Episode 148 PROOFED

Wed, Jan 17, 2024 4:07PM • 47:50

SUMMARY KEYWORDS

colony, bees, honey bee, queens, small hive beetle, beekeepers, peter, questioner, bee, beekeeping, question, cape, drones, document, workers, research, ants, laying, unfertilized eggs, amy

SPEAKERS

Amy, Serra Sowers, Guest, Stump The Chump, Jamie

Jamie 00:10
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. Hello, everyone, and welcome to another segment of Two Bees in a Podcast. Amy, this is a super duper exciting segment for me because I get to reach back way into my past for a colleague and friend of mine who I've known for over two decades now. We were in the same research lab when I was a PhD student at Rhodes University in Grahamstown. He was a postdoc there, and I'm talking about none other than Professor Dr. Peter Neumann, who's the Professor of Bee Health, the Director of the Institute of Bee Health, the President of the COLOSS Association, which is the prevention of honey bee colony losses, the Institute of Bee Health for Vetsuisse Faculty, the University of Bern and Agroscope in Switzerland. Peter, thank you so very much for joining us on this podcast.

Guest 01:30
Great, Jamie. Thanks a lot for the very kind introduction. I'm really happy to be here.

Jamie 01:35
Peter, I know you and I could tell a lot of stories about each other, but I'm gonna do my best to stick to the script and ask the questions that Amy and I have thought about. But Peter, just to introduce yourself to the audience, how did you get into bee research? How did you find yourself where you are now?

Guest 01:53
In fact, it's by accident, to be quite honest. Well, as a child, I was fascinated by insects already. In particular, I loved ants. So I spent a quite a bit of time in feeding ants little bits of chocolate. I was quite amazed, when I was very young, a tiny ant is able to carry a huge piece of chocolate, like twice or three times its size. A couple of years later, I became more fascinated by how the ants help each other in

cutting the pieces, and how you find their trails and find home. So I fell in love with social insects very early in life. But later, when I went to school, I thought to myself, "Okay, I have to find a reasonable job. So I'd rather do chemistry." So I did a major in high school, a major in chemistry and biology. I started, accordingly, to study chemistry. However, after one and a half years, I felt, "Am I doing the right thing?" So, I went to biology, and I didn't regret it. It was great. I really loved biology. And towards the end, of course, I wanted to do something on ants. But unfortunately, there was no and professor at the time in Berlin, and I didn't want to leave my hometown in Berlin, Germany, to study, in, for example, in Wurzburg with Bert Hölldobler, or other famous ant people, so I stuck in Berlin, ended up with a person who worked on bees. And actually, that was a great choice. So I switched on bees, just because I didn't want to leave my hometown. But there was that Six Flags, it was social, so come on, you know, bees are reasonable surrogate for ants at a time. And then I started to do genetics with Professor Moritz. And I never regret this. After a couple of years being in the lab, I went back to what I really, really love with a passion. I had to learn smoker and up in the field, I went to my postdoc in South Africa, and so I never lost my excitement for bee research since.

Amy 04:02
Peter, I'm cracking up at the beginning of your life of feeding chocolate to ants. That's pretty good. That's a new one for me.

Jamie 04:09
I know, lucky ants, right?

Amy 04:11
Seriously. That's so funny. Well, we'll have to talk off-air about the stories that you and Jamie had when you were in South Africa. I can't wait to hear some of those stories. But I know that because you're in South Africa, you spent a considerable time studying the Cape honey bee. Can you just describe the Cape honey bee and why it's so fascinating? And also, maybe just tell us some of your most notable findings with your research studying the bee?

Guest 04:40
Yeah, well, great. Well, the first thing which I noted very quickly is Cape bees are much better than the reputation. At least, they were much more calm and easier to work with than the Apis mellifera scutelatta in the northern part of the country. There were generally, of course, exceptions, as always with colonies, but in general, I enjoyed working more with the Cape bees. They seemed to be more docile, at least to me. And of course, then, beekeeping with African bees is something completely different. Some of you working with those, or Africanized bees are very similar, you may have noticed, I had to change my beekeeping completely because when I started that in South Africa, in Grahamstown, at the time, I was still a PhD student, for a short visit, there were about 30 colonies of bees. I was supposed to check them, whether they were queenright, and how were they doing. Then, in a very German efficient way, 1, 2, 3, 4, I went through those colonies in no time and highly efficient. However, a couple of days later, about 10 colonies left the apiary. So Prof Hepburn, at the time, wasn't particularly happy with me. I learned, I have to change my beekeeping, I have to be much more gentle and calm. So if I'm calm, the bees are calm. And also the chances of them absconding, leaving the nest because of a major disturbance, is reduced. So I learned that fairly quickly. And after a couple of

months, the colonies didn't leave anymore when I had a look at them. Alright, but this has nothing -- to stick to a purpose, specifically to the Cape bees, what I found most intriguing was when I looked at a colony, and there was, as usual, there was a solid brood nest in the middle of the colony with one and a half frame of sealed brood and a bit of open brood. But in that outer frame, there was some other brood, and I found that quite interesting. I took out the frame, I checked it carefully, and the point was there used to tend to be more than one egg in a cell. They were like two or three eggs, and not the queen bees doing it right in the middle of the bottom, but actually, rather on the sidewalls, and I found that very, very interesting. I spoke with Prof Hepburn, "Prof, what's on here? Those nests, what's going on?" And he told me, "Peter, that's normal. In the Cape bee, the workers are laying even though the queen is present." And I found that absolutely fascinating. And what was even more fascinating, and turned out to be a huge problem for the South African beekeepers is that when Cape bees get into a colony of the other bees, of Apis mellifera scutellata, they don't realize or they don't check that there is a queen there. They just stay laying eggs, and they basically take over the whole colony. So that was a Cape problem. It was the big issue at the time when Jamie and myself worked there. And there was quite a bit of research going on. One of the most fascinating aspects published by another group in Pretoria, together with colleagues from the UK, that a single clone, a clonal line was those. How is that possible? It is possible because in any given honey bees, the workers are certainly not sterile, but when they lay an unfertilized egg that is developing into a drone, because it's haploid, very much like when the queen is laying an unfertilized egg. In the Cape bee, however, there's a strange mechanism going on. And when the Cape bee is laying an egg, it basically is able to clone itself. So the eggs are diploid, and they're producing female offspring. That is extremely rare. There has been a paper by Mackensen called, "Golden strains of bees in US." it occurs extremely rarely in other species or subspecies. But in the Cape honey bee, it is the common mode of worker reproduction. You do have workers also producing drones, but the majority of workers are laying diploid eggs, and that has major consequences for the colony and how it can nevertheless be functional. Anyhow, these Cape bees are really fascinating objects, and I think they have been extremely undervalued because of this clonal ability. They offer exciting questions for research. For example, we very often look at phenotypes, and the phenotype is almost always environment plus genotype. So we have a lot of variation because in a colony, a queen is meeting 1, 10, 49 times. So there's lots of variation and this is a bit of a noise. But with Cape bees, you have a clone line. You can precisely determine what is the impact of the environment on a phenotype. That is an amazing system. And even though I left Cape bee research long ago, I still believe there's a lot of potential to answer a number of exciting questions with all sorts of African bees.

Amy 10:03
Peter, that is so cool. I feel like we could do an entire segment on just the Cape honey bee with you sometime. I think while I'm listening to you talk, I have two questions. I think maybe our audience might have that too. With the Cape honey bee, why even have a queen, then, if there is the ability for those workers to produce fertilized eggs? The other question I had, you were talking, we know that worker bees typically lay a couple of eggs within a cell. What happens with the other eggs? If one egg hatches, did the other bees come in and clean the other eggs out? Or how does that work?

Guest 10:40

All right, question number one. Why do they still have a queen? Well, we know for some social insects, they have secondarily reduced the queens. That is Ponerine ants. And, Ponerine ants, laying workers do the job. So they have no queens anymore. However, Ponerine ant colonies tend to be very small. And I guess here we go, why the queens are better. Queens are professionals. Laying workers are kind of amateurs, to be quite honest. And the different costs in the honey bee -- a cost is defined as simultaneous coexistence of polymorphisms and single-sex clones are no cost, certainly not -- and those queens ust do a much better job. They are much better able to do the reproduction. They are able to, for example, because their abdomen is longer, they are able to position the egg precisely in the center of the cell. Also, their whole morphology is much better adapted towards doing this job. Most importantly, honey bee queens mate. For workers, there's one obscure report also from South Africa that Cape bee workers may mate, but that has never been proven as far as I know. They do have thicker sperm though, which is, interestingly, very closely correlated to the occurrence of the ability of laying diploid female eggs. But that is another intriguing question: Do these workers really have a functional spermatheca or not? So, at the end of the day, queens do a better job. End of story.

Jamie 12:24
Peter, it's hard to be around you and not get caught up in the excitement that you have when you talk about bees. And that's what I remember from my PhD days, as well as anytime I interact with you in any other capacity. You're an ideas guy. You process science well, and I think our listeners are going to appreciate that. So, let's leave the Cape honey bee. It's an amazing bee, I agree with you. I love working with it and studying it. But you segued from there to really making an impact in the research world related to small hive beetles. You and I shared that passion. I was at Rhodes working on my PhD with small hive beetle under Prof. Hepburn's supervision. You've done a lot of work, you continue to do a lot of work with small hive beetles, so why is this thing so interesting to you? Why is the small hive beetle interesting to you?

Guest 13:12
Alright, great. First of all, I met this guy for the first time in South Africa. I went out to an apiary, I approached a colony, and there was some strange smell. I was kind of suspicious, something must be wrong here. And indeed, I carefully open the colony and the bees have gone. And there were thousands of maggots all over it. And I said, "What's going on here?" I put a new box, I sealed it, I went up, and I said, "Prof, prof, what's wrong here? These maggots have killed my colony." Prof. Hepburn said, "Peter, relax. It's just small hive beetle. Make a new nuc and carry on with the experiment." And I was like, okay, I did so. But I was fascinated because I never heard about it in Europe. And back in 1997, I was then reading the entire literature almost in a week. That was Lundie and Shmolke and a bit in Randall's book, he was about to publish it. So that was getting into that for the first time. And then when we started, together, Jamie, and a few other people, we started this. It's a very, very special associate of colonies. First of all, it's mobile. It's flying from A to B when it's won. It has a very sophisticated strategy of stealing food from the bees by exploiting the prophylaxis, then the adults show all kinds of tricks. They do a turtle that the bees cannot sting them, they just drop down from the comb, they attack, they do all these little things. And then the larvae are the ones which can be a total disaster. So, when they go into what we call mass reproduction, they have thousands, maybe even tens of thousands of larvae, and that results in the full structure collapse of the entire nest. You just have a stinking piece of fermented wax left. And that's it. So the effect can be so drastic. But we don't

know when this is going to happen. There are a couple of suspicions we have, but we don't really know when this disaster is going to be there. And on top of that, when I worked in Florida back in the day, I saw small hive beetle getting out of a colony of bumbles and patients in the field. That turned out to be the case that the small hive beetle is also infesting bumble bee colonies. I saw something similar in Australia with stingless bees. We all know the famous banana experiment. And the flowers where the beetles also can feed from, though it's an absolute generalist able to exploit, and in principle, at least, a whole range of different hosts can survive on everything. They eat dead bees, they eat live bees, they steal food, they eat honey pollen, so it is so general. And the point is, we know so little still about it. If we want to get a better grip on this pest, I am fully convinced we need to have a much better understanding of the fundamental biology first, because then we have can identify where the weak points really are in the lifecycle and how to get a better control. So I'm aiming together with a number of colleagues right now. I'm very happy to work together in the task force small hive beetle of COLOSS, for example. We'll be trying to really internationally collaborate, deepening our knowledge and then be able to find sustainable solutions. And this will be especially important, not only about the managed honey bees, for example, in the US, but given that small hive beetle is really an issue for, for example,bumble bees or stingless bees, then it goes much wider, meaning that is the new ranges, we should try to really protect wild bees from this pest.

Amy 17:12
So, Peter, with your research, what do you find the most promising regarding the control of small hive beetle?

Guest 17:19
I think the most promising is a public work that has already been initiated in the US by colleagues working on chemical ecology. So I believe understanding the communication small hive beetles use, first, to identify basically a mate, and maybe also to each other. That is something. I would love to see pheromone traps we have for other beetle pests. That is probably a quite efficient way. However, in colonies, we have a whole range of different trapping systems. And I guess we should really finally try to enhance the efficacy of such traps. So traps in the colony, traps outside of the colony, that will be a very promising avenue to get a better grip on this field.

Jamie 18:15
So Peter, what are the difficulties with talking about your careers that you've really just done so much and made an impact? We spent some time talking about your research with Cape bees, some time talking about your research with small hive beetle, but you've done way more than that, Varroa, pesticides, all kinds of things have come out of your lab and collaborations. But I really want to turn from the impact that you've made specifically through your research to the impact that you've made, maybe, like, the legacy impact, the pushing forward and the leadership that you've provided to an organization called COLOSS. So when elevated colony losses became the headlines around 2006-2007, you spearheaded the creation of COLOSS. Can you tell us what it is and give us a brief history of the development of this incredibly important organization?

Guest 19:04

Great. Yeah. Thanks so much, Jamie. Well, basically, there was a lot of concern in Europe about elevated colony losses. That was in 2006-2007, around this time. People quickly noticed that it is extremely challenging. And you cannot compare, for example, loss rates between Turkey and Poland, or between France and Italy, because people use very different methods to estimate colony losses. People even disagreed upon what is a dead colony. So there was a meeting in Bachvereniging of the Netherlands where a couple of researchers met. And my colleague from Switzerland, Tony Endorf, suggested, "Peter Neumann in our lab, he would be the one who could actually spearhead such an effort. Let's suggest him to lead this." And so even though I wasn't present, I was voted in absentia to be in charge of the matter. And I said, "Alright, I'll do it." We drafted a grant proposal for a European funding agency, and the ones made it and I was so nervous. There was about 50 people from, like, let's say 18 countries. How can I possibly manage, that's a big network. Now, COLOSS has over 1000 people from over 100 countries, and it's still working. And I think the magic behind it is that it's not a one-person effort it is a team effort. COLOSS is a team and this can only function if people together work on these issues. And, again, I think one of the key points is that we agree on standards that we can compare data between countries, and colony losses is a global issue a global problem, so we need global solutions to this problem. And this is provided by better cooperation and collaboration within the COLOSS network. So we are very strictly bottom up, meaning problems occurring at the apiary level, at the county level, at the country level, we notice and take them into account and react quickly. For example, when the Hornet species caused havoc in northern Italy and in southern France, we said, "Alright, it's time for a task force." So we created the task force Vepsa velutina to deal with this wasp and to help the beekeepers dealing with it and to enhance our knowledge. So the task forces are built upon or abandoned, [inaudible] demand in the field. On the other hand, COLOSS also has core projects. These are things we are fully convinced that will always be very important if we want to mitigate colony losses globally. That's, for example, obviously, the core group at the core project monitoring, where we, with the kind help of many, many beekeepers, which I hear thank a lot -- without you guys wouldn't be possible -- we get the data to understand, first, when and where colonies are lost. And this is essential to understand the underlying reasons. Now we have another core project that's B-RAP, what is called bee research and practice, so to bridge the gap between science and beekeepers, and this core project has done a lot of good workshops and work in getting those together. And then some examples, here, we're also trying to have online activities with our website. I think the most important tool we have are conferences, workshops and training schools. So researchers meet, and it's especially important for the young scientists to get to know the more experienced colleagues in the field by exchanging ideas, coming up with papers, and at the end of the day, hopefully, solutions for the field.

Amy 23:13
Absolutely. So, I've been part of COLOSS, I've been part of the honey bee lab since 2019. So I haven't ever been able to meet in person with any of the COLOSS members but I am a part of B-RAP, which is the research in bridging that gap. They've put on many different seminars for us, and it's just been fantastic. And so thank you so so much for leading those efforts and for everyone else who leads a different task force. It's extremely helpful for everybody else around the world.

Guest 23:45
Great. Thanks a lot. I'm very happy about this.

Amy 23:48
So I wanted to talk about, what do you see as some of the biggest accomplishments of COLOSS and how has COLOSS helped beekeepers throughout the world?

Guest 23:58
Well, I think there's little doubt that the COLOSS Bee Book is one of the most important accomplishments of COLOSS. For the very first time, we have standard methods people have agreed upon to do research. We don't want to and we cannot standardize research, but the methods are standardized, and that is extremely important. Again, if you want to compare data from Florida with data from South Korea, you can do that because people use the same method from the Bee Book. These papers have been cited many times. I'm very happy that people do that. When I was a PhD student, I would have loved to have such protocols. It's like cooking spaghetti bolognese or things like that. Very simple protocols everybody can understand and use. With the beekeepers, I think the point is dealing with the stressors and with those factors creating problems. So with the help of the B-RAP Group, we try to get our insights, for example, about Varroa to the beekeepers so that they can optimize Varroa control. We also try, when we're working with the small hive beetle, I'll be trying to help beekeepers in saying, what are possible things people can do? And I encourage you, the beekeepers listening to this podcast, please don't hesitate, reach out to us, ask questions on the Facebook page of COLOSS, get in touch with us. If you have some concerns, please let us know. It's a win-win scenario. We're going to help you and you're going to help us because you may notice something really interesting in some cases. So it's always in both directions. COLOSS can only function if the beekeeper community is helping us. That is not only in telling us the number of dead colonies but also in sharing your experience with us. So it's a win-win situation on both sides.

Jamie 25:57
Peter, we're gonna make sure in the show notes for this particular episode to put links to COLOSS so that our beekeepers around the world can go to your website, look at all the resources that you guys provide, but also see what it is that you do on behalf of them. I would encourage all the scientists, because we have a ton of besides just around the world listening to this as well, if you're not already a member of COLOSS to get involved. It's an amazing organization making a significant difference in the lives, really, of beekeepers and honey bees themselves. So Peter, one of the most burning questions that I have thinking about all you have done is what's next for you? What's on the horizon for Peter Neumann? You've got all of these accomplishments to date, all of this infrastructure and stuff that you've done. What do you hope your career is in the next 10-15 years?

Guest 26:48
Well, that's a very good question, Jamie. First to start with, well, I work with a lot of stressors for colonies, with pesticides with Varroa mites, with foulbroods, with small hive beetles, all the things. By the end of the day, regardless of what the stresses are, if a colony is in good shape, it is better able to deal with all kinds of stressors. And that will become even more, probably, because we are doing beekeeping under climate change. So there will be even more environmental stress factors for bees to come. So what I would love to do is working rather on the bees' side because, again, I started with, I wanted to understand what the colony is, how it functions. But I'll probably focus, in the years to come,

colony functionality because we still understand comparatively little about really fundamental things. So what makes a winter bee? We have some ideas but I would very much like to much better understand what winter bees really are because this is a core. It's the backbone for the ability of a colony to make it over the winter. So in a nutshell, better understanding the functionality of a colony so that we, at the end of the day, have a better way for how they are able to deal with all kinds of stresses in the future.

Jamie 28:18
Well, Peter, that's fascinating. And again, I just want to encourage all the listeners out there, not only to go to the COLOSS website, Peter, but also to look specifically at your institute's website, because there they can see publications and all of these things that you and your colleagues are doing on behalf of beekeepers. And Peter, it's really been a pleasure of mine and Amy's, I'm sure, I know, to have you on this podcast. Thank you so much for joining us and talking about an overview of the things that you have done and that you stand for in the beekeeping world.

Guest 28:46
It was my great pleasure. Anytime, again.

Amy 29:00
So Jamie, that was a pleasure having Peter on, I've heard so much about him. I see his name everywhere, and it was just really nice to talk to him today on the podcast.

Jamie 29:09
Yeah, it's interesting for me, especially because I have such a long history with him. He's the first postdoc with whom I ever worked. He and I, again, we were in a lab together, Professor Randall Hepburn's lab at Rhodes University there in Grahamstown, South Africa. At the time, he was kind of segueing from Cape honey bee work into small hive beetle work, which is what I was doing for my PhD, and then we've just kind of paralleled one another's careers since that point. He's a really fascinating guy. He a natural leader. People gravitate towards him for that reason. He's also, as I said a little earlier, he's an idea man, right? If you're around him for any length of time, you're going to have a thousand research project potentials just boom. I just remember every time he and I were together, in my early days, it's like gosh, if I could just do half of the research projects that came out of his mind, we'd be busy. So, it's just really great. He's been so instrumental through COLOSS, especially, making a big difference in the beekeeping world. And I think, if beekeepers could be members of COLOSS - COLOSS is a scientific organization, so beekeepers benefit from it, but aren't members of it -- but if they could just see what happens at these meetings, and how he steers people towards results for beekeepers, as well as results for honey bee health, I think beekeepers around the world would really appreciate what this man has done on behalf of their industry.

Amy 30:36
Yeah, definitely. So I know that we are now in June. This episode is coming out in June of 2023. But part of our goal at the beginning of the year was to bring in different beekeepers and different bee researchers from all around the world. So that was kind of the theme that we were thinking when we had invited Peter in. And so I'm excited to see the other speakers that we have for the rest of the year

just learning about what they do around the world. I think it's just a really nice way to internationalize our podcast a bit.

Jamie 31:05
Also Amy, it brings our beekeeping community together. There's a lot of beekeepers all over the place and we all have very similar struggles in our colonies. Peter is an example of someone who's just devoted his life's work to trying to improve honey bee health. It's great to know that there are people, hundreds, maybe thousands of people like him around the world working on behalf of beekeepers and honey bees.

Stump The Chump 31:33
It's everybody's favorite game show, Stump The Chump.

Amy 31:42
Welcome back to the question and answer time. Jamie, I've got three questions. I'm going to pull questions from paragraphs and paragraphs of questions if that's okay with you.

Jamie 31:54
Oh, that's fine. Take it away.

Amy 31:56
All right. Part of me wants to put all the questions on our Q&A, and just see if anyone can, I don't know, just pick each one and ask them separately. Alright, we're cutting this piece out. But that's okay.

Jamie 32:10
Actually, I think, one of the things the listeners would benefit from -- we often get, not just a question, but a story that goes with it and embedded in that story might be multiple questions. Amy and I have to make very careful sure that we can actually answer those questions. Sometimes, Amy, of course, you summarized those litany of questions into one main question that we believe the questioner is actually asking. So hopefully, we can do that again today.

Amy 32:36
Yes, absolutely. Okay, so the first question is about what we call equalizing. And so the person was saying that they see or hear many YouTubers supplementing smaller colonies with a frame or two. So they're equalizing those hives. They never see the people shake the bees off the frames completely. So the question is, really, when you're transferring frames, maybe from a strong colony to a weak colony, is it better to transfer those frames with or without the bees? We always talk about how there are guard bees and how a bee is kind of dedicated to their own colony, and so what are your thoughts on the transfer of frames from one colony to another?

Jamie 33:20
I'm chuckling because you and I have the benefit of seeing the entire question and the question has a comment that they say. "I can see the proverbial, "it depends," as an answer coming."

Amy 33:31
So are you going to respond with that?

Jamie 33:33
I'm going to say, it depends, but that is actually the right answer. So the questioner is basically saying, when I move frames of brood between colonies, should I remove the bees or not? And the reason behind that question, the motivation behind that question is we're all told that bees fight. At the nest entrance, if other bees are trying to get into a colony that's not their hive, it's not theirs, the bees living in that hive will fight the ones, and you'll see bees fighting during the robbing process. All these types of situations produce in our mind that anytime honey bees mix, they fight. Well, what you'll learn very quickly in the commercial beekeeper world is the commercial beekeepers are moving frames of bees and brood around all the time without really giving second thoughts, at all, to whether or not the bees are going to fight. The vast majority of the time, the bees will successfully integrate when they're moved over on frames with no problems at all. I mean, I've been doing this, also, for 20 years, and I don't think twice about it either. The real problem for me is whether or not I accidentally move the queen from the colony that I'm taking bees and brood from when I move them over to the colony that needs to receive those frames of bees and brood. So really, it's the movement of the queen that I'm concerned most about and less so about whether or not the bees will fight because most of the time, they're not going to fight at any appreciable level at all. That said, and here's the quote, it depends part of this answer, there may be times that I'm moving a frame of bees and brood from a very strong colony to a very weak one. Maybe it only has one or two frames of bees and brood, but I want to keep that really weak colony alive. I think in those cases, you have to be careful because you can move a lot of bees from the strong colony over, and they, in theory, could take out the queen from that weaker colony. I just don't see this happen a lot. In fact, you could almost counter-argue that you need to move bees over with that brood because the weak colony doesn't have enough bees to keep that brood that you're moving over sufficiently warm or well-fed. So that weak colony will need to be bolstered by the bees that accompany that brood on the frame. So yes, there's always the possibility of fighting. But honestly, I don't think it is measurable in any way that's going to lead to widespread fighting and widespread loss and bees. Yes, you might have the occasional colony that does this, but I don't really think it's worth worrying about. And certainly, it's offset by the benefits of that weak colony getting brood and bees.

Amy 36:14
That makes sense. All right. So that kind of leads us into our second question today. So, we're going to talk a little bit about the queen breeding process. But a lot of times when beekeepers are breeding queens, they try to saturate the area with high-quality drones. We all know that when workers start to lay, they lay those unfertilized eggs. So the question is, is there any value to purposefully have laying worker colonies to saturate the area for queen production?

Jamie 36:51
This is an interesting question I've actually never considered in the past. And the premise is simple, right? When you're rearing queens, queens are half of the breeding process, you also need lots of drones. So queen breeders not only rear queens, but they rear their drones that they hope mate with those queens, and those are usually done in drone source colonies. These drone source colonies are sprinkled around the mating area, not only in the apiary where the queen mating nucs are kept, but also

in apiaries around where the queen mating nuc are kept. And the idea is that you're trying to flood the area with drones that you produce to mate with the queens that you produce so that you get everything you want in the mated queens and you can sell those. And so the questioner is saying, well, why can't we just take advantage of laying workers? They want to produce drones, that's all they are able to produce, why not just have laying worker colonies? And there are a few reasons that I can think that keep breeders from really exploring this option. Number one, laying worker colonies are difficult to keep alive. Now, what do I mean by that? Well, laying worker colonies are going to die if you do not step in and do something to fix it. And that's because laying workers only produce drones. Drones can't do anything except mate so the colony is ultimately going to dwindle and die. Doesn't matter how well a worker lays, she still only lays drones and drones can't carry a colony. So the questioner knowing that I might say that, said, "Well, you could always feed those laying worker colonies frames of worker brood to kind of stay ahead of that dwindling and die." But frankly, the management associated with doing that, I think, doesn't offset any benefit that you might get from laying worker colonies, number two.

Amy 38:30
It almost seems like you would just have to have continuous support colonies. And that's like double the amount of support colonies that you would originally have anyway, right?

Jamie 38:38
Exactly, Amy. Why make continuous support colonies when those support colonies just could be your drone source colonies? So then the questioner wondered whether or not genetic diversity might be better if you're using laying worker colonies, or there's some sort of genetic benefit to using them rather than using queens. And I just don't think that that benefit exists. In the case of both queens and laying workers, they're both producing unfertilized eggs to make these drones and there's really no advantage to using lay workers or using queens at all. And the third thing that I'll say, almost kind of flies in the face of that too, as well, because laying workers produce smaller drones, right? Because they're laying these unfertilized eggs in worker cells, you're getting smaller drones, even though their semen is capable of fertilizing eggs, but drones themselves may not be equally fit at drone congregation areas. Maybe they're not giving the same amount of semen, maybe they're not able to compete with the drones produced, the bigger drones produced by queens that are showing up at these DCAs. So I would argue, while it might be interesting scientifically to look at this from a practical standpoint, I don't think it would outweigh the advantages that you would get from simply maintaining drone production colonies that would be produced by queens.

Amy 40:03
All right, so the last question we have is about dipping beehives in hot wax. So this beekeeper's asking basically just for more information. So, commercial beekeepers that I have worked with, a lot of them will dip their hive bodies into paraffin wax. I don't know if this questioner specifically was talking about paraffin wax, beeswax, other types of wax, but they were wondering what information, or what do we have as far as dipping hives into wax?

Jamie 40:38
I chuckle about this question because in the question the questioner answered their question.

Amy 40:45
You know what? That's the best kind of question, I guess.

Jamie 40:47
I love it. Well, obviously the questioner taught me something, I had to learn something myself to be able to answer this question. So what do I mean by this? Well, the questioner, actually, for the benefit of the listeners, the questioner actually put a link to a document they found online about this very process, hot dipping of beehive components for purposes of preservation and sterilization. In fact, that's the title of the document, "Hot wax dipping of behalf components for preservation and sterilization." So I read that document and it's actually a really good source of information to answer this question. So to the questioner, I think this document is really good, it's quite legit. It's a document produced in Australia by a bee team funded by standard groups that you might think to be funded by when you want to get good bee information, the Natural Resources and Environment Group, the Rural Industries Research and Development Corporation. The document was written by Russell Goodman for the Institute of Horticulture and Development, and Agriculture, Victoria, and that's again, in Australia. So this document was really good, it synthesized the information known about hot wax dipping beehive components at the time. And so to bring all the listeners up to speed on this, and I didn't realize this was done until I got to Florida myself, but a lot of beekeepers, especially commercial beekeepers, will dip their woodenware, hive boxes, the lids, etc. in wax, Amy, just like what you mentioned, for the purposes of preservation or sterilization. We live in Florida and Florida has a hot humid climate, which is terrible on wood. If you do nothing at all to your bee boxes, they're not going to survive three to five years. So a lot of our beekeepers will paint them but even painting is not good enough. So some of them will dip in wood preservative and then others have decided to use this hot wax dipping. This document that we're going to link in the show notes really goes through everything that's known, the methods that are used, the research that are used to support it. I was reading through it, there's not a ton of research that's been used to support the preservation and sterilization. But there's just enough to make it worth experimenting with, especially if you're a beekeeper who needs to protect a lot of woodenware in a hot, humid climate. But I'm going to defer to this document because it goes step-by-step on how this is done. It also talks about all the safety precautions that need to be considered. I mean, think about it, you're heating wax. Well, they use wax to make candles. So you have to be careful around this stuff. There are also recommendations regarding it, whether you're trying to preserve the woodenware in other words, extend the life of your woodenware, or if you're trying to sterilize it. And so from the preservation standpoint, apparently the wood has to get really hot because hot wood will release the air and the moisture that it is trapped and it allows that wax to wick into that wood better. And the beekeepers cited in this document state that they can get 15 to 20 years out of woodenware that's first dipped in hot wax and then painted. And then from the sterilization perspective, they were doing it to sterilize woodenware from American foulbrood. Now, I want to throw out this quick caveat, every region, every country in the US, every state or every local area has different rules and regulations about American foulbrood. So you need to follow your local recommendations. But this document cites research that shows that if the woodenware is heated in wax that is also heated to a certain temperature, it both can inactivate the American foulbrood spores or encapsulate them making them inaccessible to bees. And so the argument of this document is hot wax dipping of beehive components can extend the life of woodenware as well as clean the woodenware from some of the pathogens that

bees might encounter. And so I strongly encourage folks to have a look at this document to see if it's something that you might be interested in trying in your own operation.

Amy 44:52
Yeah, that's interesting. So Jamie, where was the research done for that document?

Jamie 44:54
So they're citing research -- when I was reading it to prepare myself to answer this question -- they're citing research, some of it was done in Australia, but other places around the world and some of the research was from a protecting wooden rot perspective, while a little bit of the research was protecting it from American foulbrood. So I invite folks to read the document. And I didn't do this next step myself, but it's pretty easy to do. Another good way to find out if there's been more recent work on this topic is you can look for who has cited this document. So this document was published in 2001. At the time, we're answering the question, that's 22 years ago. So it'd be easy enough to figure out if there have been other scientists who have cited this document. And if they did, they were likely citing it because they also were conducting research on this topic. I've never hot-dipped hive components and wax but after reading this document, it really did give me some food for thought.

Amy 45:59
All right, so I know I've always asked our listeners to send in questions and write to us on social media or on email, but now I have a new request. And my request is to go ahead and send us a question, but also send us the answer with it. That'd be great.

Jamie 46:16
Then, I won't be a chump. We could just call this the answer the answered questions. I really appreciate it. I really appreciate it. I love it when people are able to do that. It might have taken me forever to find that document. That was a great addition. So I really appreciate the questioner for putting it in there because it gave me the opportunity to learn.

Amy 46:34
I know. Jamie, I think as time has gone on with our podcast and with the questions that we have, people are starting to do their own academic research, searching literature, and I think a lot of our questions are kind of becoming, have you seen this literature and what are your thoughts on it? Right? So it's kind of been fun to see how our questions have changed through the years because, at first, it was just basic management. Should we start with a nuc? Should we start with a package? What does that all mean? And we've kind of transitioned into people sending us literature and saying, what are your thoughts on this? It's just been fun to see that.

Serra Sowers 47:11
Thank you for listening to Two Bees in a Podcast. For more information and resources on today's episode, check out the Honey Bee Research Lab website at UFhoneybee.com. If you have questions you want answered on air, email them to us at honeybee@ifas.ufl.edu or message us on social media at UF honey bee lab on Instagram, Facebook and Twitter. This episode was hosted by Jamie Ellis and

Amy Vu. This podcast is produced and edited by Amy Vu and Serra Sowers. Thanks for listening and see you next week.