CENTRAL COAST BEEKEEPERS NEWSLETTER

May 2024

NEXT MEETING May 22, 2024

Important Notice: In the second half of the year, WE WILL MEET ON SATURDAYS, in the hope that more of our members with Monday to Friday commitments will be able to attend. Please see updated schedule, p. 3

PRESIDENT'S MESSAGE

By Jeremy Egolf

It's a cliché that the weather is a common and terribly dull subject of conversation, but it rightly becomes an obsession for beekeepers, even more so for beekeeping gardeners. Having lived on our rural property near the coast for seven years, we're still learning the pattern (or lack thereof) to the weather and all the local consequent microecological effects. Have the elk headed from the valley pastures to higher ground, not to be seen until October (hence mercifully not munching on our saplings nor leaving hoofprints in our beds of culinary greens)? (I wrote the previous sentence a few days back. Since then, as many as 18 elk have been seen in our yard or parading through the pasture. Sigh…) Did the anomalously warm and dry April weather portend which has resulted in lush growth more watering this summer? When will we need to refill the bees' dirty water sources?

For our backyard beekeeping, there's so much to learn from sound and respected sources (the OSU Master Beekeeper program, Honeybee Health Coalition, Randy Oliver, *Bee Culture,* the academic researchers, the oral tradition of our club's experienced beekeepers, too many etc.'s). In this newsletter, we've aimed to provide material stretching those sources – stories about pesticide legislation, Apis meliferra in the South Pacific, the intriguing potential of "pseudoscorpions" for Varroa destructor control. So, here's another small item from the fringes: a mouse took up residence in my surviving hive, carved out its nest from two frames (outboard frames in the deep brood box), and coexisted for at least a time with the bees. They did not kill it, challenging the conventional wisdom. It's possible they didn't bother since they are struggling to rebuild their fading strength. In any case, this year's lessons learned include adding mouse guards to my hives when Henry Storch's bees arrive.

Colony status varies tremendously with the microclimates and micro environments. One member with multi-species blooms in his area – wild cherries, etc. -- reports hive weight gain of as much as four pounds in a day. We've seen both bumble and honey bees in our small patch of blooming fava beans so we look forward to planting many more to overwinter and help fill the gap between the early spring alder and maple pollination and the blackberry nectar flow. Our early volunteer mustards are bolting; spurring questions of whether they are stimulated by day length, since they bloomed about two months preceding the summer solstice and we usually see flowering two months after solstice.

Our April meeting was billed as a deadout workshop but quickly transitioned to a multifaceted and enjoyable freeform discussion. Much interest was generated by observations that departing swarms can include not just the usual current queen and the typical 40-60% of the colony (as expected) but also, apparently, the new queen and considerable accompanying bees who then returned to the hive. A question about creamed honey brought forth information that it can be developed by adding some already creamed honey to fresh honey, apparently providing nucleation points for crystallization (somewhat like Ice Nine, for you Kurt Vonnegut fans). It was also brought forth that using certain shop towels for oxalic acid sponges introduces microplastics to a hive, a matter of broad concern in our conscientious group.

This month, OSU Bee Lab Director Ramesh Sagili will grace us with his presence and his thoughts on pollen patties and varroa treatments. Please bring your questions – on my mind is the matter of pollen availability stimulating brood production, and, according to the Honeybee Health Coalition, supplemental pollen patties not being made to bee bread for the larvae.

We've completed scheduling our transition to Saturday afternoon meetings, which will begin in July. We picked this time and day to enable attendance both by members holding down Mon-Fri jobs, and those not wanting to make long drives at night. We have outreach events scheduled for May, June and July (the Florence Garden Club sale, the Waldport library pollinator event, and the Lincoln County Fair). Volunteers of any level of experience are welcome, particularly for the County Fair – staffing the booth is a fine way to gain experience.

The Year's Program

All meetings 1:30 p.m. at the Newport Public Library, except for the June meeting, which is at the OSU Extension office in Newport.

Wed., May 22: Dr. Ramesh Sagili (Director of OSU Bee Lab): "Varroa Control and Pollen Supplements"

Wed., June 26: Dr. Andony Melathopoulos (OSU Extension Service Master Melittologist): "Take a walk on the wild side: the weird and wonderful world of native bees (for beekeepers)." Note: meeting at the OSU Extension Office, 1211 SE Bay Blvd., Newport.

> Before Dr. Melathopoulos's presentation, we suggest you look into the identifying keys at https://ir.library.oregonstate.edu/concern/technical_reports/xg94hz59f
>
> Better still, print them out and have them available when the bees come bumbling! Learn to distinguish the boys from the girls!
>
> https://www.beenome100.org/home

Saturday, July 27: Annie Marion (USDA Natural Resources Conservation Service, Waldport Field Office): "Coastal Pollinator Habitat."

August: Summer party hosted by Pat Wackford (to whom we are grateful!) (date TBD)

September 21: Randy Oliver (Professional Beekeeper and Citizen Scientist, ScientificBeekeeping.com

Saturday, October 19: Dr. Dewey Caron (Emeritus Professor of Entomology and Wildlife Ecology, University of Delaware, and Affiliate Professor, Department of Horticulture, OSU): "Winter Hive Preparations"

Saturday, November 16: Annual Meeting (Election of Officers, Plans for Next Year)

2024 Bulk Package and Nuc Order

If you placed an order, you will be coordinating delivery with Steve Niles (available through our email address: centralcoastbeekeepers@gmail.com).

Please keep us posted on the quality of the bees you receive – this feedback is very important to us as we make plans for next year's bulk order.

Continuous release of oregano oil effectively and safely controls *Varroa destructor* infestations in honey bee colonies in a northern climate

Qodratollah Sabahi,[1,2] Hanan Gashout,[1,3] Paul G. Kelly,[1] and Ernesto Guzman-Novoa[1]

[This abstract from the National Library of Medecine, published orginally in Experimental & Applied Acarology and online 2017 Jul 26. doi: 10.1007/s10493-017-0157-3; for full article, see here: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5547185/]

The ectoparasitic mite *Varroa destructor* is responsible for the death of millions of honey bee (*Apis mellifera*) colonies worldwide. Testing potential miticide compounds with different delivery methods that effectively control *V. destructor* and have low toxicity for honey bees is crucial to manage this parasite in hives. We determined the varroacide efficacy of three natural compounds delivered to hives with three application methods over a 4-week period. Oxalic acid in a sucrose solution was applied impregnated in cardboard (T1). A mixture of oregano and clove oils in an ethanol-gelatin solution was applied impregnated in absorbent pads (T2). Oregano oil alone was delivered using electric vaporizers (T3) to test the hypothesis that continuous release of miticides increases the varroacidal efficacy of essential oils. The varroa mite control rates for treatments T1–T3 were 76.5 ± 7.11, 57.8 ± 12.79 and 97.4 ± 0.68%, respectively, and there were no differences for bee mortality between control and treatments 1 and 3. Additionally, most mites were killed in the first 2 weeks in T3 colonies compared to the last 2 weeks in colonies of the other treatments. These results demonstrate the importance of continuously releasing natural miticides to achieve safe and high rates of mite control in hives. They also show that oregano oil may be an effective miticide against *V. destructor* infestations in colonies.

A Note on Project Apis m

Hi Beekeepers,

I have recently been elected to the Project *Apis m* board of directors and I am so excited to let you know how involved we are with beekeepers, scientists, students needing scholarships and of course our honey bees!

Project *Apis m* (PAm) is uniquely positioned at the intersection of beekeepers, growers and scientists, setting research priorities that address current and emerging challenges for our industry. We improve immediate bee health problems by increasing forage with free cover crop seeds in California almonds through our Seeds for Bees program, and deliver research and resources to both beekeepers and growers. You can see the $12M worth of projects PAm has funded here. Long term we invest to develop the next generation of honey bee scientists with a very generous scholarship program. PAm would love to hear your suggestions and ideas, so please reach out to me with them!

Now that I have given you a picture of what we do, let me tell you how we accomplish our goals. We are a non-profit and depend on donations from people like you with a passion for honey bees. We use 90% of our donations for our programs and only 10% to administer them…you can see portions of our

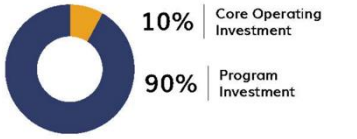
2022/2023 Annual Report here. We invite you to go to our website, www.Project-Apis m.org, look at our programs and make a donation. It will be greatly appreciated and will come back to you in good science for honey bee health!

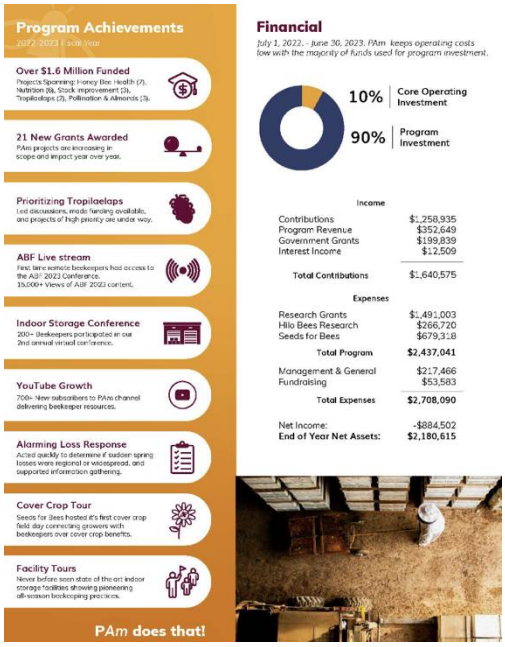
Thank you so much!

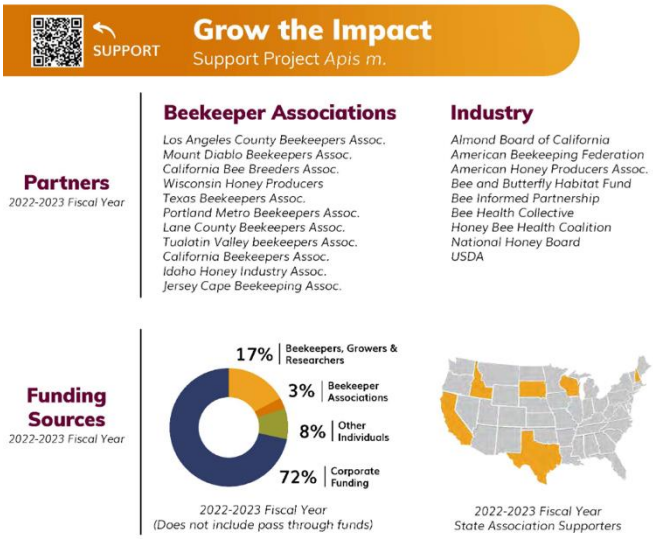
Jan Lohman

Financial

July 1, 2022. - June 30, 2023. PAm keeps operating costs low with the majority of funds used for program investment.







USDA, University Researchers Develop Near Chromosome-Level Genome for the Mojave Poppy Bee

LOGAN, Utah, May 2, 2024 — Scientists at the United States Department of Agriculture (USDA)'s Agricultural Research Service (ARS) and university research partners developed a near chromosome-level genome for the Mojave poppy bee, a specialist pollinator of conservation concern, according to a recent *Journal of Heredity* paper.

Putting together the Mojave poppy bee genome is part of the Beenome100 project, a first-of-its-kind effort to create a library of high-quality, highly detailed genome maps of 100 or more diverse bee species found in the United States. Beenome100 is a collaborative undertaking led by ARS and the University of Illinois, with collaboration of researchers across ARS and universities in the United States and Canada. The expectation is that these genomes will help researchers answer the big questions about bees, such as what genetic differences make a bee species more vulnerable to climate change or whether a bee species is likely to be more susceptible to a pesticide.

Restricted to the eastern Mojave Desert, the Mojave poppy bee (*Perdita meconis*) is a solitary, mining bee of the Andrenidae family that specializes in pollinating the Las Vegas bearpoppy (*Arctomecon californica*) and the dwarf bearpoppy (*Arctomecon humilis*) — the latter being protected under the U.S. Endangered Species Act as of 1979. The poppies are found primarily in gypsum soil deposits, which are rare and scattered throughout the region.

The Mojave poppy bee and Las Vegas bearpoppy are also being considered for listing under the Endangered Species Act. Both species will be evaluated for potential declining populations and vulnerability to extinction due to climate change and to habitat loss from urban development and mining in their native region.

Researchers assembled the genome or genetic map that will help further to understand the Mojave poppy bee's biological traits.

"The genome, with additional genetic sampling of individuals, will also potentially give us insights into the genetic basis for host-plant specialization, susceptibility to pesticides, and susceptibility to drought and climate tolerance," said Rena Schweizer, a research entomologist at the ARS Pollinating Insect-Biology, Management, Systematics Research Unit in Logan, Utah.

In particular, the Mojave poppy bee is capable of weathering drought years by remaining in the ground in stasis — a phenomenon called diapause. The trait is not well understood by researchers and, by having its genome sequenced, they may be able to learn about the genes and regulatory pathways that make the adaptation possible.

They will also use the genome to assess the species' genetic health, find insights into how bees can be specialists or generalists, and look what the tradeoffs are in terms of a bee's long-term fitness.

"It could also lead to us finding genetic signatures of decline," said Schweizer. "By studying this one bee's genome, we might be able to help conserve the bee better and identify other species that are in decline using genetic information."

To develop the genome of the small and mighty bee, researchers isolated DNA from a single, small male specimen.

This genome assembly, according to Schweizer, is impressive given that the bee is tiny (a male bee averages five to seven millimeters in length). Researchers collected the specimen in the field in a remote wilderness location.

"What is also remarkable about this research is that the specimen used for the genome was collected in non-ideal preservation methods," said Schweizer. "We still obtained high-quality DNA from a field-collected specimen due to technological advancements in sequencing technology and learned more about this unique bee. We hope that our research will set the groundwork for developing genomes of other bee species."

The detailed, high-resolution map of the reference genome is available in the National Center for Biotechnology Information's database.

The research was done in collaboration with the University of Montana, Utah State University, and the ARS Tropical Pest Genetics and Molecular Biology Research Unit in Hilo, Hawaii.

The Agricultural Research Service is the U.S. Department of Agriculture's chief scientific in-house research agency.

Honey bee colonies maintain CO_2 and temperature regimes in spite of change in hive ventilation characteristics

Apidologie. Volume 53, article number 51, (2022) [Open Access Article]

Abstract (For the full article, see: https://link.springer.com/article/10.1007/s13592-022-00954-1

CO_2, a byproduct of respiration, is toxic at high concentrations so regulation of CO_2 within the honey bee hive is an important colony function. In this study, we measured hive CO_2 concentrations at 1-s intervals while ventilation characteristics of the hive were changed every few days, and we analyzed the data for effects of increased ventilation on colony behavior and thermoregulation. Average CO_2 concentrations were significantly higher, by > 200 ppm, when hives had screened bottom boards (higher ventilation) compared to hives with solid bottom boards (lower ventilation) at the same time. Daily CO_2 concentration amplitudes, hourly temperature, daily temperature amplitudes, nor hourly hive weight changes were not significantly affected by the changes in hive ventilation. In a second experiment, we found average CO_2 concentrations at the top center of the upper hive box, on top of the frames, were significantly lower than concentrations at the center of a solid bottom board underneath frames, which was expected due to the higher density of CO_2 relative to air. Bee colonies have been reported to cycle air, with shorter periods of 20 to 150 s and longer periods of 42–80 min, but a periodogram analysis of the CO_2 concentration data found no evidence of important CO_2 cycle periods other than a strong 24-h period. Bee colonies maintained strong daily cycles of CO_2 concentration, with average maximum concentrations > 11,000 ppm, even in conditions of increased ventilation, indicating that managing CO2 concentration is a complex colony behavior.

A vaccine for bees has an unexpected effect - they also fought off a virus

Honeybees are under stress from pesticides, mites and a variety of diseases. Now, a new vaccine aimed at protecting bees from a serious bacterial infection may do double duty by warding off a virus.

By Tina Hesman Saey

From Science News, April 24, 2024 at 8:30 am

WASHINGTON — The first vaccine designed for insects may make honeybees healthier overall.

Honeybee hives vaccinated against a bacterial disease had much lower levels of an unrelated viral disease than did unvaccinated hives, veterinarian Nigel Swift of Dalan Animal Health reported April 3 at the World Vaccine Congress.

Researchers at Dalan, based in Athens, Ga., designed the bee vaccine to protect against American foulbrood — a fatal disease caused by a spore-forming bacterium called *Paenibacillus larvae*. Adult bees don't get sick but can spread spores in the hive, where the disease infects and kills larvae. Spores can remain viable for more than 50 years, so beekeepers with infected colonies must destroy hives by irradiating or burning them to keep the disease in check. A vaccine may save bee lives and beekeepers' livelihoods

Foulbrood disease is just one of many problems plaguing bees, Swift said. "Pesticides, parasites, climate change, nutritional stress — these all make bees more susceptible to infectious diseases." From April 2022

to April 2023, U.S. beekeepers lost an estimated 48 percent of their colonies, according to the Bee Informed Partnership, a nonprofit research organization.

Dalan's vaccine against foulbrood disease doesn't rely on tiny syringes. Instead, bees are inoculated through a sugar paste that researchers spike with heat-killed *P. larvae*. Worker bees eat the candy and incorporate it into their royal jelly, which they feed to the queen. Inside the queen's gut, bits of the bacteria attach to a protein, which in turn transports the vaccine fragments to the ovaries where they can be deposited in eggs. Larvae that hatch from the eggs should be protected from the disease.

Testing the vaccine wasn't easy. One larvae-producing site in Florida was hit by a hurricane, "another was taken out by bears," Swift said. But the team persisted. In lab tests, the company infected larvae from both vaccinated and placebo-treated hives with *P. larvae*. About twice as many placebo larvae died as vaccinated larvae, the researchers reported in 2022.

Based on that evidence, the U.S. Department of Agriculture gave conditional approval for the bee vaccine, Dalan announced in 2023. The Canadian Food Inspection Agency authorized use of the vaccine later that year.

Beekeepers who had been using the vaccine told Dalan that vaccinated colonies seemed to have all-around improvements in health that couldn't be explained just by reducing the incidence of foulbrood disease. The company decided to look at a variety of diseases, honey production and other measures of bee health along with the efficacy of the vaccine in a real-world setting. An apiary called Vidalia Apicultural Services & Bee Co. in Lyons, Ga., let Dalan use 400 hives for the study, which lasted for one season. Half of the hives got a new vaccinated queen and half got a new unvaccinated one.

In one sense, the test was a bust. No cases of foulbrood disease were found in any of the hives. "This apiary was just too good" at controlling the disease, Swift said. So the company couldn't determine how effective the vaccine was against its intended target.

Yet the researchers found a surprising result: Vaccinated hives were protected from a viral disease spread by varroa mites (*SN: 3/7/16*). Both vaccinated and unvaccinated hives started the study with the same number of mites and a baseline level of virus, as measured by a PCR test. Virus levels continued to rise in the unvaccinated hives but declined in the vaccinated ones. At the end of the study, vaccinated hives had accumulated 83 percent less virus than unvaccinated hives did, Swift said. The number of mites per hive remained the same.

"It's an important finding for sure, if it's repeatable," says biochemist Andrea Gwyn of the biopharmaceutical company GSK, based in Middlesex, England. Gwyn, who works on vaccines for people, is a hobbyist beekeeper. She is particularly interested in whether queen bees can pass on defenses against American foulbrood and perhaps other infections for more than one egg-laying season and whether a queen's drone sons and daughter queens could pass on the protections to a second generation.

The results are still preliminary, and the researchers aren't sure exactly why immunizing bees against bacteria might also protect against viruses, Swift said. It may be because bees' immune systems aren't as specific as those of humans and other mammals: Anything that revs up bees' immune responses may help them take on multiple intruders.

"We're just trying to think it through: What is really happening?" Swift says, "It's humbling…. You get these results sometimes that weren't what you were expecting. This could be somebody's Ph.D. now to go and tackle this particular topic."

Citations

N. Swift. A vaccine for bees: targeting pollinator health for future food security. World Vaccine Congress, Washington, D.C., April 3, 2024.

N. Steinhauer *et al*. United States honey bee colony losses 2022–23: preliminary results from the Bee Informed Partnership. Bee Informed Partnership. Posted online June 22, 2023.

F. Dickel *et al*. The oral vaccination with *Paenibacillus larvae* bacterin can decrease susceptibility to American Foulbrood infection in honey bees — A safety and efficacy study. *Frontiers in Veterinary Science*. Published online October 17, 2022. doi: 10.3389/fvets.2022.946237.

About Tina Hesman Saey

Tina Hesman Saey is the senior staff writer and reports on molecular biology. She has a Ph.D. in molecular genetics from Washington University in St. Louis and a master's degree in science journalism from Boston University.

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