye-catching headlines proclaiming the dramatic demise of the honey bee, a world pollinator crisis, and the spectre of mass human starvation.

Honey bee colonies have recently been lost worldwide, but the extent of these losses and their causes may differ from country to country. In particular, Colony Collapse Disorder ("CCD") in the USA has caused much public and US governmental concern, leading to greatly increased research funding, and US scientists are working hard to provide explanations. There have also been significant losses throughout Europe, including the UK, and worldwide and, today, many respected bee scientists are investigating the situation.

So far, no single driver for these losses has been identified. Various factors have been suggested as explanations for elevated mortality of honey bees, but conventional causes such as pests (including the Varroa mite) and diseases, pesticides, beekeeping practices and the interactions between them, are receiving urgent attention through both national and large scale international research efforts.

Issue 49(1) of the *Journal of Apicultural Research*, published recently by IBRA contains a comprehensive mixture of evidence based review articles, original research articles, and reports of colony losses in many partner countries of the COST funded COLOSS Network. This issue is edited by Dr. Peter Neumann, the Chair of the global COLOSS network "Prevention of honey bee COlony LOSSes"; and Norman Carreck, Scientific Director, IBRA, and the University of Sussex, UK.

The *Journal of Apicultural Research* is available in electronic format from the IBRA website. However, in view of the special interest in this topic, issue 49(1) will also be available as a one-off paper edition for US$30.00 plus postage. The paper edition can be purchased through IBRA and individual papers can be downloaded from the website, **www.ibra.org.uk**

THE QUEST FOR THE PERFECT HIVE

A History of Innovation in Bee Culture

By Gene Kritsky

Honey bee pollination makes possible—directly and indirectly—a third of all the food we eat. According to the USDA's Agricultural Research Service, this managed natural process subsidizes $15 billion of crop production. Given how vital bees are to our economy and livelihood, recent widespread and unresolved thinning of hives—Colony Collapse Disorder (CCD)—threatens both. In **THE QUEST FOR THE PERFECT HIVE**: *A History of Innovation in Bee Culture* Gene Kritsky calls beekeepers to action:

"If beekeeping is to survive ... we need to consider the advantages and creative solutions presented by strange old beehives."

Kritsky observes beekeeping's regular evolution since the first documented human theft of a honeycomb 8,000 years ago. While we've moved from honey hunting to honey cultivating—in hollow logs, horizontal hives, skeps, and countless other forms—we stopped innovating beekeeping over a century and a half ago. Why? Economics, Kritsky says. Today's common movable-frame hive greatly increased honey yields from previous hives, but the apparatuses cost enough to make changing equipment unappealing.

Given the impending economic crisis that CCD could harbor, Kritsky implores his audience to reignite the innovation that once characterized beekeeping. He writes:

"We are keeping our bees in 'old' hives. Are we really using the 'perfect' hives? Because we have stopped inventing hives, we really do not know."

Gene Kritsky is Professor of Biology at the College of Mount St. Joseph in Cincinnati, and Adjunct Curator of Entomology at the Cincinnati Museum Center. He is Editor-in-Chief of *American Entomologist*, the magazine of the Entomological Society of America.

THE QUEST FOR THE PERFECT HIVE: ***A History of Innovation in Bee Culture***, by Gene Kritsky, will be published, in hardcover, by Oxford University Press on February 24, 2010 ($24.95 | 5½ x 8¼ | 216 pages | 147 b/w images| ISBN13: 9780195385441).

YouTube CHANNEL FOR BEE HEALTH LAUNCHED

The Bee Health eXtension.org web-initiative has a new YouTube Channel at **www.youtube.com/BeeHealth**. The YouTube channel offers a wider reach for Internet-based videos about bees and serves as portal to more complete resources about bees. The first submissions to the channel come from Dr. Jamie Ellis and Catherine Zettel Nalen at the University of Florida and Dr. Kirk Visscher at the University of California, Riverside.

Dr. Jamie Ellis already has a strong presence on YouTube, and many of his videos are linked as favorites from the YouTube channel. Uploaded directly to the channel, are 4 clips from videos he and his lab produced about varroa mites, nosema disease, the small hive beetle, and tracheal mites. YouTube no longer accepts uploads longer than 10 minutes, so cohesive segments of Jamie Ellis's videos are uploaded to YouTube, with a link back to the University of Florida for the complete videos (**http://www.ufhoneybee.com/**). The complete videos cover the history, biology, symptoms, and management of these 4 important diseases and pests.

Dr. Kirk Visscher at the University of California, Riverside has provided a high quality example of the Honey Bee Dance Language, available for viewing at the YouTube channel.

With your Google or YouTube account, you can subscribe to the channel to track updates from the eXtension.org Bee Health community. For more web-based information about bees from Apiculture research and extension personnel, see the Bee Health homepage at **www.extension.org/bee_health** .

NATIONAL HONEY BOARD MAKES EDUCATION A PRIMARY GOAL

Firestone, Colo. – Research studies have shown that many people don't know exactly what ingredients are in a bottle of honey, and the National Honey Board is making honey knowledge a key priority in 2010.

According to the 2009 Honey Attitude and Usage Study, 1 in 10 respondents thinks honey has added ingredients, such as corn syrup, sugar and preservatives. In addition, 1 in 7 respondents thinks that the color of the honey reflects its purity.

With its updated messaging strategy, the National Honey Board hopes that by informing consumers, food processors, chefs and the foodservice community that honey is pure and contains only one ingredient – honey – that there will be more consumption of and demand for this natural sweetener.

"There are so many misconceptions about honey," said Bruce Wolk, director of marketing for the National Honey Board. "The 2010 focus on education gives us an opportunity to reach out to the consumers and the foodservice industry about the basics of honey and why it is such a versatile product."

Honey blends, a combination of honey and artificial ingredients, are becoming commonplace in discount grocery stores and usually contain only a small percentage of honey. The 2009 research study shows that many consumers are aware of these honey blends, have previously purchased a honey blend and have demonstrated positive intent to purchase a honey blend in the future. This trend, if not further explored, may affect the future of honey.

In its educational component of the 2010 campaign, the National Honey Board will focus on basic honey messaging, educating consumers on pure honey, where it comes from and the natural process of how it is made.

NATIONAL HONEY BOARD SHIFTS MARKETING FOCUS

Firestone, Colo. – A recent research study has sparked the National Honey Board to refocus its marketing efforts for 2010, adding new programs and reformatting existing ones.

According to the 2009 Honey Attitude and Usage Study, current users of honey below the age of 45 have dropped significantly since 2006. This 27 percent decrease poses an opportunity for the National Honey Board to delve into other marketing avenues, like social media, to reach new and younger audiences.

In reaching a younger demographic, the National Honey Board hopes to expand the awareness and use of honey into other markets, such as snacks and natural home and health remedies. The 2009 study has found younger users of honey more likely to use the product in these fields.

"Younger users of honey seem to be a little more creative in how they use it," said Bruce Wolk, director of marketing for the National Honey Board. "Because of that, we need to communicate with them through new channels, like social networking, to continue positive trends in honey purchases and usage."

But it's not just reaching a younger demographic that the National Honey Board has in mind – the organization is directly targeting current users of honey as well, regardless of age. Further research has shown that 60 percent of respondents report purchasing honey within the last year, a drop of 18 percent from 2006. This could mean a decline in not only purchases, but also in honey consumption and demand altogether.

OBITUARY
Dr. E.C. (Bert) Martin

The beekeeping world lost a true friend, scholar, and advocate when Bert died Jan. 2, 2009. Even though he had a full and active life, it is still hard to have such wonderful people leave us. In his 99 years he did impact many people and beekeepers throughout the world, but especially the Provinces of Ontario and Manitoba in Canada and the State of Michigan.

Bert was born in Liverpool, England on Nov. 1, 1910, though his family emigrated to Ontario, Canada when he was just two

Dr. E.C. (Bert) Martin and his wife, Grace. Dr. Martin died Jan. 2, 2010. He was 99.

years old. He graduated from the University of Toronto (Ontario Agricultural College) in 1933 and remained at O.A.C. for a couple of years as an assistant in the Apiculture Department. After graduate studies at Cornell University, he became a faculty member at the University of Manitoba. During WW II he served in the Canadian navy as a Lt. Commander on a mine sweeper. His ship helped remove mines from the Normandy beaches on D-Day. After the war he returned to Manitoba as the Provincial Entomologist until he was hired by Michigan State University to be an Apiculture Professor and Extension Specialist in 1950. He remained at MSU until 1975 when he retired to take a position as Program Leader for Crop Pollination, Bees and Honey for the USDA in Washington, D.C. He held this position until 1979 when he again retired to live in Green Valley, AZ.

During his tenure at MSU he was asked to serve as Science Dean at the newly developing university in Nsuka, Nigeria. During this two-year assignment he helped design buildings, hire science faculty and generally establish a new university for this developing country. He repeated this effort, on a more limited scale, for a university in Indonesia some years later.

I can best describe the kind of person, professor, advisor, mentor, and friend that Bert was by quoting from a recommendation by Dr. James Bath who was Chairperson of the Department of Entomology during part of his tenure at Michigan State.

"Dr. Martin is one of the all-around finest individuals I have ever met. He is very understanding, logical, sensible, tolerant, patient and conscientious. He is a master at getting the most out of people, and he is a joy to work with."

Bert is survived by his wife, Grace (Ronny), who he was married to for 69 years, three children and several grandchildren and great-grandchildren.

He will be greatly missed by all of us who he touched during his long and productive life. **(Roger Hoopingarner, Holt, Michigan)**

OBITUARY
Charles Sterling Hofmann

Charles (Charley) Sterling Hofmann, 101, died peacefully Dec. 15, 2009 at the Janesville Nursing Home.

Charles was born October 24, 1908 to Emil and Clara (Sterling) Hofmann in the house in which he lived his entire life. He graduated from Janesville High School in 1926. When his father died suddenly in 1934 leaving a large debt, Charles chose to stay on the farm and pay off the debt by developing the bee business his father had started. He married Ellen Rose Hendricks on July 29, 1941 at St Gabriel's Catholic Church in Fulda, MN. Charles and Ellen enjoyed 63 years of marriage on their farm in Janesville, operating the bee business and raising four children.

While developing the bee business, Charles invented many devices to make the heavy work of beekeeping easier. He became an expert in beekeeping techniques and was sought after for advice. He was very active in beekeeping associations, holding offices at regional, state and national levels. He wrote articles for bee journals and was written about in many publications and newspapers. He was a judge for the bee and honey exhibit at the Minnesota State Fair and in 1989 was honored for 50 years of service. Charles' most famous endeavor was growing a "bee beard" for the Janesville Centennial celebration in 1958, and articles about it were sent worldwide by the Associated Press. He retired from beekeeping in 1985 at age 77, having worked with bees for a full 60 years. He quipped: "I didn't lose interest, I just got old."

Charles was also an accomplished and award-winning photographer. His beautiful color photos of bees were published in newspapers, journal covers and grade school textbooks. He created a slide show titled "The World of Bees" and traveled throughout the state for two years with the University of Minnesota Lyceum program, presenting to an estimated 34,000 students. With son Larry, this program was made into an award-winning video in 1998.

Charles was clerk of the Janesville Township Board for 44 years, an election judge for many years, a board member of the Waseca County Historical Society and member of St. Ann's choir for over 40 years. He was passionate about the environment and was an avid organic gardener. Charles enjoyed golf and travel well into his 90s, often combining the two with trips to Maui. He remained interested in current events until his last days. In his last decade of life, he began writing his memoirs, again with the help of son, Larry. His book, "My Life" was published in 2005 and records the story of his adventures and the tremendous changes this remarkable man experienced in his 101 years.

MAINE

Annual Meeting March 27, 2010
Meet other Maine
Beekeepers, Learn about Beekeeping!
Le Club Calumet, 334 Northern Avenue,
Augusta, Maine

Hosted by York County
Beekeepers Association

We are honored to have two great speakers this year—Jennifer Berry, University of Georgia Bee Lab and Cindy Bee, Master Beekeeper

MSBA Annual Meeting, c/o Peggy Pride, 119 Lizotte Road, Lebanon ME 04027 or register on-line via paypal at our website, www.mainebeekeepers.org DEADLINE IS MARCH 15, 2010

NEW HAMPSHIRE

Charles Andros, former NH/VT Apiary Inspector, will hold a beekeeping workshop from 1-3:30 PM on Saturday, April 24, at 18 MacLean Road, Alstead, NH 03602. Look for the "BEE" sign on the south side of Walpole Valley Road. Topics of discussion will be early spring management: locating apiaries, equipment, handling bees, feeding syrup and supplements, making nuclei, reversing, and requeening. Bring a veil, if you have one, as we shall be opening some colonies. We'll be inside if it is a rainy day. Registration required. email: **lindena@sover.net** or call 603-756-9056.

NEW HAMPSHIRE

Pawtuckaway Beekeepers Bee School 2010. Come learn the Art & Science of Keeping Bees. Located in Candia, NH the PBA holds an annual Bee School on Mondays from 7-9 pm beginning Feb. 22. Offering 7 classes, videos & demos at 6:30 each night and a Live Hiving event for $60 per person, additional family members can come for $15 each. Includes *Beekeeping for Dummies*, PBA binder, PBA membership, newsletter and BBQ! For more info visit our website at **www.PawtuckawayBeekeepers.ORG.** PBA holds its monthly meetings the 3rd Monday of each month.

NH Beekeepers Spring Meeting Saturday, March 20, 2010 Northwood, NH, 9-3 PM. Guest speaker Maryann Frazier from Penn State, auction, officer elections, grant updates and more. Hot lunch is provided for the cost of $20 per NHBA member or $30 non-members. For more information contact Wendy Booth **info@hivehealthy.com** or visit our website at **www.nhbeekeepers.org**

Join the NHBA for $15 individual or $20 family membership.

MASSACHUSETTS

Spring meeting - March 27th, 2010 - Topsfield, MA Hosted by Essex County Beekeepers Association

Field Day - June 26th, 2010 - UMass Agronomy Farm, South Deerfield, MA Hosted by the Franklin CountyBeekeepers Association

Fall meeting - October 2nd 2010 - Knights of Columbus Hall, Leicester, MA Hosted by the Worcester County Beekeepers Association **http://www.massbee.org/** 508-541-6324

CONNECTICUT

BackYard Beekeepers Association

March 30: Sam Comfort - Anarchy

Beekeeping with the Top Bar Hive
Sam Comfort of Anarchy Apiaries, Ger-

mantown, NY, will discuss a grassroots approach to beekeeping, evolving hive design, how to prepare the bees for agricultural revolution, and how they will prepare us.

Meetings are at 7:30 PM in the Norfield Congregational Church in the Community Room on Norfield Road in Weston, CT. At 6:30 PM there is a NewBees meeting for beginning beekeepers and WannaBees youth group meeting.

Each month we have timely weekend hands-on inspection workshops, bee school, mentor program and more. All events are free and open to the public. Please check our web site for the dates and locations or more information at **www.backyardbeekeepers.com** or contact Serge Boyce 203-259-4861 or **sergeboy@optonline.net** if you have any questions.

2010 BYBA General Meetings Program

April 27: David Tarpy, "The reproductive quality of commercial queens", May 25: Maryann & Jim Frazier "Pesticides on Bee Health and Behavior."

June 29: Dinner Meeting

September 28: Stan Schneider "Caste Interactions and Their Role in Colony Reproductive Decisions in the Honey Bee" October 26: Jennifer Berry "Sub-lethal effects of in-hive pesticides"

November 30: Allan Hayes on his unusual beekeeping tools & gadgets

Workshops:

March 20: Hands-on the Hive set up

NEW YORK

Apprentice Level Spring Course 2010

The Cornell University Master Beekeepers Program will conduct its two-day Apprentice Level Spring Workshop twice this year. New beekeepers and experienced beekeepers looking for a refresher course are encouraged to attend. Topics include the biology of the honey bee; starting with bees and beekeeping equipment; colony inspection; spring and supper management; and IPM for honey bee pests, parasites, pathogens and predators. Classes run from 9 a.m. - 6 p.m. and include 2 hrs. of field work each day. Cost is $140.00. A workshop manual and refreshments are provided. For registration meterials, go to masterbeekeeper.org. Classes limited to 24.

Offered at these times and places:

Sat/Sun, April 24-25
Betterbee
Greenwich, NY

Sat/Sun, May 1-2
Dyce Lab, Cornell University
Ithaca, NY

NEW YORK

New England Farms Beekeeping and Apiary Management Winter Seminar and Training Series

April 10, 2010 10:00 am - 3:00 PM
"Lunch with Mike Palmer"
10:00 AM, Nukes Aren't Just for Increase Anymore
12:00 noon, Buffet Lunch with Ross
1:00 PM, Wintering Nucs

Mike Palmer is a very successful commercial beekeeper and queen breeder. Mike will be discussing over- wintering nucs and "Nucs Aren't Just for Increase Anymore".

$25.00 per person, includes lunch and breaks, door prizes, a portion from each participant fee will be donated to the Vermont Beekeepers Association for the New Beekeepers Scholarships. Reservations are requested. Participants will also receive discounts from the sponsor on the day of the event. Seminar sponsor and location is New England Farms, 31 Main Street, Granville, New York 12832. 518-642-3270 email **newenglandfarms@aol.com**. See **www.newenglandfarms.com** for directions, reservations and discount information.

NEW YORK

The Southern Adirondack Beekeepers Association invites you to the **SABA Seminar 9-5 on March 27, 2010** to be held at the University of Albany, LC One as usual. . . .

Speakers: Allen Hayes, EAS Master Beekeeper from Maryland, The NASA Honey Bee Net Scale Hive Project & Gadgets You Can Keep Bees Without but Won't Want To

Dr. Thomas Seeley of Cornell University, Getting Some Freebies: The Design and Use of Bait Hives & The Flight Guidance Mechanisms of Honey Bee Swarms

Blake Shook of Desert Creek Honey, How a Home-Schooled Teen Started His Own Bee Business & Products of the Hive - More Than Honey

Pre-registration is $40 through 3/15, $10 extra at the door.

Betterbee and Brushy Mtn. Bee Farm will have booths; orders called in by 3/22 will be delivered to the seminar (space permitting).

For registration form see **www.adirondackbees.org** or call Anne Frey 518-895-8744.

SOUTH CAROLINA

The South Carolina Beekeepers Association will hold its annual spring meeting on Saturday, March 6, at the South Carolina Farm Bureau Building, 724 Knox Abbott Drive, Cayce, (West Columbia). Registration will begin at 8:00 AM and the meeting program will get underway at 8:30 and end at 4:00 PM. Registration cost is $5 per person or $8 per family. Non-member registration is $10.

Presentation topics for the meeting include a Legislative Update, South Carolina Department of Agriculture News, New Farmers Market in Lexington, Eastern Apicultural Society News, State of Beekeeping in South Carolina, Beekeeping Around the World, Removing Bees from Structures, Honey Bee Research at Clemson University and other topics of much interest to beekeepers.

All beekeepers or anyone interested in beekeeping are invited to attend for a good time of education and fellowship. No pre-registration is necessary. For further information, contact Mike Hood, Executive Secretary - SCBA at (864) 656-0346 or email: **mhood@clemson.edu** or go to our SCBA website at: **scstatebeekeepers.org**.

OHIO

Lorain County Beekeepers Association

WHEN: Friday, March 5th, Friday, March 12th, Friday, March 19th, & Friday, March 26th
TIME: 7:00 P.M. - 9:00 P.M.
WHERE: FIRST UNITED METHODIST CHURCH, 45 S. Professor St. Oberlin OH
DETAILS: Cost of the class is $45.00 and includes a year membership in L.C.B.A. and a monthly newsletter. A book will also be available for an additional fee.

An educational scholarship essay contest for local youth 9-18 years of age is available and information and form are on the web site.

A hands-on Field Day will be held, Saturday, May 8th, which allows everyone to get up close and personal in an active beehive. For updates and forms and other contact info, please visit LCBA web site at **www.loraincountybeekeepers.org** You can also contact Valerie, **buzzzzeditor@verizon.net** or 419-929-1110

OHIO

Southwestern Ohio Beekeeper School

The 2010 Southwestern Ohio Beekeeper School has been scheduled for March 27th at the Oasis Conference Center in Loveland, Ohio. This school has been held for more than 30 years and is designed for new and moderately experienced beekeepers. The school offers beekeepers an opportunity to choose from 16 different educational sessions and to browse for new equipment from on-site vendors.

Registration costs $35 for adults and $25 for youth under 17 years of age. Lunch is included in your registration fee. Deadline for registration is March 1st and is limited to the first 300 people to sign-up for the school. This event historically fills up before the deadline, so register early. No walk-ins are permitted. For

more information or a registration form, go to the Ohio State University Extension in Warren County's website at **http://warren.osu.edu** after January 15th.

OHIO

Latshaw Apiaries 2010 Instrumental Insemination three Day Course

Join us September 8-10, 2010, for the second annual instrumental insemination course taught by Dr. Joseph Latshaw. This course is designed to help individuals learn the *science* of instrumental insemination and the *art* of perfecting the benefits this valuable technique. The course will be limited to six participants to maximize the benefits of a small group setting. Ample opportunitites for individualized instruction and plenty of practice will be provided.

Dr. Latshaw has over 20 years of beekeeping experience and specializes in the design and production of instrumental insemination equipment. Dr. Latshaw has designed two insemination devices: the Latshaw Instrument and the new Latshaw Micro Instrument. Dr. Latshaw's insemination skills and his extensive background in honey bee genetics have allowed him to significantly contribute to the beekeeping community by providing exceptional breeder stock to commercial queen and honey producers across the United States.

Dr. Latshaw has hundreds of hours of teaching experience, and he is a frequently sought after speaker. Join him for this great opportunity to learn the instrumental insemination technique. Applications are required. Enrollment will be closed when the course is full. Please visit **www.LatshawApiaries.com** for additional information and an application. We look forward to working with you.

MICHIGAN

Advanced Bee Biology and Beekeeping

Dewey M. Caron and Lawrence J. Connor, Instructors
Comstock Community Center, Comstock, MI

March 9, 11, 16 and 18, 2010
6:30 to 9:00 PM each evening

Sponsored by Wicwas Press
Pre-Registration: $75 per person or $100 per couple with Caron's book*
Pre-Registration: $50 per person or $90 per couple without Caron's book*
Participants are expected to have kept bees at least one season.
Registration at www.wicwas com or 1620 Miller Rd., Kalamazoo, MI 49001

March 9 (Tuesday)
6:30 Introduction - Larry Connor
6:45 Natural History of the Bee Colony Dewey Caron
7:45 Break
8:00 Spring Management & the Colony Cycle - Larry Connor
9:00 Study Questions

March 11 (Thursday)
6:30 Discussion from first session
6:45 Swarming - Dewey Caron
7:45 Break
8:00 Making Increase Colonies - Larry Connor
9:00 Study Questions

March 16 (Tuesday)
6:30 Discussion from second session
6:45 Bee Losses—Where Are We? - Dewey Caron
7:45 Break
8:00 Bee Floral Essentials - Larry Connor
9:00 Study Questions

March 18 (Thursday)
6:30 Discussion from third session
6:45 Fall and Winter Management - Dewey Caron
7:45 Break
8:00 Varroa Control by Selection & IPM Larry Connor
9:00 Study Questions

*Additional $15 for at-the-door registration/Single night registration by prior arrangement.

MICHIGAN

Michigan Beekeepers' Association and Michigan State University will sponsor the annual ANR Week beekeeping program on March 12-13, 2010 at the Kellogg Center on the MSU campus. The keynote speaker will be Dr. Dewey Caron, professor emeritus of University of Delaware and author of two outstanding beekeeping books. Dr. Carron will speak each morning followed by breakout sessions covering many topics including: starting with bees, extracting honey, package bees, bee biology, candle making, queen rearing, bee diseases, varroa mite control, making and wintering nucs, and more.

For information call Roger Hoopingarner 517-709-3514, or **rahoopie@msu.edu**.

MICHIGAN

Beekeeping Conference at Schoolcraft College

Southeastern Michigan Beekeepers' Association (SEMBA), in cooperation with the Schoolcraft College Beekeepers' Club, and the Oakland Beekeepers' Club, will hold its 72nd Annual Beekeeping Conference on Saturday, March 20, 2010 from 8:00 a.m. to 4:00 p.m., in the VisTaTech Center at Schoolcraft College, 18600 Haggerty Road, Livonia, MI.

Major speakers include Dewey Caron, Ph.D., Emeritus Professor, Univ. Delaware Affiliate Scientist - Horticulture Dept, Oregon State Univ., Corvallis, Zachary Huang, Ph.D Beekeeping Specialist Michigan State University

Sessions during the day-long program are designed for all beekeepers, both novice and experienced, or anyone interested in honey bees.

Specially featured in this year's beekeeping conference is a series of beginner workshops, each dealing with a different aspect of beekeeping to help the new beekeeper get started. New beekeepers will have an opportunity to enroll in a year-long "hands-on" beekeeping course to be held in a demonstration apiary. Other workshop sessions include a variety of practical beekeeping management topics taught by experienced beekeepers.

On display, will be the latest in beekeeping crafts and beekeeping equipment. A variety of new and used beekeeping supplies and equipment will be on sale.

Admission is free to SEMBA members. A $10.00 registration fee is charged at-the-door for non-members. A potluck lunch is held at noon, with coffee and tea provided. Bring a dish to pass and your own table service.

For further information, please contact Roger Sutherland, 734.668.8568 or E-mail **rsuther@hotmail.com**

MICHIGAN

City Bees Detroit will be hosting an all day conference March 6, with speakers from Chicago, Milwaukee, Cleveland, Toronto and Detroit.

Workshops, vendors and panel discussion on how and why to keep bees in your city. At the Detroit Waldorf School 2555 Burns Street, Detroit, Michigan. 9:00 to 4:00. Cost is $20/person. Info at:
www.citybeesdetroit.com or email **citybeesdetroit@gmail.com**

KENTUCKY

2010 Bluegrass Beekeeping School

The 2010 Bluegrass Beekeeping School on March 13th in Frankfort on the campus of Kentucky State University. (Same location as the last few years.)

The class schedule will again have a beginner's track of classes led by Dr. Tom Webster. Kentucky Beekeeping Extension Specialist from KY State University. In addition, numerous classes of interest to more experienced beekeepers will be offered. Special out-of-state speakers will include Dr. Dave Tarpy, associate entomology professor and apiculture extension specialist from North Carolina State University. Also Michael Bush, from Bush Farms in Nebraska will

be part of the program. Additional speakers and program will be available on the website of Phil Craft, Kentucky State Apiarist. A vendor tradeshow will again be part of the program. Due to increased attendance at this school, pre-registration is encouraged, registration numbers may be limited – see webpage for more information. For more information, including pre-registration forms, contact Phil Craft, KY State Apiarist, 502-564-3956, phil.craft@ky.gov or go to his webpage at **http://www.kyagr.com/statevet/bees/**.

NEBRASKA

University of Nebraska Cooperative Extension

Everything You Need to Know to Succeed in Apiculture

Beginning Beekeeping Workshops
Nebraska City, NE – March 13, 2010
9:00 AM - 5:00 p.m.

Beginning Beekeeping Field Day
Ithaca, NE - April 17, 2010
10:00 AM - 2:00 p.m.

Master Beekeeping Workshop
Ithaca, NE - June 10-12, 2010

Registration fee for the Nebraska City workshops is $20 per person plus $6 each for additional family members. Registration includes lunch, refreshments and a workbook for new beekeepers. Preregistration is required for both workshops. The Ithaca Workshop is a hands-on session for participants in both the Hastings and Nebraska City Workshops. There is no registration fee for the Ithaca Workshop, and lunch is potluck so bring a dish to share. If you have questions about the workshops or need further information, contact: Marion Ellis at:
Email: **mellis3@unl.edu**
Phone: (402) 472-8696

Send Nebraska City Registrations to:
Vaughn Hammond, Extension Technologist
5985 G Road
Kimmel Education and Research Center
Nebraska City, NE 68410
Email: **vhammond2@unl.edu**
Phone: (402) 873-3166
Make check to: University of Nebraska

2010 Master Beekeeping Workshop
A 3-day Master Beekeeping Workshop will be offered in Ithaca, Nebraska at the Agricultural Research and Development Center Headquarters Building on June 12-13. This workshop will provide detailed instruction bee biology and practical beekeeping. Training will include both classroom and hands-on sessions. Registration for the workshop is $100 and includes 5 meals, a workbook, a cap and refreshments. The handson sessions will be in an apiary and participants should bring their own protective gear. For a complete program with schedules and a list of presenters contact Jeri Cunningham (contact and registration information provided below).

Send Master Beekeeping Workshop Registrations to:
Jeri Cunningham
University of Nebraska
Department of Entomology, 202 Entomology Hall, Lincoln, NE 68583-0816
Email; **jcunningham1@unl.edu**
Phone: (402) 472-8678
Make check to: University of Nebraska

NEW MEXICO

Kirk Webster of Champlain Valley Bees and Queens will be visiting NM in late March. A seminar will be held in the Santa Fe area with addtional guest presenters TBA. For more info, please email **zia queenbees@hotmail.com** or call Tel: 505/689-1287 for details.

NEW MEXICO

Hands-on Natural Topbar Beekeeping Classes with long-time beekeeper Les Crowder Certification Classes in Santa Fe, New Mexico April 25, May 16, May 23, June 20. Backyard Beekeeping in Albuquerque, New Mexico April 11, April 18, May 23. Backyard Beekeeping in Rio Lucio, New Mexico May 9, June 6. Out of Towner's intensive in Rio Lucio, New Mexico August 19-22. **www.fortheloveofbees.com** or email **fortheloveofbees@kitcarson.net** (575) 587-2065.

OREGON

GloryBee brings bees to the people on Bee Weekeend

GloryBee Foods has announced that their annual Bee Weekend will take place approximately the second weekend of April 2010. Bee Weekend is a two-day event filled with beekeeping education, distribution of pre-ordered packages of live bees, and lots of fun for veteran and beginning beekeepers alike. Dick Turanski, founder and beekeeper, will be on hand to demonstrate installation of package bees into hives. For more information go to **www.gloryfoods.com**

CALIFORNIA

2010 Specialized Classes to Promote Stock Improvement

Taught by Susan Cobey and offered at the Harry Laidlaw Honey Bee Research Facility at UCD, in Davis California.

1. THE ART OF QUEEN REARING WORKSHOP. Two, One day workshops will be offered March 31 and April 7th. The class is designed to provide an understanding and appreciation of what it takes to rear high quality queens. Basic biology and principles of queen rearing will be presented. Registration $125 per class. Signup deadline Mar. 15, 2010.

Optional Queen Production Tour, Thursday Apr. 1st. and April 8th., 2010. For those who would like to see large scale commercial queen production, an optional one day tour will be offered following the Queen Rearing Workshops. We will visit several northern California producers during their busy spring season. You will observe techniques and systems involved in commercial queen production. This tour is optional and open to class members only. It will be scheduled the day after the Queen Rearing Classes. Tour Fee $50.

2. INSTRUMENTAL INSEMINATION & BEE BREEDING WORKSHOP,
April 14, 15 & 16, 2010. This class is designed for commercial beekeepers who are involved in a breeding program and for laboratory personnel requiring the skill for research purposes. A practical hands-on approach to instruction is provided with emphasis on individual attention, therefore classes are kept small. Registration $425. Signup deadline Apr. 1, 2010.

3. The ADVANCED WORKSHOP ON INSTRUMENTAL INSEMINATION,
April 22 & 23, 2010 Designed as a follow-up to the Instrumental Insemination course, the focus of this class will be perfecting insemination techniques and solving individual problems in the laboratory and in the field. The class is recommended for those with some experience. Registration $375. Signup deadline Apr. 1, 2010.

For Information:
Susan Cobey **swcobey@ucdavis.edu**
http://entomology.ucdavis.edu/courses/beeclasses
University of California, Davis
Dept. of Entomology
Harry Laidlaw Honey Bee Research Facility
367 Briggs Hall
Davis, CA. 95616-8584
Tel. 530-754-9390 Fax 530-754-7757

CALIFORNIA BEEKEEPERS MEET IN SAN DIEGO

The California State Beekeepers Association held their 120th Annual Convention Nov. 17 - 19, 2009. The meeting of beekeepers from throughout California, as well as the nation, was held at the beautiful San Diego Hilton by the Bay. Attendees were informed of new developments in the bee industry by some of the nation's most

prominent honey-bee researchers. The convention was opened by Dr. Eric Mussen of UC Davis humorously commenting on the future of beekeeping. Dr. Gloria deGrandi-Hoffman of the Carl Hayden Bee Research Center in Tucson, AZ gave a presentation on the effects of fungicides and pollen on honey bees. This is an important topic for those beekeepers who pollinate almond groves and have fungicides applied to the almond groves while bees are in the orchard.

Sue Cobey of UC Davis updated attendees on her ongoing project to help with the stock improvement of queen bees here in the United States. She is traveling all over the world in search of new queens to help our breeding in the states.

Dr. Frank Eischen of USDA Weslaco, TX gave two presentations. The first on pollen substitutes and a comparison of the different pollen substitutes commercially available as well as the timing of the application of the pollen substitute. His second talk was about Nosema and almond pollination. These are two important topics for any beekeeper who brings bees to almond groves.

Mary Ann Frasier of Penn State University presented some new possibilities and developments with Africanized honey bees. Dr. Neal Williams of UC Davis gave an introduction to the work he is doing with UC Davis and their Native Pollinator project. Judy Wu of Washington State University spoke on new questions that beekeepers must deal with in regards to the sub-lethal effects of pesticides in honey-bee brood comb. Matthew Smart, also of WSU, talked of his work on *Nosema ceranae* and the interactions that are going on inside the honey bee.

Mary Ann Frasier of Penn State was the featured speaker at the Research Luncheon. She spoke on the latest developments on Colony Collapse Disorder. An interesting presentation on the mating quality of commercial queens that was very enlightening was given by Dr. David Tarpy of North Carolina State University. This was followed by Dr. Marla Spivak of the University of Minnesota. She spoke also of queens and the importance of the queen's mating habits and what they are finding out about the mating habits of queens.

There were also two beekeeper panels. These are always interesting as you get to hear information from actual beekeepers and what they are dealing with and what solutions they have devised to make their operations successful. The first panel spoke on migratory beekeeping—a topic that many beekeepers have experience with or are considering to begin, moving bees around the country. The second panel spoke on almond pollination. This topic has become very important to beekeepers who move bees into almond orchards as this is a major source of income to commercial beekeepers.

Other speakers included beekeeper John Miller and his thoughts on the state of beekeeping and where we as an industry should be going in the future. Cynthia Cory of the California State Farm Bureau gave information on the new diesel rules that will be implemented in California and what beekeepers need to do to be ready for this game-changing event. Gene Brandi, a board member of the CSBA, and Holly Fraumeni of Platinum Advisors, gave an update on the lobbying efforts that Platinum Advisors is doing on behalf of the CSBA.

Thursday night brought a close to the convention with the CSBA Annual Banquet and Awards Presentation. This year's awards recipients were as follows.

CALIFORNIA AWARDS

Also recognized for their contributions to beekeeping was Haagen Dazs Ice Cream for their commitment to funding honey bee research, as well as Kathy Kellison and her work on behalf of honey bees.

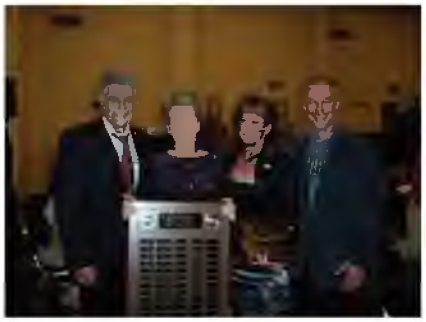
The close of the convention brought the end of CSBA President Brock Ashurst's term. He handed over the duties of President to Roger Everett. Thank You for your service Brock and good luck to Roger.

CSBA President Brock Ashurst and the CSBA put together another excellent convention that we hope you were able to attend and if not this year, please make plans to join us next November, 2010 in San Luis Obispo, CA.

2009 CA Distinguished Service Award Sue Cobey

Left to Right: Sue Cobey and Frank Pendall

2009 CA Beekeeper of the Year Jackie Park-Burris



Left to Right: Shannon Wooten, Glenda Wooten, Beekeeper of the Year Jackie Park-Burris and her husband Jim Burris

2009 CA Lifetime Honorary Beekeeper Jim Robertson

Left to Right: CSBA President Brock Ashurst and Jim Robertson

2009 CA Lifetime Honorary Beekeeper Kenneth Bennett

Left to Right: CSBA President Brock Ashurst and Kenneth Bennett

2009 CA Presidents Award Patti Johnson

Left to Right: Patti Johnson and Brock Ashurst

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- 20 6 1/4" Assembled #1 Wood Frames With 20 5 5/8" Waxed Rite-Cell· Foundation
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American Bee Journal Editors

W.F. CLARKE and ELLEN S. TUPPER

by M.G. DADANT and ROY A. GROUT*

In the final chapter of the article on Samuel Wagner, who established the *American Bee Journal* and was its first editor, George S. Wagner, Samuel's son, announced the disposition of the *American Bee Journal* to the Rev. W. F. Clarke, of Guelph, Ontario, president of North American Beekeepers' Society[1]. The cover of the January 1873 issue was of the same design as used by Samuel Wagner, but on one side appeared the words: "Edited by W. F. Clarke," and on the other side, "Established by Samuel Wagner."

On the same page that George S. Wagner's announcement appeared, Clarke announced his acceptance of the editorship, which we quote in part:

"With this number, as elsewhere announced and explained, the AMERICAN BEE JOURNAL passes into new hands. It will, however, continue the same as to character and aim that it has been from the beginning, and it will be the constant effort of the new Editor and Proprietor to catch the spirit and emulate the example of the lamented Samuel Wagner, its original founder and, until within a few months, its able and honored conductor. Our embarkation in this enterprise has been largely the result of solicitation and encouragement on the part of eminent beekeepers . . . As of old, the AMERICAN BEE JOURNAL will take a straightforward, impartial course, anxious only for the general good. It has no patent interests, and no personal ends to promote. We shall conduct it on the principles embodied in our inaugural address at the Indianapolis meeting, and shall endeavor to make it helpful to the beekeeper, whether his apiary be located in the inclement North, or in the 'sunny South.' . . . Mr. George S. Wagner, we are happy to say, has engaged to furnish such translations of German articles on apiculture as may be of value to American apiarians. Aided by a host of earnest and friendly co-laborers, we shall toil hard to make the AMERICAN BEE JOURNAL all that its best friends desire it to be . . . Though we have faith in beekeeping as a fairly remunerative business, it is as yet comparatively in its infancy, and few, if any, have made, or are making, such fortunes out of it as to justify high charges. We prefer, if possible, that we and our patrons should prosper conjointly, and would go upon the maxim, 'Live and help live,' which is higher and nobler than 'Live and let live.'" It was signed "W. F. Clarke, Editor and Proprietor of the AMERICAN BEE JOURNAL."

The Rev. W. F. Clarke, according to Thomas G. Newman,[2] bought his first hive of bees in the spring of 1864, with a view of investigating the secrets of apiculture, "to fit him to write on that branch of moral economy." In concluding Clarke's biography up to that time, Newman stated: "Mr. Clarke never practiced beekeeping as a business, but wholly as a matter of scientific investigation and interest, 24 colonies being the most he has ever had at one time." Clarke, however, was always active in beekeeping affairs.

According to Milum in his "History of Our National Organizations,"[3] Clarke attended a meeting Dec. 21-22, 1870, held in Indianapolis, for the purpose of the formation of the North American Beekeepers' Association. At that meeting, W. F. Clarke, Ontario, Canada, was designated asst. secretary for the next meeting; the Rev. L. L. Langstroth, president elect. Then, in February 1871, in Cincinnati, the formation of the American Beekeepers' Association was concluded and the elected officers were the Rev. L. L. Langstroth, who became president, and H. A. King, secretary. Milum comments that "this was the joining together of two antagonistic parties—over patent right," and that the group of 150 delegates agreed to meet at Cleveland to amalgamate.

The officers elected at the Cleveland meeting, December 4-6, 1871, included W. F. Clarke as 1st vice-president. Moses Quinby, of New York, was elected president, and this was the formation of the North American Beekeepers' Society. The 1872

William F. Clarke, editor of the American Bee Journal, 1872-1878.

Ellen S. Tupper, editor of the American Bee Journal, 1875-1878.

***Former *American Bee Journal* editors**

The *American Bee Journal* and the *American Poultry Journal*, under Thomas Newman, were both published in this building in Chicago, IL. handy to the wood engravers and the printing shop.

meeting, Dec. 4-6, to which reference has been made, was in Indianapolis, Indiana, and Clarke was elected president and his residence is listed as Clarksville, Ontario. It was at this meeting that Clarke, in his inaugural address, told of his continuing the publication on the *Journal*. Inasmuch as Moses Quinby was absent, Clarke presided over this meeting.

At the 1873 meeting of the Society, Clarke could not be present, so one of the 27 vice-presidents, Hamlin of Tennessee, presided, and no mention is make of Clarke in Milum's "History," but at the Pittsburg meeting, Nov. 11-13, 1874, Clarke again was elected to the presidency of the Society. But the Society experienced difficult times and on Dec. 1-3, 1875, there was a meeting in Toledo, Ohio, to discuss abandoning the organization, and one who was vigorously opposed the proposition, W. Z. Zimmerman, of Ohio, was elected president and Clarke's name apparently does not appear thereafter.

Returning to the story of the *American Bee Journal*, Clarke, as president of the North American Beekeepers' Association, was influenced by many prominent beekeeper friends to continue its publication. Many testimonials and signatures to this effect appear in its pages. But Clarke was not a newcomer to journalism. In 1864, he had undertaken the editorship of the *Canada Farmer*, owned by the Hon. G. Brown, and he continued as editor of that publication for 5 years. In spite of his ministerial duties and his extreme activity in beekeeping organizations, he was a good editor as long as he was in office.

When Clarke became editor and proprietor of the Journal, he moved it, on the advice of friends, from Washington, D.C. to Chicago, Illinois. The January number 1873 appeared a little late, mailed from Washington, D.C. but the cover and masthead read "published monthly in Chicago, Illinois.

In the February 1873 issue,[4] under "To Our Correspondents and Readers," appears in part: "Have patience, good people, all! Rome wasn't built in a day, nor can editoral and publishing changes be accomplished in a day. Our own transfer, and that of the AMERICAN BEE JOURNAL, from the east to Chicago, has necessarily involved inconvenience and delay. Partly on this account, and partly because we waited for the proceedings of the North American Beekeepers' Society, the January number was considerably behind time. That issue, though bearing the Chicago imprint, was published and mailed in Washington. But for the adoption of this plan, it could not have possibly appeared until the end of the month. This arrangement, however, has made it difficult to get out the present issue as promplty as could be desired, but we hope hereafter to be 'on time.'"

In the same issue and on the same page appears a notice that the publishing office of the *Journal* will be at 146 Madison Street, and that J. S. Thompson & Co., General Job Printers, 35 Canal Street, corner of Washington, will print and publish the *Journal*. Then, in the May 1873 issue,[5] there is an announcement of the transfer of the offices to 25 West Lake Street, but in the November 1873 issue[6] Clarke announces movement of the offices to No. 27 McCormick Block in Chicago.

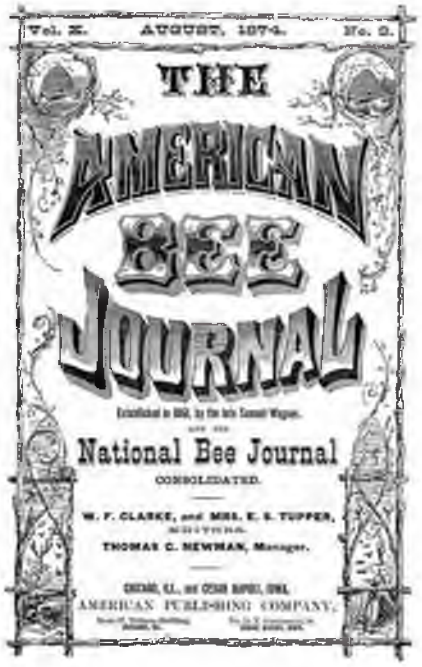
It should be noted that Volume 9 of the *American Bee Journal* consisted of only six monthy issues, and Volume 10 begins with the January 1874 issue. We find no explanation as to why Clarke, who moved the Journal to Chicago, found it necessary to move his office three times in one year.

Commencing with the January 1874 issue, there appears a new cover design listing W. F. Clarke as editor, but the publishers were The American Publishing Company, Room 27, Tribune Building, Chicago. An inner "false" cover read: "Edited by W. F. Clarke and Mrs. E. S.Tupper, Thomas G. Newman, manager, Chicago, Illinois and Cedar Rapids, Iowa. In the same issue,[7] appears an announcement of moving the publication of the *Journal* to the American Publishing Company, managed by Newman. Apparently, in this move, Clarke obtained the help of Mrs. Ellen S. Tupper, in an editor's capacity, and divorced himself from the business end—publishing, circulation and advertising.

Apparently, the American Publishing Company had businesses both in Chicago and Cedar Rapids, Iowa, and there is an announcement in the July 1874 issue[8] that reads: "We have purchased of Geo. S. Wagner, Esq. and the Rev. W. F. Clarke all the back subscriptions and the advertising accounts." From this it is apparent that Wagner still had a financial interest in the Journal, and the masthead of the August issue announces the source of publication as Cedar Rapids. The address was No. 11 Commercial Street. The cover also reads: "The *American Bee Journal*, established in 1861, by the late Samuel Wagner, and the *National Bee Journal*, consolidated." The outside back cover is a full-page illustration of the *National Bee Journal*, listing as editor and

Q. When did wood cuts cease to be used in the *American Bee Journal* for illustrations?

A. The first metal engravings appeared in the 1895 *American Bee Journal* 35(1):1. Pictured were Charles Dadant and C. P. Dadant. Through 1894, Vol. 34, only wood cuts were used.



Cover of the *American Bee Journal*, August, 1874.

proprietor "Mrs. Ellen S. Tupper, Des Moines, Iowa," but the contents listed on the cover are the same as those in the August issue of the *American Bee Journal*.

Starting with the September 1874 issue, the cover design was changed to resemble that of the *National Bee Journal*, but with the words: "*The American Bee Journal*," a fine engraving of a skep, and with these words directly below: "A Monthly Magazine Devoted Exclusively to Bee Culture." The names of Clarke and Tupper appeared on the cover as editors, and this was continued through the March 1875 issue. Starting with the April 1875 issue, their names no longer appear on the cover as editors, but they do appear on the masthead through the May 1875 issue.

Of historical interest, the December 1874 issue advised readers that Congress had enacted a new postal law, effective January 1, 1875.[9] Prior to this time, individuals paid the postage on their papers at the post office when receiving them, but now the publishers were required to pay the postage, and charge it to subscribers. Manager Newman reports: "We have concluded not to ask the additional price of postage from our subscribers, and hope they will so far appreciate their having no postage to pay in the future, as to send us a new subscriber when renewing the next year."

Returning to Clarke and Tupper, according to Newman, Clarke continued to contribute to its columns until sickness compelled him to retire from all literary work. Recuperating under the influence of farm life, he regained his health and, in June 1880, he became pastor of the Congregational Church in Listowell, Ontario. Newman wrote in the July 13, 1881 *Journal* that "of late he has resumed work on the *American Bee Journal*, and we hope hereafter to see his face and hear his voice at our annual conventions of beekeepers as of yore."

Previously, we have referred to Mrs. Ellen S. Tupper and her connection with the *American Bee Journal*. Mrs. Tupper was a beekeeper, a queen rearer and sold Italian bees. She was a dealer in beekeepers' supplies, and was prominent in conventions and affairs of that time. In the April 1873 issue,[10] Charles Dadant wrote: "I intend to preserve, for Mrs. E. S. Tupper and for myself, all the dark queens, for we both know very well that the light-colored queens are less prolific and less vigorous than the dark. In so doing, we are to satisfy everybody—those who prefer color rather than quality, and those who, like ourselves, prefer the quality rather than the color." In concluding his story of a trip to Europe to import Italian queens, he stated: "Let me, therefore, say to those who are willing to procure the best Italian bees, help me by sending early orders, either to Mrs. Tupper or myself, and I will try to prove that I have at last found the true conditions of success in the imporation of Italian bees."

In the May 1873 issue,[11] Charles Dadant had written, "When Mrs. Tupper came to my place, she said she desired to buy from me fifteen or twenty stocks of bees. Then, after having seen my bees, she asked me to sell her fifty or seventy-five stocks. She had probably been struck by the regular beauty of my bees." All this goes to show that Mrs. Tupper was a highly regarded beekeeper and queen rearer, and well versed in the subject.

The first advertisement of the *National Bee Journal*, with Mrs. Ellen S. Tupper as editor and proprietor, apparently is in the February 1874 issue[12] of the Journal. This advertisement tells that Mrs. Tupper had purchased the *National Bee Journal* and had moved it to Des Moines, Iowa, "where it will hereafter be published under her supervision." It was later printed by the American Publishing Company, Cedar Rapids, Iowa. The story of its consolidation with the *American Bee Journal* was mentioned earlier in this article.

There likely is more that should be said about editors W. F. Clarke and Mrs. Ellen S. Tupper, although their terms of editorship were comparatively short. No official notice or announcement of the *Journal* going into the hands of Thomas G. Newman & Son has been noted nor has there been found precisely the ultimate outcome of Clarke and Tupper. Apparently, when Newman moved the *Journal* to Cedar Rapids, neither one accompanied it there, and a quiet, gradual transition from Thomas G. Newman, as manager, to his being editor of the *Journal* that Samuel Wagner had established took place.

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11. **Dadant, Charles, 1873.** Importations of Italian bees, reply to D. L. Adair. *American Bee Journal* 9(11):256-257.
12. **1874.** See numbered advertisement pages in back of issue. *American Bee Journal* 10(2).

Next month—American Bee Journal editor Thomas G. Newman

Invention of the Honey Extractor

From the "History of American Beekeeping"

by FRANK C. PELLETT*

The invention of the honey extractor was an event of major importance in the development of the beekeeping industry.

As is so often the case, it was the result of an accidental observation. It was 1865 that Major Hruschka, an Austrian of Vienna who later moved to Dolo, near Venice in Italy, gave his small son a piece of comb honey on a plate. Placing the honey in a basket, the boy swung the basket around his head as children commonly do when carrying any kind of object. When Hruschka saw that the honey was thrown from the comb by the motion, the idea of the extractor was born. Such is the story commonly told, although historians question the facts. They say the extractor was born of long search for a way to remove the honey.

Once the power of centrifugal motion was recognized, it came into use among the beemen of the civilized world very rapidly. The Rev. Lorenzo Lorraine Langstroth, among other Americans, at once recognized its value and soon had made a machine for his own use. He, apparently, first learned of the discovery through Geman sources, since his announcement in the *American Bee Journal* in April, 1868, tells of "a plan devised in Germany for emptying the honey from the comb, without injuring the comb." He gave a picture of his machine and an enthusiastic report of the success of the new equipment. (see accompanying article)

Later, in his personal reminiscences published in *Gleanings* in 1893, Langstroth mentions the extractor with the regret that he had been unable to grasp the possibility when he had observed the water flying from a grindstone, or mud from a carriage wheel. He was actually making use of the principle by emptying the contents of the comb, by filling the combs with water to get rid of partly grown drone larvae and then with a swift motion of the outstretched hands flinging out the water and the larvae. He expressed the opinion that the honey-emptying machine should never have been called by any other name than a Hruschka, in honor of the man who first made it.

Once the American beekeepers learned of the principle involved in the extractor, there were a great many applications of it. Since no manufactured machine was available in the market, every man built one according to his own ideas, and each made some changes in the model to meet his peculiar conditions.

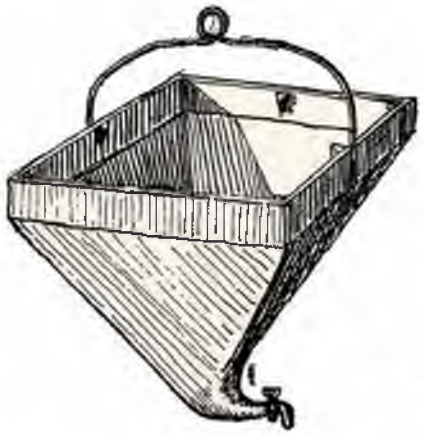
For a time there was much seeking for a name which would carry the correct impression of the new machine. Honey-emptying machine was the first term employed, but that was cumbersome and unsatisfactory. Some called it "Honey Slinger", which was not much better. It was not long until the term 'extractor' came into use.

Charles Dadant's account of his first extractor is typical of the efforts of the beekeepers to take advantage of the new invention. He had the local tinner make the big can, while the blacksmith forged the iron frame to support the baskets. The baskets were made of fly screen, which soon had to be reinforced to keep the combs from breaking through. A butcher knife was used to uncap the combs. Many combs were broken, but the honey was thrown out and much enthusiasm resulted.

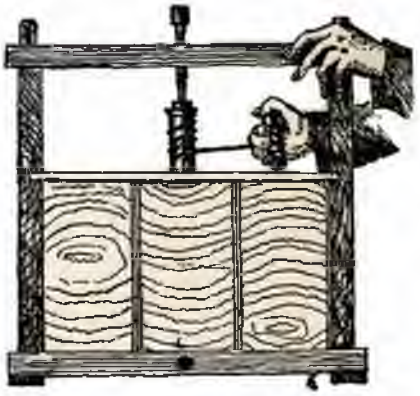
Moses Quinby took an old fanning mill used for cleaning grain and used the parts to make his first extractor. The fans were removed and wire cloth stretched around the four sides. A box set in the frame was made to revolve by means of the gearing which had moved the fanning mill. It is said that Quinby was enthusiastic beyond words when he saw the honey thrown from the combs by the new device. This crude beginning did not satisfy him for long, as he built another in more workable form. *Root's ABC of Bee Culture* is authority for the statement that is was the Quinby pattern which served A. I. Root for the beginning of his experiments which, after much improvement, was placed on the market under the name of "Novice Extractor".

In the second issue of *Gleanings*, Root gave directions for making an extractor at a cost not exceeding five dollars. This was described in great detail to enable any handy

***Former editor of the *American Bee Journal* and author of the book, *History of American Beekeeping*.**



The first extractor. Hruschka's smelatore swung at the end of a rope.



Above, one of first improvements; a rope-pulled slinger. At right, is the Peabody extractor; the can and contents rotated on a pivot.

workman to construct it. For gearing, an apple parer was used with parts not needed removed. A little later he offered the inside work of an extractor for two dollars and when gearing was also wanted, at $3.50, made to fit either a seventeen- or twenty-inch can.

It is not surprising that hundreds of devices making use of the centrifugal motion were made for the purpose of throwing out the honey. Root commented editorially on Draper's dollar extractor, which was a metal case much like a dripping pan with a sheet of wire cloth, frames in tin, laid over the top. The comb was laid on this and the whole apparatus whirled around the head by means of four cords fastened at the corners. Crude as it was, it was said to work.

In the *American Bee Journal* for January, 1870, was described the Peabody extractor, invented by H. O. Peabody of Boston. This invention was patented in 1869 and appears to have been the first extractor manufactured for sale. All machines previously described were accompanied by detailed desriptions to enable those interested to make them, but this announcement advised those interested to send for circulars. The Peabody extractor differed from others in that the can was contents rotated on a pivot instead of having baskets to revolve inside the can. The description as first published follows:

The machine consists of a tin case, in shape somewhat resembling a common wash boiler, adapted to receive frames of any size, across either end, and is made to revolve upon a central stationary spindle, set in a cast iron base.

The bottom of the can is made sloping toward the center, and has a metal casting of peculiar form soldered into the center of the same, through the center of which passes the spindle on which are also formed outlet passages, through which the honey is discharged.

While this machine remained on the market for some years, it appears never to have had a large sale.

Soon machines began to appear under the name of numerous men who had some minor difference to offer. There were "Gray's Honey Slinger," a Muth extractor, and a dozen others, all presenting some supposed advantage, but really differing but little from each other.

Herrod-Hempsall in his *Beekeeping New and Old* states that the first practical cylindrical extractors, called "Honey Slingers," to be sold in England were manufactured by R. R. Murphy, of Fulton, Illinois, and cost delivered in England a total of eight pounds sterling. Because of the high price, only three were sold in England. This was about 1873, the year when T. W. Cowan began his experiments which led to the Cowan extractor. Cowan appears to have originated the reversible basket, which enabled the beekeeper to change sides of the comb to be extracted without lifting them from the machine. This was a very important step forward, and was later adopted by most of the machines in common use.

While many individuals offered minor changes in these machines, few men seemed to have made any definite contribution. The first machine built in this country by Langstroth and Samuel Wagner was quite different in design from the Hruschka extractor, although, of course, utilizing the same principle of centrifugal motion. It provided for rotation of the combs within a container by means of a gear driven shaft, and this improvement is retained until now. Quinby appears from the record to have gone a step farther, although just how much he contributed to the machine later known as the "Novice," developed by A. I. Root, is not clear from the record. Root made a very definite improvement in the container by using a can, which was taller than wide, and by means of improved driving machinery. To this, the reversible baskets contributed by Cowan were added later. Little further improvement was apparent for many years.

Automatic reversing extractors had a short vogue. Cowan's baskets were hung from hinges fastened at one side and, by swinging first one way and then the other, both sides of the comb were emptied. The next step was to set the baskets on a pivot in the center of the bottom, and to reverse by simply turning the baskets while the machine was in motion.

Who is entitled to prior credit in originating this form of reversing frames is not entirely clear. In the spring of 1917, the writer visited T. W. Livingstone at Leslie, Georgia, and was much interested in a machine which Livingstone had built for his own use on this plan. It was illustrated in the *American Bee Journal*, December, 1919. Livingstone previously had described it in the same magazine in 1909, and the machine had been in use in his apiaries since that time. Whether or not he was the first, he never received either recognition or reward for the invention.

About 1919 a man named Markle demonstrated an extractor which he called the "New Idea" at the annual meeting of the Ontario Beekeepers' Association. This machine was manufactured and offered for sale in 1921 by Ham Brothers, of Brantford, after it had been given two years of tests in the apiaries of Foster and Holterman. In 1922, it was offered in the United States by the name of Lewis-Markle extractor, by the G. B. Lewis Company of Wisconsin. It was built as a power machine only, with eight baskets. A considerable number of them were sold for a few years.

In 1919, the Root Company also built a machine of this type which they called the Buckeye. It was tried in a Michigan apiary that year and again in 1920. A model for trial was first built at Medina in 1918. In 1921,

Square box machine, with top horizontal hand crank.

"Novice's" (Root's) improved metal can with faucet. At right, Gray's Honey Slinger with vertical crank.

they offered it in the catalog and continued its sale for several years. Others have since appeared.

The perfection of the radial extractor by several individuals at about the same time brought a new kind of power extractor into the market, and definitely retired the Buckeye and the Markle.

Radial extraction appears to have been suggested by several soon after Hruschka discovered that honey could be thrown out by centrifugal motion, but much difficulty appeared in the making of a practical machine. It was mentioned by Hamet in *L'Apiculteur* in 1867. Cowan's first extractor, which was exhibited at the Crystal Palace in 1874, appears to have been built on this principle, as will be seen from the following description by the editor, C. N. Abbot, in the October 1 issue of the *British Bee Journal:*

Instead of the combs of honey standing at right angles with the radii of the circle as with others and forming two sides of a square within the circle in which they revolve, and which necessitates the reversal of their positions, as each side of the comb is operated upon, they stand perpendicular as radii from the center of the machine in the same plane with its spindle. The argument appears to be, that inasmuch as the cells point slightly upwards toward the top bar of the frame of comb, if the frame is placed on end with its top bar outermost, the cells will have their inclination outward, and at the angle which most facilitates the escape of the honey from them.

In the same magazine (Aug. 16, 1888), Mr. Cowan tells of his success with this first outfit, but explains that it was safe to extract only old combs because of damage to new combs through breakage. He then described a similar machine invented by M. Buhne-Lauben, of Schleisen. When Cowan invented reversible baskets the radial principle was dormant for many a long year.

In 1893, "Rambler" described, in *Gleanings*, the Bohn's honey extractor invented by a German living in California. Bohn placed the combs in a wheel so constructed that fourteen combs could be extracted at once. It was provided with gearing and is described as "so simple and easy that the eleven-year-old boy, Claude Henderson, extracted with it twelve tons of honey during the past season."

About 1922, interest was revived in this method of extraction and experiments looking toward a practical machine were undertaken. In 1924 S. P. Hodgson & Sons, of British Columbia, patented such a machine in Canada and, in the following year, the A. I. Root Company announced their Simplicity machine which held forty-five combs, whereas the Hodgson machine took twenty-eight. Herrod-Hempsall patented a similar machine in England shortly before, and it appears that Hodgson based his machine on that.

Arthur Hodgson, of Jarvis, Ontario, built a machine in 1923 on the general plan of the Bohn extractor which would carry forty-eight combs at one time. Root credits Arthur Hodgson with building the first practical machine which would throw out the honey in a commercial way without reversing the combs, and at the same time reduce the time necessary for the operation. Although it took longer to extract a comb completely, the fact

Honey-Emptying Machine

From April, 1868 *American Bee Journal*
by L. L. LANGSTROTH and SON

We, last year, made the following announcement in our circulars: "A plan has been devised in Germany for emptying honey from the comb, without injuring the comb, or removing the beebread or any other impurities. By returning the emptied comb to the bees, the yield of honey, in favorable seasons, may be largely increased. An improvement on the German machine for effecting this object, has been devised and patented by L. L. Langstroth and Samuel Wagner, which will soon be thoroughly tested, so that the machine can be offered for sale the coming season." Owing to constant demands on our time in other directions, the first machine was not ready for use, until the middle of June. We had sent to purchasers about the first of May, a large number of queens reared the previous season, and as the yield of honey from the fruit trees and the locust blossoms had been very abundant, the combs, in many of the hives, were so filled with honey that the young queens had very few cells in which to deposit their eggs. In this state of affairs the machine was at once called into play; four and even six, of the heaviest combs were taken out, the uncapped cells emptied, and the combs returned.

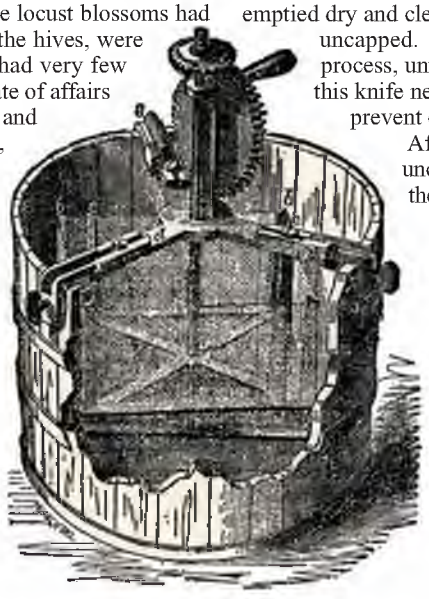
During the course of this work, we found that sealed brood in the combs was uninjured by the process of emptying, that the eggs in the cells were undisturbed, and that pollen, freshly deposited, remained in place; but that all the honey uncapped, and all the young larvae in the cells uncapped, made haste to quit the comb when once the machine commenced to work.

An apiarian friend, whose articles have often added interest to the columns of the *Journal*, being soon after on a visit to our apiary, saw the machine and devised a plan for making it lighter, simpler, and cheaper, and at the same time equally adapted to most of the ends sought to be attained. Our original machine, as shown, will serve to give an idea of the principle on which we work, (viz: centrifugal force), had two ends in view: one to allow of the reception of comb frames of different sizes, the other, to allow of the use of different sized barrels or receptacles. To accomplish these ends, it has been made of iron, with numerous bolts, pillars, screws, etc. In the modified machine the patented features are dispensed with, a barrel being furnished with each apparatus, and the comb-holder of wood, being made large enough to hold the Langstroth frames used in hives not over ten inches deep. Smaller frames, or pieces of broken comb, can as readily be emptied.

This modified style we have thoroughly tested, and found to work to our satisfaction. With it, two full combs, in our frames, can be emptied dry and clean, in less than three minutes after the cells are uncapped. This uncapping was at first a very difficult process, until we had a knife made expressly for the work; this knife needs to be frequently dipped in boiling water, to prevent clogging of the edge.

After a little practice nearly every cell can be readily uncapped by this knife, without materially injuring the comb, which can at once be returned to the bees.

Having already made this communication longer than was intended, we will only add that since the first day of December, we have emptied successfully all our full combs secured as surplus, and that the honey obtained from these combs, many of them black from long breeding, and more or less stored with beebread, was of good color, and possessed the peculiar, delicate flavor which would have been destroyed if the comb had been subjected to either heat or pressure. We found no difficulty in selling this honey at wholesale, put up in "glass screw-top fruit cans," side by side with the finest box honey, for only a few cents less per pound. For table use, in all except the mere show made by white comb, it is far preferable to honey in the comb.



Langstroth's extractor was the first made in this country.

that the machine could accommodate so many more combs at one time made the final result more efficient.

There were other patents both in this country and abroad, but since the machines did not come into common use, they contributed little to the development of the industry.

THE NEW INDUSTRY

Although the change was slow in coming, the invention of the extractor brought a revolution in the beekeeping industry. To extract the honey from the combs and return them to the bees to be filled again, opened great possibilities to the honey producer. During the good honeyflows, supers of drawn combs were filled at a surprising rate and the average yields greatly increased.

The change brought a new product to market. Since, at that day the common method of taking honey was to cut the combs from box hives or crude hollow logs and sell it in bulk, it was anything but attractive in appearance. Too often there was much pollen in the cells and sometimes brood as well. Bits of wood, leaves, and other refuse were likely to be mixed with the honey, due to careless handling. The public had come to expect that kind of product. Liquid honey was known as "strained" honey and was secured by mashing the combs and hanging them in cloth bags until the honey drained away. Sometimes the honey was heated to the point of melting the wax, when the honey was darkened and the flavor changed through too much heat. It was impossible to secure a high grade of liquid honey by such methods.

The extractor changed all this. The cells were uncapped by a sharp knife and the honey thrown out in the machine. It was clean and unheated, and several shades lighter in color than the honey then known to the housewife. The new product was slow to gain public confidence. Instead of meeting popular favor as the beekeeper expected, it aroused suspicion.

The Dadants have told in the old bee magazines of difficulties in disposing of the first extracted honey. About 1870, they had about 300 pounds of liquid honey to sell. C. P. Dadant, then a young man, went to Keokuk, Iowa with a sample to dispose of it. His sample was too light and clear, and was regarded as sugar syrup. In fact, some of the customers told him that when they wanted sugar syrup they would make it themselves.

Previously, Dadants had put up honey in small frames which held about three pounds each and packed them in crates with glass at each end. To dispose of the crop they often went on a river steamboat to St. Louis, and the shipment was often much admired by the crew and passengers.

The trade, long accustomed to the sight of honey in the comb, refused to have anything to do with the liquid product and refused to believe in its purity. In spite of the beekeeper's best efforts, many believed that they were manufacturing the product instead of getting it from the bees as they previously had done. The worst slander was from a local man who thought that he could not eat honey. He stated that honey made him sick, but that he liked the stuff that Dadants made. He said that he did not know what they made it of, but probably good sugar, and that it was just right for him. In the face of such an attitude, it required much tact and patience to convince the public and dispose of the crop.

Adair's "Melipult" weighed 28 pounds and sold for $14. He claimed it would empty the honey with half the motion needed for any other since the cells of the comb were always in line with the motion. It was sold during the period of 1869-1872.

The difficulty was greatly increased by the fact that adulteration of the extracted honey sold in the cities became general so quickly. Since suitable containers were not then available, it became a problem to place the product before the buyer in a suitable quantity. At first much of it went to market in wooden pails holding about twenty-five pounds. These were given a coating of wax mixed with a small quantity of lard to prevent leaking. On the 20th of October, 1874, C. P. Dadant took a boat for St. Louis with 112 of these pails and 15 cases of comb honey. Such a quantity of honey from one apiary was rarely seen in those days and it caused something of a sensation.

For many years it took a great deal of personal argument and instruction to convince the buyers that liquid honey was a dependable product, and the difficulties were not greatly reduced until the passage of the pure food laws many years later.

The problem was further complicated by the tendency of extracted honey to granulate. This natural change was not understood and required an endless amount of explanation. Adulterators took advantage of this fact to accuse honest honey of adulteration and to claim purity for their own because it did not granulate, when just the opposite was true.

When beekeepers began to use the extractor, they were astonished to see how fast the honey came in. In their enthusiasm they often extracted honey before it had ripened and fermentation was the result. There were many lessons to be learned before beekeepers were able to make proper use of their new tool. A. 1. Root even went so far as to propose to empty his cistern in which to store his honey. Much honey was stored in barrels and after it was fully granulated, it offered something of a problem to get it back to the liquid state. It was common practice to remove the head of the barrel and to dig out the honey with a bright new spade. For many years barrels were the common containers for large quantities of honey.

After the sixty-pound can came into common use, it provided a satisfactory means of handling the product. Tightly sealed, it could be kept for a long period free from dust and dirt, and could be restored to liquid form by heating before removing from the container.

The extractor largely has been responsible for the great expansion of the industry, whereby outyards and large-scale production have resulted.

Honey Bee Biology

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Using Old Bee Supply Catalogs to Reconstruct the Histories of Beekeeping Equipment

In my studies of beekeeping history in the United States, I have been collecting and preserving old beekeeping equipment since the 1970's. Driving around the country, thousands of miles, whatever it takes, to get old rare hives, extractors and numerous other things beekeepers of the past used. If the equipment was manufactured in a big factory or a small shop, then *somewhere* there was literature on it in an advertisement, sales catalog, booklet, or perhaps some obscure pamphlet. Then, my job is to reconstruct the history of the equipment, which admittedly may take years.

Looking back into the late 1800's and past the turn of that century, numerous bee supply companies dotted the populated areas of our country. Bee suppliers promoted their particular hive styles, while others acted as hive distributors. Some of the hive designs were quite exotic; other designs were simple and more practical. Besides hives, other implements used by beekeepers also have lost histories: bee smokers and all kinds of unusual equipment for producing comb honey sections (in the wooden boxes). I have even tracked down the histories of queen cages from the 1880's.

Most of these pieces are quite rare. When found, they should be preserved and their history reconstructed. If the piece was manufactured, quite often the maker is unknown, unless the item was marked. To figure out who made it and when, one must resort to the old beekeeping literature – usually books and journals. Other fruitful identification sources are supply catalogs, part of the subject of this article. Included in my collecting has been building a reference collection of them, some several hundreds dating back to the 1870's.

Consider a hive purchased from an elderly commercial beekeeper in New York years ago (see Figure 1). He had retired and none of his family was interested in beekeeping. Nevertheless, he wanted to find a home for the clever old hive design lest it get thrown out someday. From the outside the hive looks fairly typical. The difference is on the inside. The frames are suspended from pins near the upper corners. The manner to space the frames is also different. The end-bars are straight and wide all the way down, instead of being wide just near the top as with a standard frame (see Figure 2).

That hive was not too difficult to identify. It's on the cover of the 1915 Kretchmer Manufacturing Company catalog, a firm once located in Council Bluffs, Iowa (see Figure 3). The hive was called the Massie hive, at least this was Kretchmer's version of it (see below). The catalogs can also give an estimate of how long an item was pro-

Figure 1. A hive with a brood chamber about the depth of a modern super.

Figure 2. A closer view of the pins. Note the lack of gaps between the end bars. Consequently, these three frames could easily be handled as one piece. The end-bars also form an internal solid wall front and back.

Figure 3. The 1915 catalog published by the Kretchmer Manufacturing Company showing the Massie hive.

duced. The Massie hive is not in their 1899 catalog (my earliest), but it is in the 1908 catalog. The hive is still featured on the 1916 cover, but not pictured anywhere in the 1918 catalog (my latest), just a listing of hives and parts. Presumably the Massie hive was discontinued soon afterwards. (I do not have many Kretchmer catalogs; they are difficult to find.) In addition to marginal sales, a limited production run adds greatly to an item's rarity.

From the catalog descriptions, we can learn the *original intent* of the design. When used, the brood chamber of the Massie hive consisted of two-stories, which in their old slang was a "divisible brood chamber hive." (It would resemble two 6 5/8 supers since the Massie frame was seven inches.) The closed end frames could be handled in pairs or in triples, a maneuver not easily done with today's frame. With the Massie frames pushed together, the straight-sided end bars formed a second (internal) wall front and back. "Following boards," solid boards hanging between the outer frames and the sides of the hive, formed a second wall on the sides. Taken together the Massie hive had two walls: the exterior one and another formed by the end bars and following boards. Hence the Massie hive was touted as a double-walled hive, a design once thought necessary for increased winter survival. Now knowing a name, let's dig deeper into the history of this hive.

Mr. T. K. Massie resided in Athens, West Virginia. Right after 1900, the exact year is not clear, he wrote a rare booklet titled *A Few Sane and Irrefutable Deductions on the Subject of Beehives and Practical Beekeeping*. There's a must read; I managed to get a photocopy. His original thoughts for the hive did include the double wall and divisible brood chamber as above. He wanted a hive with a more cubical shape (which two stories would have). The cube, he reasoned, was close to the natural spherical shape of a bee colony. Quite revealing though, a frame Massie showed has end-lugs of the standard design. Apparently suspending them from pins was not part of his plan. Piecing together these histories is a bit like detective work. The next source, or voice, and the story changes in unexpected ways. (I am still searching for an original Massie hive.)

Nevertheless, see the big picture. Here we have a rare hive. It was produced for several years, but did not seem to catch on with large sales. By chance there were survivors. These hives and other equipment are what I am trying to preserve. Sure finding them is a long shot. But in this work *they're all long shots*. So for me that ceases to be a detraction.

These early 1900's Kretchmer catalogs have also been decisive in identifying a bee smoker in my collection. Quite likely other bee smoker collectors have found it, too. I have seen this smoker for sale on the Internet, but never identified there (see Figure 4). Note its distinctive design. The funnel has a noticeable two-piece crook, and the funnel hinge is screwed to the top of the bellows. The firebox (can) attaches to the bellows with one vertical metal strap and two bolts.

That is a Kretchmer Champion smoker (see Figure 5). Kretchmer also made a smoker with a vertical funnel (without a hinge), but still with the distinctive firebox and bellows attachment (see Figure 6). Of the five Kretchmer smokers in my collection, none have any manufacturing identification marks. So one needs a literature documentation, preferably with a picture.

Especially for those who have Champion smokers, here are the approximate production years. Both of the same funnel styles are in the 1908 Kretchmer catalog. In the 1899 catalog, the slanted funnel style is much different. The Champion smokers are not listed in their 1918 catalog. By then Kretchmer was a distributor of smokers from the A. I. Root Company and the A. G. Woodman Company. Those smokers were similar to the modern smoker. (Also in the 1918 catalog is a smoker with a modern funnel style and the old style bellows and firebox attachment. The Kretchmer Company was one of the oldest bee suppliers. My April 1899 catalog, the 62nd edition, says the company was established in 1864.)

Along another line, producing section comb honey was labor intensive, and beekeepers created clever machines to ease the monotonous work. A beekeeper bought the wooden section boxes in the flat (as one piece) and then folded them. Since a crop of comb honey could consist of up to some 30,000 sections, depending on the size of the beekeeping operation, the operator needed to fold sections fast. A section folder or press locks the finger joints, called dovetails, on the open corner of the section box. Beekeepers devised all kinds of section

(l) Figure 4. A smoker in my collection whose origin was a mystery until I acquired the right bee supply catalog.

(below) Figure 5. Champion smokers shown in the 1915 Kretchmer catalog.

Figure 6. A Kretchmer smoker with a straight funnel. A small picture of it appears in the upper right of Figure 5. Unlike its flamboyant cousin, the Champion, this one had a more lackluster name, the Medium smoker.

presses. Many were homemade. Some were built in small shops. Take for example the section presses in Figure 7. After placing the section box in the press with the dovetails aligned and pointing upward, a slight forward push closes the press. The upper "V" piece comes downward upon the dovetails and locks them together.

The 1892 catalog by G. K. Hubbard of Fort Wayne, Indiana shows the original section press in operation (see Figure 8). The left one in Figure 7 has the Hubbard name and directions ink-stamped on the front, but barely readable. My other original Hubbard press (not shown) lacks them entirely, though it may have had them when new. Of course, once these identifications have faded away and the piece loses its connection with the beekeeper, then to his or her family, it becomes just some odd peculiar contraption, subject to being thrown away. To me that's a deplorable shame. In its day this section press was an instrument of perfection. Imagine the honey houses where beekeepers worked through the winter, preparing hundreds of comb honey supers, filling them with thousands of section boxes. They banked on honey crops to feed their families, enduring long, laborious days. With the Hubbard press though, one could fold up to 1,000 sections an hour. Easing that part of the burden, it was the perfect tool for comb honey producers in its time.

Searching for old beekeeping equipment and reconstructing their histories is long and difficult work. Beekeeping supply catalogs have been crucial to identifying several pieces. Instead of identifying a piece as manufactured by a big beekeeping supply company, sometimes it gets more personal (like with Hubbard), and I can reunite a beekeeper's written work, a supply catalog, book, or pamphlet with his or her equipment. (If anyone knows where I can find this kind of old beekeeping equipment, especially beehives that look like little houses or cabinets, please contact me at the above address.)

Figure 7. Section presses. Note the section box in either mount. Pushing it forward brought the upper piece down slightly to lock the top corner. The press on the left is the original. The other was a later version mass-produced by the A. I. Root Company, once a large beekeeping manufacturing company.

Acknowledgments

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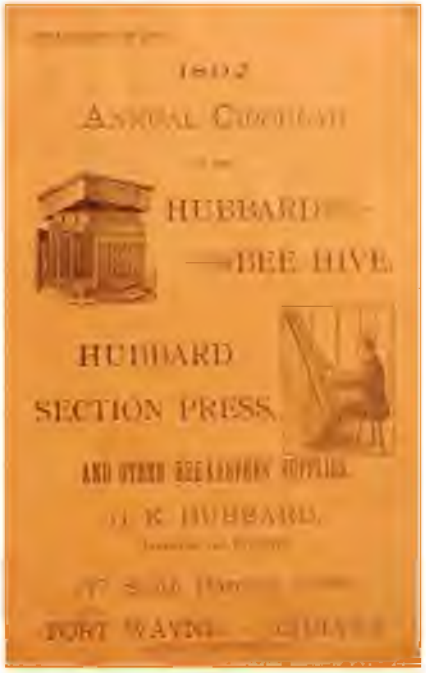

Figure 8. Historical origins revealed by the Hubbard supply catalog for 1892. The operator is sitting in front of the press folding a section. The press is the same as the left one in Figure 7. Also shown is Hubbard's beehive where one can leaf through the frames like pages of a book. (My search continues for that hive.)

World Honey Market

UNITED STATES

The California almond pollination season was going into high gear in February. Better almond prices and an improved moisture situation had growers scrambling to obtain more bees in those cases where contracts had not been previously signed. Although it made colony transportation difficult at times, the extra rain and snow held the promise of improved honey flows in this drought-stricken state. Nevertheless, some beekeepers were worried about the rainy, cool weather limiting bee foraging, not only in the almond orchards, but also later in honey flow locations.

Beekeepers in the Southeast and Mideast have battled colder than normal temperatures this winter, sometimes accompanied by snow and ice. The winter was also difficult for colonies in the northern half of the United States. Many of our reporters indicated much colder temperatures and significant snow accumulation. The main overwintering concern was possible starvation if bees could not break cluster to move to new stores or beekeeper-provided sugar. Beekeepers were hoping for an early spring accompanied by bountiful nectar and pollen sources. Many beekeepers had already fed their colonies heavily, but expected to give them more feed in the form of syrup and pollen supplements in March.

Reporters from every area have mentioned the shortage of domestic honey. Wholesale honey prices have continued to inch up, but many beekeepers were sold out of their smaller 2009 honey crops. Imported honey and honey blends continue to be a major factor in what has been called a two-tiered U.S. honey market—one market for U.S.-produced honey and another market for cheap imported honey.

NORTHEAST—The winter has been more severe than usual, but beekeepers are hopeful about overwintering success, as long as they can have a break in the weather in March to check and feed colonies where necessary. The snow actually insulates colonies, so is of no real concern unless it prevents access to outyards. On the other hand, extended periods of cold weather can sometimes prevent colonies from breaking cluster in order to move sideways to new stores and to use beekeeper-provided sugar.

The first sources of nectar will be the maples, willows, and other early-blooming trees, followed by fruit trees and wildflowers. Good ground moisture conditions should allow luxuriant spring plant bloom if the weather cooperates.

As we indicated earlier, little honey remains unsold due to the short crop and heavy consumer demand for local honey.

MIDEAST—Beekeepers in these states have also commented on the harsh winter and they are worried about how their colonies are overwintering. The excess rain and snow are welcome since they will help ground moisture. On the other hand, the prolonged cold spells have been hard on overwintering colonies since it has prevented them from having cleansing flights and moving to new honey stores. As this was written, reporters were telling us that beekeepers were hoping for an early spring to not only give colonies a break, but also to bring on early maple, willow and wildflower pollen and nectar. Beekeepers anticipate needing average or larger than normal numbers of replacement packages, nucs and queens.

Local demand for honey remains strong, but beekeepers sold most of their remaining surplus honey during the holiday season.

SOUTHEAST—A combination of colder than normal temperatures and heavy rains at times kept bees confined more than normal this winter. Some beekeepers reported that they had to feed more than normal as well. At the end of January, an ice storm hampered colony work for a while. Beekeepers have now gone into colony buildup mode and are preparing bees for their first major flows of the season. Package bee and queen producers are also busy feeding and working their colonies in preparation for what looks like it will be another very busy season. Some migratory beekeepers were still in the process of moving their colonies to California in late January and early February for the almond pollination season.

Earlier freezes only did limited amounts of damage to citrus trees in Florida, but growers had to harvest many oranges quickly to prevent their spoilage after the freezing weather. Maple and other tree pollens are now coming on over much of the Southeast. Numerous fruit tree and wildflower spring flows will follow this. Although much of the area received heavy winter rains at times, the sandy soil characterizing farmland over parts of this area prevents good soil moisture retention. This means that periodic spring rains will be needed to insure adequate moisture for later spring and summer honey flows.

Wholesale and retail demand are good for remaining unsold honey, but most stocks are depleted by now. Some packers are beginning to inquire about locking in supplies and prices for 2010 honey production in this area. Most reporters have told us that they believe wholesale prices will continue to increase during the coming months due to the scarcity of domestically produced honey.

SOUTHWEST—As in the Southeast, the winter season was colder than normal, which has confined bees for longer periods. In many cases this has not been a problem, but some colonies that went into winter with light stores may not survive until spring flows begin. Maple and other early tree pollens were just beginning as this was written. In addition, some beekeepers were feeding their bees to help colonies until more nectar and pollen sources were available. In addition to the colder weather, beekeepers in this area have also reported more rain and snow, which has made beeyard work difficult at times. However, the added moisture will be welcome once hotter weather begins since it will promote and prolong plant growth. Package bee and queen providers have also been busy preparing for another busy season.

Little honey remains in the beekeepers' hands, so few sales are being reports at the wholesale level. Retail sales are still good where supplies of local honey remain.

EAST CENTRAL—Above normal snowfall and extended periods of cold weather have made for a harsh winter to date. The snowfall was not a problem for beekeepers except in cases where they were trying to reach beeyards for feeding or movement of colonies. However, the long periods of cold weather was of concern and beekeepers said that their bees needed a least a day or two of warmer weather in order to have cleansing flights and move to new honey stores. In some cases, too, colonies had poor fall crops. This has caused beekeepers to worry about colony starvation. Once temperatures warm some, beekeepers can resume feeding. Maples should bloom in March and this will signal the return of bee-foraging weather. The extra moisture received this winter

U.S. HONEY, BEESWAX AND POLLEN PRICES FROM OUR REPORTERS

	North-east	Mid-east	South-east	South-west	East Central	West-Central	Inter-Mountain	West
Wholesale								
White lb. Blk	$1.40-$2.20	$1.45-$2.00	$1.30-$1.70	$1.35-$1.70	$1.50-$2.00	$1.40-$1.75	$1.30-$1.60	$1.25-$1.60
Amber lb. Blk	$1.25-$1.60	$1.20-$1.75	$1.20-$1.50	$1.20-$1.60	$1.35-$1.75	$1.20-$1.60	$1.25-$1.50	$1.20-$1.50
1 lb. CS 24	$40.00-$65.00	$36.00-$60.00	$38.00-$48.00	$40.00-$50.00	$39.00-$50.00	$38.00-$49.00	$39.00-$45.00	$40.00-$60.00
2 lb. CS 12	$41.40-$75.00	$36.00-$43.00	$36.00 $52.00	$35.00-$45.00	$39.00-$47.00	$35.00-$50.00	$36.00-$48.00	$34.00-$55.00
5 lb. CS 6	$42.00-$72.00	$37.00-$60.00	$42.00-$50.00	$35.00-$60.00	$39.00-$60.00	$36.00 $65.00	$35.00-$65.00	$38.00-$60.00
Retail								
Jars 8 oz.	$.96-$2.50	$1.00-$2.25	$.89-$2.50	$.90-$2.25	$.95-$2.75	$1.05-$2.50	$.99-$2.20	$1.00-$2.75
Squeeze Bear 12 oz.	$1.89-$3.50	$2.00-$3.75	$1.75-$3.20	$1.40-$3.25	$1.99-$4.45	$1.59-$3.75	$1.55-$3.50	$1.50-$3.60
Jars 1 lb.	$2.50-$5.50	$2.55-$5.25	$2.40-$4.75	$2.50-$5.00	$2.45-$5.25	$2.95-$5.25	$2.75-$5.00	$2.70-$5.25
Jars 2 lb.	$3.99-$6.75	$3.95-$7.00	$3.99-$5.49	$3.00-$6.25	$3.25-$8.00	$3.29-$6.50	$3.25-$6.25	$3.50 $6.50
Jars 1 1/2 lb. (Pint)	$4.50-$6.75	$4.25-$6.00	$3.50-$6.00	$3.58-$6.50	$3.25-$5.50	$3.50-$5.50	$3.75-$6.00	$4.75 $7.00
Jars 3 lb. (Quart)	$5.50-$9.75	$5.95-$15.00	$5.79-$10.00	$5.25-$9.25	$5.00-$11.50	$4.50-$10.00	$5.10-$9.75	$5.00-$10.50
Jars 4 lb.	$7.50-$9.25	$5.00-$10.00	$7.00-$8.75	$6.00-$9.70	$8.00-$12.00	$5.50-$13.00	$6.00-$9.00	$5.95-$9.25
Jars 5 lb.	$8.99-$19.00	$7.00-$19.50	$7.50-$17.50	$7.25-$18.00	$8.00-$21.00	$7.75-$18.00	$8.00-$19.25	$8.50-$18.00
Creamed 12 oz.	$2.50-$4.25	$2.50-$4.00	$2.49-$3.20	$2.25-$3.99	$2.00-$3.90	$1.99-$4.00	$1.75-$3.75	$1.75-$3.85
Comb 12 oz.	$3.00-$5.00	$2.50-$5.00	$2.25-$4.25	$2.50-$5.50	$2.50-$4.75	$2.50-$5.50	$2.50-$4.75	$2.75-$5.50
Round Plas. Comb	$3.00-$5.50	$2.25-$4.50	$2.50-$4.00	$2.00-$5.25	$2.25-$4.99	$2.00-$5.50	$2.25-$5.00	$2.50 $5.50
1 Gallon	$15.00-$25.00	$12.50-$26.50	$14.50-$25.00	$15.00 $25.00	$15.00-$30.00	$15.00-$27.00	$15.00-$30.00	$15.00-$30.00
60 lb.	$115.00-$145.00	$84.00-$125.00	$85.00-$120.00	$80.00-$130.00	$82.00-$140.00	$80.00-$135.00	$85.00-$130.00	$80.00-$130.00
Beeswax								
Light per lb.	$2.00-$3.50	$2.00-$2.75	$2.00-$3.00	$2.00-$2.50	$2.00-$2.50	$2.00-$2.50	$2.00-$2.50	$2.00-$2.50
Dark per lb.	$1.85-$3.00	$1.85-$2.35	$1.85-$2.25	$1.85-$2.25	$1.85-$2.25	$1.85-$2.25	$1.85-$2.25	$1.85-$2.25
Pollen								
Wholesale per lb.	$3.50-$6.50	$3.50-$8.00	$3.00-$6.00	$3.00 $5.00	$3.25-$6.00	$3.25-$6.00	$2.50-$6.00	$2.50-$5.50
Retail per lb.	$5.50-$15.00	$7.00-$15.00	$6.00-$15.00	$6.00-$10.00	$7.00-$15.00	$7.50 $15.50	$7.00-$12.00	$7.00-$15.00

The above prices are not meant to provide a realistic picture of prices in all states of the particular area. They are intended merely to show what a few beekeepers are receiving for their honey, beeswax and pollen and we realize prices may vary tremendously, even within individual states. The bulk prices for honey are stated per pound, delivered buyer's warehouse, containers exchanged or furnished by buyer, unless otherwise noted. Where prices are not shown, insufficient data were available.

HONEY MARKET FOR THE MONTH OF DECEMBER 2009

In volumes of 10,000 pounds or greater unless otherwise stated

(From January 2010 USDA National Honey Report)

Prices paid to beekeepers for extracted, unprocessed honey in major producing states by packers, handlers & other large users, cents per pound, f.o.b. or delivered nearby, containers exchanged or returned, prompt delivery & payment unless otherwise stated.

-Report includes both new and old crop honey-

**(# Some in Small Lot —
+Some delayed payments or previous commitment)**

Dakotas - Clover white $1.38 - $1.45

Florida
Brazilian Pepper extra light amber $1.25
Brazilian Pepper light amber $1.16 - $1.19

Montana - Clover white $1.45 - $.1.48

Prices paid to Canadian Beekeepers for unprocessed, bulk honey by packers and importers in U. S. currency, f.o.b. shipping point, containers included unless otherwise stated. Duty and crossing charges extra. Cents per pound.

Province Not Reported
Mixed Flowers white $1.50 - $1.57

Prices paid to importers for bulk honey, duty paid, containers included, cents per pound, ex-dock or point of entry unless otherwise stated.

Argentina - Mixed Flowers white $1.44 - $1.45

Brazil - Mixed Flowers light amber $1.16 - $1.30
Organic light amber $1.38 - $1.40

India - Mixed Flowers extra light amber $1.35
Mixed Flowers light amber $1.18

Vietnam - Mixed Flowers light amber $1.10 - $1.20

should help plant growth this coming spring and early summer. Many commercial beekeepers had moved their colonies to the South or California. These colonies will build up and be returned for honey flows in May.

As in many other parts of the country, beekeepers are mostly sold out of their 2009 honey crops. With a continued strong honey demand in 2010, producers believe that offering prices will increase again this year.

WEST CENTRAL—Reporters indicate a difficult winter to date due to frequent snows and extended cold weather. Although many of the migratory beekeepers had already moved their colonies to the South or California, those beekeepers who do not move their bees to warmer climates are particularly worried about the extended cold weather without honey-bee cleansing flights. A shortage of stores could also be a problem if colonies are not able to break cluster, move to new stores or begin taking beekeeper-provided syrup. The snow and rain will no doubt give spring plants a good boost if the weather warms enough. Maples and other early pollen and nectar sources will start blooming this month and this will be a welcome sight to winter-weary beekeepers. At this point, beekeepers do not know how many deadout colonies will need to be replaced, but most reporters felt there would be a strong demand of package bees, nucs and queens again this spring.

Demand for honey at both the wholesale and retail levels continues to be excellent. However, due a short crop, many producers sold out early and cannot take advantage of increased packer offering prices. Since local honey crops were so poor in 2009, many consumers have seen their local sources of honey disappear.

INTERMOUNTAIN—Migratory beekeepers were preparing for almond pollination in California. Some were feeding, medicating or beginning to move into the almond groves. Intermountain beekeepers who do not move their colonies often provide winter wrapping or move them to sheltered buildings. It has been a very cold winter, but beekeepers are hoping for an early spring or at least a few cleansing flight days for bees. As in the much of the rest of the country, the first nectar and pollen flows will come from the maples and other early-blooming trees, followed by fruit trees and wildflowers in April and May. However, beekeepers will begin feeding colonies this month as weather permits. As we have indicated during the last few months, most wholesale lots of honey were sold last fall. Packers who do not use imported honey are short on inventories and have been searching for any remaining bulk quantities to purchase. Retail honey sales also continue to be strong.

WEST—Beekeepers were very busy as

they began to move colonies into almond orchards for the pollination season. One big problem has been the huge amounts of rain parts of the state have received. In some cases flooding and impassable roads have made colony transportation problematic. Both beekeepers and almond growers were also worried about having sufficient bee flight time to provide adequate pollination. Adding to the picture was a last-minute frenzy among some growers to contract colonies. In some cases these last-minute deals may have won the beekeeper a premium price, but the situation could have just as easily gone the other direction, as has happened in some previous seasons. Many growers, however, had already contracted for all of colonies they needed, as well as the price.

A combination of factors contributed to changing the almond pollination picture from a buyer's market to a seller's market. First, rumors about larger-than-normal colony losses caused some growers to worry about bee supply. Then, the demand and price for almonds regained some of their previous strength to the point that growers wanted to maximize their production by providing sufficient bees for good pollination. Finally, the heavy rains eased the water shortage situation in some parts of the state, insuring that sufficient irrigation water would be available to almond growers in these areas.

The heavy rains could bring on a bumper wildflower bloom this season, which would mean improved honey crops. The big question, however, is will the rains stop in time to insure adequate bee-foraging weather? Many beekeepers who still rely on honey production rather than pollination for a major part of their income would welcome a return of lush manzanita, eucalyptus, sage, buckwheat and other wildflowers.

Very little honey remains unsold in the West and there is a demand for domestic honey at both the wholesale and retail levels.

ARGENTINA

At the time of this report (early February 2010), the honey crop in Argentina should be in full swing. However, only a few areas in the eastern region of the country have enjoyed reasonable honey yields. The entire month of January provided a much-needed break from excessive rains suffered until December 2009. Along with this situation, most of the prairie region is now under an intense heat wave, which in some specific cases has been beneficial for nectar production. Some beekeepers are optimistic about obtaining a second harvest round before the end of February.

Nevertheless, the honey production area this year will be restricted to the north, east and central parts of Buenos Aires Province, south of Santa Fe and the mesopotamic province of Entre Ríos. The expected volume this year will be higher than the record low obtained during the 2008/2009 season; preliminary surveys indicate a crop of approximately 65,000 metric tons for the current season. One of the major limitations for any potential increase is the sharp decline in the number of colonies all over Argentina, now estimated at 2.5 million.

After the terrible humid conditions of December, one of the major concerns for commercial beekeepers is the huge application of fungicides made by farmers who planted sunflower and soybeans. Beekeepers are already noticing detrimental effects in their hives, in particular, a premature dwindling of their populations.

The local honey market remains stable in light of the scarce influx of new honey. Beekeepers are being offered US$1.00 per pound, but most expect a substantially higher price after the total crop is finally assessed. Demand from both European and American packers is heavy for this time of the year.

International Honey Market

by RON PHIPPS
President, CPNA International Ltd.[1]
Co-Chairman,
Committee for the Promotion of Honey and Health

Presented to the American Honey Produers Association Convention in Sacramento Jan. 8, 2010

There is a product that was shipped to several countries to achieve commercial advantage. It was then refined, blended and adulterated for re-export under a false customs designation and fraudulent country of origin certificates. Fraudulent documents served as the handmaiden to this illegal activity. A two-tiered market resulted, engineered by international networks. From such unscrupulous collusion, fortunes are made and honest members of an industry suffer. Arrogance and audacity create a sense of impunity for those involved that spreads to wider domains, bringing increasingly devastating consequences. Let me quote a few excerpts from a *New York Times* article dated Oct. 27, 2009:

"It began when . . . customs officials examined shipping records for dozens of giant tanker trucks that outlined an odd triangular journey… The trucks, each carrying 22 tons… swung through eight nations…

"Some 200 shipments roared along this route over a three-year-period, investigators say, earning millions in refunds …investigators raided the company's offices… initiating an investigation … they raided about 35 sites . . . 'we are investigating a complex, extensive and difficult case of economic … fraud …so that exporters can avoid customs fees.'"

"There's a whole world of commercial fraud, which goes under the radar for most people," said James Byrne, a law professor at the George Mason University School of Law in Virginia … It is a parallel universe that mimics the real world of commerce and finance."

The article describes factories blending product, mislabeling it and adulterating it.

Is the product honey? Is the country America? No. It is sugar that is transshipped outside Europe so that it will qualify for export rebates from the EU. The need to bring the enforcement of law more effectively into international trade is becoming increasingly more imperative. The American honey industry has been plagued by an enormous amount of commercial fraud during recent years. This fraud persists to this day and it takes on the forms of undervaluation of imports, improper customs classification and transshipment. For example, one southeast Asian country is exporting honey to America in quantities that are approximately 15 times greater than the production quantities which their national government has officially reported. Another country is exporting huge amounts even though official documents from that country indicate they produce only 30% of what they consume. According to economists in the U.S. embassy of a third country, there is no production of honey available for export, even though millions of pounds of honey are imported into the U.S. from that country. The surge of honey imports from another country has been enormous, even though during the antidumping investigation that country, used as the surrogate country for the calculation of antidumping duties for China, had no appreciable commercial exports not only to America but also to the world. That 4th country has considered its own antidumping suits against the cheap Chinese honey that has flooded the country.

Furthermore, several of these countries are tropical and subtropical countries. Despite this fact, there is a predominance of exports of white honey, and in one case, 100% of the exports are white honey. This aberration occurs despite the fact that the general rule is that the closer to the equator a given country is, the darker its honey, and the further away, the lighter.

Additionally, laboratory tests that have been conducted at American universities and laboratories, as well as European laboratories, have reported such phenomena as:

1. Significant amounts of Chinese rapeseed pollen
2. Ultrafiltration, clearly designed to remove pollen that could facilitate country of origin analysis
3. Contamination by illegal residues
4. Massive adulteration from sweeteners that are believed to be rice syrup.

If we were to look at the last one or two decades and graph one line with Chinese honey imports into the U.S. and a second

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Report distributed Jan. 8, 2010

Mr. Phipps is president and founder of CPNA International, Ltd. and is currently Secretary-Treasurer of the National Honey Packers & Dealers Association. He is an importer of honey, natural foods and tea from various international producers. Ron is also the former personal research assistant to the president of the American Philosophy Association. He is a recipient of the National Science Foundation fellowship for philosophy of theoretical physics. Mr. Phipps is a founding member of the Tea & Health Committee, which organized three major scientific symposiums on tea and health and the role of antioxidants in the prevention of disease. He has worked with FDA to develop a research protocol for the global diversity of honey.

line with imports from countries that have no history of significant exports of honey, we could observe the first line to decline sharply and the second line to rise rapidly, filling in the gap created by the decline. This is not a case of astrological accident. It is widely held to be the result of widespread collusion to evade antidumping duties.

As has been widely reported in the press, there have been indictments, complaints and arrests in Chicago, Seattle and Los Angeles. The arrests that occurred in the summer of 2009 have resulted in confessions of involvement in elaborate schemes to transship honey through third countries by two Chinese nationals. Despite these successful actions, more has to be done or the American honey industry will quickly enter the intensive care unit. There are three possibilities:

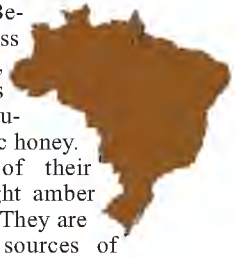
1. The circumventers will continue to gain increasing market share and dominance through unfairly priced honey, driving honest honey producers and packers out of business;
2. All honey packers will be compelled to buy circumvented honey in order to survive;
3. The U.S. government will put a timely end to the circumvention that has mushroomed in recent years.

If the latter occurs, it would not only help the American honey industry, but it will also serve as a model for other industries which are plagued by circumvention of antidumping orders and other types of commercial fraud.

Let me give an update on international market conditions. The 2009 U.S. honey crop, as a consequence of adverse weather, was approximately 150 million pounds, plus or minus 5%. The Canadian honey crop was approximately 70 million pounds, but experienced a significant increase in canola honey due to the cool weather that greatly extended the canola bloom. The Argentine crop was about 110 million pounds, largely due to a severe drought. A significant shortage of white honey has emerged. Aside from the allegedly circumvented "white honey" from tropical regions, the price of white honey has greatly firmed and will likely remain firm through the second and third quarters of this year. Both Brazil and Vietnam have provided a significant and necessary amount of light amber honey, so essential to the industrial honey market. Total 2009 imports of honey declined relative to 2008, according to initial indications. This decline could be influenced by honey being imported through customs categories other than "honey" and the persistence of the "Packer's Blend" loophole which may also play a role in the reduction of total reported imports.

Brazil

Regarding crop prospects for 2010, Brazil is a country with significant potential to increase its production of honey. Brazil has a huge diversity of botanical forms of life. Because of the vastness of its virgin areas, it is the world's largest source of authenticated organic honey. Eighty percent of their honey crop is light amber and amber honey. They are developing new sources of honey that could include both coffee and cashew nut. After excessive rains in mid spring, the rainfall in the northeast of Brazil has been very favorable to production. There were many Brazilian exporters at Apimondia in Provence, France. The Brazilians are attracted to the high prices that the European market can pay due to the fact that the Euro is 45% stronger than the U.S. dollar. Since its inception, the Euro has doubled relative to the U.S. dollar. Increasing numbers of Brazilian exporters are authorized to sell to the European market.

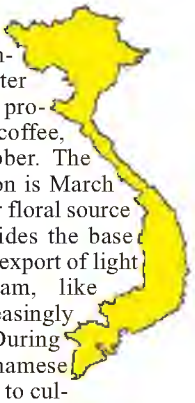


The role of currency valuations, as indicated in earlier market reports, are coming to play an increasing role in the valuations of commodities and the destination of those commodities. Argentine, Uruguay and Chilean honey also find the European market increasingly attractive, despite the EU's extraordinary stringent quality standards, due to the power of the Euro among international currencies. The situation in Canada is the opposite. The U.S. and Canadian dollars have recently attained relative parity, whereas a year ago the U.S. dollar was 25% stronger than the Canadian dollar. American packers could pay Canadian producers $1.50 Canadian (equivalent to US$1.20). This year that is not the case, resulting in more of the Canadian honey crop being consumed within Canada. The value of currencies is inexorably linked to the magnitudes of national debts and the magnitude of the money supplies. While recently there has been a relative strengthening of the U.S. dollar relative to the Euro, the projected persistence of the U.S. national debt is likely to keep the value of the U.S. dollar comparatively weak.

Argentina

In Argentina, the early spring in 2009 (our autumn) witnessed a severe drought in many regions, including the north. Prices of soybeans rose and the early honey crop was delayed and short. However, during the past four weeks, there have been very ample regular rains in the important producing areas of La Pampas and southern Argentina. These regular rains have been interspersed with very sunny and windless weather. By the middle of this week, major exporters have indicated that the nectar flow is wonderful and the bees are producing a lot of honey compared to the spring. It is now projected that their crop will reach at least 150 million pounds. If the prevailing excellent weather persists into the late summer, the crop could reach 175-180 million pounds. Currently, they are producing clover, various forms of alfalfa and sunflower. Even though conditions are greatly improved, Argentina will not be able to produce the bumper crop of 240-250 million pounds which they obtained for several years. The limitation is due to the fact that the Argentine beef and dairy industries, which depended upon pasture lands and clover and alfalfa production, have been severely restricted by government action. Those pasture lands have been converted to soybean production. Argentine and Brazilian exporters, like many North American farmers, look to the vast populations in India and China for steady and strategic consuming markets of their agricultural products.

Vietnam



Vietnam's 2009 crop has just begun. The conditions are much better than last year. There is production occurring for coffee, cashew and some rubber. The major producing season is March and April and the major floral source is rubber, which provides the base for Vietnam's growing export of light amber honey. Vietnam, like South America, is increasingly looking to Europe. During Apimondia, the Vietnamese honey exporters sought to cultivate the European market. The Vietnamese beekeepers have suffered significant increase in the cost of sugar needed to winter their bees. The global shortage of sugar, coupled with India's huge demand for sugar, dramatically increased the international price of sugar. The Vietnamese dong fell in value relative to the U.S. dollar during 2009. This has led to an increase in the cost of production in Vietnam. The Vietnamese are also more cognizant of the international market conditions than they were in the past. They have opened communications not only with consuming countries, but with producing countries around the world.

The Vietnamese have taken very serious steps to prevent circumvention of Chinese honey through Vietnam. They have established systems of traceability and authorization of beekeepers and exporters, quality control systems, and have relationships with leading laboratories in Europe. They also sent a delegation to the University of California, Davis, in order to study and improve beekeeping practices. Efforts are being made to establish a data base of primary floral sources from different regions of Vietnam that will provide a basis

to assist country of origin identification. The steps being taken in Vietnam may serve as a model for other countries.

The Future

Many people in the honey industry are curious whether any new honey-producing countries will emerge with significant export volumes in the coming years. I believe that an increase in international consumption in various markets, including emerging market countries, will concurrently develop as beekeeping increases, especially in emerging markets. In fact, as living standards in the emerging markets increase, and the interest in varietals increases, as has happened in the wine, coffee and tea industries, there will be new opportunities for American honey to find attractive markets overseas.

People also wonder if China will resume direct exports to the U.S. market in the foreseeable future. My answer is yes. China is a huge producer of honey and possesses a tremendous diversity of floral sources that include premier honey such as Acacia, Chaste, Clover and Alfalfa. Furthermore, when China entered the WTO it was agreed that surrogate country analysis would end during the decade that commenced last week. The Chinese government also is opposed to corruption in international trade.

The industry as a whole longs for and needs a level playing field with a better integration of the interests of producers, packers and consumers. A significant improvement in the marketing of honey would greatly benefit everyone in the industry. Green products, of which honey is one, represent a significant trend. The growing emphasis upon varietals is a second factor, and the ability to link consumption of natural foods with health benefits is a third and perhaps the most promising. America has seen this occur with almonds, blueberries, tea, chocolates, wine, etc. It is honey's turn.

The Committee for the Promotion of Honey and Health has had preliminary discussions about the possibility for a second scientific symposium. The first such symposium occurred 2 years ago in Sacramento. Our experience in the tea and health movement indicates that a break of three or four years allows good science to beget more good science. Of course, the Committee needs the support of the trade organizations, the producer's associations and the National Honey Board or Boards. In September, 2007, there was an impromptu meeting of eight leaders of the industry which laid the basis for the formation of the honey and health committee. I remember Jerry Brown, who was then hobbling on his crutches, saying to me, "Ron, if we can really make this honey and health work, this will resolve the conflicts between producers and packers. The real question will be how can we produce enough honey in the world to satisfy the increased demand for consumption that will follow if and when we successfully link honey consumption with health and disease prevention?"

On the one hand, let us all work with our organizations, our congressional representatives, the justice departments, government officials and, if necessary, the media, to put a timely end to the circumvention that has created a 2-tiered market that has plagued our industry. On the other hand, let us work together to use good science as a marketing tool to promote our sweet, green and healthful product and in the process revitalize our industry, with its deep roots in antiquity.

From the west to the east, the south to the north, and in the heartland, there is a greater unity to achieve both of these goals than at any time in recent decades.

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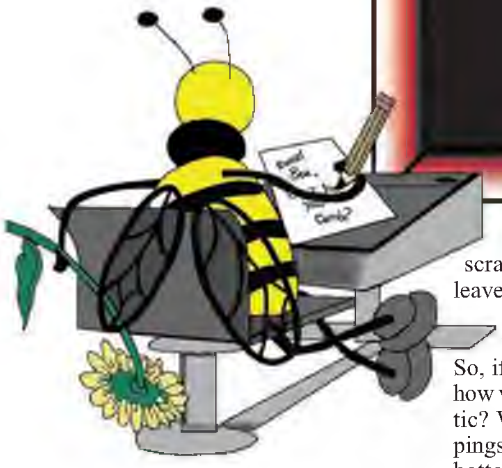


Organic and CCD—Comment

I want to thank you for what you said in the Jan. 2010 edition of the *ABJ* about organic and CCD. On both subjects you said just what I have believed for a long time. We have a small pumpkin farm with about 10 beehives. We will never go through the organic certification process, although we do not use pesticides or herbicides. Our soil amendments are provided by the cover crops, the cattle, donated horse manure we compost and the tons of duck manure in rice hulls we buy. We just tell people the pumpkins and other crops are raised naturally to protect our bees. In other words, we are a bee-friendly farm. People understand that! I also tell them just what you said about the causes of CCD. I remember that talk I heard at Apimondia in Australia where the speaker said it was "death by a thousand cuts". I quote that statement when people ask about it. Keep up the good work educating beekeepers! I learn a lot from your monthly column!

Ettamarie Peterson

Q Cleaning and Rewaxing Plastic Foundation

I have a question about cleaning used plastic foundation. I have heard that scraping the old comb off and then power washing it works. Now, specifically, do you try and remove ALL of the wax or do you just scrape it and let the bees clean it up and leave a little "old wax" for them to work?

Next question, I know that bees work better on wax-coated foundation. So, if you suggest removing ALL old wax, how would you go about re-waxing the plastic? Would you melt down your own cappings, dip them in some way and hope the bottom of the cells don't hold too much wax? I'm racking my brain here!

Thanks,
Nick

A I wouldn't worry about getting 100% of the wax off. Shoot for 85-90%. Yes, bees do better at drawing out comb if they have some in place and don't have to make it all. In some type of double boiler arrangement (beeswax is highly flammable) melt some beeswax and use an old small paint brush and paint the beeswax on. You don't have to be neat. The bees will mold, shape, massage the wax into the proper areas and construct new cells. You are helping your colony by removing old potentially disease-holding brood comb and the negative chemical residues they contain. This will help honeybee health as much as anything.

Q Which Type of Honey Bee to Use?

I have a small bee yard in mid-Michigan (8 to 12 swarms). I have always kept Italian bees with good success, but have become curious about the Carniolan strain. They seem to be perfect for our climatic conditions in Michigan. I am contemplating trying a couple of swarms this season. However, I am not sure if I should go with Russian honey bees. I have read that the Russians can be "touchy" and require regular requeening to retain their mite resistance and productivity. However, price and availability seem to be on their side. I am just looking for some suggestions.

Thanks,
Tom

A Tom, I think that purchasing "hygienic" stock from reputable queen producers is the long-term solution to lots of our problems. Hygienic Russians are better than they were a few years ago. There is a list of approved Russian producers on the web. There are legitimate, reputable breeders of hygienic stock and then there are the mass marketers selling junk.

Q Can You Overfeed Honey Bees?

I have a question that has bothered me for some time. Can you overfeed bees? By this I mean, the bees take all the HFCS or sucrose fed to them and store it in cells, which may not be consumed by springtime. This leftover food could be mixed and extracted with honey the following season. We talk so much about contaminated honey. Could it be possible that we ourselves are doing this without being aware of the consequences? Depending on weather conditions and strength of the hive, the bees will consume

various amounts of food over the winter. This amount is hard to predict and it's better to be on the plus side than to starve the bees. It still makes sense to over-winter bees with pure honey rather than feed them with other sugars. I know that this is not always possible. Thanks for your help.

Fred

A

Fred, I cannot argue with any of what you have said.

Q Trouble with the Neighbors

I am writing to you because of a problem that I have. It is not with the bees that I have, it is with the neighbors that I have. I have six or seven hives at my house and six at another location. The neighbors have several teenagers who think they can do anything they want to do in the neighborhood. I have had words with them about the bees in my yard because they trespass using my yard to go to their buddy's house. I have checked with the township where I live and can legally have them, so I don't have any problem with the law. It seems every time they see a honey bee or any other flying insect, they call the police to complain.

This summer we had words about the bees because I caught them killing a swarm of bees that was in their yard. About 5 days later, when I checked on my hives, I noticed a foul smell. When I opened the hives, I found that two of the bee hives were dead. I highly suspect that they had been bug-bombed with insect killer because I recognized the odor in the hive. I have also had several of my hives kicked over. Since there was snow on the ground at the time, it told me the story of what happened because the footprints in the snow lead straight to the neighbor's house.

Just this week the boys were outside and made a comment to me that they knew what happened to my hives and if I did not get rid of the rest them, they would do it for me. Their statements indicate to me that they killed the hives since I did not say anything to anyone else.

What I would like is to get some information as whom to call if and when they try to kill another swarm or hive? I think that if the issue is turned over to the federal government because they were killing this vital insect and let them deal with the boys, then they might get the idea to leave them alone. I do not know whom to contact and was wondering if you knew who to talk to?

Sincerely,
Ken Berg
Flint, MI

A

Ken, if I were you, I would have called the police, sheriff or whomever is supposed to enforce Michigan Law. It sounds like this relationship with your neighbors is out of control and you are losing. If you have checked local law and you can keep honey bees in your community legally, you are in the right. Of course, you must also be sure that you are abiding by any regulations about how many hives you have on your land or how close they are to your neighbor's house.

You have evidence with footprints in the snow. Did you take photos? They admitted they destroyed your colonies to your face because they apparently know that you won't do anything.

You should contact Mike Hansen, who is the Michigan Dept. of Agriculture Apiculture Chief and report a honey-bee kill. They can come out, take samples, and analyze dead bees, comb, etc. You might consider putting up a "motion sensing" camera such as those hunters use to monitor deer movement. Turning the other cheek, giving your enemy your coat and going the extra mile certainly is Biblical, but you must hold those who harm you to a level of Biblical accountability and responsibility or you will actually stunt their growth.

It's too bad this situation could not have been nipped in the bud with amicable give and take between you and your neighbor (perhaps even a few jars of good-will honey). However, it may have gone beyond this stage of reason by now.

Q Raising Queens

Mr. Hayes, I really enjoy your classroom column in the *ABJ*. This spring is my third year in beekeeping, so I still have lots of questions. I got lucky last fall and found a hive, about a half-mile from my house that was abandoned three years ago, according to the property owner. The hive contains a strong colony of bees. This coming spring, I'd like to make a split out of this hive and install a sister queen from this survivor hive.

Here's where I get lost. I've read several of the most recommended books on queen rearing, also every article I can find. I've also read and am familiar with several of the methods commonly prescribed for rearing queens. I have no desire to learn or perform the grafting method. Most every method seems to me to be geared towards the commercial production of queens, or at least towards raising large numbers of queens. I only need one. Can you suggest an easy method of raising my own queen from this survivor stock? I have two other hives of bees at my home location, plus an empty nuc box. That's the extent of my equipment right now, though I'm not opposed to adding more if necessary.

I helped my nephew do what he called a "dirty split" last year, where we just put a frame of eggs, plus frames of food and bees in a nuc and let them produce their own queen. This seemed to work (if they survive this winter, I'll call it a success), but I've read several times that you shouldn't do this as it results in inferior queens. No explanation why. Thanks for any help you can give.

Gary Blackford
Hebron, Ohio

A

Gary, I lived in Wooster years ago where I went to the Ohio State University Agricultural Technical Institute specializing in beekeeping. I like Ohio. The queens with the most ovarioles (egg-producing organs) are raised from the youngest larvae, hours old, that are being fed copious amounts of royal jelly, the food that turns a female worker larva into a queen. Commercial queen breeders manipulate situations in order to facilitate these conditions.

If you want to raise one queen or several, then I would simply identify frames with eggs in spring, distribute them equally in two hive bodies, along with a few frames of honey and pollen. Then, take one of the hive

bodies and place it next to the other box on a bottom board, etc., making a new hive. In a couple of days, go in and see which one has queen cells. There you go. Not pretty, but effective!

Q Treating with Antibiotics

I enjoyed your presentations at the Louisiana Beekeepers Convention earlier this month. I am a new beekeeper who is blessed with a beekeeping club close to me. However, there exists a large experience and age gap within our club. We are told to give antibiotics twice and year, Fumidil in the fall, etc.

I've been in the medical field for 16 years. I have seen that the abuse of antibiotics in people contribute to some of the worst resistant bacteria imaginable. I believe this was through indiscretion and ignorance. I believe this could happen with honey bees also. The reason I'm writing you is because your presentation Saturday at the convention was the first time someone had suggested that bees should only be treated when symptomatic.

I have no real resource within my club and want your input or perhaps some study or publication that could clarify this "medication" dilemma for me. Any help you can spare would be great. Also, thank you for your presence here at our conference. I appreciated your work.

Brent Ingvardsen
Stonewall, Louisiana

A Good Morning Brent. Thank you for the compliment. I am glad that you are a new beekeeper and it is good that you have the expertise of members of a beekeeping club close to you. Like many organisms, honey bees can take a lot of stress and abuse that does not kill them, similar to humans and our livestock that are exposed to lots of chemicals that are purposely ingested, applied or inhaled. As you know in the medical field, antibiotics are prescribed freely and taken freely and many times incorrectly which has led to MRSA and other really scary stuff. This will only get worse as time passes and practices do not change dramatically from either the medical practitioner side or the patient side.

Production livestock are fed a diet that routinely contains antibiotics to lower infection levels in these animals that are crowded together in stressful and unhealthy conditions. None of this will change soon since food production for the lowest cost per unit output is the goal. *E. coli* and other organisms' resistance to antibiotics have been documented. As long as the ultimate product does not immediately kill the consumer or make him/her sick, it is considered to be all right.

Honey bees are just as tough as a cow or a chicken. However, the real question should be: Are they healthy and thriving or are they just OK? We have antibiotic resistance in bacterial diseases in honey bees. The most significant and prominent is *Paenibacillus larvae,* the causative organism of American Foulbrood (AFB). A couple of reasons for this are: 1) Feeding antibiotics inappropriately and 2) applying them inappropriately. To highlight, (1) why feed antibiotics when there is not a disease? My example at the meeting was when I asked, "Is anyone taking antibiotics now because they are afraid of getting strep throat in the future." No hands went up from the audience. And in regards to: 2) Not following label directions as a factor in antibiotic resistance, I believe antibiotics are designed to kill all sensitive organisms, both good and bad, if applied properly in multiple doses over X period of time.

This is similar to when your doctor prescribes antibiotics for you to take over a 10- to 14-day period so all the bad organisms are killed. If you don't follow the instructions, then you are promoting bacterial resistance because some of the bad organisms are genetically hardier and they stay alive after the first or second exposure to the antibiotic. If you quit taking the antibiotic after a few days because you are feeling better, you have then become an evolutionary selective agent who has selected for organisms that are somewhat immune to a partial treatment. When this happens over a large population, over and over again, then at some point in time you have selected for organisms that are entirely resistant to this antibiotic and the disease cannot be controlled easily, i.e. MRSA or flesh-eating bacteria found in all hospitals now.

The same thing happens with honey-bee diseases such as AFB. The beekeeper may not complete treatments using labeled products or he may use antibiotics in "food patties" for disease prevention when there is no active disease, thereby selecting for those organisms that have some natural resistance. These resistant bacteria breed and then you develop an organism over time that requires a different stronger antibiotic. In the beekeeping industry we have gone from Terramycin to now Tylosin and already there is some noted AFB resistance to Tylosin because of the reasons cited above.

Now let's take a quick look at what honey bees eat for protein, lipids, vitamins and minerals. It is not pollen. It is beebread, which is a fermented product that is created by honey bees adding bacteria, yeasts etc., to pollen to break apart the pollen grains sealed in silica (glass) to release and pre-digest this vital nutrition enclosed. If you have an agricultural background, stored bee pollen is kind of like pollen silage. Or, for you or I, it might be compared to a fermented food like yogurt, kefir, sauerkraut, sour cream, etc. Adding antibiotics kills both good and bad bacteria in a honey-bee diet. Antibiotics even kill the good bacteria that honey bees need to make beebread in order to obtain full nutrition. Thus, unknowingly, the beekeeper may have further stressed and compromised the health of the colony.

Antibiotics are extremely valuable tools for human and animal health. However, any tool is not the right tool. A hammer is not a screwdriver. A crescent wrench is not socket wrench. We have been abusing antibiotics and are now suffering the consequences personally and in our animals. We are relying on our advancements in technology to step up and save us. I hope that they can continue to do so. Sorry to *drone* on so long.

Q Colonies in the Winter

Thank you once again for taking the time out of your busy schedule to drive all that way to speak to our group. Everyone enjoyed it and I am hoping that we will have more of our members getting registered and involved in the Best Management Practices (BMPs) about which you spoke.

And, since I have your reading eye, instead of your listening ear, I have a question. What are eight-frame brood boxes supposed to look like at this time of the year in this area? I checked mine today and there were only about two or three frames that had any eggs, larvae, and capped brood on them. There was plenty of honey and pollen stores. The frames that do have the eggs and such on them are not very consistent either. I did see fresh eggs, still standing up, just not a lot. When I had bees before, I didn't look into them at this time of year. I am trying to be a good bee mommy, but I just don't know what I am supposed to be seeing at this time of year. Thanks for your help,

Debbie Bohannon
Florida

A I enjoyed being able to address your group. They will all be good beekeepers with all the support and mentors available. I am all eyes. The European honey bees we have are varieties with a biology/physiology that is attuned to always preparing for winter—a season that has harsh temperatures and is food resource barren. In temperate climates, honey bee colonies and their reproductive queens respond to the shortening day length, downward temperature changes and lack of nectar and pollen availability by slowing down and eventually stopping brood rearing to save food resources in this energy-dependent activity.

In Florida, it is a bit confusing for European temperately evolved honey bees since the days are shortening and the temperature is dropping (but not by a lot). However, a few flowers are still blooming. If your colonies have brood in all stages, lots of stored food and parasites, pests and diseases are at nonexistent or controllable levels at this time of the year in Florida, I would say you are in good shape.

Q Medications and Ventilation Questions

First, I really enjoy your column, "The Classroom". There are always great questions asked by fellow beekeepers who have run into problems and need your help with fixing them. This might be a problem someone else is having also or may just help them to prevent a future problem with their bees. Great job!

Jerry, here is my first question. When hives are medicated in the fall and early spring with medicated syrup, there is a time limit on when it must be removed before a honey flow and supers can be put on. Later, there comes a time to put the queen excluders on and then supers, whether above a single deep, double deep, one and half, or three mediums as the brood boxes. These colonies are still expanding the brood nest and making room for more brood. Do they move the medicated nectar or honey from the brood area up into the supers as they are making room?

My second question, if you have time to answer, is: What is the best cover to use on your hives? Beekeepers talk about hives needing ventilation and to keep the hives cooler in the summer, so the bees don't have to work as hard to cool the hive. The telescoping cover and inner cover create a dead air space, plus you can put a hole in the rim of the inner cover to create a upper entrance and to let the hive vent out some of the moisture. But in the South, it seems that most of the hives I had seen pictures of in the magazines use migratory covers. It seems to me that being in the South where they would get a lot more humid temps, the colonies wouldn't cool the hives much with that solid migratory cover on them.

There seems to be so many different opinions on what is best, but as beginners in this area of beekeeping, which one do you choose! I wish there was a standard to go by, depending on the area in which you live. Which is the best brood box set up, cover, entrance, reduced entrance, vented top, etc.? Can you help me out with some answers? Thanks Jerry. Keep up the great job!

Robert Warnick, Jr.

A

Robert, Thank you for the "Classroom" compliment. I learn things all the time from the excellent questions that are central to an understanding of beekeeping. I'll try to answer your questions.

I guess my first question is why are you medicating in fall and spring? Do you have a disease? If you have a disease such as American foulbrood or European foulbrood, antibiotics can be a valuable tool. If there is no disease to treat, then why treat?

Always follow label directions for antibiotics labeled for honey bees. The directions will indicate how far in advance of the nectar flow the antibiotics should be withdrawn in order to prevent contamination of stored honey.

Honey bees are successful insects because they have the genetics which require diversity. With certain exceptions, *Apis mellifera* can live in most locations—at high altitudes, at low altitudes, in deserts, in jungles, in cities, in the suburbs, in hollow trees, rock cavities or the attic of your house. They survive because of genetic diversity contributed by multiple matings from multiple drones. Instead of putting their survival into the genetics of mating with one drone, honey bees spread the risk around by mating with many drones. If one drone's sperm carries weak genetics for over wintering, then only those workers produced by that sperm are at risk, not the whole colony. Honey bees go for the averages not a homerun every time at bat. That is why there are only generalities for hive dimensions, covers, bottoms, etc. Honey bees don't care. They adapt because they can.

Use whatever kind of cover you want; it really doesn't matter. Upper ventilation in the hive is something to consider. Honey bees, in the process of eating and processing stored honey, release excess water in the form of water vapor/humidity as respiration takes place. Now, think of putting your warm, moist breathe on a cold windowpane in winter in your house in Farmersville, Ohio. Water droplets form from the condensation of the water vapor in your warm breath. The same thing happens in a beehive in winter. Water condensation can freeze on the top of the hive (inside). It can build up and freeze layer upon layer over weeks of subfreezing temperatures. It can freeze inside the hive because the cluster does not heat the entire hive like your central heating in your home.

The cluster, for efficiency reasons, just heats itself so not a lot of extra heat is produced to keep the condensation from freezing inside the hive. When there is a break in the outside weather, the hive warms up. The frozen condensation melts and the bees have a cold rain on them that compromises their ability to stay warm. Cracking the top to let water vapor out before it condenses and freezes is a reasonable management practice. Too much insulation applied by the beekeeper keeps too much water vapor inside the hive, which like your house, encourages mold and fungus to grow. This is not a healthy situation. Cold does not kill honey bees. In healthy honey bees with adequate winter stores, the honey-bee cluster easily deals with the temperature extremes.

Custom Labels For The Hobby Beekeeper

By DEWEY HASSIG
email: deweyhassig@gmail.com

A nice quality, custom label on a glass jar adds value to your honey, communicates your message, and sets you apart from the generic and mass produced honey.

For a small scale-beekeeper, an easy, cost effective way to make custom labels for a smooth sided jar is to use Avery address labels. Depending on the size label you use, you can expect to pay about 6 to 15 cents per label, including printing done at a print shop, on a color laser printer. You can easily change your labels for specific customers, seasons, or the nectar source. You can do one page of labels or hundreds of labels at one time. The printing cost per page is usually the same, whether you do one page or fifty. You are not committed to thousands of labels, all identical or with the same mistake you overlooked.

I purchase the labels online, at averylabelsonline.com, and download the Avery template, in Microsoft Word format, from the Avery website. Then, add your own background color, text and pictures to the template. You can download the template and practice making a label on plain paper, before buying any labels at all. Printing is best done on a color laser jet printer, but an ink jet can work, *IF* you have separate color ink tanks. Ink jet prints are more prone to smudging during and after printing than laser jet prints are. Spray a fixative on the labels to reduce the chance smudging, even on laser jet prints. The fixative is found at craft stores, intended to spray on chalk or pencil drawings to prevent smudging. The labels seem to adhere better to the jar if the label has time to "age" after applied. A label that is freshly applied can easily be removed. Give it a week to age, if you can.

On my 9 oz. hex jars, I use *two* labels, Avery 6873 color laser jet labels, 2 x 3 ¾ inches; about 6.5 cents per label, and printing costs 39 cents per page, or about 5 cents per label to print. The front label has the usual information, the rear label has one of two pictures, and notes about the honey, and a raw honey vs. infants warning.

On my 3 oz. hex jars, I use a single Avery 8162 inkjet label, 1 1/3 x 4 inches, costing about 2.6 cents per label, and about 3 cents to print (on a color laser jet printer). There is room for the basic information here, but not much else.

I am not proficient at Microsoft Word, but here are some tips I have. The most difficult

Front of my label

These two labels show the two different photos I have been using on the label. One shows me working a hive; the other shows a honey bee on a wildflower.

part is adding the background color, and going beyond the edges of the labels, so a slight shift in the paper does not leave an edge without color. It is a lot of trial and error, and the print software may give you trouble if you go off the printable area. A label without a background color, though, screams "cheap". A bright yellow background color looks great. If you want a picture on your label, insert the picture to the template, and add text alongside the picture with a text box, removing the outline from the text box when finished. I have trouble getting the picture on perfectly, but close should be good enough. For a fancy type font, I use "Monotype Corsiva". Warning: the wonderful people at Microsoft have made some fonts and page formatting that are not compatible between old and new versions of Word. Make sure the version of Word you use is the same as the print shop uses, and carefully inspect a test page. My labels are nice, but not perfect, but my customers know I'm not a million dollar operation.

Find out what the label legal requirements are for federal and your state. Typically, they require your name, address, grade of honey (assume Grade A), and US and metric weight. There are specifications for minimum text size, but don't sweat that if you just sell locally. Also, don't worry much about not having zip code or even state, if you sell locally. For small operations, you should not need to add nutritional information.

Side view of my labels on jars

In my opinion, you should avoid phony beekeeping imagery. Don't use any cute bee drawings, or drawings of skeps. Of the two pictures I use, one is a bee on a native wildflower, and on the other I am doing a hive inspection with a veil and long sleeved shirt, but no bee suit or gloves. That is how I keep bees. Stick with reality. Leave the deceptive marketing pitch to the cereal people.

Have fun and be creative. Part of my front label reads: "Produced in the Glen Lake area of Minnetonka, by the bees and Dewey Hassig." Numerous people have commented and appreciate that I give the bees top billing. For your name, you could make it "Joe Blow and family (or neighbors)", if your family or neighbors help you with the beekeeping. Pitch the local connection and wholesomeness of honey every way you can. From my 9 oz. rear label: "Just the way the bees made it—nothing added or removed. From the flowers and trees in the Glen Lake area of Minnetonka, MN."

ILLINOIS BEEKEEPERS SHARE THEIR HONEY SHOW SECRETS

By CHARLES AND KAREN LORENCE

If you have ever been to the American Beekeeping Federation's convention, you know the names of Karen and James Beiii! Why? Since going for the first time in 2007, the Beiiis have walked away with (probably) more prizes than anyone eise. That isn't surprising though, since everything they do is pursued with a passion.

Here's their story: Karen and Jim both grew up in Chicago. Jim was an architect; Karen, a Chicago Public School teacher. In 1989, they decided to move out of the city and bought a 40-acre farm in the town of Wadsworth in northeastern Illinois. They became very good friends…almost a parent/child relationship…with the woman from whom they bought the farm. Sitting at her kitchen table, drinking coffee, she said to them, "Son…do you think you'll ever have livestock?"

Jim thought her question ludicrous. He didn't know one end of a cow from another. He had grown up in the city and his only relationship to livestock was at the Lincoln Park Zoo.

Yet, 'Mom' continued to badger him. "You ought to think about going into bees. You'll learn something about agriculture and how agriculture is done." The seed was planted!

Jim and Karen began going to county fairs so they would have something to talk about with their neighbors, something that would help them blend into their new community. It was at the Cook County Fair (at Garfield Park in Chicago) in 2001 that they first had their interest in bees piqued.

One day, Jim was out on the farm, clearing brush, when an old man appeared with FBI (Federal Bee Institute) imprinted on the back of his shirt. Paul Atkinson, in his 80's, told them that he just wanted them to know he was putting 12 hives in next door. "We've been 'kind of' interested in that ourselves. Could we watch you?" replied Jim.

"Hell…watch? You can help." And so began the process of learning about bees. Old Paul Atkinson went into his sticky red Pinto car and found a suit for Jim to wear. He lit the smoker without cracking a smile. "You can carry the boxes. I'll light the smoker because that takes experience!" And so… Jim provided Paul with some free labor for the price of learning about bees from an 'old-timer.'

Karen looked up beekeeping on the Internet and found an active group in Lake County, IL. They attended an all-day seminar at Garfield Park Conservatory in Chicago. They thought about beekeeping, read about it, discussed it, thought about it some more. Finally they decided that they had deliberated long enough. "If we're going to do this, let's do it now."

They sent away for a Dadant's catalog and made a list of everything they thought they'd need. They drove down to Hamilton one day with the list in hand and inquired about where the factory was. A friendly townsperson directed them by saying, "Roll down your window and, when the scent of honey and wax is in the air, you're there."

Paul Atkinson, their old neighbor, was their mentor as they began their venture. He gave them four drawn frames for each of their two hives, increasing the survival chance for the hives and insuring some honey since the new packages didn't have to draw comb when they were installed. By 2003, they were ready to take their first honey to a fair. They took their honey to the Lake County Fair and entered every category they could. Interestingly enough, they won ALL blue ribbons…not because they had honey better than anyone else's, but because they had the ONLY honey. They even won the Grand Champion ribbon for their gift basket. The second year the same thing happened…ALL blue ribbons. Now they were ready for the 'big time', so they headed down to the Illinois State Fair in August of 2004. What they saw was overwhelming. Not only were there many exhibitors for open class honey, but they also saw a display by four beekeeping clubs in the state along an entire wall.

Wanting to learn more about how honey judging took place, Jim and Karen planned to spend the day watching judge Dr. Marion Ellis, as he examined each category. Upon seeing them, Dr. Ellis invited them to pull up their chairs and, for four and one-half hours, he explained to them every single aspect of honey and beeswax judging. Interestingly enough, as first time exhibitors at the state fair, the Bellis took 2nd place in light

Jim & Karen at their exhibition booth at the 2010 American Beekeeping Federation convention

Jim & Karen's homemade honey polariscope

and 3rd place in amber. They were floored! It was great to win ribbons for their honey, but the best outcome was that they learned how to show their product.

They went home, eager to work toward their next goal…the American Beekeeping Federation (ABF) honey show. In 2006, they attended their first ABF convention in Louisville. Three blue ribbons that year affirmed that their bees did a good job and the honey was packed to perfection by beekeepers who wanted to show off their honey to the best of their ability. Who could argue with that? The Bellis have consistently taken ribbons at the ABF conventions since then and continue to enjoy the competition, as well as the camaraderie that competition affords.

What are the most important concepts the Bellis advise future competitors to follow?

(1) Read the rules (deadlines, bottles, size, what the product will be judged on.)
(2) Make sure you have the right amount in the right size bottle.
(3) Use the right tools! The Bellis built a 'magic box' or a **polariscope**. One can't buy it but there are plans in the *ABC to XYZ of Beekeeping* if you would like to build one. A **polariscope** is basically two panes of polarized glass spaced about six inches apart. The panes are put at 90 degree angles to each other. Use a 60 watt light bulb. The rays of light go through the jar of honey, deflecting particles that show up on the screen. Thus, crystallization, lint, bee legs, or hive debris are magnified.
(4) Buy LOTS of jars so you can find the number you need that are perfect, with no imperfections. Check those jars BEFORE you put the honey in as lint is easier to remove when there is no honey in the jar.
(5) Extract honey at various times during the season, sometimes only a few frames, if you want to get a variety of colors for your honey.
(6) Don't use an electric uncapping knife. Use a cappings scratcher.
(7) Strain through nylon cloth so there is no lint.
(8) Do not heat your honey to a high temperature. Heat darkens honey.
(9) Cap your jars immediately to eliminate dust.
(10) Use an Ott light…a wonderful super intense light for checking jars and honey.
(11) Use a **refractometer**. Judges check moisture and your honey must be within the recommended parameters.
(12) Use a **color analyzer**. Here, a high price is not always the best indicator of quality. The Bellis use Jack's Color Analyzer, but another good one is a Hanna.
(13) Give yourself plenty of time. Planning is critical, so don't wait for the last minute to get ready for a show.
(14) The more hives you have, the better chance you have to get a nice variety of honey including Ross Rounds, cut comb, section boxes, different colors of honey, and enough beeswax to make candles.
(15) Using new foundation gives you a better chance to get light honey. You'll never get light honey out of old frames. You're not going to get beautiful light beeswax from old combs.
(16) Fill your jar so no daylight can be seen under the cap. Fill all jars evenly.
(17) Make sure there are no bubbles in your honey, no pollen floating on the top,
(18) Make sure no honey has spattered onto the inside of the lid.

Jim and Karen both agree that everyone who competes wants to win. Nevertheless, competition is fun and they have made great friends as a result of competing. "Whenever we are stumped, even though we are competing against one of them, they are the first ones to come to tell you how you can improve," say Jim and Karen. "If they need a new lid or something to polish their jars with, we're always there to help them."

Jim and Karen are amazing people because they have accomplished so much in so little time. They are relatively new beekeepers, but yet have achieved what so many of the seasoned beekeepers are still striving for…prize-winning honey.

Jim & Karen's talk about honey show competition know-how at the Florida 2010 American Beekeeping Federation convention.

An Adaptable Workforce

by RANDY OLIVER
ScientificBeekeeping.com

I'd like to return to the analogy of the honey bee colony as being similar to a medium-sized mammal. The combs are analogous to the skeleton, the queen to the ovary, drones to sperm, honey to body fat, and the workers to the individual cells that make up organs.

The honey bee superorganism has one up on a mammal, though—a mammal can't "dissolve" unneeded or overrepresented organs, and shift those cells to augment other organs. A colony of bees can—by shifting workers from one task to another. This plasticity in worker task specialization allows the colony to quickly respond to changes in the environment—such as a sudden bonanza of nectar, or the need to shift from broodrearing to winter cluster formation. However, in order to undergo such transformations at maximum efficiency, the individual bees of the colony must be able to share information. Such sharing is done via the commerce of foods (analogous to the mammal's circulatory system), and through the bees' pheromonal language (analogous to a colony nervous system).

Allow me to return to the concept of the hive economy, which is driven by floral resources, and to the female labor pool that processes them. (Drones do not participate in within-colony labor other than in heat production. That leaves the two castes of females—the queen or queens, whose only labor is to lay eggs, and the omnicompetent and versatile worker.) By having only one sort of generic yet adaptable worker, that can specialize in short order to fill any task, the colony's workforce can rapidly shift from one job to another, as opportunities or challenges arise, so as to ensure that the economy of the hive functions most efficiently.

Seeley (1995) points out that much "communication" within the hive is by cues, rather than actual communicative signals. This is especially true with communicating the status of the state of nutrition within the hive. The feedback of cues (such as amount of jelly, or the ease of unloading nectar) forms the bulk of communication ***from the colony to the individual***. Only a few signals (the dances, alarm and orientation pheromones, etc.) ***allow the individual to directly communicate to the colony*** as a whole.

Human economies respond to the dynamics of price—the more valuable goods get more economic attention. The same occurs in the hive—and foragers respond to cues that tell them how valuable certain commodities (rich or dilute nectar, water, or pollen) are *at the moment*. In response, the individual foragers invest work effort proportionally to the current value of each commodity, ***not for individual gain, but rather for the maximum gain of the colony as a whole.***

Thus, a web of information sharing within the hive allows it to function without a central brain or government. Rather, the myriad feedback loops based upon food cues and pheromones allow the entire colony to act as a "mind" that allocates the labor pool to efficiently exploit the ever changing market of available resources upon which the hive economy is based—the pollen and nectar of the flowering plants that have coevolved in a mutually beneficial symbiosis with the bees. (Bees are the "shoppers" in the pollen market; plants advertise with bright petals and fragrant scent for bees to "buy" their product, and reward the shoppers with energy-rich nectar to fuel their shopping sprees.)

The godmother of hive dynamics was Dr. Anna Maurizio (1950), who found that workers in queenright colonies starved for pollen would transform into long-lived "winter" (diutinus) bees, ***even in summer***. In the past several years the combined research of others has culminated in a considerable understanding of how nutrition and pheromonal feedback regulate colony economics and population dynamics.

Drs. Zachary Huang and Gene Robinson

The honey bee superorganism (minus the box). The wax combs are analogous to the skeleton of a heavy animal, the outer layer of water-shedding wings to the skin, and the various cohorts of workers within to the internal organs of a warm-blooded mammal. I took this photo in Gus Rouse's Kona Queen yard in Hawai'i (all photos © the author).

(1992, 1996) made a major breakthrough when they demonstrated, in a series of clever experiments, an antagonistic relationship in worker bees between two substances—juvenile hormone (JH) and vitellogenin (Vg). The relationship has been greatly expanded by further research by the duo, and later by Drs. Gro Amdam, Robert Page, and their collaborators (Nelson 2007).

I'm going to try to simplify and summarize the current model for the dynamic interplay between colony protein economy and the allocation of the workforce into "winter," nursing or foraging bees. In reality, there are multiple redundancies of feedbacks, stimuli, and inhibitors, but I feel that for Joe Beekeeper this simplified model will help us to understand the major forces at play. Let's begin with vitellogenin.

Pollen, Vitellogenin, and Juvenile Hormone

The first thing to understand is that the requisite source of the protein necessary to build bee bodies is a nutritious mixture of pollens. Pollen is the most essential food for the colony, and is processed by nurse bees into vitellogenin (Vg), which can then either be stored in the fat bodies (in "winter" bees) or converted into jelly (by nurse bees) for transfer to the queen, brood, and foragers.

Bees with high Vg titers remain in a "young" state, and rarely leave the hive. The presence of high levels of Vg in their "blood" (haemolymph) suppresses the action of the hormone that causes them to "age" into foragers—juvenile hormone (which surprisingly has the opposite action in bees that it does in "normal" insects).

When fresh pollen is in short supply ***in the immediate broodnest***, colony Vg levels drop, which then allows JH levels to rise, thus causing middle-aged (or even young bees during severe famine) to quickly "age" into foragers, with a disposition to collect pollen in preference to nectar. ***This feedback loop adjusts the relative amounts of brood, nurses, and foragers in a colony.***

Practical application: colony buildup is largely dependent upon an uninterrupted supply of fresh pollen *immediately around the brood*. A colony can lose the "momentum" of its buildup during a short pollen dearth.

Be aware that a strong broodrearing colony can eat up all its pollen reserves during a few days of rainy weather (and even cannibalize brood). Supplemental protein feeding can mitigate the effects of the resultant pollen shortage, or promote broodrearing at times when natural pollen is scarce (as before almond bloom, or during late summer).

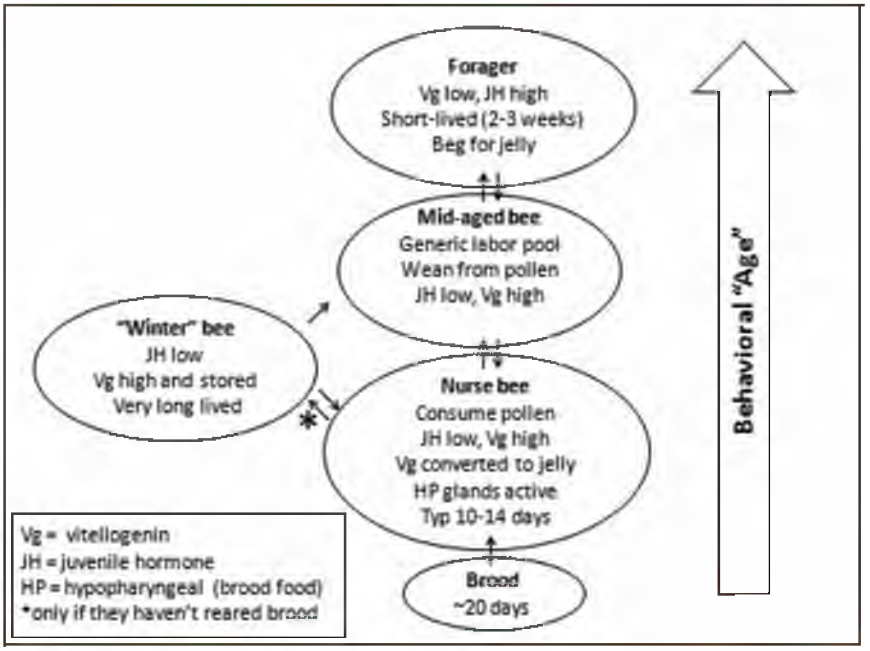
At this point, since I suspect that some of your brains are already starting to fog from the flurry of jargon, I've drawn up a visual chart for you to refer to.

Amdam (2004 and pers. comm.) and others (Lourenco 2009) have found that not only do forager bees have reduced immune function due to low Vg levels, but that young bees that become infested with parasites (get sick) apparently deplete their Vg stores in the process of mobilizing their immune system. Ditto with stressed bees (Lin 2004). This then removes Vg's inhibitory effect toward JH, and the sick bees quickly transition to foraging behavior. ***This process has major implications in the understanding of colony-level immune function. First, it gets sick bees out of the nursery, and second, it helps to explain the reason that parasites (including viruses) that attack adult bees can quickly depopulate a colony*** (I will return to this in an upcoming article).

Practical application: starved, stressed, or infected bees can very quickly shift to forager status. By doing so, they rapidly begin to age, and are soon lost to the colony. Younger bees then take their places. If the infection is not brought under control, especially if nutrition is poor, this process can rapidly depopulate a colony—leaving only the queen and a handful of young (uninfected) workers. Sound familiar?

Practical tip: colonies in late summer following poor forage conditions may be

This colony has abundant mixed pollens in the broodnest, young "wet" brood, and appears to be in nutritional balance. Note the bees engaged in trophallaxis—the exchange of pheromones and food.



A summary of the physiological changes in the colony workforce as they "age" through a series of behavioral tasks. Note the plasticity of bees in that they can sometimes "revert" to a previous task if necessary.

composed largely of undernourished older bees with poor immune function. Such bees are sitting ducks waiting to be knocked off by varroa and viruses.

Drs. Heather Mattila and Gard Otis (2007a, b) recently fit some final pieces into this jigsaw puzzle by studying the transition of a colony to "winter" bee status. The common wisdom has been that colonies shut down brood rearing in response to shorter days and cool weather, and resume it when days begin to get longer. However, there is virtually no actual evidence to support that those factors (temperature or photoperiod) are causal, as opposed to coincidental. What Mattila and Otis demonstrated was that it was the cessation of pollen income that initiated the suspension of broodrearing, which was ***then*** the reason for the last emerging brood developed into "winter" bees. Feeding of pollen supplement late in fall prolonged broodrearing, but didn't increase the size of the eventual winter cluster.

As much as I'd love to say that everything is now explained neat and tidy, the authors express a caveat:

"It is unlikely that the availability of pollen is the only trigger that induces the switch from brood-filled colonies of short-lived workers to broodless colonies of long-lived workers because seasonal changes in pollen supply clearly do not account for the resumption of brood rearing that occurs before workers start foraging in spring. It would be adaptive for colonies to utilize several redundant cues to initiate this switch during autumn, because having a single mechanism would result in opportunities for mistakes as they prepare to survive a long winter, one of the most severe environmental challenges that honeybee colonies face in temperate environments."

Mattila and Otis found that fall feeding was not of benefit *in Guelph, Ontario*. It is of practical interest whether their findings apply to say, colonies going to almond pollination in California. I studied their paper, and compared it to my own practical experience, and to the data gathered by Dr. Frank Eischen in California (in prep), which indicate a contrary conclusion.

One huge difference is the massive amount of pollen coming into the Guelph colonies in fall—the colonies with pollen traps yielded an average of 13 lbs of pollen in the last two months (Sept and Oct) of flight. Assuming that 50% of the pollen got through the traps, that means that even the "pollen-limited" colonies were able to obtain about 13 lbs of pollen despite being trapped. I'll tell you right now that any beekeeper in California whose colonies each got 13 pounds of natural pollen in fall would be one happy camper!

Second, the winter temperatures are significantly colder in Guelph than they are in most of California. In many of the Pacific overwintering areas, colonies only form tight clusters on occasion, since even in winter the daily high temperature often allows the breaking of the cluster and bee flight (the average January high temperature for Modesto is 54°F). So I'm not clear what percentage of bees go into true diutinus state during California winters.

Indeed, in a recent presentation, Dr. Eischen showed that colonies destined for almond pollination, and wintered in the cold mountains of California behaved very differently than those wintered at a warmer lower elevation. The mountain colonies appeared to have formed true winter clusters, suspended broodrearing for a longer period, and had less adult bee loss. Once moved to the orchards, the mountain-wintered bees not only caught up with, but passed, the lowland bees once the almond bloom was underway.

Bees on Rabbitbrush (*Chrysothamnus*) in Nevada. Many Western beekeepers rely upon this plant as a fall source of pollen. Rabbitbrush bloom was killed by early frost this year in some areas, and the bees suffered for lack of late pollen.

Colonies being fed on the Sacramento Valley floor prior to almond bloom. The syrup feeding helps to stimulate broodrearing, but may also cause workers to wear themselves out in fruitless foraging. Unless these hives have good pollen stores from the previous fall, they will be lacking in the protein necessary for good buildup, due to inadequate local forage at this time of year.

I've looked carefully at the data from Mattila and Otis (2007a) and Harris (2008) regarding the formation of "winter" bees. One thing that jumps out at me is that few bees that actually engaged in broodrearing as nurses later became long-lived "winter" bees. The long-lived bees were mostly those that emerged after the last brood was sealed. Such bees would have had pollen resources in order to develop plenty of stored protein in their fat bodies, haemolymph, and hypopharyngeal glands, but would never have fed any jelly to brood (I'll cover the trigger for their transition to "winter" bees in my next article).

So let's try to make sense of this. Honey bees have this survival mechanism to deal with pollen dearths—they shut down broodrearing when pollen runs out (perhaps even cannibalizing brood), and give what protein they've got to the oldest larvae. At that point, the colony is sitting on its future—the sealed brood that will emerge over the next twelve days. It's not clear yet whether the last of the former nurses transfer their remaining protein reserves to the emerging bees, but somehow those bees wind up with high Vg levels. They will have no brood to feed, and will become long-lived diutinus bees prepared to survive after all the rest of the bees in the colony have perished in the search for food, succumbed to disease, or simply flown their aging bodies out to die away from the hive.

This shrewd strategy removes any excess mouths to feed during time of dearth, and ensures that fresh, "fat," unworn bees are given the responsibility to hold down the fort. As long as they have some sort of honey reserves, they can survive through winter cold or summer drought until the next pollen flow.

As far as practical application of this knowledge, it is all about local conditions and timing. Research suggests the following management actions:

Cold winter areas with late pollen flows: fall supplemental feeding (of protein) may not be of benefit—it just prolongs broodrearing. Save your money for appropriately timed spring feedings if bees don't get early pollen flows. This will help them to build so as to take advantage of early nectar flows—if they have to wait until the nectar flow to build up, you won't make near the honey crop that you could have!

Cold winter areas without late pollen flows: Feed pollen supplement in late summer, timed to allow the colony to produce a late round of brood that will be emerging as cold weather shuts down foraging.

For almond pollinators with bees in holding yards with little natural forage:

California wintering (in mild winter areas): Eischen's research in California suggests starting protein feeding no later than September, and continually through until bloom (many top-notch California beekeepers begin feeding in August). Colonies will take less supplement in November and December. Don't forget to give the colonies a patty if they are sitting very long in the orchards before bloom—lack of protein at that critical time can shut down their buildup.

California wintering (in cold winter areas or sheds): Feed if appropriate in fall, and then let the colonies settle down into "winter" mode for minimal adult mortality. Due to the resultant larger surviving cluster size, such colonies can catch up with colonies that were overwintered at lower elevation, despite the lowland bees' head start in broodrearing. I find that strong, heavy colonies that were on good fall pollen flows don't need any additional help. However, January feeding of pollen supplement will enable them to build to splittable size before bloom!

Southern wintering: If your colonies aren't in great shape in fall, it may be worthwhile to "skip winter" entirely by moving hives to the warm south to build up on natural forage, and then move them to California at the last moment.

Syrup: All the above assume that colonies have plenty of honey or heavy syrup stores. Colonies without ample honey stores are loathe to winter with large clusters. Feeding of light syrup (especially sucrose) will stimulate broodrearing.

Coming up

The primer pheromones and managing the labor pool.

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The Traveling Beekeeper

What Bees Should I Have?

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Ways Bees Are Bred

I am writing this from a campground in South-Central Florida, the week after the ABF meeting in Orlando. This is an area south of Lake Placid described by ecologists as 'wet prairie' meaning that when the wet season arrives in the summer, it is quite possible to be standing in water. Think of it as a transition area to the Everglades. Don't walk your little yippy dog too close to the pond where the 'gater feeds. The campground is set up in an oak hammock, with towering water oaks festooned with Spanish moss providing a respite from the hot Florida sun. This month has not been that, quite the opposite actually, with a prolonged cold spell that turned much of the landscape into a shade of brown or grey.

A great horned owl woke me in the night as I slept. Or perhaps it was answering my undirected snore. The sound echoed around the trees and the strong single 'whos' were followed by a more rapid call, answered by another owl, some distance away. There are bears in this area, and panther too. I was lucky enough to see one years ago when I ran the Genetic Systems, Inc., bee breeding program in LaBelle, about 30 miles away, and we had apiary sites just a few miles from here. It was a young male with spotting, and a long, long tail.

The bee-breeding program is the one started by Dadant & Sons, Inc., with Dr. Bud Cale Jr. They produced two breeding stocks, the Starline and Midnite hybrids. In LaBelle we produced two others, the Cale 876 and the Cale 235, both produced by instrumental insemination. That part of the program ended in 1980.

Since Dr. Cale had been trained by Iowa corn geneticists, he used the hybrid corn model as the mechanism for the production of Starline and Midnite bees. A number of queens were located and developed into lines by crossing closely related queens to drones of the same bloodline. Repeated crossings produced queens that had genetically 'locked-in' certain genetic traits. These queens and their colonies were inbred, but when crossed with other inbred lines via instrumental insemination, the worker bees they produced were hybrid bees, two-line hybrids. The queens grafted from such a queen were also hybrid.

Various two-line hybrid combinations, on both the queen and drone side, were inseminated and the final colonies compared in Illinois for honey production, gentleness, wintering ability, and initially for disease resistance. Later hybrid queens focused mainly on honey production and brood rearing, and the disease resistance was dropped due the abundance of antibiotics for bees. The resulting four-line hybrid bees were very popular as the Starline and Midnite hybrids.

The Dadant and Genetic Systems operations were responsible for developing the breeder queens and releasing them under cooperative agreement with breeder cooperators. These were queen producers and commercial honey producers who could sell or had need for a large number of highly uniform queens. The breeding plan was amazingly simple. On the first year, the queen producer would graft from the two-line breeder queen sent for this purpose. Since the queen in this cross was herself still inbred, she was often kept in a five-frame nucleus or a single deep hive, and frames of brood were added to supplement her reduced egg-laying rate. During the first year all of the colonies in the beekeeper's operation were requeened with the Starline or Midnite daughter queens. These queens produced pure Starline drones, regardless of the drones they themselves mated with, due to the haploid-diploid mechanism of sex determination in honey bees.

In the second year, a second two-line cross breeder queen was sent to the cooperating beekeeper, still operating under agreement. Since this queen was genetically unrelated to the drones produced in the operation, her daughters were able to mate with a large number of highly productive drones and, in turn, produce a hybrid queen that generated a large hive of hybrid bees.

Bud Cale referred to this program as the 'Criss-Cross' program, since unrelated queens were shipped every year to mate to the drones in the beekeeper's colony. Cale liked to have all beekeepers in the program on the same side of the cross so that only one type of breeder queen was produced that year and available to the breeders. This prevented, in large part, the possibility of genetic inbreeding if one beekeeper 'borrowed' a breeder queen from another Starline or Midnite cooperator.

While I was part of this program we had 13 inbred lines, meaning that some were not used. It cost a lot of money to maintain these lines with their constant need for food, brood, and careful management. A support team was needed for queen production and instrumental insemination.

It was this high cost and the arrival of tracheal and varroa mites that brought the end to the program.

Serious Sideliner Symposium V, Orlando, January 2010

As part of this small-scale beekeeper conference, separate from the main speakers at the American Beekeeping Federation meeting in Orlando, we had a review of the Russ-

ian, VSH and Minnesota Hygienic bees. This will help us review the similarities and differences.

Russian bees—Dr. Tom Rinderer traveled to Eastern Russia nearly 20 years ago to bring stock back from that region of the world where *Apis mellifera* was exposed to *Apis cerana* colonies where varroa mites have evolved. Beekeeper and queen breeder Carl Webb discussed the Russian program.

The Russian stock was established as a closed population bee breeding program, where 18 beekeepers are responsible for maintaining one or two of the queen families that make up the program. By a planned rotation of stock exchange, each Russian breeder receives stock from other breeders and uses this as part of their effort to maintain the stock without producing any noticeable level of inbreeding. Selection is essentially completed except for the constant removing of any unacceptable traits, so the stock is in a subtle state of improvement.

Webb said that it is not possible to purchase a breeder queen from any of the 18 breeders. Instead, a beekeeper must purchase production queens from these beekeepers. It was not clear if any of these people are producing queen cells for sale, something that might limit the nature of the final queen without acceptable drones. While this keeps the economic incentive in place for the 18 cooperating beekeepers, it does eliminate the rapid use of the stock by a large number of beekeepers. The only way to get breeding stock is to become another Russian bee breeder. Of course, a beekeeper could graft from a Russian queen and all of her daughter queens would produce pure Russian drones (if the Russian breeders did their job right).

Varroa Sensitive Hygienic (VSH), formerly called the Suppressed Mite Reproduction (SMR)—These bees are still maintained by the Baton Rouge Bee Lab and breeder queens are available for purchase from Tom Glenn Apiaries in California. This has made it possible to purchase VSH stock by simply writing a check, getting the queens, and grafting from them.

The selection program was started by Drs. John Harbo and Jeff Harris about 20 years ago. Dr. Roger Hoopingarner at Michigan State University was involved in the initial part of this program. Nearly 100 survivor queens were identified from around the country and brought to Baton Rouge for testing and evaluation. Several queen families are maintained, as Jeff Harris explained at this program. This means that different breeder types exist and can be used in a criss-cross type bee breeding program, switching from one queen to another every other year.

At first the researchers felt that the bees had the ability to suppress the reproduction of mites, but it has since been shown that these bees are also hygienic. Harris showed an exciting video clip where he introduced a frame of worker brood filled varroa mites into a colony of VSH bees. A bee is seen chewing the capping of the cell, and other bees remove and tear apart the worker pupae inside. The strain is able to detect cells with reproducing mites and remove them. This reduces the reproductive rate of the mites. Further, when the mite crawled out of the cell, she immediately jumped onto one of the worker bees. That bee reacted strongly to the mite on her body, and may have triggered a grooming response from one of her sisters, implying that a second resistance mechanism is at work in this strain of bees.

Minnesota Hygienic Bees—U of MN scientist Gary Reuter discussed the development and status of the Minnesota Hygienic strain of bees. This is perhaps the best known of these selection efforts due to Reuter and Dr. Marla Spivak discussing them at so many meetings. Now the program has been turned over to beekeepers, as in the Russian model, who are responsible for stock maintenance, testing and propagation.

The program started in 1993 when Spivak and Reuter used bees in the University apiary. These bees were primarily Starline bees, so they represented a good strain of bees. These bees were put though a testing program of using liquid nitrogen to kill a circle of brood in a brood frame. Once warmed to air temperature, the killed brood was returned to the hive and checked at 24 and 48 hrs. Then, the percentage of brood removal was counted. Non-resistant stock had removed little of the brood, but highly resistant stock had removed all of the brood in 24 hrs. With constant selection the entire MN Hygienic stock has over 95% brood removal.

Since the genes in this system are recessive, there must be recessive genes on both sides of the cross. Therefore, like the Starline and Russian program, alternative breeders must be used to prevent inbreeding and to promote high levels of mite removal.

Perhaps key to the Minnesota program is the fact that any beekeeper can duplicate this outcome with his or her bees. A few years of selection for general characteristics in conjunction with the liquid nitrogen (or frozen brood) method of testing will produce a result in a very short time period.

Final thought

This is more work than I want to do on a day marked on my calendar 'South Florida Vacation'. But I think I would like to see several hundred beekeepers try this in 2010:

1. Contact Tom Glenn Apiaries and explain what you want to do. He is probably a bit better at this than I am!
2. In 2010 obtain either a Minnesota or VSH breeder queen and produce daughter queens for your operation, as well as all your neighbor beekeepers. I am becoming more and more an advocate of production of queen cells and virgin queens and you may want to sell some of these in your county/surrounding area.
3. In 2011, obtain either the Minnesota or VSH breeder you did not get in 2010. Produce queens from this queen (or several) and let them mate to the 2010 queen's drones.
4. In 2012, repeat 2010 and you have started a criss-cross program. Dr. Bud Cale would be pleased. And I will want you to get up at a future Sideliner Symposium to tell fellow beekeepers what you have done. Deal?

When not slaving at the laptop while on vacation, you can order books from Dr. Connor from his online website www.wicwas.com. That site has a compete list of bee books printed by Wicwas Press. Many of these titles are also available from leading bee supply dealers.

Beeologics and RNAi
The Future or a Dead End?

by JERRY HAYES
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Honey Bees worldwide are under siege from a variety of parasites, pests, predators and diseases.

After 20+ years varroa is still the most significant negative health influence to honey bees. Chemical varroacides from fluvalinate, coumaphos, amitraz to essential oils and organic acids have essentially failed, as varroa became immune to these chemicals, or they provide incomplete control. Varroa has developed significant resistance to most man-made chemical controls. Small hive beetle is endemic in many parts of the U.S. without consistent control. American foulbrood is resistant to a whole suite of antibiotics. Now pathogenic viruses have been identified in honey bees that have been implicated in CCD.

I sat down with Eyal Ben Chanoch, CEO of Beeologics, to find out more about his company and RNAi. Perhaps there is a chemical-free future for maintaining healthy honey bee colonies.

Q. I was able to attend Apimondia last year and there was a lot of interest in controlling honey bee diseases and especially the viruses that seem to be implicated in CCD. Whenever virus control was brought up, your company, Beeologics, came up in the same breath. What is Beeologics?

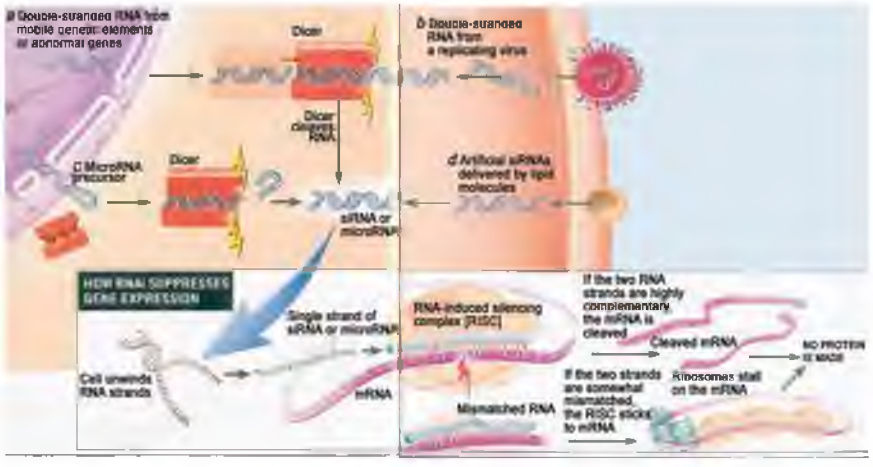
A. Beeologics is a bio-technology company developing RNAi products for veterinary use with special focus on bees, beneficial insects, providing medicine, health products, services and business solutions to the growers, beekeeping community and food industry. Beeologics is privately held with offices in Israel and the USA. Collaborating with many of the leading bee research institutions such as the Hebrew University of Jerusalem, USDA/ARS, Beeologics R&D team has produced significant results that positioned the company in a leadership position in this new technology.

Q. Since Beeologics is now charting a path with this new RNAi technology explain to me what the heck RNAi is and why a reader should continue reading.

A. Ribonucleic Acid or RNA is one of the building blocks in the living cell which among other functions is responsible for the activation and regulation of specific activities in the living cell. RNAi or RNA interference is a name of a technology that was awarded the Nobel Prize for Medicine in 2006 which leveraged the ability to augment and generate RNA activity to control activities in the cell. This technology brings a set of properties that were never available before in a safe and sustainable model, a fact that puts it at the center of medical research for humans. Using RNAi methodologies Beeologics has developed an anti-viral agent that acts as a preventive measure for virus infection in bees.

Q. This sounds potentially dangerous to the bees. Is it or could it be?

A. On the contrary, the RNAi to treat viruses was designed such that it has no impact on the bees or the environment. Moreover, RNAi is a naturally occurring phenomenon and it is produced by organisms such as the honey bee in the presence of a pathogen such as a virus. In normal conditions, RNAi not consumed by the target animal will degrade and dissolve without leaving traces or any toxic effect on the environment. RNAi



A cell can censor the expression of an individual gene inside it by interfering with the mRNA transcribed from the offending gene, thus preventing the RNA from being deoded by ribosomes into active protein. The censorship machinery is triggered by small, double-stranded RNA with ragged ends. An enzyme called Dicer chemically snips such short interfering RNAs (siRNAs) from longer double-stranded RNAs produced by self-copying genetic sequences (a) or viruses (b). Regulatory RNA sequences known as microRNA precursors (c) are also cleaved by Dicer into this short form. And scientists can use lipid molecules to insert artificial siRNA into cells (d).

is specific and as such presents a viable and safe alternative to current strategies that use chemicals.

Q. So, RNAi is different from chemical controls like antibiotics, varroacides and fungicides that beekeepers currently use to control pests, parasites and diseases now. Is that right?

A. This is correct and a very valid statement! Remember, our first product to control IAPV infection, and the following products designed for disease and pest control in the colony are based on RNAi (RNA interference). This Nobel-winning technology involves the use of double-stranded nucleotides, which are identical to naturally occurring RNA in many forms in bees, as well as many other living organisms. As these strings are extremely specific to a certain target, our scientists developed a method to identify and select the specific and effective sequence for certain targets and then produce it in quantities that will protect the bees on the colony level. Traditional pesticides, as well as many medicines, are based on non-discriminatory strategy. Examples are many; we know that antibiotic agents may kill the good bacteria necessary for our health along with the bad bacteria: Radiation used for cancer treatment will suppress the immune system along with fighting the cancerous cells. Up until now everything had good and bad consequences simultaneously, with RNAi this may all change.

Q. Chemicals disrupt the cellular mechanism of pathogens and parasites now and have proven themselves, if not perfect, at least economical and efficacious. Why is your new technology as applied to honey bees better?

A. Specificity, efficacy and affordability to the beekeeper are the key. We generated the appropriate data to show that not only is RNAi effective, but it also has longevity in terms of resistance development by the target. We have also made tremendous progress in manufacturing techniques that brought cost to levels comparable to other products in the industry. The strategy using chemicals as pesticides is also nonspecific in the hive as in other areas of agriculture. Chemicals poison the target pest, but also affect all living creatures in the treated area, depending on their size and the consumption levels. In the hive, it is pronounced even further as we try to control one organism--the mite with chemicals in the presence of another organism, the bee. If the size gap between the two were similar to a dog and a flea, finding the right dosage that will not affect the host (dog), but will kill off the pest (flea) is relatively easy. However, with the small size gap between the bee and the mite, it is almost impossible to find the dosage balances without significant risk to the colony. Simple environmental changing conditions may cause significant risk like few rainy days or especially hot weather, which can devastate colonies after chemical treatment.

Nitzan Paldi, chief technology officer, on the left and Eyal Ben Chanoch, CEO of Beeologics, on the right.

Q. Can RNAi technology target any pathogen of honey bees or only certain kinds at certain times?

A. In theory, the technology can be used with any organism or pathogen that has endogenous silencing mechanisms. In other words, we can develop a unique construct to deal with most known pathogens and pests. Any such development or research require specific knowledge of the target organism; it is independent of the technology and a mandatory prerequisite.

Q. If you develop a RNAi "treatment" for IAPV (Israeli Acute Paralysis Virus) let's say, will it hurt or damage the brood, larvae, pupae, adults or the queen in some way?

A. Specificity means that it not only will be inert to all forms of the bee metamorphosis cycle, but to other organisms in the hive. The IAPV specific dsRNA is an agent that will naturally degrade, if not consumed, and negatively affects the IAPV virus it was designed to address. After treating thousands of hives so far with Remebee, our proprietary IAPV RNAi treatment, all the data has shown that no harm whatsoever is done to either bees or brood.

Q. Can you explain a little more clearly how the RNA "strings are extremely specific to a certain target"? What do the RNA strings do?

A. The "RNA strings" are composed of four different types of "beads" or "base" (A, C, U and G) on a long chain. It is helpful to visualize four different colored beads on a string. If you have several hundred beads on a string, and at each position can be filled with one of the four different colors, the total number of permutations is enormous; every five additional beads on the string multiplies the number variations by a little over a thousand. The target organism is similarly composed of the same type of beads. The strings have an inherent property of coming together if their "beads" are exactly complementary (binding) in pairs of beads.

C is complementary (binds) to G and A is complementary (binds) to U. So, a very short string of three beads such as ACU can only fit UGA which is one out of 64 combinations (4X4X4). If we add only three more beads to make the string ACUCUG, the one to fit will be UGAGAC which is 1 out of 4096. In RNAi applications, strings start to be interesting from 21 beads and up, so if the string is composed of 21 beads such as ACUCUGCAGCCGUACGGAAUC, it can ONLY bind fully with the complementary string UGAGACGUCGGCAUGCCUUAG, which in the case is 1 out of 4,398,046,511,104 different combinations. Now, that's specific!

The strings, themselves, don't "DO" anything; however, they direct cellular "cleaners" (enzymes) specifically to the complementary string that belongs to the target we are trying to "silence' and cut it up.

Q. Are you saying that when RNAi targets a certain specified genetic weakness in a honey bee pathogen, that the organism can't develop immunity or resistance like it would with a chemical control?

A. Our dsRNA is a string composed of hundreds of beads that correspond perfectly with the pathogen we are trying to silence. When the dsRNA is nearing the target, it breaks into smaller strings of 21 beads each.

Hence, even if the target will mutate ("change beads") at several locations simultaneously, there will still be hundreds of 21 bead variations that are perfectly aligned with the target. Thus, resistance is the wrong term and cannot be developed and the chance that a target will mutate such there are no 21 beads strings that fit it is so slim that it is practically zero.

Q. This control technique will not hurt, damage or weaken the honey bee?

A. Exactly! We use the honey bee genome database to make sure there are no honey bee corresponding 21 bead strings to what we are using. Therefore, the honey bee remains completely safe.

Q. Explain to me another term you used. What is "endogenous silencing"?

A. The cell mechanism recognizes the dsRNAs as foreign and brings out the silencing response (turning it off) to them, according to the sequence of the beads. If one of the host genes is perfectly complementary to the introduced string, it too becomes silenced.

Q. So, before you can devise a genetic location target (construct), don't you have to have the whole genome sequenced in the virus, bacteria or fungi? If you don't, then you can't pick a target, can you?

A. You need the host genome in full to avoid miss targeting and endogenous silencing as above, but for the target it suffices to have just the string of beads corresponding to parts of the pathogen genome, which will be enough to suppress its negative action.

Q. If you know the genetic sequence of a harmful organism to honey bee—any organism in theory, sensitive genetic targets could be identified and that harmful organism could be damaged or killed, eliminating it as a problem? Is that right?

A. In theory, this is true across all living organisms. However, as always in biology, there are many factors involved that make reality very complex. Firstly, there is a big difference in the processing of the dsRNA between vertebrates (those animals that have a backbone) and invertebrates (those without a backbone). In vertebrates and mammals in particular, the dsRNA breaks down very quickly in the guts or in the blood, and thus delivery of dsRNA is currently impossible. Moreover, killing or even affecting larger organisms by using this method is far from trivial, because their systems are more complex and robust.

Q. This all sounds way too easy. Why isn't it being done now? Is it being successfully engaged in control of harmful, viruses, bacteria, fungi now in people, pets or livestock? Is the technology too new and has not been developed completely? Where is Beeologics in refining RNAi for commercial use by beekeepers?

A. Well, easy it is not and there are many layers of difficulty. It was only recently that the breakthrough in RNAi research placed the technology as a potential medical solution, so in many ways, it is in the beginning. For human use, the delivery and efficacy are of acute concern, whereas in invertebrates the challenge is of a different type; that is what helped Beeologics develop Remembee as quickly as we have. We have developed and accumulated know-how by our multidisciplinary team with expertise covering viruses, bees and technology. Furthermore, the ability to scale up economically and efficiently, which is unique to this platform, and the swift and extensive coverage of the FDA regulatory process let Beeologics leap forward.

Nonetheless, using RNAi technology, at least nine different human drugs are in various stages of the FDA approval process for indications such as respiratory virus control, cancer treatment, for treating a genetic eye disorder, and recently some drug giants announced the launch of a program to develop a treatment for H1N1. They are, however, still many years away from being awarded a New Drug Approval. The most potent hurdle is delivery, or how to bring the medicine safely to the treated area.

Q. When will Beeologics be able to help beekeepers?

A. Currently, two big field trials under an FDA-approved protocol are being run in Florida and California. With the end of these trials due in June 2010, we hope that Remembee will be available to the beekeepers in the fall of 2010.

Honey Bee Colony Mortality in the Pacific Northwest: Winter 2008/2009

by DEWEY CARON[1], MICHAEL BURGETT[2], RANDAL RUCKER[3], and WALTER THURMAN[4]

A 2007 study by Underwood and van Engelsdorp reported more than 20 instances of large-scale colony losses since the late 1860s. Many of the reported instances involved diseases whose symptoms included the disappearance of large numbers of bees. For example, one early documented loss, which was referred to as disappearing disease, occurred in 1915 in Portland, Oregon (Root & Root 1923) and losses were reported to be widespread from Florida to California (Tew 2006).

The extent of the recent colony losses has been documented in several surveys. An initial survey, conducted by the Apiary Inspectors of America (AIA) in cooperation with the USDA, queried beekeepers in 15 states. A 31.8% loss rate was documented for the over-wintering season in 2006/2007 (van Engelsdorp et al. 2007).

Similar national surveys have been conducted the past two years, again with the involvement of the AIA and USDA. For the 2007/2008 survey, about 20% of the owners of an estimated 2.3 million managed colonies were contacted. The estimated loss rate of 35.8% was about 13% higher than in 2006/2007 (van Engelsdorp et al. 2008). For the most recent winter (2008/2009), the national survey again queried about 20% of managed colony owners, and the reported colony loss rate was 28.6%, which represents a decrease of about 20% compared to the winter of 2007/2008.

While colony mortality rates of 30% (or more) are clear causes for concern, it is important to put them in perspective. Burgett et al. (2009) reported that prior to the appearance of two important species of honey bee mite parasites (*Acarapis woodi* and *Varroa destructor*) in the mid- to late-1980s, beekeepers typically had winter losses of 10% or less. The mites caused loss rates to increase substantially—a ten-year study (1989–1998) of Pacific Northwest (PNW) beekeepers reported an average annual loss rate at the time of 22.6% among commercial beekeepers (Burgett, 1998). Over time, however, beekeepers have developed techniques to control mite losses. Prior to the appearance of CCD, estimates suggest that loss rates were about 15% (Pernal 2008; Burgett et al. 2009), below that of the 1990s. Another estimate suggests that the average loss experienced by operations reporting normal losses during the winter of 2006-2007 was about 16% (vanEngelsdorp et al. 2009). Thus, a winter mortality rate of 30% suggests that (assuming other loss factors have remained constant) about half the recently observed losses have been due to CCD. It is noteworthy (and possibly encouraging) therefore that not only do van Engelsdorp et al. (2009) report a 20% reduction in mortality in 2008/2009, but they also find that only about one-quarter of the reported 2008/2009 losses exhibited CCD symptoms.

To date, no single factor has been identified as the reason for the elevated losses documented since the winter of 2006/2007. Although pathogens are actually killing the bees, the reasons why honey bees appear to be so susceptible to the pathogens is a source of considerable debate and the impetus for a number of research projects currently underway. A recent analysis of samples from the Florida and California colonies initially hit by CCD failed to determine what might have caused the heavy losses (van Engelsdorp, et al. 2009).

Beekeepers in the Pacific Northwest have not escaped the impacts of CCD. Burgett et al. (2009) documented increased losses for the winter of 2007/2008. Fourteen commercial beekeepers (those owning more than 500 colonies) responding to a survey questionnaire reported an average mortality rate of 29.5%, with a range across individual operations from 6% to 50%.[5] For the 11 semi-commercial beekeepers (fewer than 500 colonies) who responded, the mortality rate was 55%, with a range of 10% to 83%. The average (colony-weighted) loss rate across all respondents was 30%. The 25 individual beekeeping operations that responded to the initial PNW survey owned about 68% of total estimated colony numbers in Washington and Oregon in 2007 (as reported by the USDA, National Agricultural Statistics Survey in the annual publication, *Honey,* February 2009).

This report describes the results from a second season of a survey mailed to all beekeepers in Oregon and Washington with 50 or more registered colonies. Twenty-five surveys were returned and analyzed in 2008. Thirty-four usable surveys were returned in 2009. Additionally, a survey of part-time/backyarder Oregon beekeepers was conducted during April of 2009 with a survey form distributed at local bee meetings west of the Cascades. In addition to a question on colony losses, the backyarder survey asked about methods being used for mite control management. A total of 100 responses were obtained. The largest number of colonies owned by a single beekeeper in this group was 45. The results of this survey are presented separately as a sidebar to this article.

Two years of mortality survey results in the Pacific Northwest

The mortality results of the two years of the PNW survey are displayed in Table 1. The 14 commercial beekeepers responding in 2008 reported a combined loss of 17,968 colonies for a 29.5% loss rate. In 2009, 12 commercial beekeepers provided survey responses and reported losing 7,788 colonies, for a 21.0% loss rate. (A 90% confidence interval for the average loss of individual commercial beekeepers is from 14.1% to

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[4] Professor, Department of Agricultural and Resource Economics, North Carolina State University, Raleigh, NC 27695
[5] Note that Burgett, et al. (2009) mistakenly indicated that the cutoff between commercial and semi-commercial beekeepers in that study was 300, when the actual cutoff was 500 colonies (as in this study).

Table 1. Pacific Northwest colony mortality: Winter 2007/2008 and 2008/2009

	Beekeeper Classification	# of Survey Responses	Living Colonies Oct. 1, 2007 or 2008	Winter mortality	% loss
2007/2008	Commercial	14	60,870	17,968	29.5%
	Semi-commercial	11	1,230	677	55.0%
	All Beekeepers	25	62,100	18,645	30.0%
2008/2009	Commercial	12	37,125	7,788	21.0%
	Semi-commercial	22	2,127	472	22.2%
	All Beekeepers	34	39,252	8,260	21.0%

24.9%.) In 2008 the losses for individual commercial beekeepers ranged from 6% to 50%. In 2009 the range was from 2.5% to 40%.

For 11 non-commercial beekeepers in 2008, the loss rate was 55%. The 22 responding semi-commercial beekeepers in 2009 reported a loss rate of 22.2%. Individual loss rates for 2009 varied from 0.00% to 91.67%.

When the data for both commercial and semi-commercial operations are combined, PNW beekeepers lost an estimated 30% of their fall colony numbers in the 2007/2008 winter, while the 2008/2009 over-wintering losses were considerably lower at 21.0%. This represents a 30 percent reduction in mortality rates for the winter of 2008/2009. Based on the most recent USDA/NASS estimates of colony numbers (92,000 colonies for the two states in 2007 and 91,000 in 2008), the beekeepers who responded to the PNW surveys owned 67.5% and 43.1%, respectively, of the colony population in Washington and Oregon.

One potentially important issue with comparing the survey responses across the two years is that although the surveys were sent to all Washington and Oregon beekeepers with more than 50 registered colonies in both years, it may not have been the same beekeepers who responded to both surveys. If several beekeepers with relatively low mortality did not respond the first year, but did respond the second year, then the inter-year comparisons in Table 1 might not reflect an actual decrease in mortality rates. To address this issue, we were able to match up surveys from a number of commercial beekeepers who provided responses for both years of the survey. For the most part this matching was possible because some of the survey respondents signed or stamped both years of their surveys. Information from the beekeepers who responded to both years of the PNW survey, hereafter referred to as "repeat commercial respondents," is displayed in Table 2.

Several features of Table 2 are noteworthy. First, the repeat commercial respondents owned a substantial majority (80%) of the total number of commercial colonies in the 2009 survey sample. Second, this group of commercial beekeepers actually increased their colony numbers (by 6.6%) between the falls of 2007 and 2008. Third, the mortality rates for this group of beekeepers are quite similar to those of the entire sample of commercial survey respondents. For the full sample of commercial beekeepers, there was a 29% reduction in average mortality rate, whereas for the subset of commercial beekeepers in Table 2, there was a 28% reduction. Based on these observations, we conclude that differences in the composition of the sample of beekeepers between the two years of our sample are not driving the reductions in mortality rates indicated in Table 1.

Twenty-three of the beekeepers who completed a survey in 2008 provided opinions as to what was causing their losses. Of these, two beekeepers attributed 100% of their losses to mites and another attributed all losses to *Nosema ceranae*. Two believed 80% or more of their losses were the result of CCD and another three also believed CCD was the largest cause of their losses, while 10 said they did not see any losses fitting CCD symptoms. Across all 23 beekeepers, CCD-related losses were estimated to be higher than any other source of losses, with 32.7% of total losses attributed to CCD (see Table 3). Mites (25%) and queen failure (23%) were the next largest sources of losses.

In 2009, 34 beekeepers provided estimates of the percentage of their losses attributable to each of several causes. Three of the 12 commercial beekeepers ranked CCD as the largest cause of their losses, while five of the 22 semi-commercial beekeepers attributed more of their losses to CCD than to any of the other causes. Seven of the commercial beekeepers and 15 of the semi-commercial beekeepers indicated that they did not lose any colonies to CCD.

As indicated in Table 3, of the total number of winter losses reported by the 34 beekeepers in the 2009 survey, 35% were attributed to CCD, 22% were blamed on queen failure, 21% were due to "other" causes, and 17% were attributed to mites. Losses attributed to starvation were about 3% in both years. The differences between the two years are small. CCD remains the largest cause of losses and is up slightly relative to the 2008 survey. Mite-related losses are down and "other" causes are up somewhat.

Table 4 displays similar information as in Table 3, but only for those commercial beekeepers who responded to both surveys. Possibly the most noteworthy feature of Table 6 is the substantial reduction in the percentage of losses attributed to "other" causes by those beekeepers. This percentage fell by half and was offset by considerable increases in the fraction of losses attributed by these beekeepers to mites, queen failure, and CCD.

An issue of further interest is whether

Table 2. Pacific Northwest colony mortality: repeat commercial respondents

	Living Colonies Oct. 1	Winter Mortality
2007/2008	27,984	31.8%
2008/2009	29,825	22.9%

Table 3. Pacific Northwest beekeeper opinions regarding causes of winter losses: all surveys*

	Percentage of total colony mortality attributed to:				
Year	CCD	Queen failure	Mite related	Starvation	Other
2007/2008	32.7%	23.0%	25.2%	3.1%	15.9%
2008/2009	35.2%	22.3%	17.4%	3.8%	21.3%

***The numbers in the Table represent the percentage of all colonies lost that beekeepers attributed to each of the causes listed.**

Table 4. Pacific Northwest beekeeper opinions regarding causes of winter losses: repeat commercial respondents

	Mite Related	Starvation	Queen Failure	CCD	Other
2007/2008	9.7%	3.0%	11.9%	30.9%	44.4%
2008/2009	16.0%	3.5%	20.8%	37.4%	22.3%

***The numbers in the Table represent the percentage of all colonies lost the repeat commercial beekeepers attributed to each of the causes listed.**

Table 5. Mortality rates for beekeepers with CCD losses and those without CCD losses by year and type: All surveys.

Year	Beekeeper Classification	Mortality Rate with CCD	Mortality Rate without CCD
2007/2008	Commercial (12)*	30.9% (7)	27.6% (5)
	Semi-Commercial (11)	39.6% (6)	75.9% (5)
	All Beekeepers (23)	31% (13)	29.5% (10)
2008/2009	Commercial (12)	25.3% (5)	13.1% (7)
	Semi-Commercial (22)	21.2% (7)	25.2% (15)
	All Beekeepers (34)	25.1% (12)	14.2% (22)

***Only 12 of the 14 commercial beekeepers who responded to the survey provided information on whether they lost bees to CCD.**

Table 6. Mortality rates for beekeepers with CCD losses and those without CCD losses by year and type: repeat commercial respondents.

Year	Mortality rate with CCD	Mortality rate without CCD
2007/2008	33.3%	30.0%
2008/2009	25.6%	15.9%

Table 7. PNW colony replacement methods: all surveys

	2007/2008		2008/2009	
Replacement Method	Number	Percent of replacement colonies	Number	Percent of replacement colonies
Splits/Nucs (own colonies)	17,612	78.30%	9,897	94.8%
Nucs (purchased from other beekeepers)	3,570	15.90%	50	0.5%
Packages – USA Source	216	1.00%	164	1.6%
Packages from Outside USA	400	1.80%	50	0.5%
Mature Colonies from other Beekeepers	700	3.10%	54	0.5%
Other	12	0.10%	223	2.1%
Total	22,510		10,438	

Table 8. PNW beekeepers' assessments of changes in winter 2008/09 relative to winter 2007-08: all surveys

Beekeeper Classification	Higher	About the Same	Lower	No Response
Commercial	3	7	2	0
Semi-commercial	7	8	6	1
All Beekeepers	10 (29%)	15 (44%)	8 (24%)	1 (3%)

winter mortality rates differ between beekeepers who report losses from CCD and those who report no losses from CCD. Table 5 provides insights into this issue. Among commercial beekeepers, in both survey years, mortality rates were higher for beekeepers who reported having losses from CCD, although in the winter of 2007/2008, the difference in mortality rates (30.9% vs. 26.2%) is small. For semi-commercial beekeepers, the relationship is reversed with beekeepers who reported losses from CCD having lower mortality rates than those who did not report losses from CCD. In all cases (commercial and semi-commercial, with and without losses from CCD), the mortality rate was lower in the second year of the survey than in the first year. Across all beekeepers, mortality rates for beekeepers who lost colonies to CCD are higher than for those who reported no losses from CCD. Again, the difference in mortality rates is small for the winter of 2007/2008.

The values in parentheses in Table 5 represent the number of beekeepers in each subcategory. They indicate that the percentage of commercial beekeepers reporting the loss of bees to CCD fell from 58% in 2007/2008 to 42% in 2008/2009. The percentage of semi-commercial beekeepers who reported losing colonies to CCD is lower in 2008/2009 (31.8% or 7 out of 22) than in 2007/2008 (50%, or 5 out of 10).

Table 6 provides similar information for the repeat commercial respondents—those responding to both years' surveys. As in Table 3, in both years of the survey the mortality rate for beekeepers who reported losses from CCD is higher than for those who did not report losses from CCD. Again, the difference in mortality rates between the two groups is relatively small for the winter of 2007/2008, and mortality rates fell in the second year of the survey for beekeepers who reported losses from CCD, as well as for beekeepers who did not report losses from CCD.

In both survey years, beekeepers were asked how they replaced colony losses. The responses to this question from all beekeepers from both years are presented in Table 7. In 2008, 78.3% of colony replacements came from splits of beekeepers' own colonies. This method of colony replacement increased to 94.8% in 2009. Purchasing of nucs from other beekeepers was another survey response choice. In 2008, 15.9% of colony replacements were made using this method, but in 2009 only 0.5 % of replacement colonies came from purchased nucs. Buying packages from sources in the United States was infrequently used (about 1%) in both years. Less than 2% of replacement bees were obtained from foreign sources in both years. Purchasing established colonies was used to replace 3% of losses for 2007/2008 and less than 1% in 2008/2009.

Another question on the 2009 survey asked beekeepers to compare their losses during the winter of 2008/2009 to their losses in the winter of 2007/2008. As can be seen in Table 8, the most common response (44%) was that losses were about the same in the two years. Roughly equal percentages of respondents indicated that losses were either higher (29%) or lower (24%).

Of the repeat commercial respondents, 67% reported lower losses (both in terms of number of colonies and in the percentage of their colonies lost) during the winter of 2008/09 than during the winter of 2007/08. The reductions in the number of colonies lost for these beekeepers ranged from 10 to 1500, and the reductions in terms of the percentage of colonies lost ranged from 15% to 64%. One-third of the repeat commercial respondents reported higher losses in 2008/2009 than in 2007/2008. In terms of the numbers of colonies lost, the increased losses ranged from 25 colonies to 118 colonies. The percentage increases in losses ranged from 9% to 87%.

The final question on both surveys asked about levels of losses of the current year compared to years prior to the arrival of CCD. As shown in Table 9, in 2008 equal numbers of respondents (11, or 44% of the 25 survey respondents) indicated losses were higher or about the same, while 8% said they were lower than before the arrival of CCD. Although mortality loss rates are lower in 2009 than they were in 2008, overall, the proportional responses of all the responding beekeepers are about the same in the two years. Interestingly, a higher proportion (50% compared to 29%) of the commercial beekeepers indicate that losses were higher (than before CCD appeared) in 2009 than in 2008. On the other hand, a lower proportion of the semi-commercial beekeepers (41% compared to 64%) indicate that losses were higher in 2009 than in 2008.

In both years, beekeepers reported that they replaced more colonies than they lost. In 2008, the total number of reported colony losses was 18,645 and beekeepers reported total colony replacements of 22,510, or

20.7% more than they lost. In 2009, the total number of replacements reported in the surveys was 10,438, or 26.4% more than total reported losses of 8,260. For the sample of repeat commercial beekeepers, the numbers are similar. In 2008, they reported losing 8,892 of their 27,984 colonies for a 31.8% loss percentage. They created 11,546 new colonies, or 30% more than they lost. In 2009, the repeat commercial beekeepers reported losing 6,825 of their 29,825 colonies, for a 22.9% loss percentage. They created 7,885 new colonies, or 15.5% more than they lost.

The phenomenon of replacing more colonies than were lost has important implications for pollination markets. Despite the fact that CCD is causing increased winter mortality for beekeepers, our survey results suggest that commercial beekeepers (who provide virtually all commercial pollination services) in the PNW have been able to maintain, or even increase, their colony numbers. This is consistent with the findings of Burgett et al. (2010, in press) who find no evidence that either pollination fees or colony input costs (as measured by the prices of purchased queens and packaged bees) have increased since the appearance of CCD. If CCD were having large impacts on commercial beekeeper's colony numbers, pollination fees would be expected to increase.

Table 9. PNW beekeepers' assessments of changes in losses since the arrival of CCD: All surveys.

Year	Beekeeper Classification	Higher	About the Same	Lower	No Response
2007/2008	Commercial	4	8	1	1
	Semi-commercial	7	3	1	0
	All Beekeepers	11 (44%)	11 (44%)	2 (8%)	1 (4%)
2008/2009	Commercial	6	6	0	0
	Semi-commercial	9	8	3	2
	All Beekeepers	15 (44%)	14 (41%)	3 (9%)	2 (6%)

Discussion

Colony losses in the PNW were down significantly for the over-wintering period of 2008/2009 compared to the previous year (21.0% compared to 30.0%, or a 30% reduction). The level of losses in the 2007/2008 PNW survey was 16% lower (30% com-

Non-Commercial Beekeeper Losses in Oregon in 2009

Oregon backyard beekeepers were surveyed about 2008/2009 overwinter losses in April 2009 at county bee meetings. The 100 respondents reported beginning the overwintering period with 558 colonies. In April they collectively had lost 144 colonies, a 25.8% loss rate. The median number of beekeeping years was three and the median number of colonies managed was two. This loss pattern tracks the PNW survey results with small colony number beekeepers reporting slightly higher losses compared to the semi-commercial and commercial OR beekeepers (25.8% compared to 21%) and slightly lower than national losses as reported in the AIA/USDA survey (25.8% compared to 28.6%).

In the surveys Oregon non-commercial beekeepers were asked to report their level of experience and to indicate their mite control measures. Comparing new beekeeper losses (1-3 years experience, with a 26% loss rate) with more experienced beekeepers (4 or more years experience, with a 25% loss rate) suggests that experience and loss rates are not related. Similarly, mite control measures seem unrelated to losses. Fifty-five percent of the sample used screened bottom boards, 47% used powdered sugar, and 42% used miticide (including acid or Apistan.)

In a 10 year survey period (1989 to 1998) Burgett (1998) found semi-commercial beekeepers (50-500 colonies, total of 22 individuals in the later years of the survey period) had losses of 13-22% in the first four years of surveys (1989-1993 – colony numbers varied from 10,000 to 22,000 colonies). The next four survey years included more colonies and respondents and higher losses, 33-38% of managed colonies. In 1997 losses were lower again (20%), but bounced higher again in 1998 (30%), similar to the fluctuations seen in Delaware/Maryland backyarder colonies as shown below (Caron, 2009). Commercial losses were more stable, gradually increasing from around 20% to high 20% range over same 10 years.

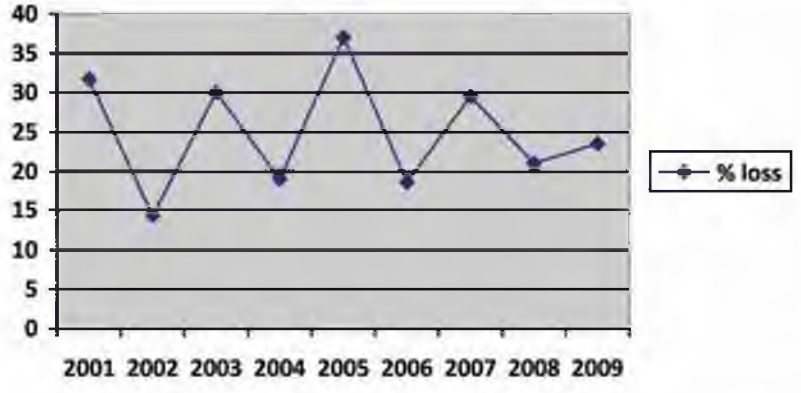

Figure 1. Cyclic losses of backyard beekeepers, DE/MD 2001-2009.

As a comparison, one of us (Caron) has been monitoring Delaware and Maryland backyard beekeepers about colony losses and what they are doing for Varroa control for the past eight seasons. Return survey percentages have varied from 12% to nearly 50%. In this annual survey, beekeepers were asked their number of years of beekeeping experience and to document colony losses by indicating the number of colonies in the fall and following spring and the number lost/replaced during the active season. Typical of the backyarder Oregon beekeepers surveyed in 2009, many Delaware and Maryland backyarders are relatively new beekeepers, (about 50% of survey respondents report one to five years experience) and they own only a few colonies. The vast majority (75%) of respondents manage less than 10 colonies with median number and mode (most common number) being 3 colonies.

When Delaware and Maryland backyarder losses are graphed over this nine year period, the loss pattern appears cyclic. Only three beekeepers had typical CCD symptoms in 2006/2007; none were reported in 2008 or 2009 surveys. (Modified from Caron 2009 by addition of the CCD losses of three beekeepers 2007).

pared to 35.8%) than losses reported in the national survey conducted by the AIA and USDA.[6] Both surveys found decreased losses this past winter (21% in the PNW and 28.6% nationally), with a sharper percentage decrease for PNW beekeepers (30% compared to 20%). The losses experienced in 2008/2009 are similar in magnitude to the losses reported by Burgett (1998) for PNW beekeepers during the years from the mid-1980s to the mid-1990s when beekeepers were attempting to deal with new mite problems. A repeat survey planned for 2010 will provide insights into whether loss rates continue to decline.

Also significant is the observation that commercial beekeepers are replacing lost colonies in numbers that actually exceed the number of colonies lost, and that this is largely through the production of splits from their own over-wintered colonies. This management practice has allowed the beekeeping industry to maintain sufficient colony numbers to service the agriculture industry's pollination requirements without noticeable increases in fees.

In both years of the PNW survey, almost half of the surveyed beekeepers consider their recent losses to be higher than prior to the appearance of CCD. Moreover, beekeepers attribute more of their losses in both years to CCD than to any other single cause.

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[6] See Burgett et al. 2009 and vanEngelsdorp et al. 2008.

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Honey Bee "Medical Records": The Stationary Apiary Monitoring Project

by MARLA SPIVAK
University of Minnesota

Why are so many honey bee colonies dying across the U.S.? Wouldn't it be great if we could download medical records for every honey bee colony that died over the last 25 years, or even the last four years, to piece together the primary factors or patterns of factors that correspond with colony death?

Thanks to funding from the USDA-CAP project, a number of researchers are compiling the first of four years worth of medical records on 420 colonies located across seven states. Our objective is to determine the role of pests, pathogens and pesticides in causing death in these stationary honey bee colonies. We chose to study colonies that are not transported for pollination and honey production because researchers involved in USDA-ARS Area Wide projects, funded by a different branch of the USDA, are studying the health of migratory colonies. This study will provide unprecedented and very important data on colony health within stationary apiaries across the U.S.

In April and May 2009 we established 30 colonies in each of seven apiaries located in Washington, California, Texas, Florida, Maine, Pennsylvania, and Minnesota. The apiary sites were situated in a variety of urban, suburban and rural landscapes including areas surrounded by agricultural fields, organic farms, wooded areas and nature reserves. The cooperating researchers in each state are: Steve Sheppard, Washington State Univ.; Kirk Visscher, Univ. California-Riverside; Kate Aronstein, USDA-ARS Weslaco; Jamie Ellis, Univ. Florida; Frank Drummond, Univ. Maine; Nancy Ostiguy, Penn State Univ.; and Marla Spivak, Univ. Minnesota. Brian Eitzer from the CT Ag. Exp. Stn. is in charge of analyzing pesticide exposure from pollen samples collected by the honey bees in each of the states. Anne Averill from Univ. Massachusetts is studying the health of bumblebees that are nesting naturally in the area surrounding the apiaries.

Figure 1. The stationary apiary located at Carver Nature Reserve in Minnesota at the end of July 2009 during our monthly data collecting trip. Variation in colony strength is evident, but most colonies were strong and apparently healthy by the end of summer. The colony in two-deep brood chambers, next to the large colony with supers, is one of five randomly chosen colonies in the apiary fitted with a pollen trap so we could sample pesticide residues in incoming pollen.

Each of us purchased package bees from our closest or region-specific distributor: the WA, CA and MN packages came from two suppliers in CA; the FL, ME, and PA packages came from two suppliers in GA; and the TX packages came from TX. This was done for two reasons. First, it is not possible to have packages shipped from a single supplier to all of the seven states involved in this study. Second, we wanted to know the initial disease and mite levels in packages bees from different sources. The 210 colonies were hived in new wood boxes, and we used new wax-coated plastic foundation purchased from Pierco® Beekeeping Equipment. In May we replaced the queens in each of the packages with queens of Italian descent purchased from a single opera-

tion in northern CA (C. F. Koehnen and Sons, Inc.) to establish relatively uniform genetics among the colonies. We are not treating any of the experimental colonies for diseases or mites. Each of us are using management practices typical to our different climate and resource conditions. We initially fed the packages sugar syrup and pollen substitute (MegaBee®) as needed, and later provided supplementary syrup to some colonies in fall to bring them up to weight for winter, but otherwise all colonies have been left to develop on their own. Beginning when the packages were hived and continuing throughout the duration of the bee season in each state, we have been collecting an enormous amount of data from each colony every month. We will follow the colonies until they die, which unfortunately may not take too long. In 2011, we will start up again with a new set of 210 colonies, and will use one or more different queen sources.

As an example of what is involved in this experiment, I describe one of the monthly data collection trips to our stationary apiary in Minnesota on July 28. Each of us in the seven locations conducted similar collection trips once a month starting in April or May. Most of our colonies by that time had grown to occupy three deep brood chambers. In addition, some of the colonies were provided honey supers as needed (**Figure 1**). The collection trip began the day before when Mike Goblirsch, one of my students who took primary responsibility for this project, prepared and labeled 150 collection vials, copied data sheets and assembled all other necessary equipment. We met at 8:00am, loaded our gear into the University truck, stopped to put dry ice in three different coolers and drove 45 miles to our site located at the Carver Nature Reserve, west of the Twin Cities. This is traditionally a great location for honey production and we thought would give our colonies the best possible resource conditions.

When we arrived on site, Mike reviewed the protocol with us (**Figure 2**): 1) Collect a sample of 40 foragers returning to the colony to test for *Nosema* load and species (*Nosema ceranae* or *N. apis*) and put the vials immediately on dry ice; 2) Collect samples of 40 foragers, 40 nurse bees and 20 drones to test for viruses and place these vials in separate coolers of dry ice; 3) Collect a sample of 50 bees from the inner cover into a vial of alcohol to sample for tracheal mites; 4) Collect 300 bees to sample *Varroa* using the powdered sugar method to dislodge and count the mites (at least we could return these bees to each colony); 5) Determine presence or absence of small hive beetles; 6) Record observed disease symptoms in colony; 7) Estimate the number of adult bees on every frame in every box and the amount of sealed brood on each frame using a standard procedure; 8) Check for the presence of the marked queen, and mark any new queens resulting from supersedure; and 9) Collect pollen from the traps placed on 5 of the 30 colonies to analyze for pesticide residues.

We worked in pairs; one person conducted the adult bee and brood area estimates, while the other took samples and recorded data. We worked slowly and methodically, taking extra care not to damage the queens. By 4:00pm we were hot, sticky and giddy. I won't tell you about the stupid songs we started singing, including one about 99 bottles of beer on the wall, and another about finding a peanut.

Preliminary findings from this large-scale experiment were presented at the American Bee Research Conference, held in conjunction with the American Beekeeping Federation meeting in Orlando, FL, January 14-15. While much of the data are still being analyzed, some interesting information is emerging from the data at hand.

Figure 2. Mike Goblirsch, graduate student in charge of organizing the data collection trips, reviewing the sample collection procedure at the start of a long day. Clockwise, starting from the far left: Mike Goblirsch, Gary Reuter, Encarna Garrido (visiting from Spain), Katie Lee and Betsy Ranum.

Package bees:

The prevalence of parasites, pests and pathogens varied widely among the original bees that came in the packages. Although the package bees were replaced with workers from the new queens by June, it is im-

Site	n	Varroa mites (mites /100 bees)	Tracheal mites (% bees infested)	Small Hive Beetle (presence / absence)	*Nosema ceranae* (spores in miiiions / bee)	Virus prevalence (positive sampies)			
						BQCV	DWV	IAPV	SBV
MN	32	0	0.2 ± 0.9	No	3.4 ± 2.3	87%	56%	2%	16%
WA	30	0.1 ± 0.2	0.3 ± 1.1	No	1.5 ±1.0	58%	61%	7%	77%
TX	30	2.8 ± 6.0	0	No	0.03 ± 0.06	24%	96%	0	0
FL	30	1.5 ±1.2	1.7 ± 3.1	No	0.9 ± 2.4	20%	83%	0	20%
PA	30	NA	0.5 ± 1.6	No	0.03 ± 0.07	67%	74%	1%	10%
ME	30	0.5 ±1.9	0	No	0.4 ± 0.5	29%	55%	0	22%

Table 1. Initial measures (May 2009) of parasites, pests and pathogens from package bees used to initiate colonies for the Stationary Apiary Project. The packages in MN and WA were purchased from two locations in CA. Packages in TX were purchased from TX, and those in FL, PA and ME were purchased from two locations in GA. Data are not yet included from the apiary in CA. NA refers to data not yet available.

portant to know the health status of the bees that were hived at the beginning of the experiment.

For the most part, the bees in the packages had low or no detectable *Varroa* and tracheal mites, except for those from TX that had relatively high levels of *Varroa* (**Table 1**). All samples were positive for *N. ceranae* and negative for *N. apis*. The *Nosema* levels varied greatly among packages, being highest in MN and non-detectable in TX and PA. All samples tested positive for at least 3 viruses: Black Queen Cell Virus (BQCV), Deformed Wing Virus (DWV) and Sacbrood virus (SBV), while Israeli Acute Paralysis Virus (IAPV) was detected in only a few bees in some locations.

Colony Growth:

Colony populations of adult bees and brood increased at different rates in each state (**Figure 3**). The colonies in MN became the most populous by July with an average of 22,000 bees and 10,000 cells of sealed worker brood. Population growth of colonies in ME was probably hindered by cold, wet weather conditions, and in TX by very hot and dry weather. We will be factoring landscape and climate conditions into our analysis when we analyze all the data together.

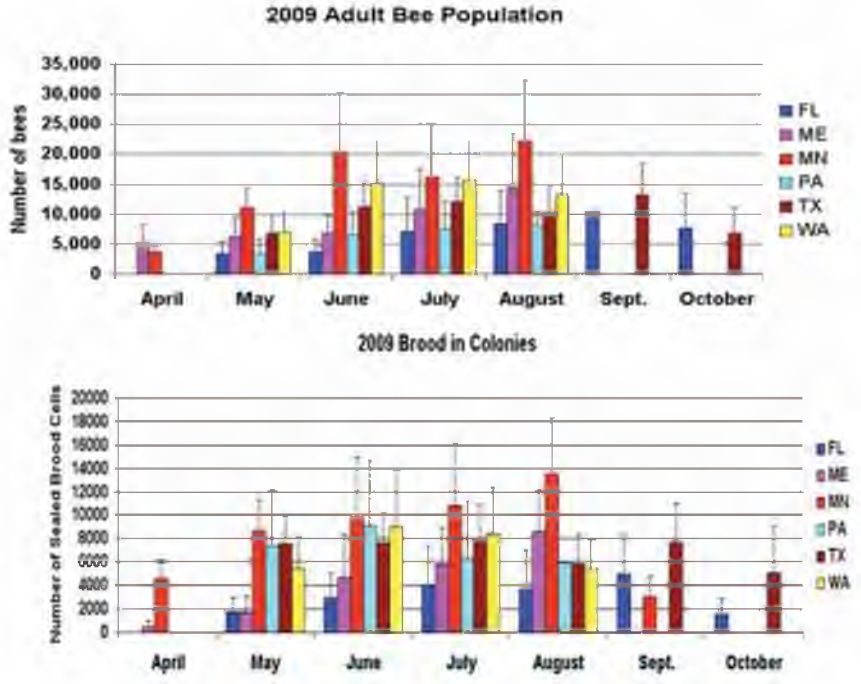

Figure 3. Monthly averages of adult bees (top graph) and sealed brood (bottom graph) in the colonies in six of the seven stationary apiary locations. Each apiary was initiated with 30 colonies in spring. When all the data is compiled, we will relate colony strength to the various pest, pathogen and pesticide levels that were measured throughout the testing period. We are using this comparative approach to determine if specific causes for colony losses can be found and to evaluate the possible regional differences in the pressures that honey bee face.

Pesticides:

Pollen was sampled with traps one day per week from five hives in each of the stationary apiaries. Initially samples were combined to generate a monthly composite sample for each apiary. Brian Eitzer in CT used a technique known as QuEChERS (for Quick, Easy, Cheap, Effective, Rugged and Safe) to analyze the samples using high performance liquid chromatography/mass spectrometry. This technique allows over 140 different pesticides to be analyzed in the parts per billion (ppb) concentration range.

To date 29 of the monthly composite samples have been analyzed. Within these 29 samples, residues of 32 different pesticides or pesticide metabolites have been observed including: 14 insecticides plus one insecticide metabolite, 9 fungicides and 8 herbicides. The average composite pollen sample had an average of 4.1 pesticide residues detected. The concentration of residues when detected was mostly in the low PPB range (1< to 30 ppb), but some residues were substantially higher.

The results indicate that honey bees at the stationary apiaries are being exposed to varying amounts of pesticides within and across locations. This variability of pesticide exposure will be further examined as we continue to monitor these hives over the next several years.

Queen Supersedures:

Throughout the summer, there were a number of colonies that superseded the queens. In MN, 16 of the 30 colonies replaced their queens, 8 of them twice. In PA, 12 colonies superseded queens, in Maine there were 7 colonies that superseded, 2 of them twice, and in both TX and FL, 6 colonies superseded queens. The high number of queen replacements did not appear to affect the development of the colonies in MN; they still became quite populous. Bee-

Site	n	Superseded colonies	Varroa mites (Sept- Nov) (mites /100 bees)	Tracheal mites (Aug) (% bees infested)	Small Hive Beetle (presence / absence)	*Nosema ceranae* (Aug) (spores in millions / bee)
MN	29	16	2.5 ± 3.4	0.2 ± 0.9	No	0.02 ± 0.5
WA	29	NA	0.5 ± 0.7	0.5 ± 2.1	No	0.03 ± 0.1
TX	14	12	17.9 ±15.7	4.1 ± 5.5	Yes	0
FL	23	6	7.1 ± 6.6	2.6 ± 3.8	Yes	0.2 ± 0.7
PA	18	6	NA	1.5 ± 2.4	No	0.25 ± 0.24
ME	20	7	0.9 ± 2.3	0.6 ± 2.2	No	0.26 ± 0.43

Table 2. Late season measures (Sept-Nov 2009) of parasites, pests, and pathogens from the remaining colonies in the Stationary Apiary Project. Data are not yet included from the apiary in CA and on virus prevalence. NA refers to data not yet available.

keepers have been claiming that many queens are superseded. Our findings show that queen replacement is something that deserves more research attention.

Status of native bumble bees?

Anne Averill will be monitoring native bee populations that forage near the stationary apiaries for known pathogens of both honey bees and bumble bees. It has previously been shown that honey bee viruses, as well as *Nosema ceranae,* can infect bumble bees. We will be able to compare pathogen presence and/or titer data with similar data collected from the stationary honey bee hives at each of the apiaries. In addition, pollen collected from the bumble bees sampled will be analyzed by Brian Eitzer to determine if bumble bees and honey bees are being exposed to the same pesticide composition.

End of the First Summer:

By the end of the summer, TX and FL had the highest levels of *Varroa,* and were the only states with small hive beetles (**Table 2).** The tracheal mite levels in the Maine colonies, which were subject to the coldest and wettest weather conditions, were quite high (27%) in July, but dropped to very low levels by August. The levels of *Nosema* dropped to low levels in all locations, and only *N. ceranae* was detected throughout the season. The virus data is being analyzed, but early results show high virus prevalence in all locations analyzed. The apiaries in TX and PA suffered the largest number of colony deaths, with 14 and 18 colonies left of the original 30, respectively. We will be collecting data on the remaining colonies through 2010, or as long as they survive.

What can we conclude?

What was the cause of death of the colonies that were lost? Once our medical records are compiled for this first experimental set-up, we expect to be able to relate colony health (or lack thereof) to the various pest, pathogen and pesticide levels that were measured throughout the testing period. In addition, information about weather and available nutrition will be included. We plan to use this comparative approach to try and determine if specific causes for colony losses can be found and to evaluate the possible regional differences in the pressures that honey bees face. In 2011, we will start the entire experiment up again with a new batch of 210 colonies and new queen sources.

For now, watching the experiment unfold and documenting the variation in the strength and health among colonies in different climatic zones is fascinating in and of itself. It has given me a renewed appreciation for the diversity (or lack of diversity) in the landscapes that our bees experience across the U.S. It has stimulated me to think more about regionally adapted bee stocks. Mostly, the pathogens, parasites and pesticides our bees face on a daily basis gives me pause for thought, and concerns me greatly.

The acronym CAP stands for Coordinated Agricultural Project. This research project is a good example of how multi-institutional funding is realized. In addition to learning about the factors that contribute to colony loss in stationary apiaries, we are learning how to better coordinate our efforts across research institutions. Our goal is to facilitate bee health, best management practices, and productive research collaborations. This is truly a win-win effort.

A Scientific Note on the Occurrence of the Small Hive Beetle (*Aethina tumida* Murray) in Southern Quebec

by PIERRE GIOVENAZZO[1] and CLAUDE BOUCHER[2]

In a recent editorial, Neumann and Ellis (Neumann and Ellis 2008) describe the most recent findings regarding the dispersion and presence of the small hive beetle (SHB) *Aethina tumida* around the world. These authors indicate that from the initial SHB endemic African range and its first observation in Florida State in 1998, the SHB has rapidly spread to other areas in the USA and is now present in most beekeeping countries. This rapid dispersal is thought to be a consequence of beekeeper-assisted movement of beetle infested colonies, package bees and beekeeping equipment. SHB has been found in Canada occasionally since 2002, but has not been acknowledged as a permanent invasive species (Manitoba provincial Apiarist, Réal Lafrénière personal communication; Alberta provincial Apiarist, Medhat Nasr personal communication). In this scientific note we report the recent finding of SHB in a southern region of the province of Québec (Canada) and present results from our SHB 2009 survey in this region.

In September 2008, Quebec provincial bee inspectors (Ministère de l'agriculture, des pêcheries et de l'alimentation du Québec) found SHB-infested hives in a region located near the Canada-USA border (Figure 1). The initial survey found 6 different infested bee yards in this isolated region and observed different stages of the SHB life cycle (eggs, larvae and adults) in one of the bee yards. Genomic analysis of SHB sampled on invasion sites has identified USA haplotype (Boucher 2009). This information suggested a northern expansion of SHB populations from the USA. The provincial animal health division was concerned about the northern expansion of this new honey bee colony scavenger and asked our bee research team (Centre de recherche en sciences animales de Deschambault, CRSAD) to investigate this problem. The aim of our work for 2009 was to survey and monitor this SHB invasion.

During the month of May 2009, the CRSAD bee research team checked all existing Quebec hives in a 20 km radius surrounding SHB positive bee yards identified in fall of 2008 (Figure 1). Over 250 colonies were examined for the presence of the SHB by visual inspection of each hive as described by Neumann and Hoffmann (Neumann and Hoffmann 2008). In all the hives inspected (including the ones from the infected bee yards in September 2008) we did not find any SHB. This absence suggested that SHB did not survive wintering. But we suspected that the number of surviving wintering beetles was probably very low and that they could be difficult to detect by a visual inspection.

At the beginning of July 2009, the CRSAD team placed 40 sentinel hives in seven different sites along the Canada-USA border from the city of Dundee to Franklin (Figure 2). The sentinel hives were made from 2 frames of brood and bees plus one honey-filled frame placed in a standard Langstroth hive. A trapping device using a piece (15 x 15cm) of corrugated Coroplast™ (5mm openings) was installed on the bottom board of each hive according to Elzen (Elzen, Baxter et al. 1999). At each sentinel site, bucket traps were placed in a way that was similar to those used by Elzen (Elzen et al 2000) and Arbogast (Arbogast, Torto et al. 2009). The bucket traps were baited with a mixture of 20 grams of pollen and honey. Sentinel sites were visited at three week intervals until November 2009. During each visit, each hive was thoroughly inspected as previously described and trapping devices were checked for the presence of SHB.

The first adult beetles were found in two of the sentinel bee yards closest to the USA border (from one to three beetles per infected hive, Table 1). Beetles were found

	July 20th	Aug. 19th	Sept. 8th	Oct. 9th	Nov. 2nd
Site 1 Amhurst (8 hives)	0	9 (in 5 hives)	10 (in 6 hives)	6 (in 5 hives)	2 (in 2 hives)
Site 2 Andrew (4 hives)	0	5 (in 4 hives)	6 (in 4 hives)	10 (in 3 hives)	3 (in 2 hives)
Site 3 Leblanc (8 hives)	0	0	0	0	0
Site 4 Ruby (4 hives)	0	0	0	0	0
Site 5 Pilon (8 hives)	0	0	0	3 (in 1 hive)	
Site 6 Lussier (4 hives)	0	0	0	0	0
Site 7 Fortin (4 hives)	0	0	0	0	0

Table 1. Adult Small hive beetle numbers found during the 2009 inspections in the different sentinel sites along the Canada-USA border. The location of each site is shown in figures 1 and 2.

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Figure 1. Location map of the first small hive beetle hives that were found in September 2008 in southern Québec (Canada). The map also shows the location of the surveyed bee yards/hives during spring 2009.

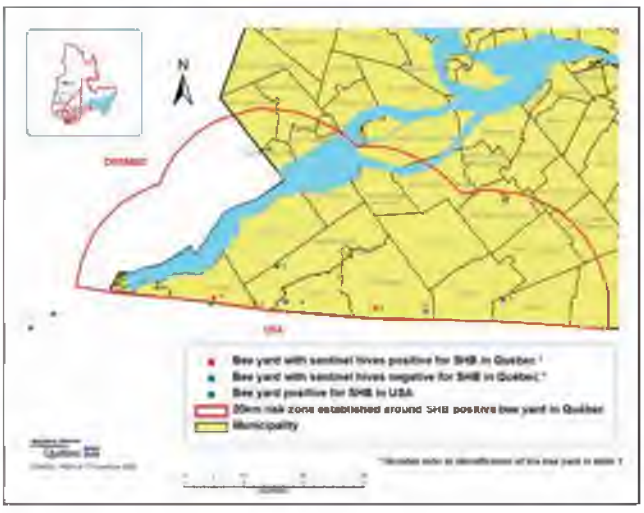

Figure 2. Location map of the 7 bee yards with the sentinel hives in 2009. This map also shows the location of the USA hives infested by small hive beetles (dark green squares located in the lower right side of this map).

running on the bottom board, on the frames and hidden in the corrugated Coroplast™ traps. From then on, adult SHB were repeatedly found in these two sentinel yards, but their numbers remained low. Adult SHB were found in a third sentinel site during the November survey. We did not find any sign of reproduction (no eggs and no larvae) in the infected sentinel hives during the 2009 survey period. No beetles were found in the bucket traps.

During the July and August surveys, we also visited some USA bee yards near the USA-Canada border and visually inspected hives present there (Figure 2). On these occasions, we found SHB infestation in all of the USA bee yards visited. The owner of these hives, who we thanked for his cooperation, informed us that they were brought there from the states of Florida and Virginia at the beginning of July by two USA beekeepers (David Hackenburg, personnal communication). All life stages of the SHB were found in these USA bee yards with the highest infestations detected in abandoned hive boxes and weak hives. One of these SHB-infected USA bee yards was about 1 km from our sentinel sites 1 and 2, through a deforested power line zone crossing the Canada-USA border.

We propose that the beetles are brought near the Canada border from the USA southern regions via transportation of beetle-infested colonies. USA beekeepers transport hives used for fruit pollination in the southern American states and move them to the northern states for summer colony build up, colony splitting and honey production. In doing so, they contribute to the northern dispersal of SHB. These hives are again transported in October and November and moved back down south for a new pollination season. In the southern USA states the SHB can reproduce and their populations increase. This beekeeper-assisted movement of SHB infested colonies in June/July causes infestation of Canadian hives near the border. Recent work by Spiewok (Spiewok, Pettis et al. 2007; Spiewok, Duncan et al. 2008) showed that dispersal of SHB between apiaries is possible and is dependent of apiary density and SHB population levels. Our observations of the USA hives showed that SHB populations were thriving only 1 km away from our sentinel hives and their migration was facilitated by a deforested power line corridor.

We do not know yet if SHB are able to complete their life cycle in a colder environment and if or how they will overwinter in our regions within bee clusters. Adult SHB have been reported in winter clusters of overwintering bees (Evans, Pettis et al. 2000; Hood 2000; Pettis and Shimanuki 2000). This information suggests that surviving winter SHB could eventually be present in our infested hives. A recent study measured high levels (83%) of overwintering SHB adult mortality in Maryland, USA (Peter Neumann, personal communication). This low winter survival rate could explain why they did not turn up in our 2009 spring survey and might suggest that they will not be able to establish a permanent population as seen in two other Canadian provinces (Alberta and Manitoba).

We will continue to study and monitor this SHB occurrence in the southern Quebec and our research goals for 2010-2011 are to verify their wintering capacity and to check if they can achieve their complete life cycle during our beekeeping season.

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The History of Beekeeping in Alaska

Part 2 of 2

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Introduction

Last month we met Father Methodius, Alaska's first beekeeper; examined the controversy over whether bees were brought to Alaska by the Russians in 1809 and subsequently introduced to California (there is no evidence to suggest this); and how bees were first introduced to Alaska's Interior in 1913.

This month we pick up the story in the 1920's, follow through with the Depression era settlers in the Mat-Su Valley, see how air transportation revolutionized bee shipments and look at the present day distribution of honey bees in Alaska.

Later Introductions – the Buzzing 1920's

The 1920's appear be a beehive of apicultural attempts; many saw success for a couple of seasons, but then faded away. A number of years ago I spoke with a pioneer Alaskan, Alaska Linck, who told a story of sitting in the kitchen of Rika Wallen's Roadhouse (then named McCarty's Roadhouse) built at the junction of the Delta and Tanana Rivers. It was constructed in 1914, run for awhile by pioneer trader John Hajdukovich, and turned over to Rika Wallen in 1918 (Ferguson 2002). Rika was a Swedish immigrant who managed to produce vegetables, 20 tons of hay and keep bees all while running the roadhouse that catered to travelers on the Valdez-Fairbanks wagon trail (360 miles). Ms. Linck related to me how in April, the bees that had overwintered in the root cellar, would be flying up into the kitchen anxious to begin their summer activities (Linck 1993).

Bees were introduced to Haines (at the northern end of the inside passage, see map) with one colony arriving in 1924 and kept continuously until sometime later than 1930 (Alberts 1930). The Haines beekeeper, Thomas Dixon Paige (or *Page*); "Devil" was his self-appointed nickname (Livingston 1978), had four colonies in the fall of 1927, only one of which survived the following winter. The loss was ascribed to dampness, since the bees were kept in an open shed and had plentiful stores. In the fall of 1929, "Devil Paige" had five colonies, three of which survived the following winter. Three new swarms emerged during the summer of 1930 and two colonies died. Yields of honey averaged 50 pounds per colony; this was about one-fourth the amount usually obtained (USDA 1930). In other reports (Livingston 1978) Paige purportedly shared beekeeping with strawberry grower Charlie Anway, who grew teacup-sized strawberries and produced enough honey to sell. Another Haines resident, Emma Smith, says Page didn't get enough honey to make it pay (Livingston 1978).

In Wrangell, one colony of bees was brought in by F. A. Cooper to cross-pollinate fruit trees in the spring of 1929. The beekeeper reported that the colony produced 210 pounds of honey and one swarm during the summer of 1929 (Alberts 1930). As beekeepers know, a single colony producing a swarm greatly reduces genetic viability as the only drones around to mate with emerging queens are the sons of the queen of the original hive. Wrangell is another Southeast Alaska fishing town famous for rainy weather – 210 pounds of honey seems almost like a fish story.

In 1924 a farmer living three miles south of Anchorage, J. N. McCain (Alberts 1930 & Horn 2005), bought a colony of bees in the spring of 1924, but lost them the following winter. They were wintered out-of-doors, but the entrance was closed accidentally and the bees were found to be

McCarty's Roadhouse (later known as Rika's Roadhouse) circa 1922; built at the junction of the Tanana and Delta Rivers, the roadhouse served travelers along the Valdez-Fairbanks trail. Rika, a Swedish immigrant, raised bees in the 1920's. Photo courtesy of Guy Cameron Collection, accession # 72-38-445, Alaska and Polar Regions Archives, Rasmuson Library, University of Fairbanks [1].

dead in the spring of 1925.

In the spring of 1925 he bought two more colonies, both of which swarmed during the summer. During the winter of '25-'26 he overwintered an unspecified number of colonies in an unheated log building. Dampness in the building caused the death of some of the colonies.

In the spring of 1926 McCain had four colonies; during the winter of '26-'27 two colonies were wintered out-of-doors and the rest in a log building. Half of the colonies died in each spot, leaving a total of seven colonies active in the spring of 1927 (*confusing math in original reports - author*). The following summer one of the latter died, and the others did not swarm; of the six that went into winter ('27-'28) only two were alive in the spring of 1928. None survived the following winter. The hives that were wintered in the open were enveloped in 4" of sawdust probably very much along the methods described by Jim Tew in his series on overwintering honey bee colonies (Tew 2009).

The Mat-Su Colonists – 1935

The Matanuska and Susitna Valley (Mat-Su) near Anchorage was opened for homesteading in 1935 by President Franklin Delano Roosevelt as part of the New Deal. Two-hundred and three farming families from one of the Great Depressions' hardest hit areas (Minnesota, Wisconsin and Michigan) were offered a fresh start, drawing 40 acre homestead parcels by lottery upon which to build a new life.

Life was not easy for the colonists, but among them were a few beekeepers. The USDA Agriculture Experimental Station in Palmer kept bees as part of their research activities; they brought in two 3-pound package bees and two 3-frame nucs from J.E. Wing of Cottonwood, California. Fed from an inverted container of sugar syrup, they were in transit for 10 days and arrived in excellent condition (Alberts 1930). The USDA Experimental Station overwintered the colonies in a "cool, dry basement", and no serious losses were experienced. Several photos of Mat-Su beekeeping activities in the early 30's exist in the archives of the Rasmusen Library in Fairbanks.

Today the Mat-Su area is home to a number of beekeepers (Hicks 2009) and the South-central Alaska Beekeepers Association (SABA), which is the most active association in the State; they normally maintain a strong presence at the Alaska State Fair in Palmer.

WWII and Shipments by Air – 1940's

Stewart West, writing in 1947 (West 1947), describes a Fairbanks lawyer, Mr. J.G. Rivers, keeping up to five colonies of bees for about 9 years, killing them in the fall and replacing them with package bees in the spring. Mr. Rivers managed his bees in a single brood box with a queen excluder and shallow supers for the honey crop that averaged about 50 pounds per season per hive. Before the war he had his packages shipped by rail and boat express which required from one to two weeks for delivery. For the first two years of World War II, transportation was so uncertain that he bought no bees. Since that time package bees have been coming into Fairbanks by air express usually in a matter of days.

Today shipping bees by airfreight is always a hand-wringing, knuckle-biting gamble. It is not unusual for the air transport company to kill a whole load; sometimes hundreds of packages. "*The bees are fine-they are all resting in the bottom of the cages; we wrapped them in shrink wrap because we thought they might get out and sting the dog in the hold; we put them in a container* (sealed) *because we thought they might get cold*" are just a few of the airlines' statements I've heard as the bees arrive dead on arrival.

Modern Day Distribution

The main areas of Alaskan apiculture at present time (2009) are the Interior, the Mat-Su area, and the Kenai Peninsula. Bees have been kept in remote areas (Fort Yukon (Petersen 1990), Ambler (Hess 1982) and Wiseman (Schoppenhorst 2009) - all north of the Arctic Circle) and in marginal areas such as Nome and Goodnews Bay (Livingston 1991). The cool damp climate of Southeast Alaska is no different now than it was 100 years ago, yet contemporary attempts have been made at keeping bees in Juneau, Haines, Wrangell, Gustavus, and Metlakatla that I am familiar with.

There appears to be an upwelling of interest in hobby beekeeping; perhaps it's the Alaskan "I-can-do-it-myself" attitude or just paralleling the interest that is blooming elsewhere. I estimate about 200 beekeepers manage 700-750 hives here in the Interior with the largest operation (240 colonies) belonging to Don Winston of Delta Junction.

Statewide there are no exact numbers—only estimates; perhaps 800-1,000 beekeepers manage 1500 to 2000 colonies. Weather is a constant battle (Hicks 2009), but the vast areas of wild forage can produce wonderfully pure wildflower honey. Alaska produces some of the "purest fireweed honey I've ever seen" according to Dr. Vaughn M. Bryant, a melissopalynologist (expert on the pollens found in honey) at Texas A&M University. It commands a premium price on the local market. Unfortunately, not enough is produced to meet the potential demand.

With the advent of airfreight, it became easier to route package bees from California (the main supplier) to the transportation hubs of Anchorage and Fairbanks, as well as some of Alaska's smaller villages. Several village beekeeping projects got off to an impressive start, but after a few years dwindled or even disappeared due to lack of interest, a loss of subsidies, or poor returns, e.g. Ambler and Fort Yukon.

John Bohme (since deceased) of Homer on the Kenai Peninsula kept bees beginning in 1947 and holds the Alaska record for honey produced, albeit from a two-queen colony. He had two double-brood chambers shoved tightly together – in the center of this he stacked his 14 honey supers producing 332 pounds of honey. Homer resident Ray Hodge was an entrepreneurial force in beekeeping, keeping as many as 120 colonies (1984-1990) and selling honey through his

Above left, beehives at USDA Experimental Farm, Matanuska Station circa 1936 [2]; above right - "Lloyd Bell and his bees" circa 1930 Matanuska Valley [3]. Photos courtesy USDA Agriculture Experimental Station Collection.

John Bohme's record hive that produced 332 pounds of honey in 1962. Photo courtesy of University of Alaska, School of Natural Resources, Agroborealis magazine [4].

Map showing the location of current beekeeping activity (or attempts) in Alaska.

health food store- "Homer Natural Foods" until the Exxon Valdez oil spill of 1989. He subsequently managed colonies in the Point McKenzie area and Homer, then moved to Fairbanks for a few more years of beekeeping.

In 1981 the Mauneluk Native Association funded the purchase of bees and equipment for 12 hives in the Inupiat (Eskimo) village of Ambler located some 50 miles above the Arctic Circle. Bees arrived by air on May 15th (temperature 15°F), were successfully hived and produced an average of 18 pounds per colony which was distributed among any of the 240 residents who wanted it (MacManus 1982). Bees were ordered for a couple more seasons, one attempt was made at overwintering, but the project faded away.

Scott Schoppenhorst and his wife, Heidi, have the distinction of being North America's farthest north beekeepers (Latitude 67.43°N – about 190 miles north of Fairbanks). Living in the village of Wiseman (population 18-20), they have four colonies of bees. Heidi, who grew up there, recounts her father, Rick Reakoff, having bees in the early 1970's. In a 1974 article Rick Reakoff tells of installing Italian package bees on May 15th, shipped all the way from Georgia (Reakoff 1974). Talk about culture shock! Scott and Heidi sell their honey at truck/gift shops along the Dalton Highway – Alaska's road to the Arctic Ocean.

Hal Livingston, an institution in Interior beekeeping, has kept bees continuously in Fairbanks since 1961. He recalls that the year after the big flood of 1967 was one of his most productive years - his yields have ranged from 19 to 128 pounds per colony. He has managed up to 90 colonies in one season. Dave Tozier of Hives and Honey in North Pole was an equipment dealer, bee supplier and writer here in the Interior, but has since sold the business and retired from bees for health reasons.

In theory there are four local associations (Interior, Kenai, Southcentral, and Cook Inlet) plus a Statewide association, all of which vary in their levels of activities. SABA (Southcentral Alaska Beekeepers Association) is the most active. The Interior, Cook Inlet, and State associations have lapsed and the Kenai has reorganized. The most important accomplishment of the Alaskan beekeeping associations was the drafting and implementation of the State statutes in the early 1980's regarding beekeeping. In brief, bees entering the State must be certified free of disease, no used equipment to be brought in, no bees on comb, and the law deals with treatment when diseases such as AFB and EFB are discovered. The full text of the law can be accessed on the web at http://www.legis.state.ak.us/cgi-bin/folioisa.dll/aac, click on Title 11 - (Natural Resources); click #4 - (Agriculture 11AAC32-11AAC39), and on #35, Bees and Beneficial Insects.

Conclusion

Writing these articles was a labor of love- a project that has been going on in fits and starts for the last 20 years. My goal is to set the historical record as straight as possible. I welcome any and all *documented* evidence that may challenge my assertion that 1900 was the date of the first introduction of honey bees to Alaska. *Ego apis ergo sum*.

Acknowledgements

I am indebted primarily to Jo Papp whose notation of early beekeeping in Fairbanks (Papp 2007) inspired me to collect my notes that had accumulated for over 20 years and write; to the staff at the various Alaskan Historical Archives locations; to my nephew, Micah Todd, who personally accessed the Hewitt Apicultural Collection at Yukon College in Connecticut to make some copies for me; and especially to Hal Livingston, a beekeeper of some 50 years experience here in Fairbanks for great stories, access to past issues of bee journals and for sharing some of his personal archives. Thanks to Ashley Kircher of the Sitka Historical Museum for her efforts in tracking down historical photographs; Deirdre Helfferich of the School of Natural Resources and Sciences for the photo of John Bohme; Rosemary Carleton of the Sheldon Jackson Museum for information on the Rev. Sheldon Jackson; William DeArmond of Sitka for accessing and transcribing a bee news item from the *Sitka Alaskan*; and to the very helpful Sandy Johnston and the staff at the Alaska State Library Historical Collections department.

Photo Credits (Part 2 of 2)

(1). "*McCarty's Roadhouse, circa 1922*" Photo courtesy Guy Cameron Collection, Accession number 72-38-445, Alaska & Polar Region Archives, Rasmuson Library, University of Alaska, Fairbanks.

(2)."*Beehives at Matanuska*", Photo courtesy USDA Agriculture Experimental Station Collection, accession number 1964-4-587, Album #5, Alaska & Polar Region Archives, Rasmuson Library, University of Alaska, Fairbanks.

(3)."*Lloyd Bell and his Bees",* Photo courtesy USDA Agriculture Experimental Station Collection, accession number 1964-4-581, Album #5, Alaska & Polar Region Archives, Rasmuson Library, University of Alaska, Fairbanks.

(4)."*John Bohme and his record hive*", Photo courtesy of Alaska Agriculture & Forestry Station, School of Natural Resources, *Agroborealis*, May 1974, pp. 23, a University of Alaska Fairbanks publication.

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SOME MORE MEMBERS OF THE ASTERACEAE

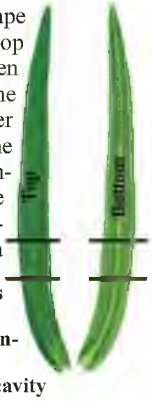
Often Mentioned in the Beekeeping Literature

Pearly-everlasting, western pearly everlasting, everlasting, life everlasting, straw-flower, moonshine, ladies' tobacco, silver-button, immortelle, anaphalide nacrée

Scientific name: *Anaphalis margaritacea*

Synonyms: *Anaphalis occidentalis*, *Gnaphalium margaritaceum*

Origin: The species is native to at least North America, but two references[6 & 16] indicate that Asia, probably northeastern Asia, is also part of the origin. Notice that its current distribution includes Alaska, suggesting that this probably is correct.



Plant description: *Anaphalis margaritacea* is a rhizomatous[1] perennial that grows to heights of 12 to 36 inches. The pointy 1.2 to 4 inch long, stemless (sessile) leaves range from long and narrow with nearly parallel sides (linear) to less frequently a more spearhead shape (lanceolate). They frequently are greenish on their top surface and white and wooly (tomentose) beneath when young, often turning a rusty color with age. Both the whole leaf and higher resolution photos of the upper and lower surfaces are shown in the page margin. The two parallel black lines running through the leaves indicate the location of the high-resolution pictures. The species for the most part has its male and female flowers on different plants (dioecious) or there may be a few male flowers centrally located in a clump of female flowers. The involucre[2] is about a quarter of an inch in diameter and the phyllaries are pearly white. You might at first mistakenly think the phyllaries as petals. For a better understanding of the structure of a flower in the Asteraceae see this column August 2005. The fruits are 0.5 to 1 mm achenes.[3] The species is quite variable and the above is only a very general description. [4, 6, &16]

***Anaphalis margaritacea* flowers. Notice the white petal-like structures, which are really the bracts (phyllaries) of the involucre. The yellow central parts within the involucre are the many florets, These are almost totally or totally female flowers. Plants were grown for this column—date and locality data are of no significance. Seed from J. L. Hudson, Seedsman, P. O. Box 337, La Honda California, 94020. (www.JLHudsonSeeds.net).**

Distribution: Harvey Lovell[7] describes the general habitat of the species as "dry places, especially after a fire". Burgett et al.[2] report that it is abundant in burned-over areas in western Oregon.

[1] **Rhizome: an underground stem from which new plants can develop.**
[2] **Involucre: A whorl of leaf-like structures (phyllaries) underneath a flower.**
[3] **Achene: A dry fruit with no means of opening, a single cavity containing a single seed, which is attached to the outer wall at a single point; as in a sunflower seed.**

Gleason and Cronquist[4], covering the northeastern US and contiguous parts of Canada, state that while the species can be found in various habitats, it is most often found in dry and open places. Stebbins[16] writing about California plants states that it is found at altitudes under 3200 meters (ca. 11500 ft) in "woods, roadsides and disturbed places".

Blooming period: Pellett says that the species provides nectar as the fireweed (*Chamerion angustifolium*[4]) flow comes to an end. Burgett et al.[2], writing about the situation in Oregon, state that it blooms with fireweed, and as fireweed production diminishes, the bees frequently work pearly everlasting.

Importance as a honey plant: Ayers and Harman[1] from their questionnaires found the species to be of at least some importance in British Columbia. Pellett[13] reports that the species is an important source of honey in some localities on the West Coast. Lovell[7] states that beekeepers who place their bees in fireweed locations often obtain a surplus from pearly everlasting if the fireweed fails. Burgett et al.[2] report that there are conflicting reports about whether the species produces a surplus.

Honey potential: Pellett[13], reporting on a 1919 Washington Beekeepers' Convention, says that the species was claimed to average 20 lbs or more of honey per season. On the other hand, some beekeepers in attendance stated that they had never known bees to work the plant. Burgett et al.[2] provide a nectar sugar concentration of 34%.

Honey: Pellett, reporting on the same Washington Beekeepers' Convention, states that the honey was described as amber with a strong and bitter flavor and a thin body. Lovell[7] claims that the honey is dark and has only a fair flavor, but is fine for wintering bees.

Pollen: According to Burgett et al.[2] the species provides pollen to bees.

Hawkweed, orange hawkweed, devil's paint brush, king devil, orange-red king-devil, orange paintbrush, missionary weed, red daisy

Scientific name: *Hieracium aurantiacum*

Origin: Europe[6]

Plant description: *Hieracium aurantiacum* is a hairy (hirsute) stoloniferous[5] perennial that grows to heights of 20 inches. Cut surfaces of the plant produce a white milky sap. The up to 8 inch long leaves are located almost entirely in the basal rosette, and range in shape from elongate and widest beyond their midpoint (oblanceolate and obovate) to an elliptical form that tapers to "points" at both ends. Occasionally, smaller leaves are also found higher in the plant. The inflorescence is corymbose[6] and composed of 5 to 25 orange-red "flowers" each with a diameter of about 1 inch. Remember that this is a member of the Asteraceae and each floral unit, which you might think of as a single flower, is actually a cluster of florets and the "petals" (ligules) emanate from the outer circles of florets (see this column August 2005). The involucre[7] bracts are tipped with black stiff hairs. Each floret produces a dark brown achene[8].[4,6 & 14]

***Hieracium aurantiacum* rosette of leaves. These will remain the main leaves of the plant and it is out of them that the flowering stem will arise. The beginning of that stem probably is visible in the center of the leaf cluster. Photo taken in the W.J. Beal Botanical Garden on the Michigan State University Campus in East Lansing, MI on 9/4/09. ©Peter Carrington.**

***Hieracium aurantiacum* in various states of bloom. Notice how there are no leaves on the flower stem. Also notice the flower and seed head. Do you see characteristics that remind you of the common dandelion? Think about why that might be. Photo taken in Haslett, MI on 9/27/09. ©Peter Carrington.**

4 **Readers who notice scientific names, probably know this species under the synonym of *Epilobium angustifolium*.**

5 **Stoloniferous: having stolons, horizontal creeping stems that root at the nodes or tip to produce a new plant.**

6 **Corymbose: a corymb—a flattish to rounded floral head where the lower flower stems are longer than the upper floral stems.**

7 **Involucre: The whorl of leaf-like structures (bracts) surrounding the base of the flowers. (See this column August, 2005).**

8 **Achene: a dry single seeded fruit with no means of opening that is attached to its outer shell at one location (think like a sunflower "seed").**

Distribution: Larsson and Shuel[5], writing about Ontario bee forage, describe the species distribution as being "uplands on deep and alluvial[9] deposits". Gleason and Cronquist[4], writing about the northeastern U. S. and contiguous Canada, describe the plant's distribution as "a weed of fields, roadsides and meadows". Stebbins,[16] writing about California plants, describes the species as an invasive weed of lawns and disturbed places at about 300 m (984 ft).

Blooming period: Larsson and Shuel describe the species as producing both nectar and pollen from May to early June. Gleason and Cronquist provide a blooming date range of June to September.

Importance as a honey plant: Oertel[11], from his questionnaires, found the species to be of at least some importance in NY and ME. Ayers and Harman[1], who did not distinguish species, from their questionnaires found the genus to be of at least some importance in NY. John Lovell[8] states that usually bees do not visit hawkweed "to any great extent, but in Aroostook County, Maine, in some seasons, when there is sufficient moisture and a bright hot sun, it yields well." Pellett[13] says, "Hawkweed is not important as a honey plant, although under favorable conditions it is reported as yielding some nectar." He recounts information supplied by a Maine beekeeper that during hot weather, when the soil is saturated with moisture, it yields well. Apparently, however, this beekeeper experienced these conditions relatively rarely. Pellett also quotes from a 1934 letter from a Merrill, New York beekeeper which stated "Our land is more or less run out[10] so the fields are red with paint brush bloom. Paint brush never fails to yield except in very wet weather. In fact, it seems to do better during hot dry days." Harvey Lovell[7] in his 'Honey Plants Manual' says that bees work the flowers freely in early summer and sometimes store honey from the species. Larsson and Shuel[5] who lump *H. aurantiacum* together with *H. vulgatum* (a synonym of *Hieracium lachenalii,* a yellow *Hieracium*) state, "fair nectar and pollen producers in latter half of May early June". For both attractiveness to bees and nectar production they rate it as a "1", their lowest rating on both scales (4 and 3 point, respectively) indicating "light foraging" and that it is a "fair nectar producer, rarely if ever giving a surplus".

Honey: John Lovell[8] reports the honey to be "light-greenish yellow". Pellett[13] relaying information from the Maine beekeeper cited above, indicates that the honey from hawkweed is a light greenish color and is of only fair quality. From a New York beekeeper he describes the honey as dark amber and of poor quality. Harvey Lovell[7] states that the honey from the species is a light amber with a yellow cast and poor flavor. Larsson and Shuel[5] describe the honey simply as "greenish".

Pollen: According to Larsson and Shuel[6], bees work the species for pollen.

Additional information: The genus *Hieracium* apparently is quite large. Hortus Third[6] states that there may be 700 to 1000 species of *Hieracium* though some of these may reproduce by nonsexual means and, therefore, many do not consider them true species. Hieracium *aurantiacum* reproduces by seeds, stolons and rhizomes[11] and is considered a troublesome weed, especially in eastern North America and the Pacific Coast[6].

Below I present information for three common species within the genus *Ambrosia* that have a wide North American distribution. All are referred to as ragweeds. Each also has one or more other common names, which I have listed here under their respective scientific names. Other parts of the normal format of this column are presented under the subheadings of the three scientific names.

A. trifida

Giant ragweed, greater ragweed, great ragweed, horseweed, blood-weed, buffalo-weed

Ambrosia artemisiifolia:

Annual ragweed, common ragweed, small ragweed, Roman wormwood, hogweed, bitter-weed, herbe à poux, sarriette

A. psilostachya

Western ragweed

Scientific name: *Ambrosia trifida*, *Ambrosia artemisiifolia,* and *Ambrosia psilostachya*

Synonyms: To conserve space, this list of synonyms does not extend to varietal names, neither to what is now accepted nor to past synonyms that include varietal names.

Ambrosia trifida

The USDA Plants Website[17] lists two varieties for the species. The only synonym the website provides (not delving into varietal differences) is:

Ambrosia aptera

***Ambrosia trifida* male flowers. While the inflorescence looks much like that of *A. artemisiifolia* notice that the leaves are quite different. Photo taken In the W. J. Beal Botanical Garden on 8/21/09 in the Economic Weeds, Late Annual Collection.**

[9] **Alluvial deposits: soils deposited by water.**

[10] **Run out: I judge from the context of the Pellett discussion about this species that "run out' indicates that the soil has been farmed to exhaustion and had a low nutrient content.**

[11] **Rhizome: An underground stem that produces new plants along its length.**

Ambrosia artemisiifolia

According to the USDA Plants Website [17] there are three varieties of *A. artemisiifolia*. The following are the synonyms that have been used for them.

Ambrosia elatior
Ambrosia glandulosa
Ambrosia monophylla
Ambrosia paniculata

***Ambrosia artemisiifolia* flowers. Notice the series of yellow spots that represent the anthers that either are or soon will be releasing their copious amounts of pollen that will make life for hay fever sufferers miserable, but also sometimes provides a fall pollen source for our bees. The enlarged insert is a copy of the lower part of the flowering stem shown beneath it in the picture. There are several female flowers identifiable by the whitish bilobed structures, one of which is indicated by the white pointer. How many more can you find? Generally the female flowers are located beneath the male flowers. This positioning facilitates pollen dropping directly onto them from above or to be blown there by a breeze. The size bar applies only to the main photo. Photo taken in the W.J. Beal Botanical Garden on 8/21/09 in the Economic Weeds, Late Annual Collection.**

Ambrosia psilostachya

Ambrosia californica
Ambrosia coronopifolia
Ambrosia cumanensis
Ambrosia rugelii

***Ambrosia psilostachya* male flowers. Photo taken in the W. J. Beal Botanical Garden in Economic Injurious Plants, Hay Fever Collection.**

Origin: All three species are native to North America

Plant description:

Plants within the genus *Ambrosia* are generally erect annuals, much less frequently perennials. One of the perennials, *A. psilostachya*, is represented here. Many would consider them unattractive; Fernald [3] calls them "homely". The leaves are generally attached oppositely to the stems in the lower portions of the plant, but are often attached alternately in the upper parts. While the small male and female flowers are located on the same plant, when on the same stem, the male flowers are generally in higher positions than the female flowers. Neither male nor female flowers have ray florets (think like the petals around the edge of a sunflower). The male flowers are generally assembled in elongated more or less "spike-like" groupings; the female flowers are generally more spread out. The seeds have no bit of fluff (pappus) to facilitate wind dissemination as do some of the other members of the family, as for example, the dandelion.

Below I provide a key adapted from Fernald[3], and Gleason and Cronquist[4] that will separate the three species covered here. The USDA website, however lists 30 species and 2 hybrids of *Ambrosia*. Clearly the key provided will not separate these. The three species chosen here for discussion are, however, widespread and mentioned in the beekeeping literature whereas most of the species listed on the USDA website are rarely if ever mentioned in that literature. That is, however, not to say that some of them could not be as important to beekeeping as the three mentioned here. For a discussion of keys and their use, see this column February 2009.

Key to the three species of Ambrosia covered here

1a. Leaves palmately 3 or 5-lobed or not lobed and usually placed oppositely on their stems; often 6.5 ft or taller; male (staminate) involucres with three strong ribs on one side; ————*A. trifida*

1b. Leaves once or twice pinnatifid[12]: leaves placed both oppositely and alternately on their stems; seldom over 3.2 ft in height; staminate involucres with indistinct veins radiating from a common point————————————————————————-2

2a. Perennial with creeping roots; upper surface of leaves with closely packed short hairs giving them a "harsh" feeling to the touch ————————————————————*A. psilostachya*

2b. Taprooted annuals; leaves not feeling "harsh————*A. artemisiifolia*

[12] **Pinnatifid: with multiple lobes on each side of the central vein that do not reach the central vein. Twice pinnatifed: the lobes themselves are similarly lobed.**

Distribution:

A. artemisiifolia

Pammel and King[12], writing about Iowa bee forage, describe the species as being common along roadsides, in various soils ranging through clay, sandy, black prairie, and gravelly knoll soils. Sanborn and Scholl[15] writing about Texas bee forage, describe the plant's habitat as dry upland soils and waste places. Gleason and Cronquist[4] covering northeastern U.S. and contiguous parts of Canada, describe the species only as common in waste spaces. Julia Morton[9] writing about Florida bee forage describes the species being abundant on muck and uncommon on sand.

A. psilostachya.

Gleason and Cronquist[4] describe the species as being common in waste places, usually in dry soil.

Ambrosia trifida

Under *A. aptera*, one of the synonyms of *A. trifida*, Sanborn and Scholl[15] describe the plant's habitat as low grounds in southwestern and western Texas and along field fences and low places. They describe *A. trifida* as being found along moist river banks throughout Eastern and Central Texas and along low moist creeks and along the Brazos river. Gleason and Cronquist[4] describe the species as being common in moist soil and waste places.

Blooming period:

A. artemisiifolia

Gleason and Cronquist[4] give the blooming period as August to October and occasionally as early as July. Sanborn and Scholl[15] provide the blooming period for Texas as July and August. Munz and Keck[10] writing about California flora, provide a blooming date range of August to October. Julia Morton[9] states that the species blooms during the "summer and fall" in Florida.

A. psilostachya

Gleason and Cronquist[4] give the blooming date range as August to October and occasionally as early as July. Munz and Keck[10] give a blooming date range of July to November.

Ambrosia trifida

Sanborn and Scholl[15] describe the blooming date of *A. trifida* for Texas as July and August. Under the synonym *A. aptera* (a largely Southwestern variety) they provide the same blooming date range. Munz and Keck[10] provide a blooming date range of June to September.

Importance as a honey plant:

***Ambrosia* spp.**

Oertel[11] from his questionnaires found the genus itself to be important in IA, NE and NJ. Ayers and Harman[1] who did not distinguish between the *Ambrosia* species, found the genus to be of at least some importance in AR, CT, IL, IN, KS, LA, ND, NE, NH, OK, TN, WI and WY.

Ambrosia artemisiifolia

Pammel and King[12] after describing both the plant and its distribution, mention that it was observed being heavily worked by bees at Ames, IA during the summer of 1922. Sanborn and Scholl[15] state that the species probably produces only pollen. Julia Morton states that there is no nectar, but using what I interpret as personal information provided by a Florida beekeeper, states that the pollen is "sometimes of value in autumn".

Ambrosia psilostachya.

Oertel[11] from his questionnaires found *A. psilostachya* to be important in CO. Pammel and King, after describing both the plant and its distribution, say nothing more about the species.

Ambrosia trifida

Oertel[11] from his questionnaires found *A. aptera,* a synonym for *A. trifida*, to be of at least some importance in Texas. Pellett[13] under *A. trifida* states, "The ragweed does not produce nectar, but furnishes large quantities of pollen in late summer and fall". Pammel and King[12], while describing the species and providing distribution information, say nothing else. Sanborn and Scholl[15] under *A. aptera* state, "Some honey but more pollen of a resinous nature" and under *A. trifida*, state "honey yields not important, but yields much pollen."

Honey potential: Some of the references above seem to feel that there is some nectar being produced by at least some of the three species covered here. In the questionnaires used by Ayers and Harman[1], there were some respondents who also thought that the genus produced some nectar, though perhaps only a small quantity. After photographing the three plants discussed here under relatively high magnification, I find nothing to convince me that they produced any nectar. They do, however produce large amounts of pollen that is well-suited to wind pollination. The structure of the plants with the female flowers placed beneath the male flowers also seems well-suited for wind pollination. Given that there is some opinion among beekeepers that at least some nectar is produced, it seems possible that bees may forage ragweeds for honeydew.

Pollen: As the yellowish speckles of pollen on my photographic equipment will attest, these plants do produce **copious** amounts of pollen. Julia Morton[9] seems to believe that the pollen from *A. artemisiifolia* is green. This would not, however, be my opinion based on the plants that I photographed (which see). I have not observed bees working ragweed for pollen. Given, however, that in early spring bees work our birdfeeder for small seed particles left by the birds, and that I have even heard of them collecting coal dust in Pennsylvania where I grew up, I have no doubt that if they are in need of pollen they would work ragweed.

Additional information: The pollen of this group of plants causes hay fever sufferers much discomfort during late summer and into fall. Applying the genus name *Ambrosia* (the sweet smelling, delicious food of the Greek and Roman gods) has always seemed to me like a misplaced, bad joke. The New World Encyclopedia website[18], however offers the following alternative explanation. The food of the immortal gods *ambrosia* (αμβροσία), is related to and derived from (cognate with) the Greek word *ambrotos* (άμβροτος) meaning immortal. The above reference then suggests that the genus name refers to the tenacious nature of the genus, especially when its members are invasive species. I'm not sure! I was, after all, trained as an entomologist not as an etymologist!

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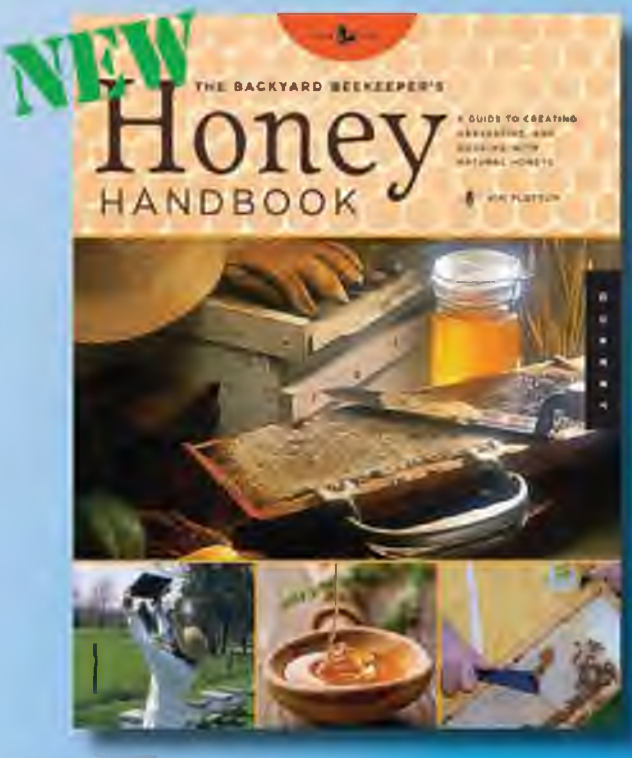

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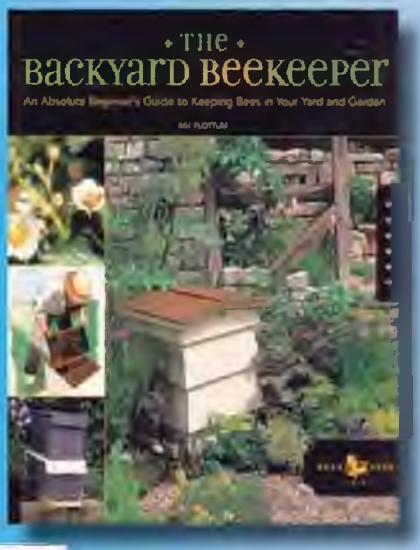

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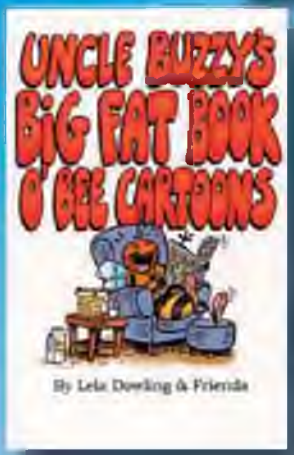

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