THE MARIN BEEK NEWS

Volume 10, Issue 5 **May 2018**

What You Missed

Our last meeting featured a talk by Samuel Ramsey, doctoral student, University of Maryland. Sam received his undergraduate degree at Cornell University. He is currently working on his doctorate degree under Dennis vanEngelsdorp at the University of Maryland

His talk was titled "Varroa Feed on Hemolymph and Two Other Alternative Facts."

Varroa Destructor

- Considered agent of primary concern in trend of colony loses
- First found in the US in 1987
- Wiped out feral colonies by 1997

Varroa mite distribution – discovered in 1904 in Southeast Asia
Moved to China then Europe and Russia

Vast majority of literature is written in Chinese and Russian – a lot of details were never translated into other languages so much of the data was not shared. The abstract says the varroa feed on hemolymph but the actual body of the paper says that is only an assumption. Nobody questioned the assumption before.

Feeding Behavior
Food source not confirmed by experimental data
Feeding behavior is difficult to observe

The curious case of the bee mite's bite - they are well adapted to mimic honey bees. They have microscales exactly like honey bees. The bees don't sense them as an intruder. There hairs are similar and they even smell like bees.

1. Mite digestive system and excrement shows similarities to other hemolymph or fluid feeding arthropods.
2. Mite lineage shows varroa are closely related to other lymph feeders.

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What's the Buzz?

Our next meeting will be on Thursday May 3, 2018 at the American Legion Log Cabin, 20 Veterans Place, San Anselmo, CA; starting at 7:30 pm. The meeting will feature Tamara Wolfson, LAc an osteo-acupuncturist, apitherapist, herbalist and educator with over 25 years of clinical experience practicing natural medicine. Her talk will be on "Apitherapy: Medicine from the Beehive".

Upcoming Meetings:

June 7, 2018

Marin Beekeepers, "Gadgets and Gizmos".

July

No meeting: Marin County Fair, June 30 – July 5. See the Fair notice in this newsletter.

August

August 4, 2018

Marin Beekeepers Annual Potluck. Watch for more information in the next Beek News.

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3. Mites observed feeding where hemolymph can be drawn from host.

Sam started studying mite frass (poop)

Expected: insoluble waste product based on proposed life history
Observed: >95% guanine, very little water content – not expected since hemolymph is very watery.

Sam's dad has gout and asked Sam what he was not supposed to be eating - Gout is a buildup of guanine crystals in the blood system. Things to not eat include liver. (Sam wondered if mites were feeding on liver)

Varroa Digestive System:

Expected: filter chamber like modification

Observed: no modifications to shut excess water away from mid-gut

Sam postulated that the expectation that they are feeding on a watery food is not correct.

Mite Phylogeny

Expected: Varroa closely allied with other dilute fluid feeding mites

Observed: Closely allied with predatory mites feeding through extra oral digestion (like spiders). Varroa shares similar digestive system structuring with spiders.

Observational study:

- Where are mites feeding?
  - Expected that the mites could feed anywhere
  - Actually – they feed on the underside of the abdomen
  - Statistically significant preference for left side of host body

- They only climb to highest part of host body when they are looking for a new host

Alternative Fact #2:

You usually find varroa on top of worker bee's thorax

Visual inspections are ineffective since the mites are usually found on the underside of the bee's abdomen, between the plates on the abdomen. They will usually only leave if they have damaged the host too severely or if there are too many mites on a single bee. They also will attach themselves to foragers to leave if they sense the hive is collapsing.

Others believe that mites only feed on the brood and the phoretic stage is only a vehicle of transportation. Sam was discouraged from publishing his research because other researchers believed that the mites were not feeding on adult bees and all his evidence was anecdotal.

Sam used liquid nitrogen to freeze bees and mites to determine if the mites were feeding on adults. It was hard to discover before because the membrane that the mites were feeding though was so thin that it was hard to remove the outer shell of the bee without damaging the membrane.

With freezing they were able to remove the shell without damaging the membrane and were able to see mite feeding wounds – piercing multiple layers of soft tissue, only found in membrane between sternites and tergites.

Through electron microscopy they were able to determine that the varroa were feeding on the fat body tissue of the adult bees (the liver of the bee). They found that bees that were fed on by varroa were missing large portions of their fat bodies. They discovered that the fat bodies had been broken down through extra oral digestion. They also found bacteria at the wound site.

Feeding:

- Froze a mite and bee with liquid nitrogen. Sliced through the bee and mite
  - Saw that the mite mouthparts reach a small distance into the host bee
  - Saw that fat body tissue was also in the mite as well as the bee
  - Varroa were only feeding where fat body tissue was present.

Biostain Experiment:

- What host tissue/tissues is being ingested by varroa?
  - Had bees ingest certain substances some of which would only be found in fat.
    - Fed the bees the various chemicals in a sugar solution
    - Bees were fed for 10 days

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Bees were then put in separate cups with a varroa mite. Collected the mites and crushed them to analyze what was in their gut. Found that mites had a lot of the fat body indicator, showing that mites were ingesting a great deal of fat bodies.

Sam tried another experiment with only the hemolymph of the bees stained. Only found a small amount of hemolymph in the mites.

Bees produce a lot of hemolymph so losing a little of it is no big deal. Fat bodies are different so losing them is more serious.

Things fat bodies control:

- Metamorphosis is dependent on fat bodies organizing the process of changing from a larva to an adult bee. Larvae are primarily fat bodies at the start. That is why they are white.
- Nutrine storage and mobilization – dependent on fat bodies
- Metabolic activity – affected bees often have energy to leave to forage but not to return
- Water loss and osmoregulation
- Temperature regulation
- Pesticide detoxification – reduction in fat bodies makes the bees more sensitive to pesticides
- Protein synthesis
- Vitellogenesis – vitellogenin is egg yolk protein (reduces oxygenation stress – aging). This is what allows winter bees to survive for so long.

Fat bodies are much more important to bees than hemolymph.

Alternative Fact #3:

Your varroa are your problem and yours alone.

If you allow your colony to collapse from varroa they go to your neighbors. You are effectively encouraging the most virulent varroa to move onto a new host.

Without chemicals you can:

- Drone trap

Sam then conducted a host tissue feeding experiment:

Foundress mite introduced into cell.

She was allowed to feed on a controlled diet without honey bees.

Created artificial cells and decoy bees (gelatin capsule), pill rubbed against pre-pupae to attract mites. Mites climbed on.

- Dissected nurse bees to extract fat bodies.
- Injected the fat bodies into decoy bee.
- Tried various solutions of fat body
- Was able to produce varroa eggs

Mites produced the most eggs when they were fed a larger portion of fat body. Feeding hemolymph produced no eggs

If treating your colonies for varroa mites, the time of treatment is very important. You should treat when winter bees are being produced, early August or late July. If you don't want to treat don't feed protein because it can cause problems.

Currently, researchers are looking for a systemic system that can be fed to bees and kill mites. It needs to be somehow introduced into fat bodies.

Beekeeping Classes

Upcoming Classes

Queen rearing (Sat., May 12, 1:30pm – 4:30pm, $50)
Led by Bonnie & Gary Morse, Jennifer Berry, Volker Ackermann

Learn the basics of queen rearing with simple methods that can be used even in small apiaries. Participants will learn to graft queens and how to set up hives to support those grafted queen cells so they mature into healthy, well-mated queens.
Location: Woolly Egg Ranch, 503 Tennessee Valley Road, Mill Valley Register on Eventbrite.

Integrated Pest Management **(IPM)** (Saturday, July 14, 9am – 12pm, $50)
Led by Bonnie Morse

The challenges of managing pests and diseases in your colony can be overwhelming. We will look at the potential risks and benefits of various tools and techniques available to manage common pests and diseases in your colony.
Location: Fairfax Backyard Farmer, 135 Bolinas Rd, Fairfax Register through Fairfax Backyard Farmer.

Rewilding Honey Bees – The Whole Hive Being (Saturday, May 19)

more info at: https://www.eventbrite.com/e/rewilding-honey-bees-the-whole-hive-being-tickets-44708305746

County Fair Time!

The 2018 Marin County Fair is fast approaching. Entry forms and category descriptions are posted, as well as this year's entertainment schedule. If you entered last year you should have received an entry package. If not, or if you are entering for the first time, you can view the 10 category descriptions for the Adult Honey Department on the Fair website, under Competitive Exhibits.
https://www.marinfair.org/~/media/files/fair/2018/exhibits/honey.pdf?la=en
Entry forms are available at
https://www.marinfair.org/~/media/files/fair/2018/exhibits/entry-form.pdf?la=en
Enter as many categories as you would like. You must enter to win.

Important Dates

Entry Forms are due at the Fair Office on or before 5 pm Thursday, May 10th, but Dan can accept entry forms for the Honey Division on the day that you submit your entries for the competition.

Entries received **June 8 and 9 at the Exhibit Hall**
Friday, June 8 – 3 pm to 7 pm
Saturday, June 9 – 10 am to 5 pm
Judging will be the following day on Sunday, June 10.

Actual Fair dates: **Saturday, June 30 to Wednesday, July 4**

Dan Stralka will be posting a fair schedule/sign-up sheet on the Buzz when available. As in the past, we'll need 2 volunteers per time period to educate and answer questions. This is a great opportunity for us to do some PR for bees, for the club to get some exposure with the public and for you to have fun talking about bees. All the exhibits entered will be on display as well as an observation hive for you to practice finding the queen. You'll get a free admission to the fair and can spend the rest of the day enjoying everything else the fair has to offer.

Please note the dates and plan on participating in the fun.

Hive Tips

By Bonnie Morse, Bonnie Bee & Company

- **To repeat last month's tip: Strong hives are building quickly.** If your bees are starting to get crowded, add more space. Most importantly – be sure there is contiguous space in the brood chamber. If you add additional space, but there is only honey between it and brood area, you will not prevent brood area congestion – which is the cause of swarming.

- **Are they already making preparations to swarm…**i.e. swarm cells? You won't stop swarming by adding more space. You can take a split with the queen – and without any frames with queen cells – to (likely*) stop them from swarming. This is basically a swarm (except they will get some comb and perhaps some food). By removing the queen and part of the colony, you have done what they were already planning to do. Now, leave the original colony (with queen cells) alone for at least 3 weeks to do what they were already planning to do – get a new queen to replace the one that left in the "swarm".

  *** "likely"…** if they are left with too many bees, they could still have a secondary swarm.

- My bees swarmed – now what?? Well, not soon after the swarm leaves, multiple queens may be emerging. It's a "Game of Thrones" situation in there with virgins vying for the right to lead the colony. And after all that fighting, they'll still need to go on mating flights. Best you can do is be patient. Put it on your calendar to check them again in three weeks. By then, you should see

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evidence of a mated queen, if not the queen herself. No evidence? Give them another frame of brood so they can try again.

Drone laying queens vs laying workers:

- Chances are, a new queen (whether due to supercedure or swarming) will successfully return from her mating flights, there are a percentage that do not.

- How do you determine whether it's a drone laying queen or laying worker?
  - A drone laying queen will tend to have a regular brood pattern (tight, centered in the hive) and single eggs in the center of cells. To correct:
    - Find the drone laying queen and then introducing a frame of brood with eggs/ young larvae so they can make a new queen, OR,
    - Combine with a queenright colony. To slow the combination of the two colonies, use the newspaper method – place a few sheets of newspaper between the two hives. The bees will eventually chew through the paper.
  - In either case – it is imperative that you find and remove (kill) the drone laying queen. If not, they will either not make a new queen, or if you combine with a queenright colony, the queens will fight and the queen capable of laying fertilized eggs might not win the battle.

- Laying workers will tend to have more of an irregular brood pattern and you will find multiple eggs – not centered – in cells. To correct:
  - Combine with a stronger queenright hive using the newspaper method.
  - Shake / brush all bees out 20+ yards from the hive. Return hive / frames to original location. Foragers will return. Laying workers – who have not been outside the hive – will not. Introduce a frame of brood and now bees will create a new queen.

A Simple Formula for Splitting: #7 Split = 2+2+2+1 (for a 5 frame nuc box)

- 2 frames of brood (one capped, one mixed age that has eggs/young larvae from which bees can start queen cells)
- 2 frames of food (include pollen and nectar/capped honey)
- 2 frames of bees shaken in (preferentially from brood frames that have a lot of nurse bees; return brood frames to parent hive after shaking bees into your split)
- 1 empty frame
- Check split in 2-3 days to be sure they are making queen cells (no queen cells? Are you sure you didn't get the queen?)
- After ensuring that bees have queen cells, then be patient and wait for about 30 days +/-. By then, if the queen successfully returned from her mating flight(s) you will likely see capped brood.
- Don't see brood? You need to give them another frame of brood so they can try again. It is important that you don't wait too long to do this or they could become a laying worker colony, which is a little trickier to correct.

If you haven't done so already, it's time to set up your bait hives!

- If you plan to set out bait hives this year, now is a good time to do so. (We've already had two move ins this season.)
- Review Tom Seeley's book, Honeybee Democracy, for complete details on what his research has shown that swarms prefer in a nesting cavity.
- No time to read? Local beekeepers report success with the following set up:

  1. Deep hive box
  2. A couple of frames with empty built out combs (if you have them) in the center surrounded by empty frames with starter strips (or just empty space – but you'll need to add frames soon after they move in or else they will start building from the top of the box).
  3. Entrance reducer set to medium
  4. Box above the ground 2-3' (higher if you are able)
  5. Optional: Spray lemon grass tea (boil lemon grass until you make a dark tea) or other substances mimicking queen pheromones on the top of the frames and entrance of the hive.
  6. Wait to observe scouts!

From the Librarian's Desk

Don't forget to stop by the library table on Thursday and check out the Beeks collection. In addition to bee & beekeeping references, there's also some fiction options. If you're interested in the American Bee Journal, we have old issues for you to take & subscription discounts. We're always happy to see books come back - your odds in the lucky draw increase the more you return!

Bee Salon

Club member Jennifer Berry will be hosting the Bee Salon on Saturday, May 5th from 11am-1pm at the Woolly Egg Ranch in Tennessee Valley, Mill Valley. (Note: there will be no Salon in June due to travel plans.)

This is an amazing time to be a beekeeper, when spring is in full swing and healthy hives are preparing to swarm if they haven't done so already. At this month's Bee Salon, she will be opening full-sized hives plus splits and newly hived swarms, and will focus on hive health, making increases, plus swarms and swarm prevention methods. Also, this spring Jennifer has seen an increase in mites and mite-related pathogens in apiaries all over Marin and Sonoma compared to previous years. She will be discussing how to identify this problem and different techniques to deal with it. As always, these Salons are unscripted, and we will talk about anything we find in the hives, including pests and disease, queenlessness, nutrition, etc. Feel free to bring in samples for questions, but make sure they are completely sealed so as to not infect her apiary.

All levels are welcome, and even basic questions are good ones, since they get everyone involved in the discussion.

Bring a veil if you have one. Jennifer will have some to share if you don't. If it's been raining please **bring galoshes** or rain boots, as it gets very muddy at the ranch.

Cost is free to attend, as this is about building knowledge and community around beekeeping- but Jennifer will accept bribes, treats, and donations. :) Come any time between 11-1.

The address is:
Woolly Egg Ranch
503 Tennessee Valley Road,
Mill Valley
Cellphone coverage is spotty, so please text if you need to reach me. 415.205.7440

Please park outside the gate or on Tennessee Valley Road. **This is a working farm,** so please close any gates you open and don't let the sheep out. The bulk of the hives are located up the hill, scattered between chicken coops, so head up the hill and look for the group if you don't see us when you arrive.

Jennifer Berry

415.205.7440
jenniferberry.design
jennifer-berrybees.com

Meadery Tour and Potluck

Enjoy a visit to Heidrun Meadery! The Marin County Beekeepers will be getting a discount on a meadery tour and tasting, as well as added bonus of farm tour (of their pollinator friendly organic garden) and info about their bee program.

Bring a dish to share for a potluck lunch.

Friday, July 13, 11am – 2pm, $20 per person
Register on Eventbrite

AUCTION

When the North Bay fires happened last fall, there were many who wanted to donate items to help the Sonoma and Napa beekeepers, including Diana Sammataro (retired USDA researcher and author, "The Beekeepers Handbook"). Diana has created three handmade quilts with a bee theme that she has donated to Marin Beekeepers to auction off.

The Sonoma Beekeepers Fire Fund achieved their fundraising goals and asked that we use funds raised for another bee cause. With the help of Diana, we have identified two:

1) Puerto Rican bee relief, being organized by Pollinator Partnership. The island - and the bees / beekeepers - are still in need of relief following last year's devastating hurricane.
2) Local habitat project: At Dominican convent and Santa Sabina Center. The Sisters (and the greater Dominican University community) have been very supportive of bees and pollinators, not to mention all life forms. We'll be working with them to enhance their grounds to support our local pollinators.

It has not yet been finalized whether the auction will take place at the June meeting or our August potluck. Stay tuned! But here are some pictures of the beautiful bee quilts that will be up for grabs to the highest bidder! You need not be present to bid. All those interested but unable to attend will be able to call in bids.

See page seven for photographs of these beautiful quilts. They will also be on display at our meeting on Thursday May 3rd.

Thanks again to Diana for her support of these very worthy causes.

QUILT AUCTION PHOTOS