CENTRAL COAST BEEKEEPERS NEWSLETTER

Nov., 2024

NEXT MEETING Nov. 16, 2024

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

PRESIDENT'S MESSAGE

By Jeremy Egolf

Anticipation, responsiveness, proactive adaptation, learning, repeat… So, we're dealing with the devil we know, and preparing for the one we don't. At my place, besides adding feeders this past week, we'll be hitting the colonies with oxalic acid at the end of the week and checking the store room for spring varroa treatments to apply around early April or so when the alder (?) pollen appears. As for the devil we don't know as well, the bee keeping industry is girding up for the tropilaelops mite by education the community and, I suppose, the researchers are putting in their grant proposals, or should be. In this issue, we provide a sampling of the Tropi publicity that is appearing around the US.

Speaking about learning, a friend recently had a robust colony collapse to a couple hundred bees for no obvious reason, and then to nothing, followed in short order by a second more modest but nevertheless healthy appearing hive. No deformed wing or similar, but possibly a less obvious disease (and not foulbrood or the other usual visible suspects). Lesson learned for me is that the right response to an undersized colony going into winter is not to automatically combine it with a stronger neighbor but to give good thought to the reason it's failing. In the case of my own micro-apiary, I have one colony that only had a couple frames of bees, had heaps of dead bees on the porch and was already visibly weak on stores (I was surprised, so early in the rainy season, since it seemed to be OK). An early starvation diagnosis is plausible so I did some emergency feeding and will combine it with another colony. Learn, repeat, or maybe learn not to repeat and to try something different.

Besides other odds and ends of interest, this issue includes a couple of relevant items from the good ol' US Department of Agriculture's Agricultural Research Service, whose scientists continue to research broadly applicable solutions to problems plaguing our American food industry.

At our last meeting, the eminent Dewey Caron spoke on "Winter Hive Preparations." A few highlights:

- Late autumn, it is recommended that a count be made of adult bees, open/capped brood, and resources. [We note that this is particularly useful if you are building a local database to use with Randy Oliver's mite model]

- Winter losses - Lincoln County (based on a small number of respondents) had the highest rate mortality in Oregon. {Editorial comment: So, let's get pay attention to food stores and clobber the mites before the brood season - mite counts save lives!] Dewey noted that, overall, backyard losses in the state are generally similar to commercial.

- For overwintering, it is important to close upper entrances; heavy syrup should be fed as long as the bees are willing to consume. After particularly cold days, the syrup should be rewarmed; alternatively, large sugar patties can be fed. And heft those colonies as a method to check for resources without opening the hives..

- Consider replacing queens in the spring, summer when hives are heavy with honey, or early after the nectar flow (e.g., August) [though we note that queens are hard to acquire after May - see within for our club's advance purchase of 2025 bees]

- It is important to reduce mites in the March/April period to minimize late year boom. A spotty brood pattern may result from hygienic bees smelling mites and opening capped brood - sometimes they are overzealous, opening caps on cells in which mites are not established

- Viruses may cause devastating losses, but if the host is wiped out, there are no residual spores, etc., contaminating hives for reuse.

- The European Foulbrood Project (in which OSU is an active participant) will examine 6000 colonies during the 2025 almond pollinating season

We're looking forward to a cozy winter and another fine year of beekeeping!

The Year's Program - last Meeting of 2024! Bring a Taste of Honey, if you like!

All meetings 1:30 p.m.   November 16th is at the OSU Extension office in Newport.

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

USDA Agricultural Research: **Scientists Gain Insight into a Buzzing Spring Pollinator that Plays a Significant Role in the Almond Industry**

April 2, 2024

The USDA's Agricultural Research Service (ARS), in collaboration with the Ecological Forestry Applications Research Centre in Spain and North Dakota State University, conducted a comparison of the physiological and molecular processes involved in the summer and winter dormancy of *Osmia lignaria*, also known as blue orchard bee or orchard mason bee.

This analysis of gene expression is believed to be the first to compare the dormancy periods of this species in their natural habitat, and more importantly, it led to sequencing the first draft genome of this important pollinator for the almond industry.

According to the U.S. Forest Service, North America has 140 species of Osmia. *Osmia lignaria*, a solitary bee, follows a one-year lifecycle that includes two periods of dormancy. During summer, the bee develops to the prepupal stage (the stage of larva after its final molt), pauses, then finishes to developing to the adult stage before winter. Adult bees slow their metabolic activity while overwintering [second dormancy]. When spring arrives, adult bees emerge from dormancy and become highly active in pollination. Although this species does not produce honey, it is very effective in pollinating almond trees due to cross-pollination among different varieties, which leads to higher crop yields.

Osmia ribifloris is one of several relatives of the blue orchard bee (*Osmia lignaria*). These bees are effective pollinators for almond trees due to the way they cross-pollinate among different varieties, leading to higher crop yields. Photo by Jack Dykinga)

“This species inhabits a wide latitudinal range in North America, with populations in the north having different developmental rates and lengths of dormancy periods than those in southern populations,” said Alex Torson, a computational biologist with ARS’ Insect Genetics and Biochemistry Research in Fargo, North Dakota.

“In the future, we can use the genome presented in this study to start comparing the genomes of individuals from these different geographic populations. If these differences in development and dormancy can be traced to their genetics, then we could develop managed populations from different geographic locations, and time the characteristics of those populations with peak floral blooms for different types of crops.”

By aligning their emergence with the timing of crops, it would allow for better management and pollination, as this bee species emerges in the spring and is a significant pollinator of almond trees due to how it pollinates. Understanding how this lifecycle occurs has become increasingly important due to changes in environmental conditions. A better understanding of the evolutionary relationships among populations of this species will be critical for developing managed populations we can use for pollination services.

The study is available in Insect Biochemistry and Molecular Biology

CCBA's Queens for 2025:

At the recent OSBA conference, we purchased at auction a set of five queens from Russell Heitkam. The queens are planned for delivery in 2025, so we expect to have them on hand to replace weak or otherwise failing queens as we do our spring colony checks. Russell is a second generation beekeeper & Northern California (Orland) Queen Producer, and is on the Project Apis m Board of Directors.

A Watchable Youtube Video: The Importance of Place, Power, & Purpose in Pollinator Stewardship with Melanie Kirby

(just search on her name if the link is too much to copy and paste)

https://www.google.com/url?q=https://udsiqshab.cc.rs6.net/tn.jsp?f%3D00129mE8LIF3ENuaUNfp7F56fKTTCoWKVq5u7cG5hWCYfmuV75OKAShvJaIL6iRyy8ZrNhP7X4t0L9ltw8fHMBgp04IxlF9JrPiNq3IeDi7RCAFI_3MJZzVJrBNi46c5rdlCM5jVuEOO0V7c4I6YIRoX2FNGAux5Ex9j95CRgyx5RR4vZ6EQgWmT2LK3SPrI_r_Chbt42ypZ7DmMVZk9041pYukqadOVHdI35LiSB7fooqKX38D8YKXVZQIiDAb43jXuz6FryEJ-1GgNUo_kcUznPjgdbZYHdFW%26c%3DZOmbU8F50ohJOt0vSx-NHavhK7C4CwpbKQdFNON1rOyR1tvps4Kbcg%3D%3D%26ch%3DM_VZleQJLGgTsJj-mToaa9plA3LSk7LIKWmi9PhLMLCI_OC27D10yQ%3D%3D&source=gmail&ust=1729952311055000&usg=AOvVaw3O1V_txBaJt2xCqu_UZjVr

Michigan State U Extension Says: Consider nature when designing your garden!

https://www.canr.msu.edu/news/consider-nature-when-designing-your-garden?utm_source=cc&utm_medium=email&utm_campaign=extensiondigests

Gearing Up to Resist Tropilaelops When it Breaches the Ocean Barrier

The Tropi mites have been found in Kenya and Papua New Guinea as well as Russia and, as you've probably noticed, the "civil defense" preparations for their (expected) arrival here are underway. Taking a page from the impact of Varroa, Project Apis M launched "Tropi STOP Resources" with a two page pamphlet on the subject:

https://static1.squarespace.com/static/650342507631075013d25a2c/t/6716d2c19fdcf61be801f1f2/1729548998910/Tropi+2+pager+Final.pdf

Not much new here if you've read this newsletter's previous articles on the subject, but it does emphasize visual identification (pull out those magnifying glasses since these mites are smaller than varroa); the important point is that the community is aiming to proactively fight these pests.

Here are some links to resources and additional information on *Tropilaelaps* mites (Courtesy of Michigan State University Extension Service)

- Tropilaelaps fact sheet – Apiary Inspectors of America, Auburn University, Honey Bee Health Coalition, Pollinator Partnership, Project Apis m., U.S. Department of Agriculture Animal and Plant Health Inspection Service and U.S. Department of Agriculture Agricultural Research Service
- Tropi STOP webpage – Pollinator Partnership and partners
- Episode 188: Tropilaelaps – podcast episode by Two Bees in a Podcast
- Tropilaelaps: What Beekeepers Need to Know – webinar recording with Samuel Ramsey
- Tropilaelaps the WORST mite of HONEY BEES – video with Humberto Boncristiani from Inside the Hive TV
- Tropilaelaps Infestation of Honey Bees – case definition publication by U.S. Department of Agriculture
- Featured Creatures Tropilaelaps mite – publication from University of Florida
- Varroa mite and Tropilaelaps mite – slide from U.S. Department of Agriculture's Animal and Plant Health Inspection Service
- 2024 Tropilaelaps Training in Thailand Trailer – video from Project Apis m.
- First report of established mite populations, Tropilaelaps mercedesae, in Europe – publication from Journal of Apicultural Research

Colombian Scientists Develop Substance to Protect Bees from Chemicals

Bees from the apiary of the Universidad del Rosario are raised for the research of the formula to protect the brain of bees and other pollinators affected by exposure to insecticides, Bogota, Colombia, October 17, 2024. (REUTERS/Luisa Gonzalez)

Adapted from VOA - Voice of America English News

Scientists in Colombia say they have developed a new food substance that protects bees from dangerous chemicals used in farming. They claim it will protect the insects' brains from **neurological** damage caused by chemicals called **pesticides**. The plant-based food substance enables bees to deal with neurotoxins commonly used in agriculture. It protects their **motor** system and memory harmed by the chemicals.

Researchers at Colombia's Rosario University in Bogota developed the substance. They partnered with scientists from the Colombian Universidad Javeriana and the University of Arizona in the United States.

Andre Josafat Riveros, professor at the Faculty of Natural Sciences of the Universidad del Rosario, speaks during an interview with Reuters in Bogota, Colombia, October 17, 2024. (REUTERS/Luisa Gonzalez)

"This is a nutritional solution to the problem bees face when **exposed** to pesticides," said Andre Riveros, a professor at Rosario University. Riveros explained that the food substance causes the bees to develop protection against pesticides.

The substance is created with flavonoids, which are known for their health benefits. Flavonoids come from plants and are a kind of secondary metabolite. Secondary metabolites are substances made by plants that make them competitive in their environment.

Andre Josafat Riveros led a team of researchers from the Faculty of Natural Sciences of the Universidad del Rosario. Here, he feeds a bee that is inside a test tube in a laboratory in Bogota, Colombia, October 17, 2024. (REUTERS/Luisa Gonzalez)

During the first round of testing, scientists put the bees to sleep and placed them into small laboratory tubes. Then, they fed the bees the substance one by one.

A bee from the apiary of the Universidad del Rosario raised for the research of the formula to protect the brain of bees and other pollinators affected by exposure to pesticides, Bogota, Colombia, October 17, 2024. (REUTERS/Luisa Gonzalez)

Testing has now moved to real-world situations in a bee colony at the university, said Juan Jose Ovalle. He is a natural science student at Rosario University.

Students work inside the apiary of the Universidad del Rosario collecting bees raised for the research, Bogota, Colombia, October 17, 2024. (REUTERS/Luisa Gonzalez)

"We already know that there are molecules that improve the bees' health. We already know that there are molecules that prevent neuronal damage caused by pesticides," Ovalle said.He added it was important to continue the work to increase the effectiveness of these methods to support bees.

Camilo Cohecha reported this story for Reuters from Bogota, Columbia. Anna Matteo adapted it for VOA Learning English.

More from OSBA Speaker Scott Debnam:

Abstract of his PhD dissertation, "Juvenile temperature regulation in Apis mellifera (Honey bee) and the impacts of brood temperature requirements on the colony" (2022)

Little is known about the energetic costs to insects of raising young. Honey bees collectively raise young, or brood, through a series of complex behaviors that appear to accelerate and synchronize the timing of brood maturation. These include maintaining the brood nest at warmer and consistent temperatures and the exceptional activity of "heater bees." The temperature at which juvenile insects are raised can profoundly affect their development. Apis mellifera (Honey bees) cope with temperature-dependent development via social behavior that maintains the relatively high and constant temperatures within the nest where the brood are raised. Yet juvenile honey bee development is complex and can be categorized into egg, larvae, pupating juveniles, and pupae.

Honey bees use passive and active behaviors to maintain remarkably constant brood nest temperatures, from 33 to 35°C, across a wide range of ambient temperatures. In addition to these colony-scale behaviors, a small subset of nurse bees behaves as heater bees. Heater bees contract thoracic flight muscles to generate heat, but their thoraxes reach much higher temperatures than other bees responsible for brood care, ranging between 42 and 47°C. Heater bees focus their attention on incubating individual cells by moving among brood cells and regulating the temperatures of individual eggs, larvae, and pupae.

We constructed four sets of experimental hives to explore the developmental temperatures at which each juvenile stage is maintained, the energetic costs of raising juveniles, and the cost of heater bees. One set allowed us to record the temperatures of undisturbed young in the brood nest area established by the colony. The second set was designed to estimate the numerical allocation of individuals to the heater bee task. The third set was intended to contain only brood, which eliminated foraging and allowed us to quantify stored honey use when rearing juveniles at 10 and 30°C. The final set was used to measure the respiration rates and energy expenditure of individual bees displaying resting, walking, heating, and agitated behavior. We first discovered that instead of simply maintaining brood nest areas at 33-35°C, honey bees provide extraordinarily precise but different

temperatures for larvae and pupae. We found that the temperature at which heater bees regulate cells is above the overall average temperature range of the brood nest. Honey bees raised larvae at 36.38±0.02°C, substantially higher and with a narrower range than what has been reported for the brood nest, 33-35°C. Honey bees raised pupae at 35.18±0.04°C, also higher than the reported temperatures for the brood nest.

We further explored brood development by characterizing the developing juveniles' temperature profile throughout their entire 21-day developmental cycle. We found that eggs were maintained at 36.1 ± 0.03°C, larvae at 36.2 ± 0.02°C, pupating juveniles at 35.9 ± 0.03°C, and pupae at 35.8 ± 0.03°C. All stages were significantly different from all other stages, but importantly larvae were only 0.4°C different from pupae. We then conducted another experiment with brood frames without mature bees and in incubators at 34.5°C. Without nurse bees, the temperatures of eggs, larvae, and pupae were 34.4 ± 0.04°C, 34.7 ± 0.05°C, and 34.3 ± 0.04°C, with larvae different from all other stages, and a 0.3°C difference between larvae and pupae. When compared to the 1.2°C in Chapter 1, this 0.3°C difference suggests that heater bees may be a major driver of the differences between pupae and larvae. However, the 0.4°C difference between larvae and pupae in the second experiment reported in chapter 2, vs. the 0.3°C difference, suggests that the larvae themselves may be the major contributor to the temperature difference between the life stages. Either way, our results suggest honey bee development may involve far more precise temperature during the development of juveniles than previously known.

And finally, to determine the cost of maintaining juveniles at these warmer and more consistent temperatures, we compared the honey used by brood-only experimental colonies with whole-colony measurements of honey storage in the literature. We estimated that raising brood costs colonies half of their annual energy budgets stored as honey, or approximately 43.7±0.9 kg·yr-1. We estimated that roughly 2% of colony individuals perform the task of heater bee. Respiration rates of heater bees (19 mW) were more than those of resting bees (8 mW) but similar to those of walking bees (20 mW) and about half of those that were agitated (46 mW). The energetic cost of heating was more than an order of magnitude lower than reported values for the energetic cost of flying. By integrating data from our experimental hives, we estimate that the annual cost of raising brood is quite high; however, we estimate that heater bee behavior and physiology, though extreme, may require only about 7% of the annual honey stored by a colony.

Instead of simply maintaining brood nest areas at 33-35°C, honey bees provide extraordinarily precise but different temperatures for larvae and pupae. We do not know if these differences ultimately affect development, but they suggest that honey bees may exert far more precise control over the temperatures of their juveniles than previously known, which comes at a high cost at the colony level (macroeconomic), but a surprisingly low cost at the individual (microeconomic) heater bee level.

Elevated CO2 vs. Mites (Work by OSBA Speaker Brendan Hopkins and colleagues):

(Brendan is an Assistant Research Professor at Washington State University in the Department of Entomology and Apiary and Laboratory Manager of the WSU Apiary Program. He initially worked on the development of cryopreservation of honey bee germplasm for breeding and conservation, work that enabled the establishment of the world's first honey bee germplasm repository at WSU and inclusion of honey bee semen in the USDA National Animal Germplasm Program. More recently, research efforts have expanded to include developing practical solutions for the beekeeping industry ranging from bee breeding to varroa control.)

Elevated CO2 Increases Overwintering Mortality of Varroa destructor (Mesostigmata: Varroidae) in Honey Bee (Hymenoptera: Apidae) Colonies Stephen O. Onayemi,1, Brandon K. Hopkins,1, and Walter S. Sheppard, Department of Entomology, Washington State University, Pullman, WA 99164, USA and 1
Journal of Economic Entomology, 115(4), 2022, 1054–1058
https://academic.oup.com/jee/article/115/4/1054/6590767?login=false

Abstract:

Indoor storage of honey bees (*Apis mellifera L.*) during winter months has been practiced for decades to protect colonies from the adverse effects of long, harsh winter months. Beekeepers have recently employed indoor storage to reduce labor, feeding costs, theft, and woodenware degradation. Despite the growing number of

colonies stored indoors, national survey results still reveal high losses. Varroa mites (*Varroa destructor* Anderson and Trueman) are the most critical threat to colony winter survival and health of colonies because they contribute to the transmission of viruses and colony mortality. To investigate the effect of high CO_2 on varroa mites during the indoor storage of honey bees, 8-frame single deep colonies were stored in two separate environmental chambers at 4°C each. One environmental chamber was set at 8.5% CO_2 (high CO_2), while the other was set at low CO_2 (0.12%). Dead and falling mites were collected and counted from the bottom of individual colonies weekly during the experiment. There was a significant difference in mite mortality of colonies with high CO_2 compared to colonies held at low CO_2. These results indicated that high CO_2 could increase mite mortality during the period of indoor storage, potentially improving honey bee health coming out of the winter months. Our research offers a critical addition to beekeepers' tools for managing varroa mite populations.

Natural Insecticides May Be Hiding in Plain Sight:

Targeted plants may provide what's needed to fend off attackers

[Courtesy of the USDA Agricultural Research Service – by Scott Elliott, ARS Office of Communications*]*

Spotted Wing Drosophila (SWD) is a worldwide scourge of fruit-bearing plants, and it's quite possible it may develop immunity from some insecticides. How can farmers fight it?

SWD, a highly invasive vinegar fly that is native to Asia, has moved around the world feasting on soft-skinned fruit. Since 2008, it's become a major pest of U.S. fruit crops, especially berries, cherries, and some grape varieties. These crops have a combined annual value of over $5.8 billion in the United States and losses due to SWD exceed $718 million annually.

In an effort to control SWD, Blair Sampson, an entomologist at the Agricultural Research Service's (ARS) Southern Horticultural Research Unit in Poplarville, MS, is looking to a plant's own "pharmaceutical factory" to fight the predatory pest. In doing so, he hopes to eschew popular chemical insecticides and provide an alternative that's less environmentally harmful. "[SWD] is worldwide and has [required] substantial insecticidal input almost weekly," Sampson said. "Given that this fly can complete 13 generations per year, and chemicals are used against it virtually year-round, this species has high potential to develop resistance to some of the most potent insecticides."

To counter the threat, Sampson is investigating natural plant compounds that may thwart chemical pesticide resistance, manage fly populations, and yet remain benign to the environment. "Plants produce a pharmacopeia of chemical compounds, many of which do not directly benefit plant growth or development," Sampson said. "Instead, these 'secondary' compounds are largely responsible for erecting a formidable chemical defense against herbivores, especially leaf-feeding insects."

Spotted wing drosophila laying an egg inside a blueberry. (Photo courtesy of Blair Sampson).

These natural substances can appear anywhere inside the plant – roots, stems, leaves, flowers, fruits, and nuts – and are stored in the form of oil, sap, or latex within plant tissues. People have commonly used these oils as medicines, perfumes, and candle scents, as well as culinary herbs and spices. Now, researchers are testing them for their intended purpose in plants: as pesticides and feeding deterrents against plant pests.

Two of the essential oils that Sampson and colleagues from the University of Hawaii have worked with have a 50-100% effectiveness rate against adult and larval SWD flies. "We have focused our testing on two chemical components found in many essential oils," Sampson said. "They are ‘pulegone,’ which smells like peppermint, and ‘linalool,’ which has a subtle citrus aroma, much like some fruit-flavored cereals. "Many essential oils have proven highly effective for killing small bugs almost instantly," Sampson said. "In fact, some commercial insecticide/miticide products labelled for residential use or on vegetables, fruits, field crops, herbs, spices, and nut crops rely on essential oils as the sole source of active ingredients." For instance, products based on cinnamon oil and compounds from rosemary, geranium, and peppermint are particularly effective. These and other such products offer effective control of small-bodied pests like aphids, leafhoppers, mealybugs, white flies, plant bugs, thrips, mites, leafrollers, and other caterpillars.

According to Sampson, there are about 3,500 known compounds produced by plants to protect themselves from insects, and he and his team have tested hundreds of them. While studying their efficacy on SWD, the scientists must ensure the compounds are safe for non-targeted insects and consumers as well. "As we develop the insecticidal formulation, we want to be sure that concentrations that are effective against a pest pose no risk to beneficial insect species," Sampson said, "especially bees, which are vital for pollinating numerous fruit and vegetable crops."

While the essential oils are proving to be effective, they are not intended to be a stand-alone solution. According to Sampson, these natural products should be included with chemical pesticides in the chemical component of an integrated pest management program. As natural products, they are seen as alternatives to synthetic pesticides, and many qualify for organic certification.

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Club Information and Contacts

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