Episode 19 PROOFED

Wed, Mar 27, 2024 11:50PM • 57:54

SUMMARY KEYWORDS

swarm, colony, bees, beekeepers, propolis, hive, nectar flow, nest, honey bees, beekeeping, marla, queen, commercial beekeepers, honey bee, brood, bee, social, hygienic behavior, amy, resin

SPEAKERS

Guest, Honey Bee, Jamie, Amy, Stump The Chump

Jamie 00:05
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Folks, we really have a treat for you today on Two Bees in a Podcast. We have world-renowned professor and scientist Dr. Marla Spivak from the University of Minnesota. She'll be joining us talking about social immunity. That will be followed by a discussion between Amy and myself about swarms. What are they? How do they work? And most importantly, how can we prevent them? Today's episode will conclude with Stump the Chump, our question and answer series. So Amy, I have been as excited about this segment as I have been really any of the segments that we've had because we are going to be interviewing, today, Dr. Marla Spivak. Dr. Spivak is a distinguished McKnight University professor. She is a MacArthur Fellow in the Department of Entomology for the University of Minnesota. If you've been in bees and beekeeping for any amount of time, really no matter where you are on planet Earth, you will have read some of her writings. You will be aware of Dr. Spivak, and her research will have touched your beekeeping lives in some way. So it's really my pleasure, Dr. Spivak, to welcome you to Two Bees in a Podcast.

Guest 01:48
Thank you for having me.

Jamie 01:50
Absolutely. It's like I'm almost a kid in a candy store. I'm trying not to be overly excited.

Amy 01:55
He's fanboying.

Jamie 01:57
I know, it's funny, because years ago, when my program was young and I was trying to design mine after someone's, Marla, yours was one I was trying to emulate. I remember asking Gene Robinson years ago, I'm sure he'll never remember this, but I was asking him, years ago, a question. He's like, hey, well, you should ask Marla. She's got one of the best programs in the world at what she's doing. And so you're even recognized by your peers, similarly, Marla, so thank you again for joining us. I'm excited to have you.

Guest 02:25
Thanks. It's flattering. Flattery will get you nowhere, though.

Jamie 02:30
Well, as our listeners know, we're all podcasting from our closets at the moment. Amy is, I am. It's the best that I can do here from my closet, Marla. Alright, so what I want to do is, before we get into the topic of social immunity, which is why we have you on today, I want to just hear from you a little bit of an overview about your background. What did you do, where do you go to school? How did you get into bees? Things like that.

Guest 02:58
I got into bees when I was 18 years old, and I'm not going to tell you how many years ago that was because it was many years ago.

Amy 03:04
Just a couple.

Guest 03:05
Yeah, just a few years ago, and I was not the best student. I was bored and directionless, I would say, in college. I wandered into the library to look for something to read and somehow picked up a book about bees. And I spent the night reading it. I didn't go to sleep that night. Excuse me. I couldn't put the book down. And the next day, I told my advisor that I needed to go work for a beekeeper.

Jamie 03:33
So let me ask you a quick question. What in the world was that book? Which book was it that made you --

Guest 03:35
Well, I don't know that it's that good of a book. I have reread it and it's you know. I don't know what grabbed me at that time. It's called "Bees' Ways."

Jamie 03:49
Okay.

Guest 03:50

Author's last name is Curtis, I believe, or maybe his first name is Curtis, I don't remember. It's not a very well-known book. And he's a naturalist. And it was just beautifully written, actually. Just something about that honey bees were social, are social and they interact with each other grabbed me and that there are these beekeepers that just love their bees. And I hadn't really thought about loving insects that live in colonies that sting you. But I just thought it was so weird. I had to go see it for myself. So I went to work for a commercial beekeeper, a family that has about 2000 hives of bees in New Mexico. And I worked for them for four or five months, I guess. And then I was hooked.

Jamie 04:41
That's pretty incredible. I'm amazed that you just randomly picked up that book. It sounds like serendipity. I mean, that's pretty crazy. So you've had a distinguished career. Have you spent your whole time at the University of Minnesota? How did you end up there specifically? How long have you been there? Tell us a little bit about that.

Guest 05:00
Sure. I did my PhD at the University of Kansas.

Amy 05:05
Oh, hey, I'm from Kansas.

Guest 05:07
Are you?

Amy 05:08
I am. I went to K State though.

Jamie 05:12
Conversation over.

Guest 05:14
Much better, of course. But after I got my PhD, I did a postdoc in Tucson at the University of Arizona, the Center for Insect Science. And I was actually based at the USDA Bee Research Lab down there in Tucson. And then I was hired here, actually, in 1992, and I was hired as a temporary non-tenure track position. But then within a few years, they made it a tenure track position. So I've been here since.

Jamie 05:48
That's really cool. I think they realized what they had, I guess, and worked really hard to keep you. We could talk maybe another day about the fact that you have a new bee lab and all the different programs that you have. But yeah, it's pretty miraculous how you ended up there.

Guest 06:03
You have a new bee lab, too, Jamie.

Jamie 06:05

Yeah, we're fortunate. We're fortunate for sure. I'm not going to lie.

Amy 06:07
W're going to have to have you come visit sometime. But, to get back on track, let's go ahead and talk about social immunity because that's what we're here to talk about. Can you tell me what that is and why that's important?

Guest 06:20
Sure. Social immunity is a term that was coined by Sylvia Cremer, who is one of my heroes in research. She actually studies ants. She's from Austria.

Amy 06:32
Oh, cool.

Guest 06:33
I believe she's from there, at least she works there. And she coined this term to describe how social insect colonies keep themselves healthy. So honey bees and ants and termites and some of the big social wasps live in very, very dense societies. So social immunity describes their behaviors or how they organize themselves, or their physiologies, what they can do to defend themselves within their nests against parasites and diseases to maintain their health and survival.

Amy 07:09
That's amazing.

Guest 07:11
In a nutshell, it's how they keep themselves healthy, which is very pertinent right now is we're all worried about getting COVID-19 and how we keep ourselves healthy when we live in dense communities.

Amy 07:30
So it's really interesting, just because I think the normal person would see an ant or wasp or a termite and not think anything of it, we just want to get rid of them. But once you start digging a little bit deeper in to being social insects, it's very fascinating. And so do you have examples of honey bee social immunities?

Guest 07:52
Sure. I have lots of them. One of them that I studied for a very long time is called hygienic behavior. And the fun part is that I called it, I mean, I studied hygienic behavior, which was a term coined by Walter Rothenbuhler in the '60s. The behavior was described by some beekeepers and researchers in the '30s and '40s. So, when Sylvia Cremer coined the term social immunity, all of the sudden, like 10-15 years of my studies had a context. And all of my life was like, oh, that's what I do, I study social immunity. How cool is that? But hygienic behavior in honey bees is the ability of some bees, it's a genetic trait, and it's their ability to detect diseased brood in the nest. So some larvae and pupi that get sick or maybe that are parasitized by Varroa mites, and so some bees in the colony can detect that

there's a problem in the nest, and they yank out the sick or parasitized brood and throw it out of the nest. And in that way, they're limiting the transmission of the problem within the nest. So they're basically weeding or calling out the sickness from the nest.

Jamie 09:19
I think it's interesting how you describe your epiphany about this. You now are aware of social immunity, I had a similar moment with it as well. When I was a graduate student in South Africa, I read Robin Moritz' book, "Bees are Superorganisms," one that he co-authored and he talked a lot about this idea of the superorganism concept. So I became kind of fascinated with that and then read E.O. Wilson and Holldobler's books on the topic, for ants, etc. And as I started giving talks on superorganisms, I kind of started discussing how the investment in the colony is what was important, and not necessarily the individual. So what you start seeing are these colony-level, quote, phenotypes that arise out of these groups of insects. And so when you think specifically about immunity, hygienic behavior is one of those. There's not necessarily a quick and direct benefit to the individual bee from hygienic behavior. But it confers a significant benefit to the colony, right? And when all of that started clicking at me, and I started stepping back, looking at how colonies handle disease or pest pressures or other stressors, I started going, wow, it's pretty miraculous what they are capable of doing. I mean, you have spent a lifetime studying hygienic behavior, you mentioned it. But there's also some other things that you're looking at even recently, propolis, we'll get into that in a moment. But let's think specifically about hygienic behavior. What do we know? What do we need to know about the benefits of hygienic behavior for colony health?

Guest 10:57
Sure, but I want to dwell a little bit on the point that you were just making about the superorganism first, and then you'll have to remind me of the question because --

Jamie 11:07
Not a problem at all.

Guest 11:09
But, yes, the colony is the animal, if you will. And there's a bunch of little animals within the animal. And so to think about social insects, and honey bees, in particular, we have to train our minds to jump levels of selection, if you will. So there's selection on the individual bee, there's selection at the colony level, and then at the population level. It's like a mind game, if you will. I really like to jump those levels and think about what's going on in the individual and inside the individual, its immune system, its microbiome, etcetera, everything that's going on in that individual, and then scale that up to the colony level. Now, the animal level, full of all of the complexities that's within these thousands of little animals within it, and yes, the colony has its own phenotype, its own personality, if you will, and its behaviors and ways that it keeps itself healthy. That's what I really like about really highly social insects is that kind of thinking.

Jamie 12:12
I agree completely. And I love this concept of emergent properties. When you put two bees together, you've got two bees. When you put 100 honey bees together, you've got 100 honey bees, but when

you put 1000 honey bees together, you've got a colony. Something else happens when you squeeze bees together. Properties begin to emerge that are otherwise absent in the individuals, but the genes and the behaviors of the individuals govern these emergent properties. Now, I agree with what you said, love it completely, this idea that we can go back and forth between the individual, the colony, and then the population, and then back down, and consider how certain things have upstream or downstream effects on three things that we look at: the individual, the colony, and the population. So I agree. I tell you, we're going to end up getting very philosophical here, I guess, if we're not careful. But let's let's kind of hone in again, back for hygienic behavior. So as a reminder, what do we know about it? What do we need to know about it with regard to colony health?

Guest 12:13
Hygienic behavior is honey bees' -- one of their most important mechanisms, I think, to keep the colony healthy. I think there are a number of ways they can do that. But honey bees are really well-known for their ability to detect and remove diseased and mite-parasitized brood. Like I said, not all honey bee colonies can do this very well. For me, the most important part of the hygienic behavior is the timing of it. So if we're thinking about diseases right now, if a colony has a little bit of chalkbrood, or if they have American foulbrood, there's a disease progression. So the adult bees carry the pathogen, but they don't get sick. So adult bees don't get chalkbrood or American foulbrood, but they have the spores of those diseases on them or in them. And they inadvertently end up feeding, putting some of those spores in the food of larvae. The larvae then eat that food with those spores and those spores then germinate inside their guts, and then continue to multiply. So those spores germinate into what we call the growth phase or vegetative stage. For fungus, it would be the mycelial stage, and that grows and grows and grows inside them until it bursts the gut and then kills the poor little developing bee. The interesting thing is that hygienic bees can detect that brood, that larva, or pupa is sick while it's in the non-infectious stage. So while it's in the vegetative stage or the mycelial growth stage, so that when the bee removes the larva from the cell, the adult bee removes the larva, that adult bee is handling something that's not infectious. So then, they throw it out of the nest, and then they can not get sick themselves and not transmit the disease. So the timing of the removal is the really fascinating thing. Ants do the same thing. So, in Sylvia Cremer's lab, they had a postdoc, his last name is Pull, and he studied how ants do this also. It's really fascinating.

Jamie 13:31
I've never heard that explanation. That's pretty interesting.

Amy 15:43
Yeah, that is really interesting. We'll definitely have to bring you back. I mean, now that I'm listening to you speak, we're gonna have to bring you back about to talk about all the different research that you've done. But I know that you've also worked a little bit with propolis. Right? Can you tell us a little bit about that and, and maybe some of the known benefits of propolis for colony health?

Guest 16:04
Love to.

Amy 16:06

Yay.

Guest 16:08
So propolis or propolis, tomato, tomahto, I don't know how to pronounce it.

Jamie 16:15
Definitely tomato.

Guest 16:16
It's actually resin. So, some plants produce resin and it's a plant defense. It's a way a plant can keep itself healthy. So these resins are highly anti-microbial. They fight off bacterial and fungal and even virus pathogens in the plant. bees can queue in to these plants that are producing these resins, and in our area, it's mostly cottonwood trees on the leaf buds, and they go into the cottonwood leaf bud and scrape the resin right off the bud and pack it in their hind legs, and then bring it home to the nest where they use it like a cement. And they'll put it in cracks and crevices where beekeepers know and love it very much, I'm sure, because it makes it very hard to pry boxes apart and pull frames out of the boxes. It's on all of my clothes. Propolis is everywhere. But, in the same way that it's a defense or medicine, if you will, for the plant, it has the same function inside of a bee colony. So resins equal propolis. But propolis in the nest, sometimes, is mixed with a little bit of beeswax. But basically, the chemistry of the resins are intact, the same as they would get it from the plant. And we know that it has many, many functions to help bee health and it's really important to the bees. As beekeepers, we've been selecting against colonies that collect a lot of propolis because it gets in our way. But I think we've missed the boat on that one. I think that it's important for the bees to have propolis within the nest to support their immune system, to support the microbiomes, to help them fight off pathogenic bacteria and fungi that are in the nest.

Jamie 18:14
One of the ways that I was introduced to propolis use the most is, even though I've been keeping bees for a very long time, when I did my PhD in South Africa, it was pretty overwhelming to me the propolis use of the bees that I was working with there. They would take standard Langstroth hives and the bees would reduce their own entrances to about an inch. When we did some subsequent work there where we were working with wild honey bee colonies, some nesting in cliffs, they would close -- think about it, if you're nesting in a hole in a cliff, you've got this exposed hole -- well, they would close off that entire hole, except for maybe a centimeter or two with an entire sheet or a wall made of propolis. I mean, there are lots of honey bees out there that still use copious amounts of propolis, and I don't mean just a little. I mean a lot of propolis, reducing entrances, building walls with it, it's pretty amazing what wild honey bee populations do with this stuff.

Amy 19:10
Do they eat the propolis?

Jamie 19:12
No. Well, Marla, I'll let you answer.

Guest 19:12
No, it's fine. No, they don't eat it. Smart bees that you're talking about. Resin would be hard to get down there. Their little esophagus. Gum up your mouth parts. But yes, propolis collection is a heritable or genetic trait and there are some races and kinds of bees that really, really bring in a lot of propolis. Bees from Africa are really notorious for bringing in a lot of propolis. Stingless bee colonies from the tropics also use a lot of resin. That's part of their nest structures. They encase or enclose their combs with resins, so it's important.

Jamie 20:03
So, when I consider social immunity, when you gave us two examples today, hygienic behavior and propolis use, and then I try to get all this back to a beekeeper, are there some strategies that beekeepers can use to maximize the social immune response of honey bees? When I give lectures about beekeeping, I always start off saying the best beekeepers are those who know what the bees are trying to do. They know what they are trying to do, and they work to harmonize the two. And you just said it, we've been breeding bees for reduced propolis use while bees are trying to use propolis, perhaps, for colony health purposes. So what are ways, what are strategies beekeepers can use to maximize the social immune response of honey bee colonies rather than work against it?

Guest 20:53
Yes, it's very important to follow the bees' lead, instead of trying to impose our will and our lead on them. They don't read the books.

Amy 21:03
They don't?

Guest 21:07
They're gonna do what they want to do anyway, but I think it's important to then, for beekeepers, as far as propolis is concerned, maybe consider using boxes that have a rough interior, unfinished lumber, or even gaps and very rough textured inner surface of our bee boxes. And that will encourage bees to put propolis where they like to do it naturally, as they would within a tree cavity where they would nest naturally. I think that's one way to help them do what they would like to do and maybe not put so much propolis where we don't like it. As far as hygienic behavior, that's a pretty easy trait to select for. The assay for it is pretty easy. You freeze kill some brood, and then check up on it within 24 hours. How much of the freeze killed or dead brood the bees have removed in 24 hours helps you get toward bees that are hygienic that will detect and remove diseased and mite-parasitized brood. If you're really looking for mite resistance and hygienic behavior, there's better assays. And that's a whole discussion on Varroa sensitive hygiene and how you select for that. And if we go there right now, we're gonna get deep in the weeds.

Amy 22:29
We'll get in that for the next podcast that we have with you. So I guess, what are some things that beekeepers might do that may harm or limit a colony's response? I know you kind of touched a little bit on that just now.

Guest 22:45
Well, for propolis, I think it's trying to scrape it all off and get rid of it.

Amy 22:51
That's the first thing we always do. Right? We just scrape the propolis right off whenever we open that box.

Guest 22:56
Well, and what I say to beekeepers, if it's in your way, yes, scrape it off. I mean, if it's impeding your management, then get rid of it. But you might consider that the bees are bringing it in for a reason. It's super hard for bees to collect resin. When they get it on their back legs, they can't even get it off their own legs. Another bee in the nest has to remove it. And they yank it -- the removing bee grabs it with her mouth parts, her mandibles, and pulls, and it's sticky. And you can just imagine trying to deal with this stuff within the nest. And yet they continue to bring it in. So that was what made me realize, the bees really want, quote, want and need this stuff. So maybe we should be letting them bring it in and put it where they prefer to put it

Jamie 23:46
Well, Marla, let me tell you some of the things that I've been thinking about recently. I was asked about a year and a half ago to provide a chapter in a book that's been written by some Italian colleagues of mine. It's called "Welfare of Managed Honey Bees." And the premise is this: The OIE, in Europe, has defined welfare with five points, and they make the argument that, essentially, animals that are under our management have certain rights, for example, cattle or poultry or what have you. And they have the right to be free from disease, the right to be free from feeling fear or malnourishment. Basically, if we're going to engage in husbandry of these things, there are certain standards that we should follow to make sure that there are not undue stressors added to those animals lives. So, he was wanting us to take that same perspective for the honey bees, right? We've got these colonies, but we do things to them that are stressors, stressing them, and we also limit their ability to address stressors the way that they should. So as I think about the welfare of managed colonies, one question that comes up is what obligations do we have when we keep bees? Like, if we are going to take a bee colony and put it into our yard, do we have certain obligations to ensure it's health, to take care of it, make sure that it's free from stress? In other words, make sure that its welfare is taken care of. And when I listen to you talk about social immune responses and hygienic behavior and propolis use, I think that, in many ways, we probably have an ethical obligation to let the bees do what they need to do to address these issues that they have, including collect and utilize propolis. I mean, what do you think about that? Am I going a little too far, or maybe not far enough?

Guest 25:39
Yes, it's a very delicate balance, isn't it? Because honey bees are not really domesticated like livestock, and yet, they're really not a wild animal if you put them in a box and manage them. So where do they fall in that spectrum? It's really interesting to think about that. I think if you are a beekeeper and you keep bees in a box, then you have some responsibility for their health, you have the responsibility to make sure that they don't spread diseases to other colonies in their community, and then, within the two-mile flight range, that's their safer social distance, if you will, really, and yet you also have the

responsibility to allow them to take care of themselves when they can. So our bees in the United States aren't fully able to take care of themselves against the Varroa mites and associated viruses that the Varroa mites might be vectoring. And so in that case, it's our definite responsibility to keep the mite levels, control them in some way so that they don't get out of hand, which then not only kills your own colony, but puts other colonies within flight range of yours at risk. So it's more of a community-level thinking that we, as beekeepers, need to be doing. Yeah, that's a very interesting and complicated question of how beekeepers find this balance between managing their own colony and making sure all the neighbors' colonies within flight range are not put at risk, and yet allowing the bees to do what they need to do to keep themselves healthy.

Jamie 27:23
It was a very new concept for me, this idea of welfare of managed honey bee colonies. And the reason I bring it up in our discussion is because the chapter that I wrote for that book required me to read a lot of your work and others' about social immunity. And so it was kind of interesting because it seemed to go hand-in-hand, what bees are trying to do naturally to address their issues, we need to permit it. But what bees are incapable of addressing currently, we need to help. I feel like we have an ethical responsibility to take care of the bees the best that we can, which, of course, as you note, will bring up interesting discussions between certain groups of beekeepers down the road. Nevertheless, Marla, you've been a fantastic interviewee today. Thank you so much for joining us. I appreciate the time that you put in here as we're all kind of hunkering down in the midst of COVID-19. Just thank you for taking the time to be with us this day on Two Bees in a Podcast.

Guest 28:18
That was fun. Great questions. Thank you so much.

Jamie 28:22
Good. So audience you've been listening to Dr. Marla Spivak, who is a distinguished McKnight University Professor and MacArthur Fellow in the Department of Entomology for the University of Minnesota. Thank you so much for joining us on Two Bees in a Podcast.

Honey Bee 28:38
For more information about this podcast, check out our website UFhoneybee.com.

Amy 28:48
All right. In this section, we're going to talk about swarming. Jamie.

Jamie 28:54
Yes.

Amy 28:55
Are you there? It's so weird to podcast without you sitting next to me.

Jamie 28:59
I'm here. I know. It is a little odd, but I promise I'm here listening.

Amy 29:03
So it's springtime, and this is really a time where a lot of beekeepers start seeing swarms, catching swarms, finding swarms, people who don't like bees start to see swarms, and you know, they really want to get rid of them. So we figured we just do a little segment on swarms, what it is, and why bees do it. So can you just go ahead and tell me what a swarm actually is?

Jamie 29:27
It would be my pleasure. So, honey bee colonies reproduce by swarming. That's the basic principle of swarm. So let's pause for just a second. A lot of beekeepers, and myself included, when I was young. Think that colonies reproduce the numbers of bees, and if that were the case, then colonies would just continue to grow and grow and grow and grow and grow until they get infinitely large, as it were. But really, what a colony wants to do is not reproduce in numbers of bees, it wants to reproduce in numbers of colonies. And so, Amy, the way that I almost always teach this is things that can reproduce want to really, really bad. Reproduction is one of the strongest drives in all organisms. So if swarming is colony-level reproduction, then it is an incredibly strong drive of the honey bee colony. And that is, in fact, the case. In fact, everything that a bee colony does is to prepare it to swarm and enhance the chances that that swarm will survive. And so think about it this way. When a colony is coming out of winter, it goes into growth mode, right? There's a lot of incoming nectar, there's a lot of incoming pollen, that colony begins to grow and grow and grow and grow. Somewhere in that process, they'll start producing drones. All right, so also, in that, and then they produce drones and think about it, they're producing drones because it's reproduction season. There's going to be a flush of virgin queens from their colony and other colonies as well, and they want to make sure drones are available. Then, they grow to fill the capacity of the nest in which they live. So they're starting to get congested, the daylight is getting longer, the temperatures are getting warmer, the food sources are available. So then they will start building queen cells. And at that point, they will put the queen on a diet. They'll actually get on her back and shake her and cause her to run.

Amy 31:25
What? Really?

Jamie 31:26
Yeah, they do. And Amy, guess what, diet and exercise causes the queen to lose weight. That's necessary. That's necessary because it's the old queen who goes out with the swarm, so they have to get her down to her flying weight, which she's not at while she's laying eggs.

Amy 31:42
Okay, wait, I have a question, though.

Jamie 31:43
Shoot.

Amy 31:44

If you have a queen excluder, and she starts to slim down, do they get her small enough to go past the queen excluder?

Jamie 31:49
Actually, in some cases, Amy, they actually can. See, a lot of people will try to stop swarming by putting excluder material on the front of their colonies. But that's only moderately successful because a lot of times, when queens are slimmed down, they can fit through those excluders. Not all the time, but a lot of times. So what happens is when they get her down to her flying weight, and they, quote, see that there are queens being produced, about 30 to 70% of the workers will rush out of that hive, the queen goes with them, they'll all fly around in the air, they will all land on some structure, a tree limb, a fence post, etc., and they will sit in that structure looking for a home to which they can move, right? So basically, when you're watching a colony swarm, you're watching a colony give birth. That cluster that's hanging on that tree limb, it's a baby bee colony that has to send out scout bees to go and find new nest sites. And then they'll fly to those new nest sites, inhabit it and so on. What's left behind at the parent colony is you've got this hive that's got a lot of queen cells. The first queen who comes out, she'll go around and bite holes in the queen cells of the other developing queen, she'll stick her abdomen in there and sting her competition to death. She then becomes the reigning matriarch in that hive. So essentially, that colony, then, came out of winter, turbocharged to try to swarm. And then, you've got two colonies, now. You've got this one that's hanging in the tree that's got to go find a new nest and has to store honey to survive the coming winter, and you've got the parent hive that now has to rebound from losing all those bees and its queen, store honey, and survive winter. So, their activities the rest of the year are to prep themselves to survive winter, which they do to try to swarm. So you could argue that everything that a bee colony does is to make it possible for them to swarm, i.e. possible for them to reproduce themselves.

Amy 33:51
So, you're talking about them choosing, like the bees looking for a new place to swarm and to live. Do they make that decision? I'm sure you've read the book "Honey Bee Democracy."

Jamie 34:02
I have.

Amy 34:02
But yeah, but it talks a little bit about their decision-making and where they're gonna go and how they kind of influence everyone as a whole. So, are they doing that in the original hive before they go and swarm? And then, they do it again when they look for their final destination?

Jamie 34:15
That's a great question, Amy. It's spot on. And it's funny. It's funny. It's almost serendipity because about a week ago, maybe two weeks ago, someone emailed me and asked me, did bees look for new nest sites prior to leaving the nest in which they live? We know they do it from the swarm cluster. We know that that is the case. The question is does it start earlier while they're in the hive? And ultimately, that question was passed to Tom Seeley, and I was on the email chain. And Tom Seeley, of course, is the professor at Cornell University who wrote "Honey Bee Democracy."

Amy 34:50
Oh cool.

Jamie 34:50
Without question, the world's expert on swarming behavior, and his reply was that there is evidence that bees do began scouting for new sites prior to leaving their nest. And then once they swarm and form that cluster hanging from a tree limb, as it were, they continue that process, amplify it, make their decision and move from there. It is my desire, Amy, to have, actually, Tom on as a guest on our podcast. Tom, if you listen to our podcast, we're coming for you, buddy.

Amy 35:22
I'll have to send this over to him.

Jamie 35:24
But I will say that his research has been paramount to understanding what goes on in swarming behavior. But long story to answer your question, yes, there is some emerging evidence that they do, in fact, start that process prior to even swarming.

Amy 35:40
That's really amazing. They're out looking for a new place, while at the same time, they're swarming. And so they're just having to catch up and keep up with the rest of the colony at that point.

Jamie 35:49
I think, Amy, one of the cool things about it is there's so much to the story, how they prep for it, how they move, how they find the site, and once they find the site, how they move in unison. And we really need to have Tom on to just go into the great depth of, how does all this process work? Because it is mind boggling and will blow the socks off beekeepers listening to this. It's incredible what bees do during the swarm process.

Amy 36:13
Yeah, we'll definitely have to have him on sometime. But so just real quickly, how long do swarms typically stay in their first stop, I guess, because a lot of the calls that we get are, we found a swarm and maybe 20 minutes later, 30 minutes later, they're gone. So is there a general time period?

Jamie 36:30
That's important. And the reason it's important is for the very question that you just asked, right? We get a lot of people saying, oh, gosh, we've got this swarm that just landed on our property, what should we do? Should we conduct a pest control operator, a beekeeper or what have you? In reality, that holding cluster usually only lasts a couple hours in the best conditions. When it's sunny, and there's a lot of available cavities and the weather's good, and it's not raining, the bees can do their job, they can look for these cavities, they can scout them out, they can move to it. And this can take as few as just a few hours. On the other hand, if the weather's bad, or the cavities aren't so available out there in the wild, or perhaps, it's raining or too cool, what have you, those clusters can sit there all day, sometimes,

two days or three days. I've seen it happen so long, in fact, the bees almost just give up and they just start constructing their new hive where they are hanging. Obviously, that's not ideal because the colony then will be exposed to the elements because they don't build around themselves. But generally speaking, it can take a few hours to a few days in the best of circumstances.

Amy 37:32
I'm just imagining the new colony kicking the old colony out and saying, we don't care where you go, but you can't stay here.

Jamie 37:41
Yeah, there's a song that comes to mind. I shant sing it, number one because I don't sound good. Number two, I don't sound good.

Amy 37:50
That's fair. Okay, so for my last question, before we wrap up, why is swarm management important for a beekeeper?

Jamie 37:59
Okay, it all has to do with swarm biology and the timing of swarms. Generally speaking, swarms happen a few weeks before or during the first half of the major nectar flow. And think about it from a biological perspective. This colony, the swarm is leaving its parental nest where all the resources are. This swarm is not carrying with it wax, it's not carrying with it lots of honey, it's not carrying brood, it's not carrying lots of bee bread. Essentially, they have nothing but themselves and they have to move into a cavity, and they have to provision that cavity by building wax, they have to store somewhere between 50 and 100 pounds of honey, and they have to do all of this with the remaining nectar flow. And if the average major nectar flow lasts four to six weeks, and they swarm at the beginning of the nectar flow, then they have four to six weeks to do the bulk of their work to prepare themselves for the winter that's months and months and months away. So as a result, most colonies swarm immediately before or at the beginning or during the first half of the major nectar flow. Basically, this means they swarm when you, as a beekeeper, least need them to. You need the bees to be there to make honey for you. So they are swarming at the worst possible time. In swarms, not only do you lose a lot of bees very quickly, but you've lost your mated queen. Your parental colony is the one that has to make the new queen. Just to do some simple math, I'll round everything up to a week to make the math and the discussion easier. But if they leave --

Amy 39:43
It's probably because I'm really bad at math.

Jamie 39:45
That's because I'm bad at math. I need to make it easier for me to think. If they leave with capped queen cells, it'll take about a week for the first cell to emerge. It'll take about two weeks for that queen to mate and lay her first egg. It'll take about three weeks for that first egg to emerge as a worker. So, basically, you lose somewhere in the neighborhood of six to seven weeks of brood production, when you have to requeen your colony that time of year. And if the average major nectar flow lasts six weeks,

and the average rebound from a swarm is six to eight weeks, you are going to lose a lot of your honey flow. So bees are most wanting to swarm when you least need them to, which is why those beekeepers who are so invested in making honey have to build in swarm management strategies to make sure their bees stay put, and that they can, in fact, make as much honey as possible.

Amy 40:45
Yeah, and, I think in a previous either question or answer when we were talking about swarming, you basically said, if there's a swarm, you lose. The beekeepers lose as a result. So do you want to tell me, just real quickly, the different steps that you can take management-wise to prevent swarming?

Jamie 41:02
Yeah, I will. Before I do that, I want to give you just a quick disclaimer. And it's important for beekeepers to hear. Amy, as you probably know, there are beekeepers of all types on planet Earth. Some are pretty management intense, some are not. Some will use chemicals to control what have you and others will not, some will feed, some won't, etc. So there's definitely a movement at the moment called natural beekeeping. And a lot of the natural beekeepers think that bees should just be allowed to swarm. What follows is certainly not a knock on that philosophy. If that's your beekeeping strategy, so be it. However, if you are into honey production, and that is important to you, and you've got to produce lots of honey for sale, especially if you're a commercial beekeeper, then you got to control swarming. And so if you think about it, Amy, swarming, because it's reproduction, is hard to, quote, control. We do our best, but occasionally, we still lose. So essentially, swarm control is addressing the stimuli that lead to swarming. I'll give you an example. If congestion is one of those stimuli that will cause a colony to swarm, you deal with that by adding more space in the hive. You alleviate the congestion. If having an older queen is a stimulus that leads colonies to swarm, then you deal with that by requeening your colonies in early spring so you have a younger queen. If queen cells are a stimulus that lead to swarming, you might go into your colonies every seven to 10 days and remove the queen cells during swarming season. A lot of commercial beekeepers will split their colonies a month or two in advance of swarm season because a split is essentially a controlled swarm. In many cases, it might, for lack of a better term, trick the colony into believing that it has swarm. So there are a lot of these types of things that you can do that collectively reduce those stimuli, and therefore, reduce the chances that your colony is going to swarm.

Amy 43:01
That's interesting. I wonder who the person was that decided, oh, if I just go ahead and split them. You know?

Jamie 43:09
Yeah, it's funny, though, Amy. It's important to commercial beekeepers. This is a very commonly used strategy by commercial beekeepers. A lot of hobbyist and sideliners will do kind of the more management-intensive strategies, clipping queens, going in and cutting out queen cells once a week, etc. But commercial beekeepers just do a lot of requeening, they do a lot of splitting, and they do a lot of super adding to make sure there is space, and those are the strategies that they often use to address swarming.

Amy 43:37
Awesome. Do you have any other last-minute suggestions for beekeepers?

Jamie 43:40
If you failed to remove those stimuli and your colony ends up swarming while you're there, just sit back and watch it happen.

Amy 43:48
It's pretty cool.

Jamie 43:49
It's really an amazing process. If you're really good at it like I am, I will sit at the entrance of a colony and catch the queen as she comes out.

Amy 43:58
No way.

Jamie 43:59
Yeah, absolutely.

Amy 44:00
I'm imagining like Mr. Miyagi, like do you do it with chopsticks?

Jamie 44:03
That one, I do it with my "bear" fingers, and when I'm done, I put my human fingers back on.

Amy 44:10
Oh, gosh. Jeez.

Jamie 44:13
But I'll do that and I'll catch the queen and I'll put her in a queen cage, and then I'll sit her down and the bees will all cluster around her, and then I've got my swarm. I've had to do this lots and lots of times when I'm in the apiary. The reason you're able to do it is the queen is not the first to leave. She's usually somewhere in the middle. So once you see that swarm initiating, you have time to run over there and sit and wait at the hive entrance to try to catch her, but be mindful. She comes barreling out so you have to be ready to catch her quickly.

Amy 44:40
Yeah, you must have good eyesight.

Jamie 44:42
Good reflexes, too.

Amy 44:43

Okay. That's fair. Well, thanks. This is probably not going to be the first or last time we talk about swarming, but we can get into it and hopefully, we can have Tom Seeley come and talk to us about his book and about some of his other research that he's done.

Jamie 44:56
Yeah, that'd be great.

Stump The Chump 45:02
It's everybody's favorite game show, Stump the Chump.

Amy 45:14
Hey, everyone, it's a question and answer time. We are so thankful that you guys are still interacting with us and sending us questions. We've been receiving a ton of questions. So hopefully, you all keep listening to Q&A, and wait your turn, I guess.

Jamie 45:29
Amy, that's kind of amazing if you think about it. People actually listen to us.

Amy 45:33
I know. I know. They actually listen to us. I'm like, what do we talk about? So it's funny, though, because all my close friends are like, you have a podcast? And I'm like, yeah, you should listen to it. They're like, well, what do you talk about? I'm like, bees, duh. What else would we be talking about?

Jamie 45:46
What else is there to talk about?

Amy 45:48
I don't know. That's true.

Jamie 45:50
Birds.

Amy 45:50
Okay, so we have three questions.

Jamie 45:53
The birds and the bees, Amy. You've missed the joke. We'd be talking about the birds and the bees. Anyway, keep going.

Amy 45:57
Well, today, it's just the bees. Maybe we'll talk about the birds next week. Alright, so for our questions, the first question we have is, how soon should I put a honey super on a newly split 10-frame hive? Is there a too early even if you don't collect the honey for a year or so?

Jamie 46:16
Okay, it's never too early. So what I would say is if I were to split a colony and see that that split has filled about 80% of the box that I moved it into, and there's clear evidence that there's going to be a continuing nectar flow, then I would put a super on, no questions asked. And so what is that evidence that I'm looking for? Well, when there's a nectar flow, bees are bringing in nectar. The way that you can tell, there are usually two good clues. Number one, you'll start seeing white wax being produced. So if you look down in the box that your split is inhabiting and start seeing white wax produced, that's an indication. And number two, if you take a frame out, turn it sideways, and lightly shake it, just lightly in the air, the nectar will rain out of that frame, suggesting to you that there is an act of nectar flow. And at that point, I would have no problem at all supering the hive. So, I usually use those two indicators. And the longer that you're in bees and beekeeping, the more you'll learn to recognize when your nectar flows are happening and what the important plants are so you can start using external cues to determine whether or not supering is appropriate. But in the meantime, I've looked for the production of white wax and then that nectar raining from combs that you lightly shake as you pick them up.

Amy 47:37
So, you're basically like, hey, bees go do all this work. Let me shake out all your hard work.

Jamie 47:42
That's why I say lightly. Basically, you're turning your frames so that they're horizontal. And if you shake the willies out of it, it's all going to rain out. So you turn it horizontal.

Amy 47:53
The willies? Or the necar?

Jamie 47:53
Yeah, the willies. No, the willies. the willy nectar. So, you can also look, of course, at activity at the hive entrance. And if you're really good, Amy, and I happen to be really good, you can actually collect a bee at the nest entrance, hold it by its wings so it cannot sting you, you can slightly squeeze its abdomen on the sides, which will cause it to regurgitate the nectar it has collected--

Amy 48:19
What, really?

Jamie 48:19
-- from its crop and you can see it accumulating at its mouthparts. And if you're really, really good, as am I, you can actually taste the nectar straight from the bee's face and know where it's coming from.

Amy 48:32
Like a mama bird.

Jamie 48:35
Just like that. See, birds and the bees. I told you. But I would obviously strongly recommend against doing that unless you're very comfortable handling bees.

Amy 48:44
Yeah, I was about to say, you must have been really bored. We'll have to talk about pulling honey too soon on another question. Maybe next time. All right. So the next question we have, so actually, there are two questions from the same person, or it's two different people named Oliver. But he had emailed us. And first of all, he says that he loves your jokes.

Jamie 49:06
Oh, really?

Amy 49:06
I don't know if your wife tells those jokes and whether we call them mom jokes or dad jokes, but --

Jamie 49:10
Yeah, we were just having this conversation off the air. The listener mentioned dad jokes. I'm like, is it only a dad joke when a male says it? I mean, what happens when a female says it? Is it still a dad joke?

Amy 49:21
Yeah, do I give good dad jokes? I don't know.

Jamie 49:24
I happen to be a dad. So I guess all my jokes are dad jokes.

Amy 49:28
All right. So he said he's finding himself treating for mites prophylactically in the spring and in the fall, and he's not testing for mite levels. He's just treating. So it seems like all the mite treatments say not to treat just one hive but everyone in the apiary. He always has a hive above the threshold. High temperatures come quickly above that for most treatments and because he lives in the valley, he has a pretty strong flow throughout the season with supers on. So as soon as temperatures drop in September, he typically treats. Is there something wrong with this? Should he be doing this? What do you recommend?

Jamie 50:01
Okay, so this is an interesting question. There's a lot of moving parts in it. But but the main focus here is this beekeeper, Oliver, thank you for submitting your questions, is making the argument that, I've got timing-related treatment issues, and there's a big window of time that I can't treat. So then, why monitor in the first place? Why not just treat prophylactically when I can? And incidentally, Oliver, that's what a lot of commercial beekeepers do. A lot of them don't bother monitoring, they see little value in it. And their argument is, hey, look, I'm going from crop to crop to crop to crop, I'm pollinating, I'm collecting nectar or whatever, and I've only got these windows. If I were to sample during the first window, but have Varroa mite populations that are low, it may be months before I get to my second window, and by that point, Varroa may be a problem. So a lot of commercial beekeepers just take the prescribed treatment route. I'm going to treat at these designated time points because that's when I can, right? On

the other hand, we always argue, scientifically, that it's best to do the other way around, to treat as a result of monitoring and only treating when necessary. And the benefit of that is you may find yourself not having to treat as much as you think you do. And secondarily, you may find yourself having to treat more than you think you should. I would argue the latter can happen a lot, especially if you're only treating twice a year. So, I would suggest, Oliver, if your current system works, then don't try to fix it. However, what I would also suggest is that there will be times in the future, potentially, that your colonies need a mid-season, a summer treatment, but since it's not in your prescribed treatment regimen, you may miss that if you're monitoring. So I think the benefit of monitoring is it tells you if you're treating too much or if you're treating too little. And believe it or not, the latter can, in fact, happen.

Amy 52:05
Sure, and you can actually save money by not having to purchase treatments. Right?

Jamie 52:09
That's correct. And Amy, I want to stress this one thing. I was at a meeting some years ago with commercial beekeepers and a few scientists talking about treating. The commercial beekeepers who were monitoring found it necessary to treat, based on monitoring, somewhere between four and eight times a year.

Amy 52:24
Wow.

Jamie 52:25
So yeah, that was a huge eye-opener to me. So basically, it told me that if people are treating once or twice, they're probably underaddressing Varroa. But so, Oliver, in your case, if your colonies are living fine, and they're being very productive, and your prophylactic regimen of twice a year is working, then I will say, if it's not broken, don't fix it. But, I would suggest to you, if you start seeing kind of midseason declines and things like that, or lessened productivity, you might monitor around those times and see if it's because Varroa populations are rebounding during a time you think, perhaps, otherwise, treatments aren't necessary. And the last point that I'll make kind of here is it sounds like, based on your comments about temperature, etc., that you might be using some of the softer compounds with the organic acids, etc. A lot of people try to use those and the treatment windows for those are usually such that it's very difficult to use them during the summer when it's so hot. So yeah, I've said a lot, and hopefully, you can kind of take that in and think about what it all means. If you have more questions about that, don't hesitate to ask us again.

Amy 53:31
Awesome. Alright, so the second question that Oliver had was that he had a hive this spring with EFB, so European foulbrood. He was able to identify it because of an earlier episode that we had, which is really great.

Jamie 53:44
What, what! Success.

Amy 53:45
I know. Exactly. That's like our biggest success story of the year.

Jamie 53:49
Finally, someone's been helped by our podcast. Thank you, Oliver.

Amy 53:52
Thank you so much, Oliver. Oh, and he said some online videos, but I'm just gonna pretend that all he said was from an earlier episode that we had put out.

Jamie 53:59
Okay, we're gonna claim credit.

Amy 54:01
That's fair. Okay, so he said that he had a medium super on a hive. They went through winter. By the spring, they had laid some infected brood. He's since condensed the hive. And he's wondering if this super is safe to reuse.

Jamie 54:14
So what I would argue to you, if it is, in fact, European foulbrood, I'm going to take your comments for granted and believe that that's the case, European foulbrood often clears up on its own when you go into a really good nectar flow. You can also treat with antibiotics, and I know that a lot of our listeners are going to be kind of split right down the middle. Probably, half of you guys don't mind using antibiotics. The other half probably do/ does mind. So what I would argue to you, Oliver, is that my personal responses is if I saw it, I'd probably treat with an antibiotic. Given that that super that you're talking about is the one that carried the bees through winter, I'm guessing it's not the one that you'd be using to extract honey, and if that's the case, if you treat with an antibiotic, then reuse of that super won't be a problem at all. I mean, if there is a silver lining in the story, it's that you have European foulbrood and not American foulbrood. Because European foulbrood you can treat with an antibiotic and it will go away. To get reinfected, you'll have to get reinfected. It's not just going to pop up because it's still in the hive. So, if it were American foulbrood, the spores would stay around, essentially, forever, and you'd never be off the treatment treadmill. So in your case, I wouldn't hesitate to reuse that super, if I ended up treating with antibiotics. If you don't do that, then even still reusing the super, probably, is not all that bad if you get through the major nectar flow because the bees are likely to pull out of it anyway. So a major nectar flow, perhaps requeening the hive, and making sure that your Varroa are under control will probably solve that problem for you if you're resistant to using an antibiotic to fix it.

Amy 55:55
Awesome, very cool. So, the Bee Informed Partnership had a webinar the other day about brood diseases, and something that I didn't know is that they have little take-home kits that you can use to test for EFB, which I thought was kind of cool.

Jamie 56:07

That's right. So, Vita, I believe, is the company that's been making them, and they work off the same technology that tells ladies if they're pregnant or not, and what you do is you collect larvae, and you swish them in the little vials that they give you, and then you collect a little bit of that liquid and put it on what looks like a pregnancy test. And I forget what the answer is. One line is negative, two lines positive, whatever it is. You have to read the instructions, but they make one for European foulbrood, and they also make one for American foulbrood. And both of those kits are really good. In fact, I often recommend people to have a couple with you that you carry to your apiary so that when you suspect you have a problem, you can confirm using those diagnostic kits.

Amy 56:50
Awesome. All right, well, thanks. Thanks, Oliver. And whoever had asked the first question, I don't have a name on there, I don't know.

Jamie 56:56
Thanks, guys, we appreciate it.

Amy 56:57
Yeah, thank you. We'd like to give an extra special thank you to the following: to our editors, Shelby Hal and Bailey Carol, and to our audio engineer, James Weaver. Without their hard work, Two Bees in a Podcast would not be possible. So thank you.

Jamie 57:19
For more information and additional resources for today's episode, don't forget to visit the UF/IFAS Honey Bee Research Extension Laboratory's website ufhoneybee.com Do you have questions you want answered on air? If so, email them to honeybee@ifas.ufl.edu or message us on Twitter, Instagram or Facebook @UFhoneybeelab. While there don't forget to follow us. Thank you for listening to Two Bees in a Podcast!