Bee *friendly*

A Newsletter of the New Mexico Beekeepers Association

www.nmbeekeepers.org *Winter 2022*

2023 Virtual CONFERENCE Saturday, February 4th

Lars Chittka, Ph.D.
'The Mind of a Bee"

Chittka has carried out extensive work on the interactions of bumblebees and honeybees with flowers, and has been involved in projects linking the science of bees with music and art.

Judy Wu-Smart, Ph.D.
"Hive Necropsies--What Dead Collonies Can Tell Us"

Wu-Smart leads the pollinator health program at U of Nebraska-Lincoln, looking at the underlying stressors in bee health and bees' interactions with environmental toxicants.

Cameron Jack, Ph.D.
"Seasonal Efficacy of Current Varroa Treatments"

Jack's goal is a program that prepares students for the challenges of beekeeping, providing practical solutions to beekeepers seeking to improve honey bee health.

Juliana Rangel, Ph.D.
"Nutritional Ecology of Honey Bees in a Changing Landscape"

Rangel focuses on honey bee nutrition, factors that affect the reproductive quality of honey bee queens and drones, and the genetics of unmanaged honey bees.

Nick Naeger, Ph.D.
"Using Fungi to Aid Bee Health"

Naeger aims to find innovative ways to help bees fight diseases, studying the interactions between honey bee nutrition, diseases, and the bee immune system.

Kaitlin Haase
"Planting for Pollinators"

Haase is the Xerces Society's Southwest Pollinator Conservation Specialist, working to create climate-resilient, connected pollinator habitat in Santa Fe and Albuquerque.

NMBKA
New Mexico Beekeepers Association

Winter 2022

Our newsletter is a quarterly publication of the New Mexico Beekeepers Association (NMBKA).

www.nmbeekeepers.org

Photo: Courtney Bradley

Interim President's Message

SEASON'S GREETINGS!

There has been a change of leadership within the NMBKA board as Robert (Bob) Reneau who was serving as President has stepped down. We appreciate all the time and energy, and the leadership that Bob extended throughout his tenure participating in the Association and also for the past year that he served as the NMBKA President. Vice President Melanie Kirby is now serving as interim NMBKA President until the next election in February 2023. Here are a few words from her:

'Tis the Season to our beekeepers and bees across the Land of Enchantment! I've served on the NMBKA board several times over the years starting back in 2007 as a board member-at-large. I more recently have been serving as the Vice President and with Bob's stepping down, now as interim President. I bring diverse apicultural experience as I've been keeping bees professionally for over 25 years and now also work in agricultural education and outreach. Until our February annual meeting and conference, my goal is to help carry the Association forward into the new year with our dynamic and dedicated board and membership. I want to encourage more NM beekeepers to consider participating on the board and Association projects and programs. Without your input and participation, the Association ceases to exist; you are each valued and instrumental members of our local to state to national beekeeping communities.

At this time, there are several pertinent topics that members are encouraged to consider for the coming year including renewing your membership and encouraging others to join the Association. Your membership includes admission to our 2023 Virtual Winter Conference scheduled for all day Saturday, February 4, 2023 and the NMBKA Virtual Annual Meeting tentatively scheduled for Thursday, February 23, 2023 at 6:30 pm MST. Please visit www.nmbeekeepers.org for conference and registration information.

Also, if you are interested in serving on the board, nominations are currently being accepted! All members are invited to apply. Email Jessie Brown at: abqjessie@gmail.com for details and the application form. And check out our numerous volunteer opportunities to serve on committees. Find info on the NMBKA website!

Sincerely,
Melanie M. Kirby
Interim President/Acting VP

CBeeks End of Season Update

By Steve Black, CBeeks Program Director

Our Level II program culminated in October with presentations selected and prepared by Level II students:

Kurt Ferreira - *Characterizing Honeybee Colony Dynamics using Data Analytics*
Benjamin Scott - *Russian Honeybees*
Ellen Drew - *My Pollinator Journey*
Philmon Koyona - *My Bee Journey and How Important Pollinators are to Us*
Alice Ahmie - *My Bee Journey*
Chris Ahmie - *Beehive Construction*
Bruce Burnham - *Regenerative Agriculture*
Dylan Martin - *Apiculture and Mycology*

The presentations on a diverse set of topics, and coming from each student's perspective, represented the culmination of each student's two-year effort in beekeeping.

The CBeeks committee is busy preparing for next year as we already have students signing up for the 2023 season. Interested students can sign up at https://nmbeekeepers.org/certified-beekeepers-program/

From left to right: Steve Black, CBeeks Program Director; Dylan Martin, graduating student; instructors Amy Owen and Craig Noorlander; Benjamin Scott, graduating student; Lynette Ewer, Level II Coordinator.

Our two graduating students met all of the graduation requirements prior to the last class. Congratulations!

(L) First year Certified Beekeeping students getting hands-on experience with one of the eight hives we maintain at the Open Space Visitor Center in Albuquerque. (R) First year includes lots of classroom, too

Garden Way Stations for the Future

By Allison Moore, BLA, Landscape Architect

By the time this article is published, it will be December and many of you will have already put your gardens to bed for the year. I am writing this article in late November and there are still leaves on many of the trees in my neighborhood as well as in my own yard. I take daily walks in my neighborhood and enjoy seeing everyone's front yards evolve over the seasons -- especially fall with the changing colors and textures. Many yards contain a creative mix of native and drought tolerant plants that are frequently visited by wildlife (including our favorite pollinator – honey bees) and have an appealing slightly overgrown quality to them.

There are also many homes that have lawns often surrounded by shrubs and trees carefully spaced out so that not one branch is touching and not a single weed appears in the gravel mulch. While the designer in me understands the appeal of a well-defined space, these highly manicured landscapes often end up looking stale in comparison to the less maintained natural ones. This year (and in years past) I noticed some of those same lawn landscapes being maintained in the form of mowing and blowing every leaf off the property. It's true that lawns cannot tolerant a heavy mulch of leaves over the winter as it often leads to disease but there were no leaves left anywhere – not the lawn, or the planting beds or gravel mulch – the end result was a landscape made starker by the absence of any organic debris.

For many years I worked at various landscape companies, several of which were permaculture or environmentally based, designing residential and commercial gardens and working with maintenance and installation crews. Even if the landscape was a native landscape or a permaculture landscape, the clients still wanted it neat, respectable, and all within HOA guidelines. Some landscapes had lawns (both turf and native grass) and some did not, but either way, the expectations were the same: every perennial was to be meticulously deadheaded and pruned, the beds were to be weeded and raked, and the lawns kept short – nothing too wild or messy.

At the time that's just what we did along with most landscape companies and I understand that not everyone wants to garden nor has the time, energy, or knowledge. Often times the easiest thing to do is to treat your landscape like the interior of your house with organizing, vacuuming and fumigating. But it's time to change that mindset and view the natural areas around our homes as just that – nature. And this is true whether you have a meadow as a backyard or a couple of flower pots on your balcony. We need to reimagine our relationship with nature and it starts in our yards. And more importantly we need to give ourselves, our neighbors and especially HOA's, landscape companies, and local governments, permission to leave those spaces a little messy and a little wild – leaves and all!

This message is not new; numerous books and articles have been written about leaving the leaves, keeping flower stalks and grasses up over the winter, and delaying garden clean ups until the late spring. Wildlife in all forms benefit tremendously from these actions, creating food and shelter during the lean months of winter and spring and finding the perfect spot for a nest or to lay eggs for future populations. But we need to think beyond the winter and spring and consider the big picture – or rather a longer life line.

I recently heard a show on the local public radio station on how to save the endangered Monarch butterfly and was struck by the observation that habitat loss is one of the biggest contributors to the declining population.

Again, this is not new information especially for those of us who observe our own honey bees not collecting as much nectar and pollen as they have in the past, perhaps due to dwindling forage both in diversity and quantity. The guest speakers on the show mentioned planting milkweed and other natives and brought up the idea of creating way stations for the migrating Monarchs. When asked how many were needed the reply was, "We don't need 4,000 way stations – we need 4 million!

I would like to take that idea of way stations and apply that concept to our yards, gardens, balconies, and landscapes. I propose a New Year's resolution not just for 2023 but for years to come and challenge everyone to dedicate part or all of your landscape as a way station – not just for Monarch butterflies but for all wildlife including the honey bee. Let's create a place where wildlife can rest, eat, lay eggs, take shelter and prepare for the next leg of the journey - whether it's to the other side of town, down the arroyo, or hundreds of miles away.

We humans benefit, too, because these way stations are often made up of a mix of native trees, shrubs and wildflowers that offer year round beauty and interest as well as a place for us to also rest, take inspiration from and enjoy.

How to start?

- Plant a mix of native trees, shrubs, wildflowers and cacti. Buy small sizes and plant more than one - especially shrubs and wildflowers. These often grow in masses or random groups in nature so replicate that effect in your yard, planting bed, or multiple flower pots.
- Pick native plant varieties that are appropriate for your area. For example: There are hundreds of varieties of milkweed native to the United States including New Mexico. Some are more adapted to central and southern NM and some for northern NM. Find the right one for your area.
- Purchase at a local nursery – not at a chain or big box store. These stores often carry varieties that are not native to your area, are often heavily hybridized and sterile and may contain insecticides or GMOs within the plant.
- Don't cover your planting areas completely with weed barrier fabric or mulch that does not easily break down. If possible do not use weed barrier fabric and instead use cardboard or newspaper under a layer of compost or native soil.
- Encourage plant volunteers, let wildflowers go to seed, allow plants to touch and overlap, tolerate some weeds, and let things get a little messy.
- Need advice or help? Ask a reputable local nursery, research a book on native plants or natural landscaping at your local library, join the native plant society, or take a hike and observe what is growing – take photos or make a sketch but don't pick the plant!
- Talk to your neighbors, neighborhood associations, and local government about the idea of way stations and reconsider any rules or ordinances that restrict "natural landscaping."

Something to read:
Rambunctious Garden: Saving Nature in a Post-Wild Garden by Emma Marris

Something to look up:
https://xerces.org/blog/leave-leaves-to-benefit-wildlife
https://xerces.org/blog/dont-spring-into-garden-cleanup-too-soon

Something to listen to:
https://www.kanw.com/2022-11-25/rebroadcast-how-to-save-the-endangered-monarch-butterfly

T or C Beekeepers Present for Museum's 50th Anniversary

By Louise Masingale
NMBKA Contact for Truth or Consequences, NM

I was recently asked by the Truth or Consequences Geronimo Springs Museum if I would be interested in doing a presentation on bees and beekeeping. To prepare, I contacted another beekeeper who I met at the Beekeepers Conference in Santa Fe, Laurie Ihm. She recommended another beekeeper that she knew, Ms. Juliann Salinas to assist with the talk, which she agreed to do.


L to R: Laurie Ihm, Louise Masingale, Juliann Salinas

The Museum was having its 50th Anniversary, with numerous other events for the community. I was excited that I was asked because bees have become a passion for me.

On September 24th, Laurie Ihm, Juliann Salinas and I met at the museum for the presentation. We began talking about the importance of the bees, why we need them, and how to take care of them. We also brought along different and important tools, bee suits and hives for them to see what we use to work with the bees. Ms. Ihm and Ms. Salinas provided some of their own honeycomb and different types of frames with honey for the crowd to see. Posters with images of the bees were also brought and passed around to see what bees look like close up, including the queen. They were very surprised at how different the queen looked and how big she was compared to the worker bees.

I decorated with lots of bee paraphernalia. Raffle drawings were done by Liz Cryer every 15 minutes giving different bee items as gifts. A variety of honeys from different locations in New Mexico were provided for tasting as was done at the Santa Fe conference. This was enjoyed by all.

Thank you to Laurie Ihm and Juliann Salinas for all your help and great information.

The first-ever New Mexico pollinator protection license plates are still available, and are a beautiful addition to your vehicle. Proceeds from the sale of the plates go to the NM Department of Transportation for increasing roadside plantings of pollinator-friendly plants across the state.

The plate was the work of Wild Friends students in schools throughout New Mexico in 2018-19, who helped to draft a bill for the specialized plate and then lobbied for it at the NM State Legislature. Jazlyn Smith, a 5th grade student at the Albuquerque Sign Language Academy drew the winning design.

Plates can be purchased online at the link below, or by ordering them at any MVD, MVD Now, or MVD Express office.

https://www.mvd.newmexico.gov/vehicles/license-plates/organizations-and-causes/

Wild Friends is an award-winning civics and science education program at the UNM School of Law. https://wildfriends.unm.edu

The Honey of It All

By Courtney Bradley, NMBKA treasurer, beekeeper, CBeeks student

When I was a kid I kept bees with my Dad. It was one of my favorite things to do with him. Each spring we would open up our four hives and take a peek, most years they made it through the harsh winter which always delighted me. One year the neighbor's cows knocked the hives over and unfortunately we had to start all over with new bees. It certainly helped that my Dad would catch a ton of swarms where he worked at the Rio Grande Zoo so we were never really hurting for bees back then.

Come spring my Dad would get his smoker going really well using manure from our horses and he would smoke them so we could get in there and see just what was going on. My little brain was always so excited to learn new things each year about the bees every time we did an inspection. All through spring and summer I would run out to help him with the bees, knowing full well that come fall the benefits of all our work would present itself in the form of that sweet, sweet honey. My Dad prided his bees in creating the most beautiful, almost completely clear honey. We would collect all the frames and take them into the house to my Mom who would load them up in the honey extractor. I would spin and spin until my arm fell off and then my dad would take over. We collected honey for what seemed like days and then we would jar it all up and save it for Christmas gifts. My Mom would take the wax and make candles with my grandma and there would be candles all over the house just collecting dust because she would never burn them. She probably still has all of them!

Fast forward to present day, 30 plus years later, and I'm on my own keeping bees. For the first few years, when I got back into beekeeping, I left absolutely all the honey for my bees. I was in no hurry to take anything from them and really just wanted to make sure I could keep them all alive without the help of my Dad. Well, this year, I finally took honey from my bees, making sure to thank them for each and every frame I took. I spent four days straining and straining and straining some more, and then putting it all in jars ready for Christmas gifts. It was the most amazingly cathartic activity, just me and my honey, alone in my kitchen, getting sticky while I reminisced about my childhood memories and made some adult memories of my own. My Mom and Dad may not have been there helping me but you better believe they will be getting honey this Christmas! And who knows, maybe someone will gift me a honey extractor for Christmas so I don't have to work so hard next year!

Hives for Heroes: My Mentoring Experience

By Annette Colbert, CBeeks Volunteer Coordinator

Hives for Heroes is a national military veteran non-profit organization focusing on honey bee conservation and a healthy transition from service. Through the national network of beekeepers and veterans, we provide connection, purpose, and healthy relationships fostering a lifelong hobby in beekeeping. Check out www.hivesforheroes.com

The organization is headquartered in Texas but has state leaders or mentors in most states and some international locations. They try to match mentors and mentees by location for ease of hands-on experience. In the western US we face the challenge of distance. New Mexico only has four mentors registered with the program.

I don't remember who originally mentioned the organization to me but I went online and signed up to be a mentor in May 2021. I was almost immediately matched with four vets in the Albuquerque area. Two of them were ready to proceed while the other two needed to postpone committing. Others have joined mid-season.

Harvesting workshop: Lynette Ewer, Bob Kunkel, George Cherolis, Annette

Early bee season 2021, the following vets joined at my apiary: Ambros Montoya (North Valley), George Cherolis (West Rt 6 from Los Lunas), Bob Kunkel (NE heights) and later in the season Brandon Galarza (Belen), his wife Sirissa and their two boys. This year I am establishing a schedule with Mark (no bees yet, T or C) and Luther (near North Valley).

When we started in 2021, we met at my apiary almost every Saturday morning and went through at least one of my five hives. Sometimes there were no vets at my apiary and sometimes we had a crowd. We shared ideas, resources and everyone learned from each other's experience.

We had a field trip to Lynette Ewer's apiary for a harvesting lesson. During the winter of '21-'22 we met monthly at the Veterans Memorial Park Visitors Center for discussions about equipment, pest management, feeding options and whatever questions came up. This year the vets who went through all of last year are becoming the mentors for the future. I will stay available for consultation and have made some very special friends.

Ambros already had hives when he found me and we starting splitting. He was also enrolled in an online program from Michigan State University (Heroes to

Ambros Montoya with Annette in her South Valley apiary

Ambros Montoya, Annette and Julie Ornelas (New Mexico Veterans Memorial Foundation board member)

Hives--very rigorous, judging by the questions he came to me with.) Of course, the online program offered no hands-on experience.

George was brand new to beekeeping and was interested in obtaining a hive of his own. In spring ’22, I took one of my hives and we set it up at his house.

Bob was already enrolled in the Certification program of NMBKA, finished his first year and also took the Michigan State online class, looking for additional experience. He cannot have a hive of his own (Home Owners Association reasons) but enjoys learning.

Brandon came to us late in the season and found a deal down south that included a trailer, an extractor, empty hives and lots of equipment and one hive of hot bees. In the spring of ’22 he bought a gentler queen, an additional nuc and received a split from Ambros.

The Galarza family: Sirissa, Grayson, and Brandon with Annette

So each of these veterans came to the program for different reasons, with different levels of experience. Through working with this group, and these vets in particular, I have learned a great deal about punctuality, preparedness, self-motivation and how much I still have to learn.

George Charolis' hive

George Charolis

A Most Unusual Collaboration Comes to NM

By Amy Owen, Desert Hives ***LLC, NMBKA Member-at-Large***

In June of this year, I received a call from Canada. I thought this was strange, so I let it go to voicemail. Thankfully, Declan Rankin left a message. He said he was looking for a beekeeper in the Albuquerque area to manage hives at one of their partner sites. I called back to see if this was a valid and reasonable request.

We spent some time talking about bees and beekeeping in New Mexico, sussing each other out. It wasn't until later that he shared that he was with Alvéole, the chic company that has locations in places like Paris, London, Toronto, and Chicago. Alvéole offers corporations a way of bringing bees and sustainability to their urban environment.

I shared that I knew about his company and that our New Mexico Beekeepers Association has just hosted a speaker from Alvéole, Quentin Geant, at our 2022 winter conference. Geant is the beekeeper who, with his father, tends the bees on Notre Dame in Paris.

Phone calls and online meetings followed as we discussed the possibility of Alvéole contracting with Desert Hives to manage the bees that they would be providing to Blue Cross Blue Shield of New Mexico (BCBSNM). In my excitement I asked Declan (one of Alvélole's co-founders) how he found out about Desert Hives. Unsurprisingly, Declan had done an internet search for beekeepers in the Albuquerque area. Desert Hives' mission statement and services aligned with what Alvéole was looking for.

Desert Hives mission statement: "Desert Hives is committed to honey bee health. This is done through mentorship, education, mite testing, hive reports, and advocacy. Honey bee health and the health of their environment is the priority of Desert Hives." On their website Alvéole states: "At Alvéole, we help businesses, schools, and various organizations meet their engagement and sustainability goals by bringing bees to their building. We provide both a turnkey educational service and an exceptional, meaningful experience. Our goal is to make people fall in love with bees, build ecological awareness, and, in time, more sustainable cities and food systems."

In August, Desert Hives signed a contract with Alvéole to provide the beekeeping and educational services that Alvéole provides to BCBSNM. This collaboration allows Desert Hives to spread the intent of working towards a healthy and sustainable environment; honey bees and their health are a direct reflection of the environment they are in.

Alvéole purchased hives and bees from Desert Hives to have them installed on September 14th at the BCBSNM site in Albuquerque. This is Alvéole's first location in New Mexico. The installation included a native blessing ceremony and prayers. Employees got to attend this special occasion, and this began their engagement with the bees outside of their workspace.

After the bees settled in at BCBSNM, many native pollinator-friendly plants were added to the landscape outside the hives. There is also a beautiful walking path for employees to walk on as they watch the bees.

On September 30th, employees got to meet me, their beekeeper, and learn about bees. We had an observation hive, honey tasting, and lip balm and seeds to give away. Kiera Tofflemire, Alvéole's Account Manager for North America, joined us during this event. This provided a wonderful synergy.

More recently, we did a "Wonders of Wax" workshop. Employees learned about how honey bees make wax, what bees use wax for, and the history of humans using beeswax. They also made their own beeswax candles to take home. Everyone enjoyed learning about bees and just one of the bees' many wonders.

I am deeply grateful for Desert Hives' collaboration with Alvéole as we bring nature to an urban workspace environment. When we are more engaged with our environment, we are more aware of the impacts our choices make. This has been a wonderful partnership and I am looking forward to the opportunities it will bring.

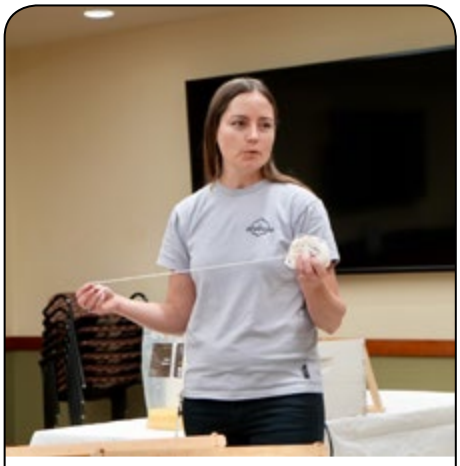
Scroll to next page to view photos of these events!

Alvéole signs with Blue Cross Blue Shield of New Mexico hives (BCBSNM) in background

Luis Campos, Amy Owen, Isleta Pueblo Elder blessing leader, and Matt Strong

Gathering for Blessing Ceremony before hive installation

Kiera Toffelmire (Toronto) at "Meet Your Beekeeper" event



Amy Owen teaching about beeswax and candle making

Candles galore after the "Wonders of Wax" workshop

Recap: IAIA THUNDER BEES field helps host the Summer conference

By Melanie Kirby
NMBKA Interim President and IAIA Extension Educator

This past summer we resumed the in-person NMBKA conference since the COVID pandemic began. Efforts were made by the board to consider sites alternative to Albuquerque, which has hosted all the NMBKA conferences since inception. Taking the summer conference to a new locale was a first for the Association. Unsure of how many beekeepers from across the state would attend, the conference committee also made efforts to find a venue that could allow for a hands-on field workshop component to share techniques and for beekeepers to learn from one another.

IAIA Thunder Bee students inspecting hives

I am one of the NMBKA board members (acting VP and now interim President) and also serve as the Extension Educator for the Institute of American Indian Arts Land-Grant Program. This IAIA Program is a department of the contemporary art college funded by a USDA Agriculture Extension grant, which is offered to all Land-Grant higher education institutions and universities. IAIA was actually congressionally charted and established in the 1960s. Over the decades it has grown and became a 1994 federally mandated Tribal College which now offers six Bachelor of Fine Arts programs of study focusing on the arts (Cinematic Arts & Technology, Creative Writing, Indigenous Liberal Studies, Studio Arts, Performing Arts, Writing, Museum & Curation) and also three Master of Fine Arts programs (Cultural Administration, Creative Writing, and Studio Arts). IAIA is not affiliated with any single tribal community, which allows them to have an open campus for Indigenous and non-Indigenous peoples. Currently the college has students from over 100 tribal communities represented in the student body and international students from Japan, France, and South America.

As a 1994 tribal college, IAIA has a USDA grant-funded agriculture extension program--the IAIA Land-Grant Program, which focuses on building curriculum and teaching about growing food in the high desert of the Southwest for youth to adults and offers many diverse workshops and courses through the IAIA Continuing Education Program (including beekeeping and apicultural value-added products). During the COVID lockdown, they developed some of their core offerings for online engagement. This includes the Indigenous Youth Agriculture Programs for youth, educators, and student mentors in training. And, also includes a pollinator habitat restoration project and a teaching apiary. In homage to the institution's emblem of a Thunderbird, their cousins were keenly named the IAIA THUNDER BEES!

On a sunny and warm late summer Saturday, the Thunder Bees Teaching Apiary played host to the morning field workshop and featured four stations with experienced New Mexico beekeepers as instructors sharing their techniques for managing top bar hives (Lara Lovell-ABQ, Amy Owen-Tijeras), conducting varroa mite counts (Craig Noorlander-Edgewood), catching and marking queens (Mark Spitzig-Taos), and seasonal management (John Gagne-Santa Fe). IAIA Land-Grant work study students and staff helped with setup and were instrumental in preparations for the field workshop. All in all, reports from attendees were positive and the IAIA Land-Grant Program would like to express its appreciation for those who attended and participated and to all the instructors and bees who shared their time and expertise. For more info on the IAIA THUNDER BEE Program, visit www.iaia.edu/outreach

With our paid state membership in the American Beekeeping Federation, we are permitted to reprint ABF articles in our publication. The most recent ABF publication has this article from Dewey Caron on varroa and viruses.

Varroa and Bee Viruses

By Dewey M. Caron, Ph.D.

Kirsten Traynor, with worldwide co-authors, published a review article in *Trends in Parasitology* about *Varroa destructor*, the major challenge beekeepers face in maintaining healthy bees. The authors state in their abstract: "Worrying observations include increasing acaricide resistance in the varroa population and sinking economic treatment thresholds, suggesting that the mites or their vectored viruses are becoming more virulent. Highly infested weak colonies facilitate mite dispersal and disease transmission to stronger and healthier colonies."

This review has a good synopsis of recent developments in the biology, pathology, and management of varroa and virus interactions. It includes a discussion of RNAi and whether it might still become a probable future mite control, a discussion as to whether marker-assisted selective breeding techniques might become economically feasible in large-scale queen breeding operations for distribution of stock that is varroa-resistant and how we need to improve techniques in detection of mite and viral evolution. There are 100 references for further exploration in this rapidly developing research arena.

Hygienic behavior is the best-studied honey bee social immune defense strategy for fighting mites. Olfactory cues released from within capped cells that contain varroa mites diffuse through the cell cap and stimulate adults to uncap pupal cells. Sometimes they open cells in a specific area, some with, others without mites, in an apparent search for the mite-infested cell. After uncapping, they might remove their developing sister or recap cells. The search for a specific odor continues with several candidates being investigated

Stephen J. Martin of Salford University (Manchester, UK) describes some of the parameters of such decision-making by adults that uncap/re-cap cells of developing sisters. Contrasting varroa-naïve bees (UK/Australia) with populations of varroa-resistant bees (South Africa and Brazil), Martin and colleagues found very low re-capping behavior in populations not exposed to varroa mites and very high levels of re-capping in the mite-resistant populations. The mite-resistant populations targeted mite-infested cells. The search for a specific odor continues.

The Pol line of bees is a hygienic bee (VSH – Varroa Sensitive Hygiene) stock developed at the Baton Rouge, USDA Lab. Although available for a while, it has recently been closely examined for mite suppression/tolerance* effectiveness. The paper is open source and includes a very extensive review (140 references). The introduction alone is worth reading. The study determined that Pol-line colonies showed significantly lower levels of three major viruses: Deformed wing virus A, Deformed wing virus B, and Chronic bee paralysis virus, all of which can cause significant problems for colonies. Results demonstrated markedly reduced *Varroa* levels in Pol-line stock and a two-fold increase in survival. (Deformed Wing B is sometimes referred to as Varroa Destructor virus VDV).

Louisiana State University professor Kristen Healy, who worked with USDA scientists pointed out, "This kind of resistance provides a natural and sustainable solution to the threat posed by Varroa mites. It does not rely on chemicals or human intervention." Besides the use of Varroa-sensitive hygiene (VSH), in which workers remove mite-infested brood, two other approaches to breeding bees better able to resist/tolerate mites and which have demonstrated increased colony survivorship, are a selection for grooming behavior and low mite population growth (termed low MPG).

Allogrooming (bees groom hive mates) and auto grooming (self-grooming) contribute to varroa resistance by the removal of mites from adult bee bodies. The mites are physically damaged by bees who use both mandibles and forelegs to remove mites. Damaged mites are subsequently unable to access a new brood cell to reproduce. Honey bees initiate allogrooming via a 'grooming invitation signal' – a whole-body vibrational dance lasting several seconds – which stimulates other workers to groom the dancer. The mite-biter (or simply "biter") bee strain is commercially available.

Reducing the rate of mite population growth (i.e., "flattening" the mite growth curve) includes selection which comprises a suite of behaviors limiting *Varroa* reproduction. Since female mites have only a few eggs – enough for between an average of 1.5 to 3 reproductions – interruption of a reproductive cycle can significantly slow mite population growth. This has been the proposed method

of mite resistance in the Russian bee stock, released by USDA and continued with a Russian bee Breeders group. Guzman, et al 2007 includes more information on this resistance mechanism.

It is critical with demonstrated resistance of mites to current miticides that our bees develop better mite defense mechanisms. The original honey bee host has such a defense, but our western bee is woefully inadequate in such defense. Breeding offers our best hope. Although some of the current efforts might not scale up to commercial needs, every development might provide clues as to how we can develop a more suitable honey bee.

** There is a difference between mite suppression and mite tolerance but not everyone agrees on how the terms apply to honey bees. Mite suppression means that selection to ensure fewer mites in a hive means there is less colony loss from viral infections. Mite tolerance means whatever the mite level, including a high mite presence, there is less loss of bees and colonies to viral infections. Tolerance might only be theoretically possible so most articles use the term mite suppression. However, some virus specialists believe stocks such as Gotland selection (so-called "Bond" bee, as in James Bond film "Live or Let Die") and local selected stock (Darwinian as defined by Dr. Tom Seeley and others) are tolerant, not resistant, to mite damage. Research to support this includes high mite number persistence in these selected strains which nevertheless show less colony loss.*

ENDNOTES:

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