CENTRAL COAST BEEKEEPERS NEWSLETTER

Sept., 2024

NEXT MEETING Sept. 21, 2024

Important Notice: Our meetings are now on SATURDAYS and LOCATIONS VARY. Please see the updated schedule (p. 3) for dates and locations.

PRESIDENT'S MESSAGE

By Jeremy Egolf

Mid-August already feltlike autumn here, with the shorter days, lower sun angle at noon, and cooler ambience. With the blackberry nectar flow behind us, the lotus blossoms have disappeared and the various dandelion-like asteraceae fading (though the asters proper are out in force), our bees took an interest in late summer bloomers like oregano and mustard. We've started feeding pollen patties for the benefit of the recently hatched young workers, who are consuming the patties with gusto.

My own mite count in four hives a few weeks ago was a moderate 1.5/100 (one colony with a count of 3, I zapped with the lower dose Formic Pro application a few weeks ago, which had the desired effect). Honeybee Health Coalition's frequently consulted

Decision Making Tool points out that using the miticide at full strength (two strips concurrently may result in queen death) has been borne out by a couple of colleagues who evidently lost queens through this approach. In light of this, and our plan to leave the honeys of their labor for the bees this winter (our colonies are all in their first year, courtesy of Henry Storch), I'm following up with a September low dose of formic as the mites shift from capped brood to the adult "hosts" and will then at the end of the year give them a couple of hits of oxalic acid. My might counts are lower than some I've heard about, but I'm loathe to let the pests gain a foothold. (Speaking of oxalic acid, I'm looking forward to trying the Varoxsan strips, though I fear they will be as messy as Hopguard, with managing storage a challenge once the shipping sacs are opened.)

Primed to avoid colony starvation, already we're checking hive weights to calibrate our biceps to "measure" the winter drawdown. With varying colony strengths, combining some residents of our strongest colony with the weakest one (and moving over a few frames of honey as well) is on the agenda for early autumn.

Our July speaker was Annie Marion of the USDA Natural Resources Conservation Service [NRCS], Waldport Field Office, who spoke on enhancing coastal pollinator habitat. She briefed us on the history of the conservation service, federal support for conservation and restoration efforts, and characteristics of numerous native plants attractive to cultivators. A couple points I found most interesting were the potential for small (less than an acre) plots to be supported under some federal programs, and that the Douglas spirea growing on our property has a good probability of being propagated by cuttings. Her presentation and related materials can be found under her name here: https://www.ccbaor.org/presenters-2024/

At this writing, we're very much looking forward to Randy Oliver's September 21 presentation, "Concepts in Varroa Management."

Finally, a word of thanks to sharp-eyed readers who pointed me to a couple of the items used in this newsletter. If you come across anything related to honeybees, pollinators, and their environment that you think merits inclusion here, please bring it to my attention.

The Year’s Program

All meetings 1:30 p.m. September 25 at the Newport Public Library. October 19 and November 16 are at the OSU Extension office in Newport.

September 25: Randy Oliver, “Concepts in Varroa Management”

Saturday, October 19: Dr. Dewey Cary (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)

Combining Pest Treatments May Be Key to Helping Honey Bees Survive Winter

[CCBA Editor's note: Condensed from original; the links mentioned are well worth exploring]

Entomology Today; August 13, 2024 Research News

In a study published in May in the *Journal of Insect Science*, Penn State University researchers found that beekeepers who used a combination of treatments to manage *Varroa* mites in their honey bee colonies had higher winter colony survival than those who used only one type of treatment. (Photo by U.S. Department of Agriculture via Flickr, public domain)

By Katie Bohn

Winters can be tough on managed honey bee colonies, with beekeepers in the United States reporting that one-third of their colonies die each winter. A new study by Penn State University researchers has found that using not one but multiple pest treatments may help bees make it to spring. Darcy Gray, a global remote sensing manager at the One Acre Fund who led the study while completing her master's degree at Penn State in the intercollege Ecology Graduate Program administered by the Huck Institutes of the Life Sciences, says she conducted this study to help provide beekeepers with the locally specific information they need to make decisions about how to best manage their colonies to combat these high colony losses during the winter.

The researchers found that beekeepers who used a combination of treatments for *Varroa* mites had higher winter colony survival than those who used only one type of treatment. The findings were published in May in the Journal of Insect Science, included in a special collection titled "Current Honey Bee Research: Investigating Micro and Macro Aspects of Health and Sociobiology."

Additionally, while weather significantly impacted winter colony survival, beekeepers using these integrated pest management strategies had higher colony survival rates even in harsh weather conditions. The study revealed that beekeepers who used treatments against *Varroa* mites in their apiaries had significantly higher bee survival than those who did not, and those who used multiple types of treatments had better survival than those who used a single treatment type.

The researchers also found no significant difference between "soft" and "hard" chemical treatments. Soft chemicals—naturally derived, organic compounds—were as effective at increasing winter survival as hard chemicals, which are synthetic chemicals that have been shown to leave long-term residue in colonies and may promote populations of *Varroa* mites that are resistant to treatment. These results are consistent with previous studies conducted by Penn State researchers demonstrating that organic beekeeping methods were just as effective as more conventional methods.

"Honey bees pollinate various crops across North America, so it's important to understand how they're influenced by beekeeping strategies and their environment, particularly under increasing weather variability," says Gray, who did her graduate research in the lab of Christina Grozinger, Ph.D., Publius Vergilius Maro Professor of Entomology in the College of Agricultural Sciences. "Understanding honey bees' relationship to the environment can also shed light on and introduce new questions about native bees, which are also threatened by habitat loss and climate change."

For the study, the researchers used data from an annual survey on winter honey bee colony loss and beekeeping management that has been sent to Pennsylvania beekeepers each spring for more than 15 years. Data included information on pre- and post-winter colony numbers, how many years of experience the beekeeper had, whether and how they treated for *Varroa* mites, and whether and what they provided for supplemental feed. Beekeepers also had an option to submit their apiary coordinates, which allowed the researchers to precisely calculate the habitat quality of the landscape surrounding each beekeeper's hives—including the availability of floral resources in the spring, summer and fall—and to obtain information on the weather conditions that the bees experienced over the previous year. Grozinger, who also directs the Penn State Center for Pollinator Research, noted that, because habitat and weather are complex factors, a lot of data is needed to build statistical models for understanding exactly how they are impacting bees.

Additionally, the researchers found that, while spring, fall, and winter precipitation was associated with increased bee survival, summer precipitation was associated with decreased colony survival. The researchers suggested this could be because many consecutive days of rain in the summer may reduce the amount of time bees spend foraging, leading to less food stored for the winter and lower brood production. Grozinger says. "This suggests that what we are seeing is an effect of weather on the flowering plants that bees depend on for pollen and nectar, and this in turn affects the bees."

"Our work introduces new questions about how colonies treated with an integrated pest management may be buffered from the worst effects of weather, which would have implications for climate change adaptation in beekeeping," Gray says.

Beekeepers and others interested in exploring the land use and weather conditions and predicting flowering resources at their locations can use the Beescape tool on the Center for Pollinator Research website, which also offers resources on how to improve local habitats for bees, including the Penn State Master Gardener's Pollinator Garden Certification Program.

The data used in this study can be accessed via the Bee Winterwise tool, and beekeepers also can obtain resources on managing Varroa mites and organic beekeeping practices from Penn State Extension.

The USDA National Institute of Food and Agriculture supported this research through its Food and Agriculture Cyberinformatics Tools (FACT) Program.

Beekeeping vocabulary: the best beekeepers get the words right

This article first appeared in *American Bee Journal*, Volume 161 No. 7, July 2021, pp. 757-760.

Beekeeping is a complex and nuanced craft. You cannot teach others about it by using the same ten words for everything. Humans communicate through language. We learn, discuss, and teach by using words we understand, words with meanings we agree on. Every hobby, trade, and field of inquiry has its own vocabulary that allows the participants to discuss the minutiae of their interest.

Beekeepers should be no different. We have dictionary-length lists of specialty words that allow us to communicate with each other. But far too often, we use the same words for multiple things and wonder why newbies are slow to catch on. A case in point is the word hive.

A hive in a hive

If you research the history of the word hive, you can find it defined as "a man-made housing for a colony of bees." That's a straightforward, easy-to-understand definition with no confusion. If you use that definition, you will never have a hive in a hive unless, for some obscure reason, you put a small bee house inside a larger one.

Beekeepers today call everything a hive. The box, the colony, a swarm in a tree — all of these are hives. Longtime beekeepers will tell you clarification is unnecessary, that the meaning is clear. Sure, I get that. But when we're teaching, mentoring, lecturing, or answering questions — when we're attempting to impart any kind of knowledge — we owe it to our audience to use words they can understand without confusion.

Hives don't die

Students live in dorms, soldiers live in barracks, and families live in houses, apartments, or tents. Unless it's a rental property, we seldom ask if the house for sale down the street includes the family. When your pig dies, you don't say your pigpen died. When your rabbit dies, you don't say your hutch died. So when your colony dies, why do you say your hive died? Most likely, that wooden box is doing fine.

I have an internal battle with sarcasm every time someone tells me their hive died. I want to ask how they knew, what the symptoms were, and how they disposed of it. The same is true for hives that swarm. Swarming hives make me think of the Wizard of Oz, and I imagine wooden Langstroths swirling in the winds of a tornado, heading for the nearest wicked witch.

A hive is a hive whether or not it contains bees.

Keep it clear with unique words

Just like everyone else, I began beekeeping thinking hive was **the word**. It wasn't until I began writing and mentoring that I realized how confusing it could be. Of all my own bad beekeeping habits, the sloppy use of hive has been the hardest to break. I answer beekeeping questions every day, yet I always need to edit my work and delete inept uses of that word. Although I'm getting better, it's ingrained and nearly impossible to break. The reward is in responses from others, things like "Oh! Now I understand!"

I'm not the arbiter of bee terminology, so I can understand anyone using definitions that are different. That's fine. But if you're going to use the word hive for most things bee, at least give your newbie friends a heads-up. Explain that when you say hive, you may mean the box, the colony, the box-colony combination, a swarm, the act of putting bees in a box, or the red welt on your arm. In other words, be crystal clear.

A nuc for a nuc

The word nuc suffers from exactly the same problem as the word hive. We can buy a box for a nuc, which we call a nuc, and then we put the nascent colony inside, also called a nuc, and then together they make a third thing — bees and box combined — also known as a nuc. If we could only conserve species with the same zeal we conserve words.

Inexplicably, the thing inside the nuc becomes a hive once you put it into a hive. So when we take a nuc from a nuc and hive it, it becomes a hive in a hive.

But I have other issues with the word nuc. Not surprisingly, the word is shorthand for nucleus. When I google nucleus, I see that a nucleus is "the central and most important part of an object, movement, or group, forming the basis for its activity and growth." That definition works perfectly for beekeepers because a nucleus contains the heart of a bee colony: a brood nest, nurse bees, and a queen. Simple and clear.

But every single day I see this word spelled NUC as if it were an acronym or Nuke as if it might explode. I often wonder what people think the acronym represents or how one might detonate the thing. I got an email recently asking about a N.U.C. It reminded me of that old television show, "The Man from U.N.C.L.E." Imagine, "The Drone from N.U.C."

Does it hatch or emerge?

American Bee Journal clarifies the use of some beekeeping terms. If you go to their website, click on Contact, and scroll down to Writer's Guidelines, you will find a section called, "Language use relevant to writing about bees." Although the list doesn't mention hives, it clarifies hatch vs. emerge: "Eggs hatch, adult bees emerge."

You may wonder if that's important, but as I've tried to illustrate, it's messy to use the same word for multiple things. Hatching occurs when an egg releases the young larva, but emergence occurs at the end of the pupal stage when the cocoon releases an adult bee. If you use these words correctly, you don't need to explain further. If the bee hatched, you know it went from egg to larva; if it emerged, it went from pupa to adult. No clarification is necessary.

Nevertheless, if you feel strongly about using the same word for both, try switching to eclose. Conveniently, eclose describes either of those situations, or it can describe an egg releasing a nymph — the thing varroa mites do so well. Technically, eclose means *to come out of the egg or the pupa case*. So when using eclose, you need some context to know exactly what's happening, and it sounds pretentious. But some like it. Eclose is one of those words that reminds me of a specific beekeeper — the only one I know who uses it.

The stuff that oozes out of flowers is nectar. It doesn't become honey until it's processed by honey bees.

Respect your audience

Beekeepers aside, the proper use of words is generally respected in society. It shows regard for the listener, the one who is spending his time — and maybe his money — listening to you.

I'll never forget interviewing for a job I really needed. During the interview, I used the word criteria incorrectly. I hesitated a moment and then said, "I meant criterion." About a week into the job, the boss called me into his office and said, “Do you know why I hired you?” I had no clue and said so. “It’s because you corrected your own English,” he said. “It shows respect for your audience.”

I’ve thought about that a lot over the years. Sometimes we think we’re smart or cool or popular, but that’s not why newbies come to us. They come because they want clear and uncluttered explanations using words they can understand. At the very least, we as mentors, teachers, or lecturers owe concise language to the people who depend on us.

Learning the lexicon

Throughout my formal education, I always noticed that once you mastered the vocabulary of a subject, the rest was easy. When you can define the words and know how they relate to others, you’re very close to grasping the entire subject.

The same is true for sports, art, trades, and hobbies. In beekeeping, if you can explain the meaning of spiracle, trachea, tracheole, and hemolymph, you are close to having a functional understanding of the bee respiratory system. You can also see why tracheal mites are a problem and how they enter a bee. A world of knowledge is yours once you absorb just a few essential words. It seems like magic.

Flexible definitions

Beginners are often brutalized by imprecise vocabulary. Flexible definitions lead to mushy, unclear thinking, and unclear thinking leads to miscommunication. I always remember a new beekeeper I met during a field day. She was upset because all her bees were bearding on the front of her hive and refused to go inside. She said they’d been behaving badly all weekend, ever since she reversed her brood boxes, something her mentor advised.

After asking some questions, I discovered she had reversed her boxes by turning the entire hive 180 degrees, making the front the back and the back the front. The poor bees were having a hard time finding the new front door, which was now just inches from the back of her house.

Another beekeeper I know misinterpreted the same advice. This guy reversed his boxes by putting the honey supers under the brood nest, confusing the bees no end. I can’t blame the newbies. Mentors should not give instructions without explaining the terminology. Even simple words like “reversing” can be interpreted in multiple troublesome ways.

A queen honey bee is not royalty, she's an egg-laying machine. The word queen describes her relationship to the other bees and her job description.

Honey flow

As much as we might wish it, honey does not flow from flowers. The stuff that flows from flowers is nectar. Honey bees turn nectar into honey by doing things to it, things like spitting and mixing and drying. The term honey flow trivializes the role of the honey bee, making it sound like the honey is out there, fully formed, just waiting to be collected. I much prefer nectar flow.

Africanized

Africanized is not a synonym for ill-tempered. A honey bee can have a nasty temperament with no African genetics whatsoever. If a bee colony possesses genes that make it truly Africanized, the word is fine, but calling any hot hive Africanized isn't helpful and it may scare people unnecessarily. If you don't know for sure, don't call it.

Queen

I can understand Europeans capitalizing the word queen out of habit. But here in the US where we rebelled from the monarchy quite a while back, why do we think the word should be capitalized? In a beehive, a queen is not a title, but a job description like lawyer, janitor, or carpenter. You can also think of it as a relationship like mother, sister, or aunt, none of which are capitalized.

Now, if you name your queen, say Queen Melissa, the word is governed by a different rule, one that allows a capital letter. However, if you name your queen, you have an entirely different set of personal baggage, especially problematic at pinching time. Naming livestock reminds me of a neighbor who assigned sweet names to her beef cattle. Once slaughtered, her animals entered the freezer wrapped in white paper and labeled like this: DaisyBelle, Round Roast, October 2019. Sorry, but the thought of eating DaisyBelle does nothing for my appetite.

Latin names

I understand that no one studies Latin these days, but learning a few Latin plurals won't hurt you, especially when you use those words daily. For many common words, you simply add an e to the end of the word, the way you add an s in English.

One larva becomes two larvae and one pupa becomes two pupae. And don't forget that one corbicula becomes two corbiculae and one antenna becomes two antennae. These plural words get a long e sound as in lar-vee, pyoo-pee, cor-bi-kyoo-lee, and an-teh-nee. You can spend decades struggling with these words or spend five minutes to learn them.

Queen cells

People use the terms queen cell, supersedure cell, and swarm cell interchangeably. Sometimes the purpose of these cells is obvious. For example, when dozens of them are lined up at the bottom of the brood frames in May, calling them swarm cells is a good bet. Several cells scattered on the face of the brood frames in August are likely supersedure cells.

But if you can't determine the purpose, just call them queen cells. There's no point in assigning a purpose to them if you don't know what the purpose is. Using the wrong word just adds confusion to any discussion.

Abbreviations

Be judicious with abbreviations, especially when you don't know your audience. No one likes to struggle with a bunch of letters while the speaker rumbles on without you. It won't diminish your authority to just say or write the words, especially the first few times.

My favorite abbreviation is SBB. I saw it used in a publication (not this one) where it referred to "screened bottom boards." Two months later, the same publication ran an article where the writer used SBB to mean "solid bottom board." Apparently, if you use an SBB instead of an SBB, you'll be all set.

Super irritating

Of course, the all-time most irritating word in all of beedom is super. Super is short for superstructure. You can't have a superstructure (which means "above the structure") unless you first have a structure. Brood boxes are the basic structure of the hive and contain the brood; supers go above the brood boxes and hold the honey. Supers are not integral to the structure of the hive, which means they can be added or removed without compromising either the hive or the colony that lives within.

The name super is determined by its function, not by its size or shape. When you call every bee box you own a super, you have limited ways to communicate what you really mean, and newbies have a hard time understanding. If you stop to think about what the word superstructure implies, you can't possibly get it wrong.

Ask ten beekeepers

If you plan to keep bees in a vacuum, no one cares what you call anything. But if you plan to teach, mentor, present, or write to beekeepers, especially new ones, try to use language that is clear and concise.

I often hear newbies say, "Ask ten beekeepers and get twelve answers." I don't think that's quite true. Instead, I think most of those ten beekeepers are saying the same thing, but they're speaking in code. Since no one understands what they mean, it sounds like twelve different answers. Who wouldn't be confused?

Rusty
Honey Bee Suite

All bees have two antennae. Honey bees also have two corbiculae, whereas many solitary bees have a single scopa or multiple scopae, depending on the species.

Tropilaelaps Department

[Our last issue included a primer on the Asian Tropilaelaps mites, which have breached southern Russia. This piece is condensed from the *Colorado Sun.*]

Meet Dr. Sammy, the Colorado researcher trying to fend off the next honeybee pandemic

As a new, virulent mite inches closer to North America, entomologist Sammy Ramsey's work involves serious science and singing R&B to persuade Thai beekeepers to share their secrets

Gabe Allen 4:20 AM MDT on May 8, 2024 The Trust Project

Sammy Ramsey poses for a portrait in his bee suit at Boulder Valley Honey in Boulder on Wednesday, April 10, 2024. (Gabe Allen, Special to The Colorado Sun)

Sammy Ramsey has spent years carefully tracking a genus of tiny mites as they spread across Asia. This winter, the honey bee parasite expert and endowed professor of entomology at the University of Colorado received a series of concerning reports: Tropilaelaps mites appear to have arrived in Ukraine. "Their presence in Ukraine is the biggest wake up call to the rest of the world about this parasite," he said. Ukraine exports bees to Canada, so North America might not be too far behind.

American beekeepers are already familiar with tropilaelaps' relative, the varroa destructor mite. But tropilaelaps are both deadlier and harder to kill. When the mites reached India, entomologists estimated that they killed between 50% and 100% of the colonies they infested. A similar death toll in the U.S. would have a devastating impact on, not only beekeeping, but agriculture as well. Nearly a third of the food that we eat comes from crops that rely on honeybees. "People say dogs are man's best friend." Ramsey said. "But, I feel like honey bees are competing for that top spot as well."

Ramsey's work on varroa mites cemented him a rising star in entomology. Using a mixture of conventional and unconventional imaging techniques, including observing the mites on live bees trapped in plexiglass photography chambers, he uncovered the details of the mites' feeding behavior. Essentially, the parasite liquidates the honeybee's liver, leaving them vulnerable to environmental toxins like pesticides.

Now in his 30s, Ramsey has already realized the dreams of many scientists. He has a tenure-track professorship and his own lab at the University of Colorado. He was also named a National Geographic Explorer last year. As someone who doesn't quite fit the stereotype — he is black, gay and a devout Christian — he is outspoken about the need for more diverse voices in science. "The very narrow conception of what a scientist looks like needs to be exploded," he told actor Craig Robinson on the Hulu show Your Attention Please.

But, Ramsey does fit the mold in one important way: He is obsessed with honeybees. And, now that mites have emerged as a looming existential threat, he is putting all of his energy into solutions. He has traveled the world in search of novel ways to treat the parasites, including trips to Thailand and Bangladesh. Here in Colorado, he keeps 10 or so experimental hives at Boulder Valley Honey for the purpose of testing novel treatments for both varroa and tropilaelaps.

Sammy Ramsey chats with Boulder Valley Honey owner and founder Christopher Borke . (Gabe Allen, Special to The Colorado Sun)

A deadly cocktail

"The state of honey bees right now is precarious because they're already dealing with a ridiculous amount of stress," Ramsey said. "But we're making it work." Thus far, U.S. beekeepers have been able to deal with lost colonies by splitting their surviving hives to create new ones. Yet, this approach only works if a certain portion of colonies remain healthy. The question now is if the honeybees can survive another even more destructive pest.

When a pregnant tropilaelaps mite arrives at a beehive, it is on a mission. It crawls, disturbingly quickly, through the colony and into the brood chamber — a honeycombed section of the hive where queen bees lay their eggs in an orderly pattern and worker bees tend to larvae as they mature. Then the mite searches until it finds a brood cell with an almost fully-grown larva inside. It hops in and waits for a worker to come and cap the cell with wax — sealing the parasite and its victim inside. Once the cell is capped, the mite lays one or two eggs, which hatch and develop into fully-grown mites in a matter of days. Throughout the process, the mite and her offspring gorge themselves on the fatty tissue of the pupa. When the mature bee emerges from the brood cell — and not all do — the mites hop out and look for a mate to start the process once again.

"The bees identify the dead or severely damaged pupae and rip them out," said Steve Cook, a research entomologist at the USDA's bee research laboratory in Beltsville, Maryland. "You begin to see this sort of shotgun brood pattern." The bees that do survive to emerge are left with a greatly weakened immune system, and the wounds left by the mite's mandibles can lead to crippling physical deformities. They rarely survive for more than a few days. To make matters worse, tropilaelaps mites often transmit virulent diseases. Black queen cell virus infects and kills queen bee larvae, while deformed wing virus disrupts pupa development leaving bees disabled, partially paralyzed and flightless. "You'll see adult bees with these deformed wings crawling on the outside of the hive," Cook said. Without intervention, the entire colony will soon perish.

The destructor

Though tropilaelaps have yet to reach North America, beekeepers have been dealing with the aptly named varroa destructor mite for four decades. Since varroa arrived in Florida in the late 1980s, they have become a ubiquitous source of death and disease. In 2018, 90% of the honey bee colonies sampled by the USDA's National Honey Bee Survey tested positive for the mites. Research ranks varroa as the leading cause of "colony collapse disorder," which kills between a quarter and a half of U.S. bee colonies each year.

In April, Ramsey took a few hours to check on his experimental hives a few miles east of the university. As Boulder Valley Honey owner and founder Chris Borke watched, Ramsey pulled a bee-covered frame of honeycomb out of the first hive and held it up to his eyes. After a few seconds he exclaimed "aha!" A varroa mite had latched onto the shoulder of a worker bee. The mite was barely discernible — a tiny red dot — but Ramsey is adept at finding them.

“All beekeepers have them nowadays,” Borke explained. “They’re difficult to manage.” Varroa destructor’s life cycle is quite similar to that of tropilaelaps, with one important difference. In addition to invading brood cells, varroa mites can feed on adult bees. This allows the mites to spread quickly to new hives by traveling on the backs of worker bees.

This difference may explain tropilaelaps’ relatively slow spread, but it is not cause for reassurance. Tropilaelaps reproduces much faster than varroa. Once it makes it into a colony, it can spread exponentially throughout the hive and quickly invade nearly all of the brood cells. Tropilaelaps mites also tend to bite their victims in multiple places, while varroa create only one wound. As a result, tropilaelaps infestations are more rapid, more deadly and harder to control at the colony level. “If we thought that varroa was bad, well, it looks like tropilaelaps is just in a different league,” said Dennis vanEngelsdorp, a professor of entomology at the University of Maryland and leader of the USDA National Honey Bee Survey.

With the threat of a future honey bee pandemic in mind, a team of USDA scientists and policymakers developed an annual survey meant to detect tropilaelaps if it arrives in America. Each year, state inspectors sample around 1,000 honey bee colonies around the country for signs of tropilaelaps. If an inspector finds the mites, they are required to contact the USDA, which will work with state authorities to develop a containment and mitigation plan. The survey aims to prevent the mites from spreading throughout the country, but there’s also a chance that by the time we know tropilaelaps is here it will already be too late. “It just takes one distribution point for a parasite to get out of control,” Ramsey said.

If tropilaelaps arrived on U.S. soil today, beekeepers would have very few tools to defend against them. Most of the literature on mite control is specific to varroa, so attempts at eradicating tropilaelaps would be, scientifically, a shot in the dark. “There is so little about this organism that has actually been documented at this point because it has remained in what are typically deemed ‘developing nations,’” Ramsey said. Yet, beekeepers in Asian countries have dealt with the mites for decades, sometimes with modest success. As alarm around tropilaelaps is growing internationally, these techniques are finally getting some scientific attention.

Acid and paint sticks

Ramsey and his lab have made multiple trips to Thailand with one goal in mind: finding and testing a surefire way to kill tropilaelaps in honey bee colonies. In particular, he heard that Thai beekeepers were using formic acid, a food preservative and chemical component of the venom in a honey bee stinger, to treat infested colonies. Formic acid is a common treatment for varroa in the U.S.

But the beekeepers that Ramsey met were reluctant to reveal their trade secrets, especially to a foreigner. One day, Ramsey was trying to pry information from a particularly reticent beekeeper, and getting nowhere. The man dodged each question with vague and confusing answers, until one of the beekeeper’s assistants interrupted the conversation by tapping Ramsey on the shoulder. “He was like, ‘are you Black Thai?’” Ramsey said. The young apprentice recognized Ramsey from his after-hours viral Youtube channel, where he sings Thai pop songs with R&B inflection. “He showed the beekeeper the video and he got really excited,” Ramsey said. “Then he opened up a ton.”

Ramsey learned that the beekeeper treated tropilaelaps by dipping paint stirrers in industrial-grade formic acid and sticking them under the entrance to the colonies. And it was working, for the most part. Because the paint-stirrer method produced an unpredictable amount of formic acid, some of the colonies were poisoned and died. But many others survived with a lower mite population than before. Once he saw it with his own eyes, Ramsey wasted no time coordinating a study to find the perfect dosage of formic acid to treat a tropilaelaps infestation. The preliminary results, though not yet published, are quite promising, but it’s not a silver bullet. When American beekeepers started using chemicals to treat varroa infections, the mites quickly developed resistance.

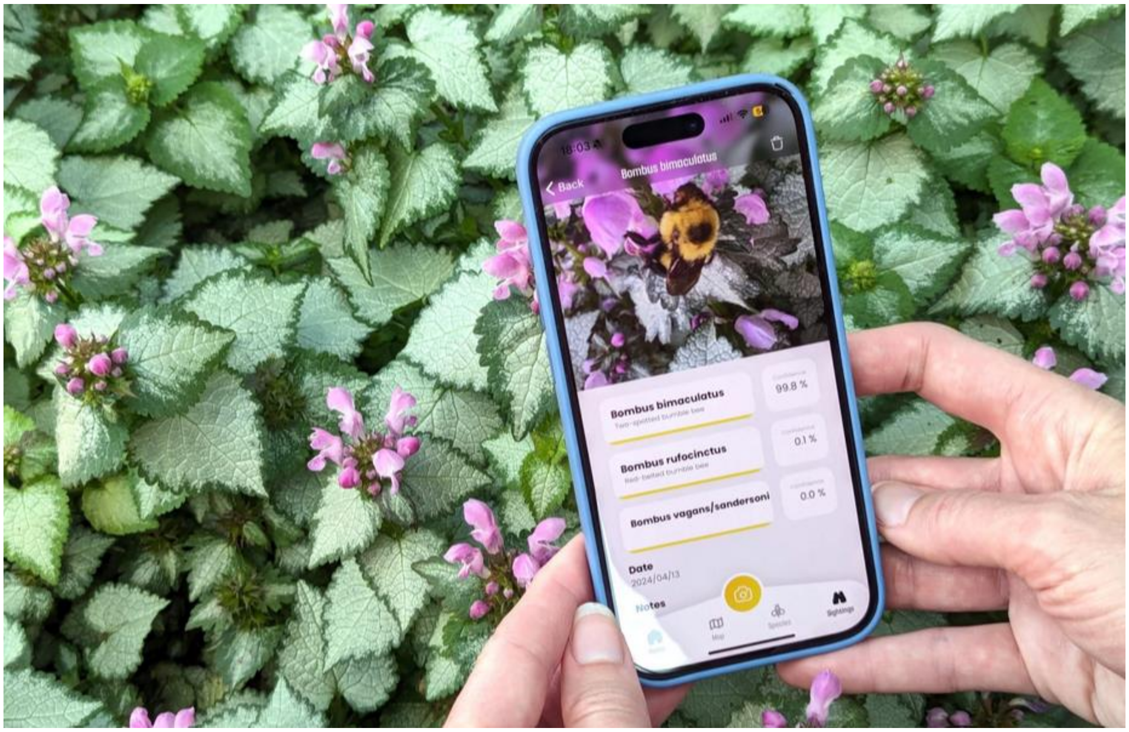
“We went through three rounds of this before we figured out we need multiple chemicals at the same time,” Ramsey said. “Otherwise we’re just going to end up on the resistance treadmill forever.” Ramsey’s lab is now busy testing two other methods to control tropilaelaps. One employs a proprietary chemical, while the other subjects the hive to a cycle of heating and cooling that might prove lethal to the mites while avoiding harm to the bees.

Now that tropilaelaps is “knocking on the door of Europe,” as Cook puts it, the USDA is scrambling to support research like Ramsey’s. In addition, the agency is footing the bill for a group of state inspectors to travel to Thailand with Auburn University entomologist Geoffrey Williams this spring. The hope is that the inspectors will learn how to identify the mites by seeing them in person.

Ramsey still wonders if enough is being done. “Let’s think about the pandemic for a moment,” he said. “Can you imagine if in 2019, as soon as we heard about COVID-19 spreading in China, we had started studying COVID, learning about it — we could have had a vaccine before the summer of 2020 arrived.”

To save the bees, a Kansas scientist is building an app to identify thousands of species

Celia Llopis-Jepsen, Wed, July 17, 2024



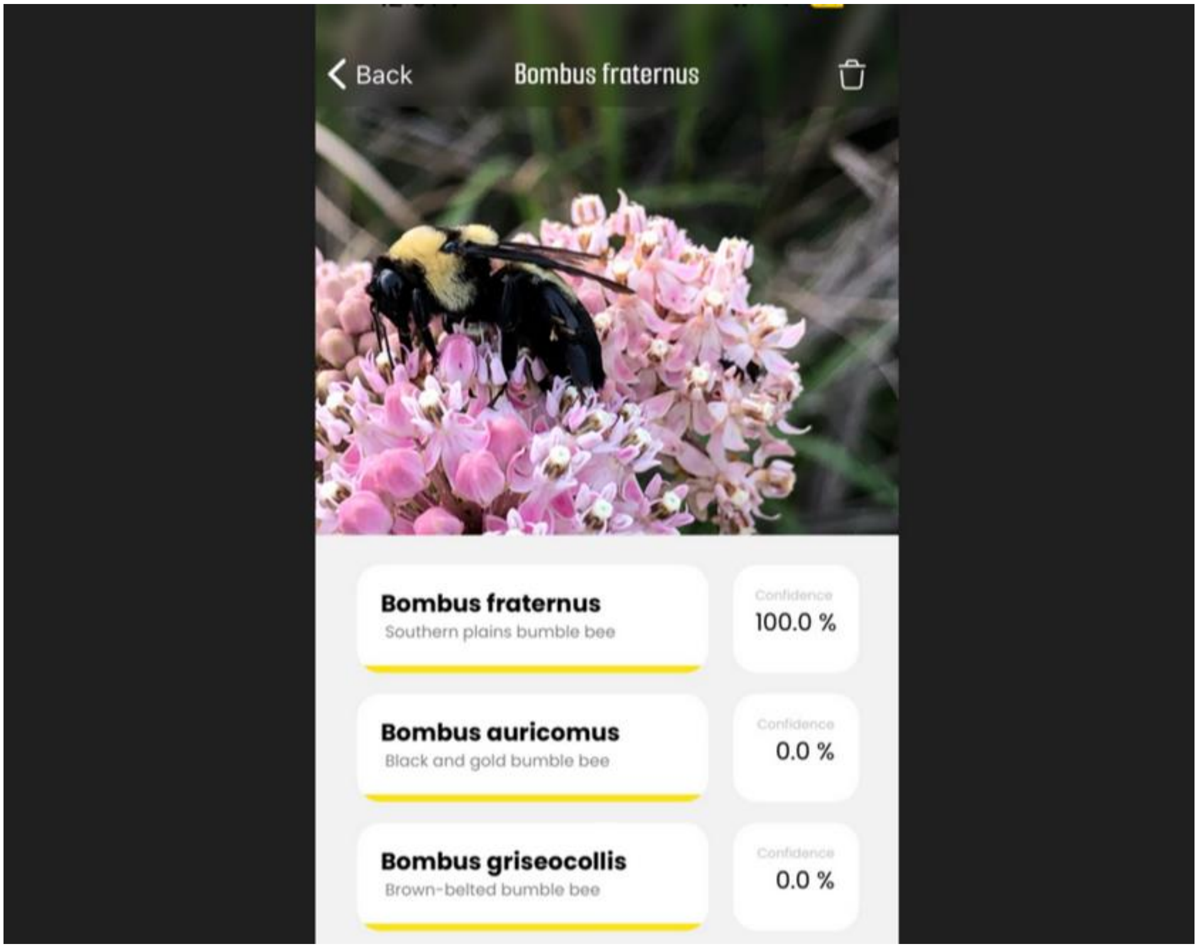
The BeeMachine app identifies a bee visiting a suburban flower garden in Lawrence as a two-spotted bumblebee. The app uses artificial intelligence to distinguish among species, some of which are very difficult to tell apart.

Just a few decades ago, bee enthusiasts across much of North America could count on spotting one of the continent's most common bumblebee species buzzing from flower to flower. Today the American bumblebee is in trouble. Its numbers have dropped sharply, and it has vanished entirely from large swaths of its range. Yet the fact that biologists even know of this pollinator's plight marks a key step toward helping it, because population trends steer conservation efforts. By contrast, scientists remain in the dark about how most of the other estimated 4,000 bee species in North America are handling habitat loss, pesticides, global warming and other challenges.

A new smartphone app called BeeMachine harnesses artificial intelligence to tackle a key hurdle to figuring this out: Right now, experts struggle to tell many species apart. "It's a huge problem," said entomologist Brian Spiesman, the app's creator and a professor at Kansas State University. "We bring back a few hundred specimens (from fieldwork) and we spend much longer identifying them in the lab than we do actually collecting them."

Bee ecologists mail tricky specimens — many species are nearly identical and tiny as gnats — to specialized taxonomists. But these taxonomists are in short supply, so Spiesman and his collaborators are training artificial intelligence to help. As an added bonus: The app lets the public participate in documenting bees, too, by snapping photos when they spot one. This type of citizen science has the potential to get more eyes out there sighting bees than any single study could ever hope for," Spiesman said. "Better tools for crowdsourcing are really important."

The public's sightings can offer valuable intel on which bees live where. In the Midwest, for example, a hiker wandering trails or a gardener scouting their flower beds could find a Southern Plains bumblebee or an American bumblebee, both of which are currently under review by the U.S. Fish and Wildlife Service for potential listing as threatened or endangered.



A bee forages on a swamp milkweed in the wetlands just south of Lawrence. BeeMachine identified it with 100% confidence as a Southern Plains bumblebee, a dwindling species currently under review for potential federal protections.

A separate project from Cornell University, E-Bird, has already proven the power of large-scale public participation by turning passionate birdwatchers into a wellspring of data for avian research and conservation efforts.

So far, BeeMachine can distinguish between more than 350 kinds of bees at the species or genus level. The goal: teaching it to identify all of the estimated 20,000 bee species worldwide. That will require international collaboration, though, because Spiesman and his colleagues need high-quality photos of accurately identified specimens to train BeeMachine.

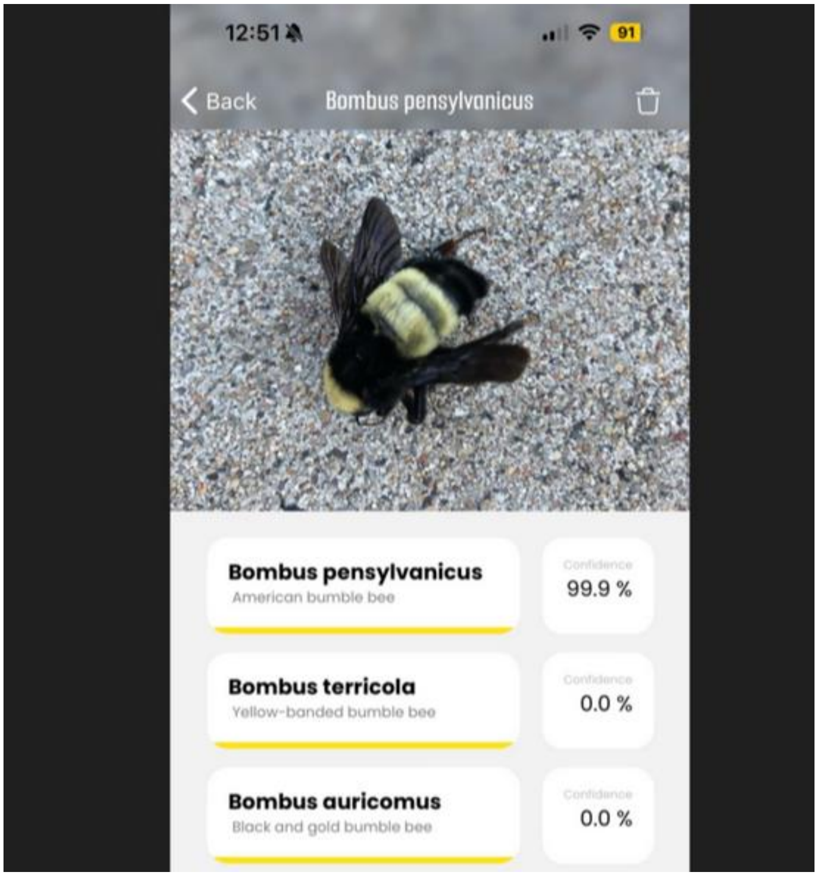
Bees without borders

Spiesman and his colleagues corral photographs from museums and other reliable sources around the world. They've taken thousands of images themselves and have pulled others from international projects such as the Global Biodiversity Information Facility, a multigovernment-funded online repository of species data. Natural history museums hold a treasure trove of specimen collections that have already undergone painstaking identification. Those specimens let BeeMachine correctly learn the minutiae of tricky species.

Yet getting images of these specimens remains a challenge. It can require a lot of specimen handling and imaging work. "Museum staff often don't have the time to pull specimens and definitely don't have time to photograph them for us unless we have an existing collaboration that is already funded," Spiesman said. As BeeMachine grows and gets smarter, it has the potential to collect and accurately identify sightings on every continent and make the information available to researchers globally. Already, the project partners with data collection efforts in Japan and Argentina, for example.

Ultimately, Spiesman hopes that BeeMachine will let scientists identify more bees in the field without needing to kill the creatures and scrutinize them under microscopes. Researchers could, for example, aim a camera at a flower and leave it there to gather images of foraging pollinators for BeeMachine to analyze. So far, data gathered by BeeMachine isn't viewable online, but that will change soon — likely this month. Users will be able to view each other's sightings on the project's website.

Popular naturalist apps, such as Seek, do a good job of identifying the largest and most common bees, but Spiesman says ecologists need a more powerful tool to tell apart the many tiny, near identical species that exist. "We are not replacing taxonomists at the rate that they're retiring," he said. Taxonomy requires specialized expertise and rigor. Taxonomists say their field is widely underappreciated and misunderstood, exacerbating the shortage of professionals.



After dead bumblebees turned up in a Raymore, Missouri, backyard, BeeMachine identified them with nearly 100% confidence as American bumblebees, a species that has vanished from parts of its range.

How many kinds of bees exist?

About 90% of plants can't reproduce through wind pollination. They depend on animals to do the work, and bees rank among the most important of pollinators. Yet bees remain as mysterious as they are important. Scientists are still figuring out how many species of them exist. Estimates vary, but they commonly range around 20,000 worldwide and 4,000 in North America. That staggering biodiversity is typical of invertebrates. For comparison, North America has fewer than 500 mammal species. But what scientists know so far skews toward bigger species that are easier to observe and identify. Thousands of small bee species remain poorly understood. Case in point: About 40% of the bee species assessed so far by the International Union for Conservation of Nature are bumblebees. This is despite the fact that bumblebees constitute a tiny sliver of the bee universe.

Based on the documented plight of some of the world's best studied bees, though, scientists worry that their smaller counterparts could struggle, too. Habitat loss and climate change have hit many insects hard. Insecticides inadvertently poison beneficial pollinators, and herbicides lead to fewer wildflowers on many farms. Microscopic parasites spread to wild bee species from infected European honeybee hives that people ferry from region to region to pollinate crops. Introduced honeybees compete for food in areas without enough of it to go around, and wild, native bees face undernourishment. On some other continents, introduced bumblebees cause similar problems for native pollinators.

Celia Llopis-Jepsen is the environment reporter for the Kansas News Service, which is a collaboration of KCUR, Kansas Public Radio, KMUW and High Plains Public Radio. This story was published by KMUW and is republished here as part of the Wichita Journalism Collaborative, a partnership of several media organizations, including The Wichita Eagle.

Club Information and Contacts

Visit our website at: https://www.ccbaor.org/

Address: POB 1916 Newport, OR 97365

Email: centralcoastbeekeepers@gmail.com

facebook: CCBA meta