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W.A.S. Journal

Journal of the Western Apicultural Society of North America

Story on page 34.

Western Apicultural Society of North America

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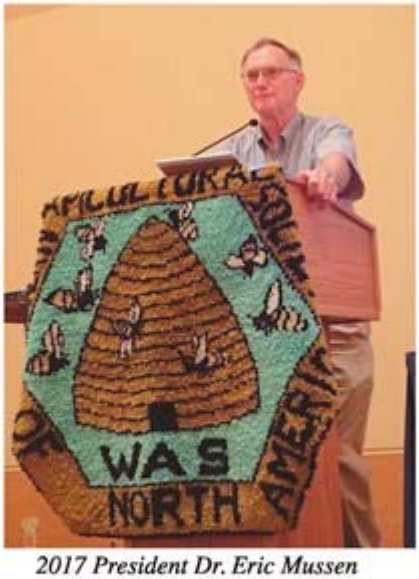
Journal of the Western Apicultural Society of North America

Index

Advertiser Index

PAST PRESIDENT'S CONFERENCE WRAP

September 2017



2017 President Dr. Eric Mussen

About 150 participants were involved in the 40th anniversary conference of WAS held on the UC Davis campus, the birthplace of WAS, between September 5th and 8th, 2017. The "home cooked" food from the caterer was very good. Working closely with the caterer, we chose three different buffets for two lunches and the banquet. People concerned about being served on "paper" plates should be aware that the University insists on "compostable" plates and utensils. So, we were consuming our food with compressed corn and potato starch plates and utensils. They were neither "paper" nor "plastic."

The two tour days contrasted considerably. The first day, we visited the Z Specialty Food honey packing facility. Inside the warehouse and packing area, the bulk supply of cool honey kept the temperature moderate. A table was set with samples of many different honeys that participants could taste. Some were very unique. Z Specialty Food produces and packs a large number of varietal honeys and fruit spreads. Many folks left the facility with scrumptious food items in tow.

That same day, Eric Foster at Mann Lake said the warehouse was just too hot for folks to tolerate a 30 minute tour. Additionally, the sugar syrup plant had sprung a leak (as quite a number of beekeepers have encountered over the years with honey) and the facility was ankle deep in syrup throughout, and not available to us. So, the visitors were treated to nearly an hour to roam the isles of the Mann Lake showroom and see in person the items that appear only as photographs in the supply catalog. So, I got to read some labels. There were two brands of reduced-odor honey bee repellent used to encourage the bees to leave the honey supers. One was a single, well-known chemical that does just that. The competitive product read like an extensive list of ingredients for human food consumption. I imagine the second product was simply purchased and repackaged for the new purpose.

The next afternoon was oddly cool. The demonstrations outside the Bee Biology Facility were very comfortable and enjoyable. Bee Biology staffers were able to display and demonstrate a number of beehives, including the internally insulated-walls, plastic, Apimaye Ergo beehive. This hive was developed by students of Dr. Osman Kaftanoglu in Arizona. He has preliminary data showing that the hive interiors remained cooler than wooden hives in the warmest Arizona summer weather. Chris Casey was in the Häagen Dazs Garden showing visitors the various bee plants. Randy Oliver was making a "big splash" (literally) with demonstrations on detecting Varroa mites and Nosema spores.

At the opening "reminiscence" session, Dr. Norman Gary was on hand to revisit the founding of the society. Finding some free time, he reflected over many aspects of his career at UC Davis. He was informative and entertaining. Hopefully a number of the other invited speakers will submit a synopsis of their presentations to Fran Bach, so that you can review what transpired in their sessions.

We had a relatively laid back conference that many folks appreciated. Hope to see you in Boise, Idaho, next year to have another enjoyable experience with our friends and fellow beekeepers.

Eric Mussen, 2017 President

WAS Presidents to date

1978 Norman Gary (California)
1979 Lucien Alexander (Oregon)
1980 Randy Barker (Br. Columbia)
1981 Charles Duncan (California)
1982 William P. Nye (Utah)
1983 John Edwards (Washington)
1984 Eric Mussen (California)
1985 Mike Burgett (Oregon)
1986 Doug McCutcheon (British Columbia)
1987 Tom Muncey (Nevada)
1988 Dan Mayer (Washington)
1989 Stan Williams (California)
1990 Mark Shelton (California)
1991 William P. Nye (Utah)
1992 Mike Burgett (Oregon)
1993 Mark Winston (Br. Columbia)
1994 James Bach (Washington)
1995 Eric Mussen (California)
1996 Russell Messing (Hawaii)
1997 Eric Erickson (Arizona)
1998 Steve Sheppard (Idaho)
1999 Leonard Joy (Nevada)
2000 Fletcher Miller (Alaska)
2001 Mike Burgett (Oregon)
2002 Eric Mussen (California)
2003 Jaquie Bunse (British Columbia)
2004 Jerry Bromenshenk (Montana)
2005 Steve Sheppard (Washington)
2006 Adrian Wenner (California)
2007 Diana Sammatarro (Arizona)
2008 Mark Pitcher (British Columbia)
2009 Eric Mussen (California)
2010 Dewey Caron (Oregon)
2011 Jenny Bach (Hawaii)
2012 James K. Smith (Washington)
2013 Melanie Kirby (New Mexico)
2014 Jerry Bromenshenk (Montana)
2015 Beth Conrey (Colorado)
2016 Ethel Villalobos (Hawaii)
2017 Eric Mussen (California)
2018 Steve Sweet (Idaho)

Introducing the 2018 WAS President Steve Sweet

Steve Sweet is a professional engineer, one of the owners of Quadrant Consulting, Inc. (http://www.quadrant.cc/) in Boise, Idaho. He received his BS in Engineering from UC Davis, CA in 1974. Satisfying undergraduate degree requirements, he took multiple undergraduate and graduate Apiculture courses taught by Drs. Norman Gary and Harry Laidlaw and participated in the campus work study program as a willing hand out at "Bee Bio," now known as the "Harry H. Laidlaw Jr. Honey Bee Research Facility."

Since graduation and with the exception of a 5-year period in the '70s, Steve has continuously kept bees in various areas, including California's Central Valley and North Coast, Washington's Tri-Cities area and Idaho's Treasure Valley.

Following a 2007 Hobbyist session in Boise, sponsored by the Idaho Honey Industry Association (IHIA), that included a highly animated and energetic presentation by Randy Oliver, Steve became one of the founding members of the Treasure Valley Beekeepers Club (http://www.idabees.org/), serving first as Club Treasurer, then President from 2008-2010 and has since retained an active role in assisting the club leadership. During his tenure with the TVBC, Steve also played a significant role in the re-write of Boise City's beekeeping ordinance, allowing for responsible beekeeping within city limits.

Over a 10-year period, Steve has helped the Treasure Valley Beekeepers Club maintain a high-profile role in Idaho's beekeeping community, including staging well-received presentations to the Club by leading beekeeping experts. These events have brought multiple presentations to the Treasure Valley by Drs. Steve Sheppard, Brandon Hopkins and Ellen Topitzhofer; along with special events presentations featuring, Randy Oliver, Dr. Jeff Pettis, Jerry Hayes, Dr. Marla Spivak, Dr. Ron Bitner, Bill Ahaus, Jan Lohman, Carolyn Breece, Veldon Sorensen, John Miller, Jay Miller, Kim Flottum, Dr. Dewey Caron, Jennifer Berry and Dr. Dennis vanEngelsdorp.

Steve served as the Hobbyist representative on the IHIA Board of Directors from 2014-2016 and on the WAS Board as the Idaho Director beginning 2016.

Steve is currently enrolled in the Oregon State University/Oregon State Beekeepers Association Master Beekeeper Program - one of a handful of the Program's certified Journeyman Beekeepers in Idaho - and is currently seeking to satisfy Master certification requirements.

Steve's activities in the bee yard include running 20-40 colonies, participating in the Bee Informed Program Tier 4 Real Time Disease Load Survey (2014-2017), and the National Honey Bee Health Survey (2015-2017).

On a personal note, Steve married Lorrie, his high school sweetheart, well prior to his beekeeping activities at UC Davis. During their days together there, Lorrie, too, worked at Bee Bio, as a work study student employee. Thankfully, she has been a stalwart in tolerating his honey bee proclivities from the very beginning. The couple's two boys, Everett and Ian, reside within an hour's drive of Boise.

NEW PRESIDENT'S MESSAGE

This September, the culmination of 40 years of Western Apicultural Society activities was celebrated in Davis, California. Dr. Eric Mussen, 2017 WAS President, convened a stellar program and kicked off the first day, sharing the early stage with Dr. Norman Gary. Our two Founders nostalgically reflected on "back to our roots" concerning the Society's origins, as they put into perspective our humble beginnings. These early reminisces were quickly followed by top-flight presentations running the gamut of beekeeping topics relevant in the West today. Journal readers, keep an eye out for summaries of the informative presentations that we all enjoyed in Davis in this and future issues.

Certainly, our speakers represented the most current state of apicultural science and kept the rapt attention of the audience. In addition to sessions at the conference hall, we enjoyed an afternoon at the UC Davis Bee Biology Facility, with Bernardo Nino providing a hands-on guide to currently popular hives; Randy Oliver - in his typically effervescent style - demonstrating how to efficiently sample for Varroa and Nosema; Dr. William's grad students informing on pollinator plant selection; and Christine Casey leading a tour of the pollinator plants in the Häagen-Dazs Honey Bee Haven.

Thursday evening's activities continued the WAS tradition, established in 2014, dedicated to the "Next Generation of Beekeepers," as Oregon Director and 2nd Vice President Sarah Red-Laird - the Bee Girl (http://www.beegirl.org/) - led a breakout session at the Robert Mondavi Institute Sensory Building. Sarah's "Next Gen" initiative is geared toward encouraging more young beekeepers to take an active role in organized beekeeping. Her outreach program brings many benefits for both new and long-time members and will continue to be emphasized in WAS's future activities.

Prior WAS conferences have been convened throughout Western North America over the past four decades. With the conclusion of our most recent and highly successful forum, Dr. Mussen completed his record fifth term as WAS President and re-established a very high Conference standard. Each of the 31 prior WAS leaders, and Dr. Mussen in particular, deserves our sincere gratitude for building a reputation for well-received beekeeping conferences across the far-flung West.

Of course, WAS is also known for the Journal, which has blossomed into a colorful quarterly production that reflects the high quality of our organization. Thanks, too, to our valued sponsors who share the Journal's success through their valued support. Unforeseen back in 1977, when WAS was originally organized, new forms of communication have sprung up thanks to the ubiquitous presence of the internet. In response, WAS has committed to a top-drawer web presence showcasing the Journal; regularly dispatching electronic notices across the internet through "Items for Beekeepers;" and thanks to Sarah Red-Laird's capable assistance, an impressive and informative presence on Facebook.

We are fortunate that our prior leaders have navigated WAS through decades of issues important to Western beekeepers. Their recent reflections on 40 years of progress helps to focus our efforts on how we might forge continued improvement. As WAS's new President, I will be encouraging each State and Provincial director to develop consistent lines of communication with their respective local organizations. WAS's foundation is education. I will be convening a group to identify the essentials of local educational programs (state-wide Master Beekeeping Programs, etc.) that will allow WAS to separate the wheat from the chaff and offer formal endorsements of worthy educational programs.

The future of any organization is guided by the youth involved in the program. Therefore, the WAS Board will also be expected to join Sarah Red-Laird's "Next Gen" program to bring new, energetic members into the fold.

Finally: Save the date!! **Our next Annual Conference is scheduled for September 14-16, 2018, here in Boise, Idaho.** For our next conference, timing will change from a mid-week rendezvous to a Friday through Sunday session, with the intention of appealing to the busy schedules of our Next Gen beekeepers. Stay tuned to the next Journal for an announcement on the venue and confirmation on speakers coming to town.

In the meantime, here's hoping that your bees are ready for winter, your mites are under control, your equipment is prepared for paint and assembly and ready to put out next Spring.

Whazzup? Boise, 2018. WAS Up!

Steve Sweet, President

Dr. Eric Mussen (left), one of the WAS founders, receiving his University of Montana Honorary Master Beekeeping Certificate at the 2017 WAS Banquet in Davis. Steve Sweet, the incoming WAS President, presented Eric's certificate on behalf of Dr. Jerry Bromenshenk and the Montana program staff.

Western Apicultural Society Pre-Conference Directors' Meting
September 4, 2017 UC Davis, CA

Present: Eric Mussen, Albert Chubak, Joe Carson, Jim Smith, Cyndi Smith, Fran Bach, Sherry Olsen-Frank, Jerry Bromenshenk (via Skype), Jaylene Naylor, Tom Frank, Peggy Beckett, Ron Hanson, Sara Red-Laird, Catherine Wissner.

President Eric Mussen called the meeting to order at 1:40 p.m.

MOTION: Al Chubak/Sherry Olsen-Frank to accept the reading of minutes as published. Motion carried.

REPORTS RECEIVED FROM OFFICERS, EDITOR-HISTORIAN AND COMMITTEES.

Financials received from Treasurer Sherry Olsen-Frank showed a $20,00 loss on the 2016 conference.

Journal profit +$3200 for the same period. Editor/historian Fran Bach would like to step down within the next 12 months. Discussion of what is involved and changes needed. Currently, the Historian's position rests also with the editor. The Journal has become the history of WAS. No current form to the job. Needs to be defined.

AUDIT/FINANCIAL REVIEW COMMITTEE (Steve Sweet) - observed that WAS is on the financial brink primarily due to occasional unrestrained annual conference costs, low membership dues, disproportional website maintenance costs and costs associated with the Journal printing and mailing fees. The financial situation of the overall organization requires immediate attention. The committee felt that many areas need to be reviewed and changes made in the bylaws to protect future interests of the association. However, these recommendations reach beyond the purview of the committee and are best served by coming before the board.

RESOLUTION COMMITTEE (Jaylene Naylor) – needed to make the bylaws consistent with the Articles of Incorporation again and take care of financial issues. Summary: The committee suggested increasing dues, the treasurer be required to be a licensed CPA. Article 7: Defining better the role of the board, requiring them to provide more oversight. Article 12: Finances (new section) A budget to be prepared by the board and the treasurer. Activities and events sponsored by WAS must be planned as cost recoverable, expenses approved in advance. Items over $500 must be board approved.

Current bylaws allow WAS to operate under the new guidelines for one year before members vote on them.

MOTION: Joe Carson/Peggy Beckett - To accept the auditor and treasurer's reports. Motion carried.

MOTION: Jerry Bromenshenk/Sherry Olsen-Frank. WAS to establish a committee to review the publication and communications issue, define the needs and come forth with recommendations. Motion carried.

MOTION: Joe Carson/Sherry Olsen-Frank - that we accept the bylaws as the document under which we will operate for the next year, and then have the vote in 2018. Bylaws will go to the general membership by mail, Facebook and online.

UNFINISHED BUSINESS: We still have an outstanding bill for $3250 from the Allen Alder Center for Communicating Science, contracted by the 2016 president without knowledge or authorization by WAS (all financial undertakings must be authorized by the treasurer to be within treasury limits). In a board conference call in August 2016, the president specified that all her speakers (which included about a dozen from England, Central and South America) were covered under a grant she had received and there would be no cost to WAS for them. No financial statements were ever received before, during or after this conference.

The statement was made that the board did not exercise proper authority over the president at the time. Correct, but the alternative would have been to cancel the conference almost at the last minute which would have engendered penalties from the hotel and possibly other businesses.

However, the president was in direct contradiction of the bylaws and overrode the often-repeated statement that there was not enough money for speaker expenses. All communications with the Allen Alda Center were with the president personally; there is no contract and not even a mention of WAS in that correspondence. No more recent invoices have been received; none ever went to the treasurer.

Eric summed up the situation and suggested: Send correspondence to the Allen Alda Center stating we have looked at this a million times and here is what we have concluded. She did not have a right to go into a contract that named us so it must be a contract with her. We have not seen the contract; it was never given to us. So under the circumstances, it has nothing to do with WAS. Advise to contact the University of HI, with which she is affiliated, and see what you can do with them. Long further discussion.

MOTION: Sherry Olsen-Frank/Jerry Bromenshenk - Eric Mussen to write a letter to Ethel with a copy to the financial people at the University of HI records, saying that we have determined it was not appropriate to run that part of the program and have it billed to us. Motion carried with one opposed.

Meeting adjourned at 4:05 pm

Western Apiculture Society Annual Meeting Minutes
September 8, 2017 UC Davis, CA

Eric Mussen called the general session meeting to order at 10:50. Motion to accept minutes as published – Steve Sweet/Sherry Olsen-Frank. Motion carried.

TREASURER'S REPORT – Sherry Olsen-Frank reported income/expenses, details on HI conference and year to date. Report filed.

AUDITOR/FINANCIAL REVIEW – Steve Sweet gave the financial review. Everything was reported properly. Recommendations have been incorporated into revised bylaws. Authorization for disbursements needs improvement; dues are pretty archaic and an increase is needed; website revamp to carry education articles; more outreach, especially to younger people via people like Sarah Red-Laird. All would affect Society's bottom line.

MOTION to accept treasurer and auditor/financial review committee reports – Joe Carson/Dewey Caron. Motion carried.

EDITOR/HISTORIAN – Fran Bach gave financials on the Journal. 2016 profit was $3256; year to date for 2017 is $6008. Primarily the profit has been put back into the conferences. More color content anticipated in 2018. A brief history of editor's wages ensued. Original (2003) was based on 40 hours per issue for 24 pages. Journal is now 36 to 44 pages without a wage increase. All but one year since 2003 returned a profit to WAS.

Question (Ian Farber): No mention of travel and meal expenses. Fran responded that there is some provision for 'remuneration' for the editor. Travel is not covered. This item is clarified in the new revisions.

MOTION – Ian Farber/Kevin French - That all WAS members in good standing as paid up members receive a printed and mailed quarterly Journal at no additional charge if they request a mailed copy. Ian spoke to the motion, objecting to the subscription cost and wanting free copies for all members. Fran explained the cost of mailing print copies vs. posting a digital copy on the website - approximately. $6.50 per copy vs. 50 cents for digital.

AMENDED MOTION: Nancy Steele/Ruth Peterson moved to table the motion until the next membership meeting, to further study and analyze the financial impacts. Ian objected to postponement. Vote called and amendment failed.

Returning to the original motion – that all WAS members in good standing as paid up members receive a printed and mailed quarterly Journal at no additional charge if they request a mailed copy. Steve Sweet and Eric Mussen spoke against on grounds of insufficient funds to support. Vote called. Motion failed.

SITES: MOTION to host the 2018 conference in Boise, ID; Oregon be the host for the 2019 meeting in Ashland. Dewey Caron/Randy Oliver. Motion carried.

RESOLUTIONS & BYLAWS COMMITTEE (Steve Sweet): The committee worked primarily to return the bylaws back to the original charter, cleaned up responsibilities of some positions and membership categories. Bylaws allow us to operate under the new guidelines for a year. Joe Carson/Sherry Olsen-Frank – Motion to adopt the new bylaws until the vote at the 2018 general meeting. Motion carried.

NOMINATING COMMITTEE (Ian Farber) presented the 2018 slate of officers, with some positions still vacant.

MOTION: Sherry Olsen-Frank/Joe Carson - to accept slate as presented for officers and directors. Motion carried.

UNFINISHED BUSINESS (Eric Mussen): We still have an outstanding bill for $3250 from last year's conference. The decision has been made that he will compose a letter to last year's president noting that the individual had substantially exceeded authorized limits and WAS will not be responsible for the bill. This letter will be reviewed by the board of directors. Steve pointed out that the bylaws have been revised to clarify how this situation would be handled in the future.

NEW BUSINESS (Dewey Caron): Wants WAS' continued participation in the Honey Bee Health Coalition at $2000/yr.

MOTION: Dewey Caron/Steve Sweet – That we continue the donation to the Honey Bee Health Coalition of $2000.

Treasurer Sherry Olsen-Frank – Though supporting the HBHC, an alternate source of funding is needed.

AMENDED MOTION: Sherry Olsen-Frank/Fran Bach – Amend the motion for this year, that HBCB funds be generated through a donation button for direct donations to the treasury with specific instructions that it go directly to the Honey Bee Health Coalition for one year.

Further discussion - Catherine Wissner spoke on how restricting money works according to the IRS, what we can and cannot do with donated money coming in. Ian Farber spoke against the amendment; the organization should not ask the members for donations. Vote called. The amendment failed.

RETURN TO ORIGINAL MOTION: That this organization pay $2000 to help support the Honey Bee Coalition for 2017. Motion carried. No suggestion of how to fund given the current very restricted WAS finances.

MOTION TO ADJOURN: Sherry Olsen-Frank/Cyndi Smith. Adjourned.

Post Conference Board Meeting Minutes
September 8, 2017

Called to order: 3:50 PM

2018 Conference Location – Boise, ID, tentatively September 14-16

Steve Sweet, President gave a sample budget, spoke about building excitement for WAS and the need for help bringing in young beekeepers to build a strong future.

Much discussion took place regarding the future vision of WAS, providing information available all year long and also put on an excellent conference. Discussed how to add value by adding benefits, especially with a possible increase in membership dues; the need to tap into our talents and skills.

COMMITTEES:

EDUCATION: (Joe Carson chair) Goal/Vision: Provide/build a base of information to recommend to the membership.

SITES: Need 2020 and 2021 sites.

Other committees not yet appointed.

CONFERENCE – 1st Vice President is Program Chair; will ask two or three people to help.

Discussion – Tentative speaker line up, expenses for speakers and how to handle them, who will help with the conference in Boise i.e. Treasure Valley Bee Club and Boise College Bee Club/students. Specialty Crop Grant was discusse; needs to be applied for by May and will have funds before the conference. Catherine Wissner's grant experience valuable.

Long discussion on the way forward regarding sponsorships, vendors, what to present at conferences, maybe smaller conferences, how to make use of our regional diversity as an organization, provide more interactive opportunities at conferences, get local bee clubs more involved and aware of membership benefits.

Thank you Eric for taking us 'back to our roots' this year and giving us a foundation to move forward on.

MOTION TO ADJOURN: Al Chubak/Catherine Wissner. Adjourned @ 5:00 PM.

CONFERENCE 2017 ....

In 1977, Dr. Norm Gary and Dr. Eric Mussen were the key players in setting up the Western Apicultural Society at UC Davis. In 2017, they indulged in some nostalgia to lead off the 40th Anniversary WAS Conference. Attendees enjoyed the session and a number of them well remembered one or both gentlemen as their own instructors years ago.

Some time ago, your editor wrote what was intended to be the first chapter of the WAS history and published it in the WAS Journal. In it, Dr. Gary's more widely known involvement with bees in the film industry was featured. At this conference, what struck me most forcibly was his comment that while his "bee wrangling" was fun, he was a serious scientist too and most of the research work he did has been buried under more recent developments.

In this issue, the scientist re-emerges to give us a look backward at some of the early findings concerning queen mating behavior, the role of pheromones and the effects of microwaves on bees.

Looking Back

Dr. Norm Gary, 1st WAS President

When I was a post-doc at Cornell University (1959-62) I researched honey bee behavior during mating flights. I designed an apparatus that permitted virgin queens, tethered by a two-foot long thread, to be elevated approximately 35 feet high where they could fly in a small circle about 4 feet in diameter. For the first time, mating behavior could be observed, photographed, and studied!

Each afternoon, when drones and queens normally take mating flights, I suspended multiple, tethered virgin queen bees on a horizontal "clothesline" approximately 100 yards from an apiary. Many drones were immediately attracted. During this research I became the first human ever to witness and photograph the mating of a flying queen!!! Eleven drones mated with the queen a few seconds apart, each becoming instantly paralyzed and dropping to the ground where they died. I was concerned that the queen might be injured if too many drones mated with her. I didn't know at that time that queens normally mate with multiple drones on the same flight. Later research by other investigators revealed that the amount of sperm in a mated queen far exceeded the amount that one drone could provide.

Repetitions of the test stymied me at first. Drones readily mounted queens but rarely mated. What was going on? Ultimately, I discovered that the queen must open her sting chamber to stimulate successful mating. I displayed artificial queens, made of wood and scented with queen pheromones, with different open sting chamber diameters. Drones readily mated with them when the "correct" diameters ... the size range of queens ... were displayed.

When multiple queens were displayed on the 'clothesline', it was clear they were not equally attractive. Why??? Apparently variable attraction was associated with the quantity and quality of pheromones released by each queen. So I researched pheromones by producing lots of virgin queens, removing their mandibular glands and extracting the complex of chemicals in the mandibular gland secretion. Then I separated the chemicals so each one could be suspended aerially and tested for relative attractiveness. I discovered one highly attractive chemical as well as several lesser attractive chemicals. I identified this chemical as 9-oxo-2-decenoic acid and published this research in 'Science Magazine", one of the world's top academic journals. I was lucky to have published such an important discovery so early in my career.

During this research, many people came to see the first ever spectacle of honey bee mating behavior in the air. My most interesting visitors were Gudrun and Nikolous Koeniger from Germany. They were impressed and excited by this research. Consequently, they initiated their outstanding research program on honey bee mating biology and behavior.

I moved to UC Davis in 1962 and continued mating behavior research there. I made a research film entitled "Mating Behavior of the Honey Bee" that was shown for the first time at the 1969 Apimondia Congress in Munich, Germany where it won an award. It also documented the discovery of the queen bee sex attractant pheromones and showed aerial mating behavior for the first time. It documented the use of drone traps that I designed and used as a tool to study natural drone congregation areas, drone flight range and distribution. The drone traps were elevated by helium blimps to altitudes

consistent with normal drone flight. I didn't publish this technique as I considered the film to have demonstrated it. Several years later Dr. Orley Taylor published a slightly different drone trap design.

Another field of my research involved microwave effects on honey bees.

A scientist proposed a new concept for collecting solar energy using extremely large solar panels in geosynchronous orbit approximately 22,000 miles high and converting the energy to microwaves that could be beamed down to earth where receiving antennae would capture and transform the energy to electricity. The panels were large enough (a mile square) to provide enough to power for an entire state! But would these microwave beams entering earth's atmosphere harm to insects on earth? Honey bees were selected as the test animal. So we constructed microwave chambers to produce energy equivalent to what would be beamed from the satellites.

How does one detect adverse effects? It seemed that the best approach would be to test whether behavior or/or life expectancy was affected by various levels of microwave exposures. In one test, I trained the bees to walk down a maze similar to test rat learning. Foraging bees had to choose colored doors to find food along the route. No impact! Furthermore, life expectancy was not affected either. Several other experiments yielded the same result ... no detectable effects from microwave exposure. Dr. Becky Westerdahl (who was also involved in the formative years of WAS) conducted most of the experiments. The project was very successful, owing to her dedication and brilliant performance!

Clowning around. Eric checks out Norm's 70 year old smoker ... his first one ... and see if he can detect the secret smoker fuel fragrance.

Always happy to sign a book for a lady!

CONFERENCE 2017 ... Keynote Address

Beekeeping in California - An Overview of Colony Management

Gene Brandi

I very much appreciated the opportunity to address the 40th anniversary WAS conference. During my talk I covered the annual cycle of beekeeping activities in my operation that has evolved since I began keeping bees in the 1970s as well as some general beekeeping observations I have made during the past 5 decades. Now that I have been a beekeeper for well over 40 years, I realize that I often find myself thinking like a bee. I get revved up and am full of energy every spring; I get excited when I see flowers and a honey flow; I get very agitated when my bees are damaged by pesticides, varroa mites, bears, or skunks; and I have a tendency to slow down (my bee work) in the late fall and winter.

Today, my son Michael, wife Christine and I manage approximately 2,000 colonies during the peak season for honey production and crop pollination. In addition to our own hives, we also lease semi loads of bees from other beekeepers, primarily from out of state (Mid West and New England), for almond pollination. We manage the leased colonies as if they were our own bees, checking each hive for strength and feeding if necessary. In addition to almonds we also pollinate cherries, cane berries, and melons. We also shake bulk bees for sale in March and early April.

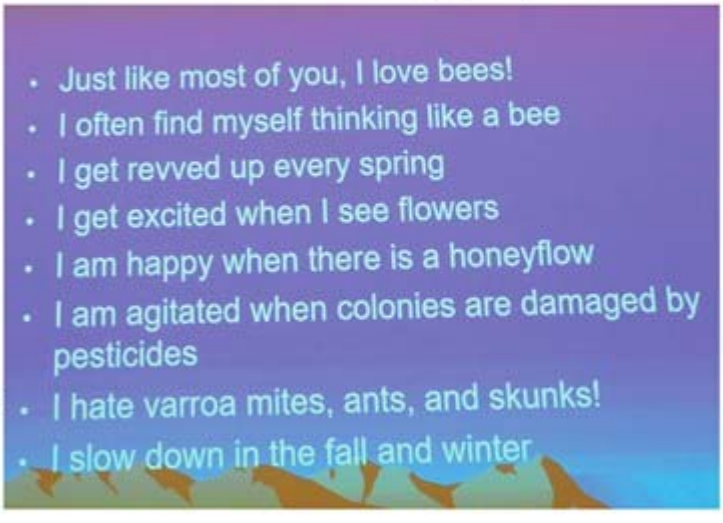
On average, we move our colonies approximately 6 times per year. The year begins with almond pollination in February and March followed by cherry pollination in late March.

In April and May we normally move many of our hives to eucalyptus, sage, citrus and early cane berry pollination. We generally make up our spring divides and nucs in the eucalyptus locations as there is usually a good spring flow and several good pollen sources available.

In June, during years with good rainfall, we continue to keep our bees in the sage areas for wild alfalfa (deer bush) and toyon flows. We also start moving some of our hives back to the Central Valley for early melon pollination.

During July and August most of our hives are in the Central Valley for melon pollination and cotton/alfalfa honey production. Cotton remains the number one honey producing plant in the valley each summer, although the acreage is far less than in the past due to lack of irrigation water and the conversion of row crop land to almond orchards. Cotton is a mixed blessing as it can be a great nectar source for honey production, but there is always the risk of pesticide exposure. We register our locations with the county ag departments wherever our bees are located during the summer months in order to receive advance notice of pesticide applications. Most applicators will apply bee- toxic products at night when the bees are not foraging, which helps to reduce the acute bee kills our bees encounter every year, especially if short residual products are used.

We always hope for bluecurl and tarweed forage in late August, September, and October either in the Sierra Nevada or coastal foothills, as these plants can provide the late season nutrition (especially pollen) that colonies need to raise "fat bees" for the winter. These plants are very fickle and need the right amount of spring rainfall to get them sprouted. They will grow throughout the summer, (unless eaten by grasshoppers when they are small) and normally begin blooming by mid to late August. Any significant rainfall on blooming tarweed or bluecurl will generally end the flow and the plants will dry up. In the absence of these plants, protein feeding is a must every fall.



Most of our hives are moved into wintering yards in coastal counties or the Central Valley in

November, December, and January, prior to movement into almond orchards in February.

Honey crops in California are extremely variable, depending upon weather conditions, primarily the amount of winter and spring rainfall. California has been the number one honey producing state in the nation many times since the late 1960s, but only in years with average to above average rainfall. Black button sage (salvia mellifera) is only produced in California's coastal hills and mountains from the mid San Francisco Bay area south to Mexico. The water white honey is some of the best in the world, but the plants need sufficient moisture and rest to rebound after a season of heavy production. A good example of that is 1983, which was an extraordinarily wet "El Nino" rainfall year in California, but the sage plants did not produce very well that year since 1982 was a great sage honey year and the plants had not rested enough by the spring of 1983.

Beekeepers who intend to produce varietal honeys, as we do, must take care to pull the desired honey from the bees prior to the onset of the next honey flow. In the case of sage, we must pull off the sage prior to wild alfalfa or toyon bloom lest the mild flavored water white sage become colored and flavored with these other honeys. Other varietals we can produce in some years include eucalyptus, vetch, wild buckwheat, manzanita, star thistle, mustard, bluecurl and tarweed. Of course we can produce some cotton and alfalfa every year since those crops are irrigated.

It is important to be aware of California Buckeye (Aesculus californica) as it can be poisonous to honey bees, especially in years of dearth when there are few other sources of forage. This native California plant can be found in the Sierra Nevada as well as coastal hills and mountains. It generally blooms in late April, May, and into early June depending upon elevation, latitude and other factors. In good honey years with adequate nectar from other sources, buckeye does not seem to be a problem for bees.

Even though we take our bees to as much native California forage as possible for honey production and colony health maintenance, almond pollination is the most important economic activity we undertake in most years. Beekeepers received between $175-$200 per colony for almond pollination in 2017. Approximately 1.8 million colonies are now needed to pollinate California's more than 1 million acres of bearing almonds. Almond growers keep planting more trees and the demand for pollination increases every year. Most almond growers rent at least two colonies per acre to pollinate traditionally planted almond orchards. However, some of the newer almond acreage is comprised of self fertile varieties which require fewer bees, usually about one colony per acre.

For many years I have believed that the increase in demand for honey bees to pollinate almonds is the best and worst thing that has ever happened to California beekeeping. It is certainly very convenient to annually have the largest honey bee pollination event in the world occur in the valley where I live. However, the influx of more than 1 million colonies of honey bees from other states can create problems for us prior to and after almond pollination due to the overcrowding that occurs in many areas of the state. Robbing can be a serious issue in these areas and bees just don't do very well under such crowded conditions with little or no forage available.

We re-queen the majority of our colonies annually, mainly with queens from Northern California bee breeders. In a normal year we purchase at least 1,500 queens to maintain our 2,000 colony operation.

Colony health issues from exposure to certain pesticides, varroa mites, poor nutrition, and diseases have seriously impacted the beekeeping industry throughout the nation for more than 12 years and my operation is no exception. We have experienced as little as 13% to more than 45% winter loss of our colonies since 2004. We continue to change our management strategies in an attempt to improve the health and survival of our colonies. For example we no longer pollinate alfalfa seed or watermelons due to the high risk of pesticide damage to our hives, and we are considering the elimination of citrus honey production for the same reason. We now treat for varroa mites at least 4 times per year with a variety of products and look forward to the addition of newer products such as oxalic acid/glycerin. We are now using probiotics in an attempt to boost colony health. The protein patties we feed contain a feeding stimulant which we hope improves colony heath as well. By adopting these and other strategies we hope to continue successfully keeping bees for many years to come.

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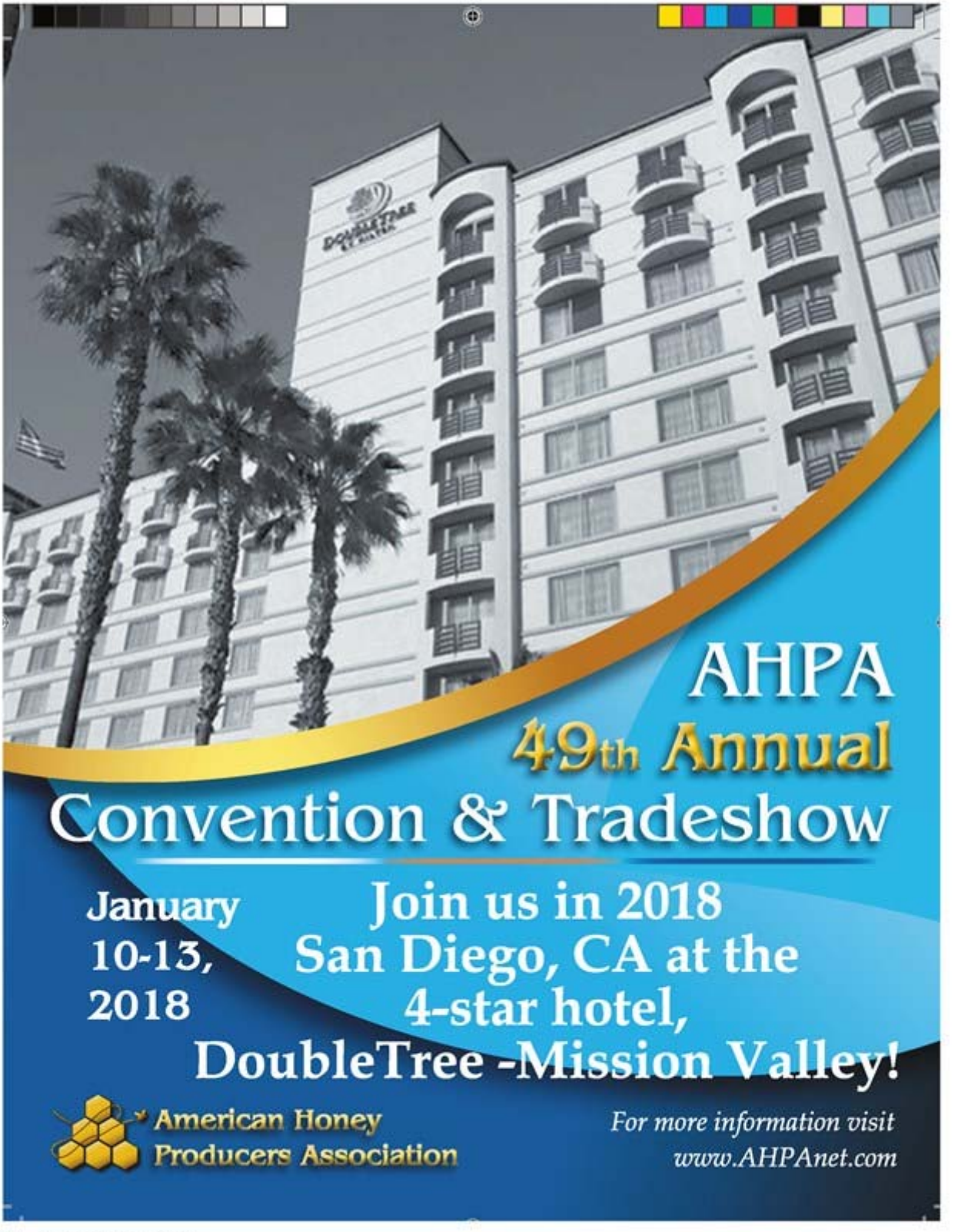
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CONFERENCE 2017 ... on Camera!

All photos Kathy Keatley-Garvey

The conference opens on a serious note as Dr. Anita Oberbauer, Associate Dean for Agricultural Sciences, UC Davis College of Agriculture and Environmental Sciences, welcomes attendees.

All sorts of things make up a great conference

First things first. WAS treasurer Sherry Olsen-Frank heads up the Registration crew, while (below) attendees visit in the hallway while they wait in line to register.

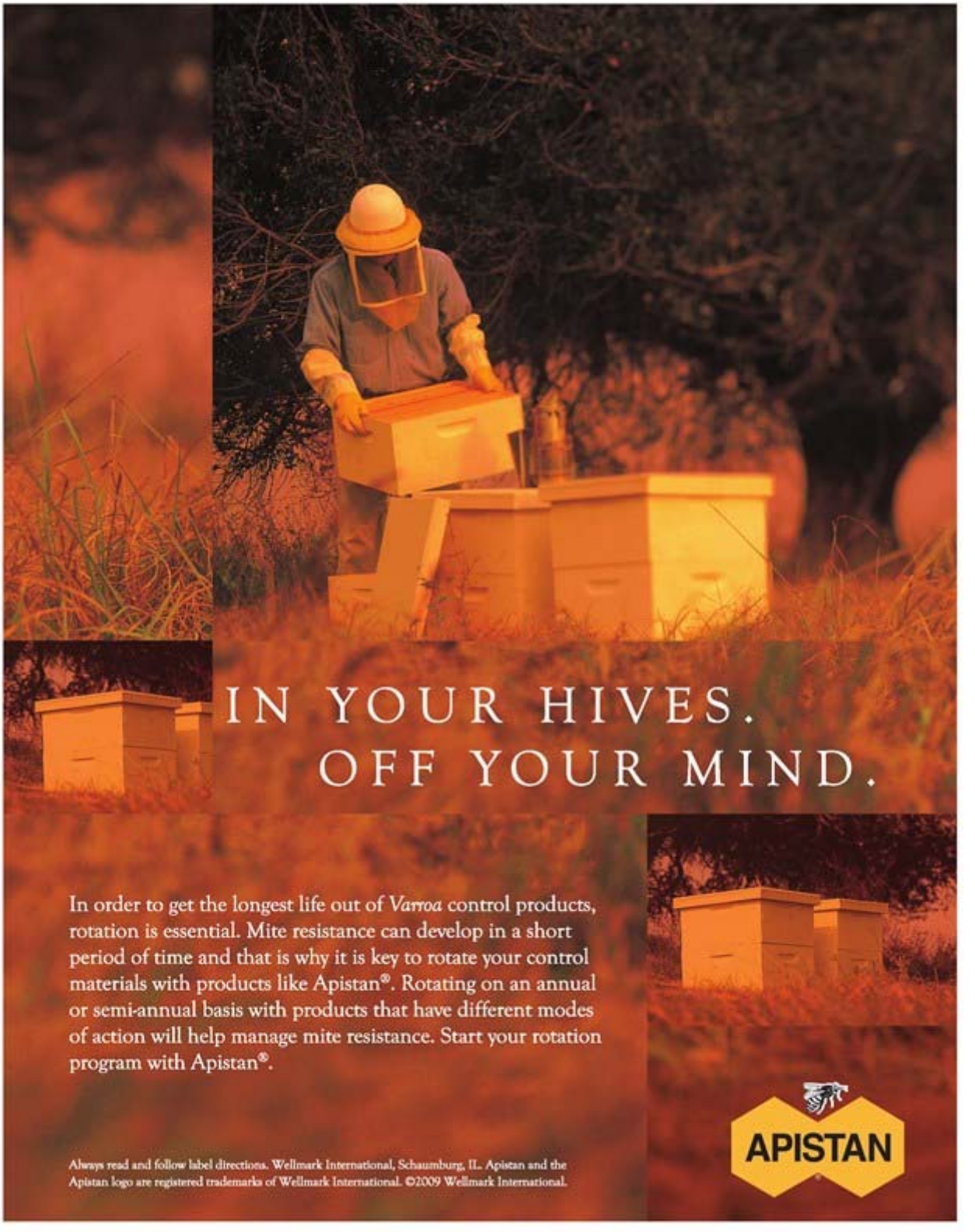
Some people come to make a fashion statement...

... while others just make a statement.

Nobody has to be called twice for lunch. The food was great!

Above, Eric Mussen with the Hive Tool of Office, to become an annual ritual, and presenter Randy Oliver. Right, Awards Chair Archie Mitchell presents Al Chubak with the Thurber Award for Inventiveness. His Eco Bee Box, with aluminum corner brackets, stainless steel locking clips, and custom carvings has gained national and international attention. Center, Mussen's ladies, whom he credits with "keeping me grounded through the Conference chaos!" - Fran Bach, Helen Mussen, Sherry Olsen-Frank and Cyndi Smith. Bach also received the Outstanding Service to Beekeepers Award for "dedication to excellence in editing and publishing the WAS Journal".

WAS Hive Central: Back row, left to right, Treasurer Sherry Olsen-Frank, Journal Editor Fran Bach, Secretary Cyndi Smith, Washington State Director James Smith, 2018 WAS President & Idaho Director Steve Sweet, Wyoming Director Catherine Wissner, Hawaii Director Peggy Beckett, Retiring British Columbia Director Ian Farber. Front row, left to right, 2018 1st Vice President & Alaska Director Joe Carson, 2017 President Eric Mussen, Utah Director Al Chubak, 2nd Vice President & Oregon Director Sarah Red-Laird, new British Columbia Director Nancy Burkholder.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CONFERENCE 2017....
Why topbar hives are not going away

Les Crowder, Austin, Texas

Once we have decided to keep bees we get to decide what kind of beehive to keep them in. In her book "The Archeology of Beekeeping", Eva Crane wonderfully describes how people all over the world for millennia have been making structures for bees to live in. Many ideas have been tried. Some did not meet the biological needs of the bees and some did not meet the financial or practical needs of the beekeepers. There is nothing wrong with trying what you can afford that seems right for you.

Beehives can be split into two major categories - fixed comb and moveable comb. Fixed comb hives where the only type people had until fairly recently. Fixed comb means the combs are built into the structure and cannot be easily removed to see what the bees are doing without destroying the comb. They could be storing honey, the honey may or may not be ripe (fully thickened and dehumidified), there could be larvae bees in the comb. The beekeeper does not know because the combs cannot be lifted out to look at and put back. Warre, Perone, skeps, and the Middle Eastern tubular hives are examples of hives in use that are fixed comb hives. They vary in complexity and cost.

Movable comb hives are structures that have removable elements, frames or topbars, that are spaced just right to get the bees to build combs on the frames or topbars. This gives the beekeeper the ability to take combs out, see what is in them and put them back. Most countries have departments of agriculture that require beekeepers to keep bees in movable comb hives so a honey bee inspector can inspect for diseases and parasites. I like to be able to see what is happening on each comb and decide where to put the comb. With movable combs the queen can be found, combs can be removed and rearranged and honey can be harvested comb by comb.

For many years, the only movable comb hive available was some version of the framed Langstroth hive. It is the stacking box hive often called 'traditional' now, invented in the 1800s. The topbar hive was initially deigned for beekeepers in developing countries that could not afford the complex, precisely cut and delicate frames and the beeswax or plastic foundation. Beekeepers in developed countries began experimenting with them and discovered that the topbar hive had some advantages. Many people are beginning to keep bees in rural and urban homes and many are choosing the topbar hive.

Topbar hive advantages

Topbar hives can be cheaper. If you are handy, they can cost $0.00.

Topbar hives require very little precision carpentry and can be made out of many local materials. I have made topbar hives from scrape lumber, plastic blue barrels, willow and wicker, and adobe mud. Some of the hives I have made did not cost any money, just time to find materials and put them together. Although very beautifully built topbar hives are available commercially, some of us love to see recycled free material made useful. And many beekeepers around the world are happy they can afford a topbar hive because they could not afford a manufactured Langstroth hive.

Topbar hives don't require lifting heavy boxes.

The framed hives have 10 combs in each stacking box and often one must lift the entire box. A full sized (deep) box can weigh more than 80 pounds. Smaller boxes weigh less but cost more for the same capacity. The topbar hive does not have supers or separate boxes to lift, and our manipulations consist of lifting one comb at a time, a comb that could weigh as much as four pounds. Many people, young and old, male and female, do not want to lift heavy boxes.

Topbar hives do not use "foundation".

Foundation is either a beeswax or plastic sheet made to put into a frame that hangs in a hive. It makes the bees build their combs in the frame. It cost money. It is made with a certain size cell pressed into it, usually about as large as a queen will lay a female worker in. (Queens measure cells they are induced to lay eggs in. They lay male eggs in large drone size cells and female eggs in worker and queen size cells.) Feral bees build combs with a variety of cell sizes. Complete control of the size of cell was considered good and bigger is better was the thinking at the time. Drones don't make honey so why waste space on them? I won't enter into the whole cell size debate. It seems we get lost in our belief systems and all point to our favorite studies, but I am happy to let the bees decide what size of cells they want to live in and they let me decide what size of shoe to fit my feet into. I don't know why they want drones now and then but I don't want to fight with them. I can always move the drone comb out of the brood nest later if they have begun filling it with honey. (They usually

do, and beekeepers who use foundation wouldn't know because they never give the bees a chance to show them. They seem to assume that bees will raise drones in drone comb all season long.)

It is easier to avoid crushing bees in topbar hives.

People who are not farmers, or professional beekeepers are beginning to keep bees, often in cities, near homes. These people view the bees more like pets and less like livestock. They need to keep calm bees and to keep the bees calm. Crushing bees in the hive when moving combs gushes the smell of bee blood and alarm pheromone through the hive. If you kill bees in a hive full of their sisters you should expect that the survivors will get angry with you. Their anger can last a few minutes to a few days depending on the temperament of the colony. (The temperament has some genetic roots, some bees are more prone to sting than others.)

It is very difficult to lift the first few frames out of a framed Langstroth hive without crushing bees. Bumps in the combs scrape against the other combs, and the moving comb bumps against the box. With topbar hives the combs lift up and away and are much easier to lift without crushing bees between combs or between the comb and the box.

It is also very difficult to stack the stacking boxes full of bees without crushing many bees between the boxes. A properly designed topbar hive has ridges that allow the beekeeper to set the combs back carefully and gives the bees a quick clear path to get out of the way of the moving parts. (See drawing next page)

Culling comb is important, easy and inexpensive with topbar hives

A colony of bees consists of thousands, even 80,000, bees living between the combs and storing everything they have - larvae, honey, pollen and occasionally water - in the cells of the combs. In the super organism the combs are like the bones the creature hangs its flesh and stores its reserves in. Certain cells are cleaned especially well and scented to induce the queen to lay eggs in them. The egg stands up for three days and then the larvae hatches out and lies on the bottom of the cell. Bees that make the larval food in glands in their mouths are called nurse bees. They regurgitate a little pool of thick liquid food on the bottom of the cell and the larvae plows through the pool eating. If the larvae were to defecate it would be defecating in its own dinner plate. So it does not defecate until it has filled the cell and is standing head up and tail down at the cell opening. It then releases a small amount of excrement on the bottom of the cell. It spins a cocoon over the excrement and into the wax walls of the cell. It undergoes metamorphosis, chews through the cap of the cell and emerges as an adult bee. The cell it came out of is cleaned. Propolis (a sterilizing tree resin) is rubbed around in the cocoon embedded in the wall and a new egg is laid in the cell. Another larva eats, poops, and spins its cocoon. Over time the comb darkens, the cells get constricted with all the cocoons one inside the next and the bottom of the cell builds up with larval excrement and cocoons. The old combs begin to get ripe with bacteria and fungi of decay. These old used combs become a detriment to the hive. Old combs increase the chances that the hive will come down with a bacterial or fungal brood disease and decrease hive growth.

Wild bees in natural hives eventually abandon old comb and either build comb in other parts of the cavity they live in or abandon the entire cavity (abscond) and let the wax moths and hive beetles destroy the old comb. Wax moth larvae actually like to eat old comb and do not like clean new comb.

There is a more modern reason to want to get wax moved through the system and not be held stagnant in the hive for many years. Our bees live in the same world that we live in, a world in which toxic chemicals are being developed and used more and more each day. Bees are licking the environment millions of times a day. Any toxins they take home with them are either going to absorb into the honey if they are water soluble, or into the beeswax if oil soluble. Oil soluble toxins often accumulate in the beeswax over time in the hive. Pesticides, including the ones some beekeepers put in the hive to kill mites, can accumulate to levels that weaken the bees. Old comb once again becomes a liability.

In my Langstroth days, I learned about the detriment of old comb and began a system to cycle combs out of the hive every five years. It was a lot of work to put a new sheet of foundation wax in the frames, and it cost money. The reason I was first drawn to topbar hives was I realized that no frame and especially no foundation could save a lot of time and money. I now dedicate a time of the year to pulling old comb out of the main brood rearing area, letting it either get empty or full of honey. Then I strain out any honey in it, solar melt the wax out of the old comb and compost the cocoons and excrement. It takes a few minutes and I don't have to scrape out old combs or buy foundation.

There are no combs to store with topbar hives.

Another benefit to topbar hives is the fact that there are no combs to store over any dearth or winter time. When I worked for a commercial beekeeper, a fall job was to fumigate all the combs of the 25,000 "supers" (the top boxes used to accumulate and harvest honey) in a warehouse. They had to be fumigated because wax moth and hive beetle larvae live in all combs in all beehives in the world. The bees are constantly weeding them out. If a comb is taken away from the bees

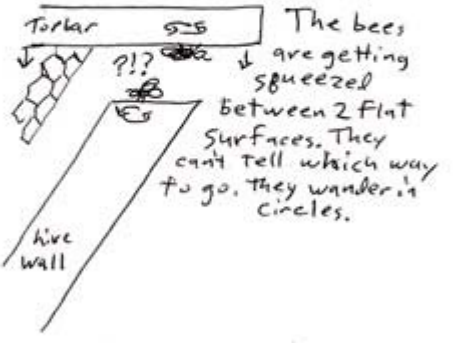
there is nothing to weed out the comb eating larvae and they proliferate and destroy the combs. The commercial beekeeper I worked for used Ethylene dibromide to kill wax moth larvae. It is highly carcinogenic, and very long lasting. It is banned now so beekeepers are supposed to use moth balls (para dichlorobenzene) -, not as carcinogenic or long lasting. I really do not want to put time and money into creating a toxic situation where I expose myself, the bees and the world to a toxin I can avoid. Topbar beekeeping destroys the comb and it is not stored. That eliminates the cost, labor, and toxicity of storing combs.

Topbar hives make more beeswax.

Since the entire comb is destroyed and the honey is strained out, there is more beeswax harvested during the honey harvests. Beeswax is a valuable product that can be made into salves, lip balm, candles and more.

Topbar hives do not require an extractor to harvest honey.

If a beekeeper only has a few hives, simple kitchen equipment (a colander, a large bowel, and a strainer) is all you need to strain honey out of the beeswax. As more hives come into your life you can get a bigger strainer and a large straining and bottling tank. All the equipment to harvest honey for 200 topbar hives in still about half the price of an extractor.



Disadvantages of topbar hives

Since there is not often foundation in topbar hives, the bees can get "cross combed" (building a comb across the topbars or from one topbar to another.) I used to start topbar hives with some 1 inch strips of foundation. Beeswax rubbed or melted on to cleats on 5 - 8 topbars helps keep them straight, but the topbar beekeeper simply has to check and gently straighten them out. Once a few combs are built straight the bees get more or less in a pattern but I always put new combs and empty topbars in between straight combs to keep the building going straight. It does take a little extra management.

Do topbar hives make less honey?

It seems they would, if they make extra wax that costs honey. They put a lot of honey in very little wax so it may not cost as much as we think. Actually we don't really know. An experiment in the Caribbean indicated their topbar hives made more honey than their Langstroth hives. The research community has not realized the number of topbar hives in use and they have not taken them seriously. A long term study to compare the production of all hive products and the costs of production with Langstroth and topbar hives has not been adequately done.

Honey Bee Nutrition (Part 4) *See previous WAS Journals for Parts 1 - 3.*

Dale Hill, PhD, PAS, Quincy, IL

In earlier articles in this series, protein (amino acids) and carbohydrates (sugars and starches) were discussed. In Part 4, we will focus on lipids. Lipids are a very large group of chemical compounds (literally thousands of compounds) that are more soluble in ether than in water. These compounds are based on carbon and hydrogen molecules, with very few oxygen molecules as compared to carbohydrates. Lipids include fats, oils, and waxes. Lipid compounds are only part of the complex basis of organic chemistry. This area of chemistry is challenging to learn and understand as any student who has taken these college courses can attest. Lipid nutrition and chemistry are, by far, much more complex than protein or carbohydrate nutrition and chemistry.

In simplest terms, fats are solid at room temperature (think of beef, pork and chicken fats), oils are liquid at room temperature (think of vegetable oils and fish oils), and waxes have a melting point above 98ºF but less than 212ºF (think of bee's wax with melting range of ~145-150ºF). The more common lipid compounds are made up of fatty acids with 1 - 24 carbon molecules. Every lipid compound in Nature is a mixture of components which adds to the complexity.

Lipids also include many carboxylic acids, vitamins (Vitamins A, D, E, K), cholesterol and many associated molecules, including sterols, hormones and pheromones. The vast majority of compounds that we can smell or taste are lipid-based or derivatives of lipids (a few examples would be banana oil, vanilla, pineapple, citrus, lemongrass oil, and mint flavors and aromas.).

With this very brief and over-simplified background, let's look at how this relates to honey bees. There is a lot less known about lipid metabolism in honey bees than protein and carbohydrate metabolism.

First and foremost, lipid compounds make up a large part of every cell wall in all living species. Any disruption of the lipids in the cell walls will negatively affect health and longevity. Lipid oxidation (also known as rancidity) is the reaction of unsaturated lipid compounds (with 1 or more double bonds between carbon molecules) with reactive oxygen or other reactive compounds (especially copper and iron). This is of major concern since this chemical reaction may change the 3-dimensional configuration of the lipid compound, which usually changes the integrity of the cell walls, which may then result in "leaking" cells. These changes are likely a contributing factor in aging and cell death in all species.

As we have all heard in the news, certain foods contain high levels of antioxidants. Antioxidants react with oxidative molecules and lipids to help slow the oxidation process down. The antioxidants of interest for bees are natural plant-based compounds that help protect the plants from lipid oxidation, and when consumed by bees (and other animals), these compounds exert the same biochemical (antioxidant) effect in the body. Antioxidant chemistry is the same basic chemical reactions whether we are discussing plants, insects, mammals or industrial applications (example: rubber in tires), and whether we are discussing plant-based or man-made antioxidant compounds.

Under normal conditions, there appears to be adequate lipids in pollens to meet the needs of honey bees. Pollens from various plant sources have been found to contain from about 4-6% lipids on a 100% dry basis. Dandelion and mustard pollens appear to have relatively high lipid content compared to other plant species. Lipid digestion takes place mostly in the middle areas of the intestinal tract between the stomach and the large intestine. Lipid digestion in honey bees increases during the first 3 days after emergence, and is greatest in bees around 8 days of age. After about day 8, lipid digestion decreases with increasing age, with relatively low lipid digestion in older foraging honey bees. Compared to mammals, there is very little fat storage in insects.

Queens, both young and old, have cell membranes made up mostly of mono-unsaturated fatty acids (think of pork fat), and are relatively low in poly-unsaturated fatty acids (think of vegetable oils). Mono-unsaturated fatty acids are less susceptible to oxidation than poly-unsaturated fatty acids. Worker bees, in their first few days after emergence, have cell membranes similar in fatty acid composition to queens. During the first week after emergence, the fatty acid composition of worker cell membranes changes to more poly-unsaturated fatty acids and less mono-unsaturated fatty acids. This means that worker cell membranes are much more susceptible to lipid oxidation within the first week of life as compared to queens. This is likely a factor in shorter life span of worker bees as compared to queen bees.

Honey bees require sterols in their diet for normal growth and reproduction. Cholesterol is essential for honey bees since they cannot metabolically make this compound. Cholesterol or 24-methylene cholesterol (the more common plant form of cholesterol) are found in very small amounts in many pollens. These compounds are used by bees to make the molting hormones that produce the changes from egg to larvae to pupae to emergence. Bees appear not be able to convert plant phytosterols to cholesterol. Artificial pollens and protein supplements with added cholesterol or 24-methylene cholesterol supported greater survival of worker bees as compared to other plant sterols. Due to cost and availability, supple-

-mental cholesterol in protein supplements is commonly from chicken eggs. Other supplemental sterol sources are prohibitively expensive and are used less efficiently - or not at all - by honey bees. 24-methylene cholesterol may also act as a pollen attractant in blossoms, but this attraction does not appear to carry over to synthetic diets for bees. Cholesterol and 24-methylene cholesterol are also precursor compounds for the bees to make reproductive hormones and pheromones.

Royal Jelly is made up of secretions from the hypopharengeal gland (clear and mostly protein) and secretions from the mandibular gland (white and mostly lipids, including 10-HDA). The primary protein in Royal Jelly is vitellogenin – a glyco-lipo-protein (sugar- lipid-protein compound) that is similar to poultry egg protein. Kamakura reported that Royalactin (a specific protein in Royal Jelly) plays a major role in ovary development. Worker bees are fed "worker jelly", with 20-40% lipid material with the rest being protein fraction and honey for the first 2 days of the larval stage. After day 2, worker larvae are fed only the protein fraction from the hypopharengeal gland mixed with honey, and are somewhat limit-fed. Queen larvae are fed equal amount of the protein and lipid fraction (Royal Jelly) throughout larvae development and are fed unlimited amounts. Glucose is the primary sugar for queen development. At this time, there has been no satisfactory substitute for Royal Jelly developed for the complete nutritional needs of bees from egg to larvae to pupae to functional adult. Much of the challenge is that complete nutritional needs of these life stages have not yet been determined. Some compounds in Royal Jelly have antibacterial and antibiotic activity. Some are not storage-stable, so you must use fresh Royal Jelly for queen grafting and rearing.

Of particular importance, nurse bees can synthesize mandibular acids from acetate (a 2-carbon fatty acid) from fermented pollen (bee bread). The most important mandibular fatty acid is 10-hydroxy-2-decanoic acid (10-HDA). This fatty acid has not been reported in any plants or pollens that I have been able to find in searches of the scientific literature. The 10-HDA is an essential compound in Royal Jelly, and may be as much as 5% of Royal Jelly by weight. The physiological role of 10-HDA is still unclear as to whether there is a direct effect on ovary development and function in the queen, or whether it protects the queen from compounds that may inhibit ovary development in worker bees who are not fed Royal Jelly after day 3. It is clear that 10-HDA has a direct influence on gene expression, but the mechanism(s) are still not understood. The queen cannot synthesize this fatty acid in her mandibular gland, so she must be fed Royal Jelly. Nurse bees lose the ability to make this fatty acid as they transition to foragers. This means that when you make splits, nucs, or are grafting eggs for queens, you must have adequate numbers of nurse bees. If the developing queen does not get adequate amounts of Royal Jelly from young nurse bees, the developing queen may not have fully developed ovaries and may not lay enough eggs for a good brood. Foragers that must revert back to nurse bees have lost much of the ability to make this mandibular acid and are much less efficient in this process than are young nurse bees6. With these factors in mind, queen failure may not always be the fault of the queen, but may be due to inadequate nutrition.

It is very clear that the food consumed is responsible for queen development. All worker bees and queens have identical DNA, so the anatomical, physiological, longevity and reproductive capacity are all determined by the food and environment, and are based on complex hormonal and biochemical reactions. This process is called phenotypic polymorphism.

Queens continue to be fed Royal Jelly throughout their lives. This dense concentration of nutrients is essential since the queen can lay nearly her body weight in eggs every day during peak laying and colony buildup.

Sterile adult females (worker bees) cannot readily metabolize vitellogenin, so they deposit this complex protein in the glands of the head and abdomen. Current thinking is that worker bees transition to foragers when they become deficient in this protein. Vitellogenin may also have a role in juvenile hormones involved in egg to larval to pupal stage development. We cannot talk about lipid nutrition without considering the complex interactions with proteins, carbohydrates, vitamins and minerals, and how these nutrients impact gene expression. There are still a lot of unknowns in bee nutrition.

Wintering Honey Bees in Northern Climates

Joe Carson, WAS 1st Vice President, Wasilla, Alaska

We have wintered bees in Alaska at what some would call "extreme" conditions. On one farm we typically reach -27 degrees F. with occasional temperature drops to a cool -37F. Our other bee yard is in the 'Bush' of Alaska, off the road system and reachable only by small airplane. We will see temperatures hit -65 F. ambient every single winter. Winds in both areas will bring the chill factor down to about -82F to -100F. So yes, we have wintered honey bees. The obvious question now is what is the success rate - or more plainly - what is the survival rate in these areas? In the beginning we had considerable die off, as much as 50%. Now many years into it, we average 7% -15% die off. The best overwintering we have had is 100% success with -65F. ambient temperatures. The loss of a hive can be attributed to many things which we have little or no control over: weak queens, wild temperature fluctuations, extended winter, too mild or too wet winter, etc. It is the things we can do to help the bees survive that I am interested in. Bees on cruise control die!

The best wintering practices and techniques: The ones that work best for you!

I will start with some basics. I prefer the darkest bees I can get. No whiz-bang college educated bees - just good, hard-working, gentle, dark-as- night bees. The lighter the bee in color the more they eat and shutting them down for winter is tough to do. No, I do not use Russians. If you want a pet, buy a horse. I use Carniolans or Caucasians, or as close to the German Black as I can get. They shut down for winter, lay prolifically in spring, are gentle as can be, and propolize the hive very well for winter.

I like to re-queen in the fall, usually around September. The queen thinks she is a spring bee and lays good young bees during winter for me.

I do not use any of the polystyrene boxes or products. I think I have tried all brands known to man. Some are of terrible design. Some of them drip the condensation exactly in the center of the brood and kill the hive. Obviously ventilation is important but some of these poly boxes are real killers.

The three things I have found that kill bees in our climate is 1. Starvation, 2. Wind, 3. Moisture.

We have about four weeks to make honey each summer - the month of July. We generally pull honey the first week of August. Then we start to feed - and I mean feed. 2:1 syrup with a product called "Complete" mixed in. Protein patties with "Complete" added. We need the vitamins, minerals, amino acids, essential oils, pre and pro-botics. You'd better have a minimum of 60 lbs. of feed per hive in the frames if you are going to winter out-of-doors. I do not use large containers, sheds, connexs or any indoor type structure. There is a way to do that which is very successful, but that is another article. Candy boards are essential. Find your best online recipe for making rock-hard sugar candy and add the product "Complete" in the liquid just before pouring it into the mold. You will need two candy boards per hive, a minimum of 3 inches thick, that fit exactly into a shallow box on top of the hive. Be prepared to replace with the second candy board in mid to

Alaska's famous Iditarod 2017, Joe Carson's swan song as a sled dog musher.

late January, depending on hive weight and temperatures to date. I like to have at least one hive per yard on a weigh scale to have solid data on hive feed consumption, an inside and an outside thermometer to keep track of the yard's wintering statistics. The new system with remote tracking on the smart phone is very handy. A tad spendy - but cheaper than losing a hive.

I put a piece of cloth on top of the candy board before putting the lid back on, for a couple of reasons. The candy board sits right on top of the top bars in the top box of your double deep hive. It absorbs moisture, and provides thermal mass for hive heat consistency as well as providing a food source with essential nutrients.

Wrapping the hive with 15 lb. tar paper seems to work as well as the fancy insulating pads sold in Canada. We have tried building poly boxes to slide over the whole hive assembly, wrapping them with rubberized sleeping bags and piling straw, with a blue tarp on top to the keep straw from blowing away, but the best success has been tar paper with lots of snow for insulation. Hive placement is crucial - south facing with north wind blocked.

I drill a 5/8" hole in all boxes just above the hand hold. These can be plugged with a wine cork when not needed and provide entrances throughout the year as the hive grows. We leave the top box hole open for ventilation and reduce the bottom entrance to about the same 5/8" size with screen in front to prevent mice and shrews from getting in. Once we close the hive we do not open the bottom entrance until we have flying days and surrounding ground clear of snow. The biggest mistake Northern beekeepers make is opening the hives up too early. The bees start to fly and then snow or hail or rain just wipes them out. I speak from experience. You need a good warm day of about 45F.

Equipment-wise I prefer cedar wood boxes with the Turkish plastic bottom board which serves as a screen bottom board, open for most of the year, sticky board, pollen trap, landing board, entrance reducer and more. I like to paint them in bright colors, a bit darker than southern beekeepers use. The darker colors soak up the sun better.

I hope these few ideas help or give you something to ruminate on. A few parting thoughts:

Water: A nutritional secret. Optimizing water intake helps bees capture the full nutritional value from the food sources and equates to better health and performance. Where do your bees get their water?

Amino Acid balancing: It's just plain smart. Income over feed costs increases with balanced amino acids.

Smart feeding protects your bees - and your future.

2017 Bee Care Award Winners Impact Local Honey Bee Health Initiatives

Western beekeepers took both awards in the 2017 Bayer Bee Care Community Leadership Awards competition. Bayer presents the Awards annually to recognize deserving individuals championing bee health on a grassroots level.

This year, Bayer expanded the scope of its awards program to recognize not only one innovative beekeeping partnership, but also a tenacious young beekeeper. By striving to understand the importance of honey bees at a young age, these next-generation beekeeper applicants have proven their commitment to making a positive impact on the long term well-being of the species.

Jake Reisdorf

Jake Reisdorf, 14-year-old owner of Carmel Honey Company, manages nearly 100 hives in Monterey County, California, and helps others do the same, speaking to organizations and schools as part of his "Jake Gives Back" program. His award comes with a $1,000 prize and the opportunity to use the platform for further outreach initiatives.

Jake's passion for bees originated after completing a beekeeping course with his father when he was in fifth grade, then a honey bee-themed website he designed for a school project. His classmates began to look to him as a resource for bee health information. This inspired Jake to adopt a hive of his own.

Today, Jake has nearly 100 hives throughout Monterey County. He sells pure, raw, premium honey and honeycombs to specialty food stores and restaurant chefs; places hives on residential and commercial properties for people who want to support the bees but don't have the time or resources to be beekeepers; and gives educational presentations at schools and local organizations focusing on the importance of bees in the food chain. Jake is also a member of the California State Beekeepers Association, the American Beekeeping Federation, and is currently participating in the UC Davis Master Beekeepers Program.

Kirk Tubbs

Beekeeping pair Kirk and Heidi Tubbs of Tubbs Berry Farm were also honored for their work with the local pest abatement district in Twin Falls, Idaho, receiving a $5,000 Community Leadership Award.

The Tubbs began beekeeping 10 years ago due to pollination issues on their farm and have since become a local resource for anything related to beekeeping. As a result of their esteemed reputation in the pollinator community, the opportunity to partner with Twin Falls County Pest Abatement District arose, with their first joint venture piloting tests to determine if a new mosquito control method had an effect on bees. As a result of their ongoing research on Integrated Pest Management, county employees have gained opportunities to expand their knowledge of bees and the products that are employed to reduce nearby mosquito populations. Additionally, Kirk instructs mosquito control operators at various conferences and workshops about how to have informed discussions with beekeepers on the impact various control methods have on bees.

64th Annual Beaverlodge Beekeepers' Field Day

In excess of 200 honey producers, hobbyists and industry representatives came out on a beautiful sunny day to take in demonstrations and talks on the latest findings in bee research at Agriculture and Agri-Food Canada's Beaverlodge, Alberta, Research Farm, Canada's most northerly research site. This was the largest turn-out in recent years. The composition of attendees has also gradually changed in that many more hobbyists and members of the general public attend, making this event a combination of producer and public outreach. Many people stayed for the entire day, including former Assistant Deputy Minister of Agriculture Jody Aylard who came with her husband from Victoria, B.C. 2017 also marked the 100th Anniversary of the Research Farm.

Besides those shown in the photos below, other presenters included Dr. Carlos Castillo, Grande Prairie Regional College National Bee Diagnostic Centre; Dr. Medhat Nasr, Provincial Apiculturist, Alberta Agriculture and Forestry; Guy Chartier, BeeMaid Honey CEO, and Grant Hicks, Past President, Beekeepers Commission of Alberta.

The annual event was organized by the Farm's Dr. Steve Pernal, Research Scientist and Officer-in-Charge, who also organized an industry tour to honey producer operations in the Peace region for invited guests the following day.

1. Keynote speaker Dr. Diana Cox-Foster IDs pathologies during her "bee autopsies".
2. Dr. Shelley Hoover on canola pollination.
3. Elena Battle and Emma Cairns demonstrate Varroa sampling and treatment.
4. Patricia Wolf Veiga (National Bee Diagnostic Centre) on ID-ing Africanized bees.
5.Good thing we had Encana's giant BBQ!
6. Dr. Renata Borba on the UBC "Bee'Omics" Project.

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Oct 27 - 29: British Columbia Honey Producers Association Annual Meeting & Conference, Coast Capri Hotel, Kelowna. Info beebetterkelowna.ca.

Nov 11: Washington State Beekeepers Annual Meeting, 4 - 6 p.m., via telephone conferencing or computer/smart phone which will also permit you to view the presentation materials. Link will open at at 3:30pm to assist members with getting online before the meeting starts. All members will have received connection information by then. If you got missed, contact president@wasba.org to rectify.

Nov 14 - 16: California State Beekeepers Association Annual Convention, Harrah's/Harveys in Lake Tahoe, CA. Info http://www.californiastatebeekeepers.com/events.html.

Beekeepers' Calendar

Nov 30 - Dec 1: Idaho Honey Industry Association 2017 Annual Conference and Annual Meeting, Red Lion Hotel in Boise, Idaho. Program and registration info at www.idahohoney.org. We welcome vendors, hobbyist and commercial beekeepers. For more, contact IHIA at 208-888-0988 or by email cindy@amgidaho.com. Special speaker – Ralph Jones addressing Risk Taking/Decision Making.

Jan 9 - 13: 75th Diamond American Beekeeping Conference & Trade Show, Grand Sierra Resort, Reno, Nevada. Info abfconference.com.

Jan 10 - 13: American Honey Producers Association 49th Annual Convention & Trade Show, DoubleTree-Mission Valley Hotel, San Diego CA. Info www.AHPAnet.com.

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