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SPEAKERS

Amy, Honey Bee, Stump The Chump, Dr. Adam Dolezal, 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, and welcome to another episode of Two Bees in a Podcast. Today, we are joined by Adam Dolezal, who's an assistant professor of Entomology at the University of Illinois. He'll be here talking with us about Israeli acute paralysis virus. In our Five Minute Management segment, we'll be talking about how to requeen colonies, and of course, we'll finish with today's famous question and answer segment, Stump the Chump. Hello, and welcome to another segment of Two Bees in a Podcast. It's my pleasure today to be joined by Dr. Adam Dolezal, who's an assistant professor of Entomology at the University of Illinois in Urbana Champaign. He is an expert on Israeli acute paralysis virus. At the University of Illinois, he runs a large lab on lots of different projects. We're going to talk with him about a lot of those projects. But Adam, thank you for joining us on Two Bees in a Podcast. We really want to chat with you about some of your work with Israeli acute paralysis virus.

Dr. Adam Dolezal 01:46

Yeah, thanks for having me.

Jamie 01:47

Absolutely. It's our pleasure. So Adam, what we always do, Amy and I, anytime we have a podcast episode, we really want to make sure our listeners get to meet our guests, and since you're a new guest to the podcast, could you tell us a little bit about yourself and how you got into bees and bee research in the first place before Amy and I start asking you some questions specific to your research?

Dr. Adam Dolezal 02:09

Yeah, sure. So I first was exposed to bees and beekeeping and bee research when I started my PhD at Arizona State University, funny enough. Most people are now surprised I didn't do my PhD work on honey bees or bees at all. In fact, I did my PhD work on harvester ant physiology and how harvester behaviors are regulated. But I did it in a lab where everyone else worked on honey bees. And so I got a lot of opportunities to help people out. This kind of accelerated because while I was there, I think at least three members of my lab developed honey bee allergies. And so suddenly, I was in high demand to help people pull frames and cage queens and do all this beekeeping stuff. And so I ended up getting quite a lot of experience with that and really fell in love with working with honey bees. And so when I then started to look for postdoc positions, I was really excited to go and take a position that was 100% honey bee focused, particularly working on honey bee viruses and Israeli acute paralysis virus in general. And when I moved from Arizona State to Iowa State where did my postdoc, it was also a really exciting time there because I was working with kind of new faculty there, Amy Toth. And so the honey bee program there was not developed at all. We didn't even have a building. They just bought 16 colonies. And so I got to jump right in and really be the apiary manager as well as the researcher, which was a steep learning curve, as I'm sure a lot of people can relate to like their first time managing a bunch of bee colonies. But it really gave me that, I want to say, real experience as a beekeeper and having to take care of these colonies while also using them for research.

Jamie 03:58
So Adam, I have to say, before Amy asks a question, that sounds like one of the most unique stories that we've heard that you got kind of pushed --

Amy 04:04
That's what I was going to say.

Jamie 04:06
You got pushed to the bee world because of someone else's misfortune, they got allergic to bees so you got to be the one who helped out with the bees.

Amy 04:13
Multiple people's misfortunes.

Dr. Adam Dolezal 04:15
Yeah, it happens several -- at least three of the postdocs in the my PhD lab ended up having to do desensitization treatment because of this.

Jamie 04:23
Wow.

Amy 04:24
That's crazy. All right. Not for you. And here we are. So one of your research areas, as you mentioned, is the impact of viruses on honey bee behavior. So you're involved in a recent study and it showed that Israeli acute paralysis virus, wow try to say that multiple times in a row, can actually alter honey bee behavior. And the behavior is to increase transmission between colonies. So you know, before we kind of delve into that, can you tell our listeners what Israeli acute paralysis virus is?

Dr. Adam Dolezal 05:00

Yeah, so I am also going to stumble over this. Imagine saying this in a talk, I say Israeli acute paralysis virus so many times. So I'll either say IAPV or I might just say a virus. That's easier for me to say. But yeah, and if I'm going to talk about a different virus and be more specific, yeah, so IAPV is a virus. It was first described in 2006. It probably existed long before that. And it's a virus that was originally gaining some attention because it was associated with some of these Colony Collapse Disorder phenotypes that people observed back in like 2006/2008. And it is a virus that we see pretty commonly. In surveys of colonies by beekeepers from different operational sizes in different places, we see about 50% of colonies often have detectable IAPV. And it's a virus that unlike deformed wing virus, which I think more beekeepers are more familiar with. It doesn't cause those types of deformities. But when bees get infected with it, and that infection gets to be high enough, it causes symptoms like paralysis, shivering, and eventually death. And these are very observable, very observable effects. And so we originally got interested in working with IAPV, because it had some links to real world problems and beekeeping. I should say that IAPV is transmitted by Varroa. But it's also transmitted in other ways, by foodsharing, like when bees spit nectar back and forth with each other. It's been shown to be transmitted from the queen to the larvae through the egg. We started working on it because of that importance that it had been linked to problems, and now we work with it a lot, because it's also a very useful, what I call like, kind of a model virus. And we use it because if you treat honey bee or adult workers with it, and they eat it, or you inject it into them, they die relatively quickly and with a very specific set of symptoms that are really easy to observe. And so some of the work that we do in my lab is trying to understand how do you reduce the stress from a virus infection. And with IAPV, it's really easy to feed bees, infect them with IAPV, and then give them a different type of food or expose them to a different type of chemical and see what that does to their survival against IAPV. And so we use IAPV a lot for that reason and just to understand, in general, how do bees deal with a virus infection. But it also does have some relevance in beekeeping because it is a pretty commonly detected bee virus that's transmitted by Varroa.

Jamie 07:54
So Adam, that's pretty fascinating. I remember when IAPV was first discovered, and you're spot on, right? They placed it in context with some of these earlier colony losses that people were experiencing. It's really neat to hear about your research. You and your team recently published in the Proceedings of the National Academy of Sciences. And incidentally, for you listeners out there, we'll make sure and link this particular manuscript in our show notes so that you guys can follow along, but in the significant section of that manuscript where you and your team are stating the impact of this, for global bee research, you make the statement, I really like the statement. I'm going to read it, and I'm going to ask you to comment on it because there's a lot of things that you say in there I think would be really useful for our listeners to have more information on. So you guys say, we find that honey bees have social immune mechanisms that may keep Israeli acute paralysis virus from spreading within a colony. But this virus infection results in behavioral and physiological changes that could increase transmission between colonies. These results show how IAPV could take advantage of modern apiculture to increase its virulence and highlight the critical need to understand how human manipulation of managed species can lead to increase pathogen pressure. Those two sentences really stood out at me. There's so many nuggets of information in there. So I'm wondering if you could kind of expand on some of the ideas that you and your team presented in that statement?

Dr. Adam Dolezal 09:25

Yeah, yeah. So like I said, we've been working with IAPV for a while doing this stuff, looking at how bees survive, how they deal with the infection. But my background and the background of some of my co-authors was really behavior-focused, and honey bees have been known for a very long time and beekeepers can observe this in the colony very easily, to have what we call social immune responses. And so this is behaviors like cleaning, collecting propolis, removing dead or diseased brood out of the colony and throwing them out, like Varroa sensitive hygiene for example, or hygienic strains of bees that have been do this a lot. So we know that bees have the ability to behave differently to deal with an infection. But we also know a lot of examples in lots of animals, a lot of insects, but also mammals, where a pathogen can make the host behave differently to increase the pathogen's transmission. A famous example of this is toxoplasmosis. It's a parasite. And when mice get it, it makes them no longer fear cat smells, so they want to get eaten by a cat because, for the pathogen, the next host is a cat. And so we wanted to know, we were curious if IAPV could have similar effects in honey bees. And so what we did was a series of experiments where we looked at, we looked at how infection affected bee behavior, but in two different contexts. So within a colony, you might expect that there's a lot of incentive for bees to reduce pathogen transmission, right? You don't want the queen to be infected, or the other workers to be infected. And in fact, that is what we see. When you infect bees with IAPV or we use another treatment that just turns their immune system on, they don't actually get infected. In some ways, it's actually kind of like giving them a vaccine, where they then have an immune response, but it's not actually a live virus. In both of those cases, when bees are inside their own colony, or with their own nest mates, they perform significantly less of that trophallaxis behavior, that mouth-to-mouth, where they spit nectar back and forth. And they, in general, just touch each other less. And this happens, whether they're infected, or their immune system is just stimulated. And so we think that what this means is that this is just a general response honey bees have when their immune system gets triggered, in some way, whether by a virus, or a fake virus, or bacteria. It makes them reduce the amount of touching they do with their nest mates. And this is probably an adaptation to help them reduce spreading diseases within their colony. You could think of like getting a fever as a human. It doesn't matter whether you are infected with a bacteria or a virus, or even if you get an injection of a vaccine or something that isn't a live pathogen, you can still develop a fever, your body just does that in response, in general. And so we think that that's what the bees are doing here. They're just trying to reduce transmission against whatever it is. But of course, for the pathogen, it's valuable not just to spread within a colony, but between colonies, and so that's where we were really curious, because from the bee colonie's perspective, it's fine to spread diseases to your neighbors. They're your competitors, right? So in nature, there wouldn't really be an incentive for the colonies to protect other unrelated colonies. But for the virus, it's really beneficial to be able to move. And so what we found is that when bees were infected with IAPV at levels that don't kill them, but they're just infected, they still forage normally, they go out and they fly and do foraging. But when you introduce those foraging bees or introduce infected bees from those colonies, and you try to introduce them to the guard bees, either in a lab, or at the entrance of a real colony, the guard bees are substantially less likely to attack infected bees than they are untreated, or these immune stimulated bees. And so again, normally, the guard bees don't want to let bees from other colonies in. They stop them and kind of attack them a little bit. But we see if the bee is infected with IAPV, then they're let in almost twice as often. And so we can see this as evidence that IAPV is changing the behavior of the bee and changing its physiology in such a way where now IAPV just got an entrance pass to come into another colony. So that would be really valuable for the virus, right?

Amy 14:27
That's crazy. It's interesting, of course, within the colony, and then the colonies interacting with each other and kind of how they communicate that. I think that's something that beekeepers want to know is why should they be concerned? Because you are talking about infection, but you're talking not necessarily that we're losing colonies, right? They're not, so can you kind of elaborate on that a little bit. So why should beekeepers be concerned?

Dr. Adam Dolezal 14:54
Yeah, that's a great question because, yeah, we were like experimentally infecting bees. The thing that we weren't able to test because anybody who's worked with Varroa knows there's lots of challenges. But we know that Varroa can kind of hitch a ride on bees to go into other colonies and move around that way. There's been a lot of interest, I know, in this perception of like, mite bombs where colonies that are really infested with mites, as they die, those mites then get dispersed somehow into other colonies. And because IAPV is transmitted by the mites, in the real world, you would expect them to cooccur. Our colonies, we actually were really stringent and basically kept our mite load at zero, because we only were interested in the virus for these experiments. But in the real world, if a colony has a rampant IAPV infection, they probably have a pretty high Varroa load too. We don't have evidence for this, we think that IAPV could also be helping move Varroa between colonies, that if IAPV is giving these sick bees a free pass, in the real world, it's very likely that at least some of them are also carrying some mites with them. And so as they then enter into a colony, they're able to kind of spread IAPV but also bring in mites. And so this is something I see concern within our own apiaries, and in the apiaries of beekeepers I work with. You can treat for mites and you can get your levels really low, and then you'll still suddenly see these big upsurges in Varroa pressure after you've treated. It's unclear where those mites have come from. We see this IAPV experiment as leading us to some expectation that this would be very helpful for moving Varroa between colonies if needed to do so.

Amy 15:00
Yeah. Well, Varroa sounds very manipulative.

Dr. Adam Dolezal 15:03
Yeah. And one of the other things that we talked about in that significant statement is this idea of the virus and potentially Varroa too taking advantage of what I would call modern apiculture. And this is because in a natural context, where honey bees are just living out in a natural habitat in a hollow tree, you might not expect this strategy to be very successful, because, this probably varies a lot by where you live and climate, things like that. But estimates I've seen are that natural honey bee colonies exist at about one colony per square kilometer, so pretty low density. And so, a virus infecting a bee and making it just accidentally get accepted into another colony may not be very successful, because how's it going to find that other colony, unless it's actually during robbing season or something like that. But in modern apiculture, where we keep colonies, sometimes hundreds of colonies, but even if you just have five, or six or seven colonies right next to each other, the chances for those bees moving between them becomes much higher. And so for the pathogen, it's now very useful to do that. This is something we see in a lot of other managed animals, right? You're taking an animal out of the natural context. It's been domesticated, and now, it usually lives at much higher density like hogs or cows, or whatever. Bees are really not probably that different. When we put them under these high densities, things are just going to be a little different than what bees would naturally be doing and experiencing, and so we're

kind of arguing that understanding these type of phenomena is really important if we want to manage and have managed bees, because we have to be thinking about, how do they exist in nature? How is it different from their management? And are there disconnects there that maybe will help pathogens take advantage of these opportunities?

Jamie 15:03
So these are very interesting statements you're making. I'm going to get a little off script here because I do want to get back to how this all impacts beekeeping operations, but I've really thought about honey bee pathogens a lot over the recent years. In 2006, is when this idea of Colony Collapse Disorder started. So lots of people started studying honey bees and pathogens, there are lots of new pathogens discovered, IAPV is one of those. And in trying to wrap my mind around understanding some of these, I think about IAPV specifically. Do we have reason to believe it is a honey bee pathogen or recent spillover? Was it always transmitted by Varroa or is its introduction to Varroa new? There's so many new dynamics at play that we essentially created as beekeepers. We know IAPV as a honey bee pathogen, but where did it originate? Varroa probably wasn't always its vector. But the two seem to work so well together to rig all these behaviors, just like what you're discussing. And I guess I'm not really sure even what to ask. I'm just thinking about the evolutionary history and relationship of these things that may be pretty new introductions to one another, and I'm curious, what are your thoughts on that? Do you have any background information on some of those things?

Dr. Adam Dolezal 20:28
Yeah, I completely agree that it's something that we call these honey bee viruses. But, are they? IAPV, again, was first, maybe I've missed some things, but my first knowledge of this description is from like, 2005-2006. And there was a paper, I think where J. Evans and Judy Chen went back into the freezer, and as far back as they could go to see if they would detect IAPV before that, and they were detecting it as early as like 2002. But that's still pretty recent. There is some, I think, some argument that -- I'll just take a step back. So IAPV has a bunch of related viruses to it. Chronic bee paralysis virus, Kashmir bee virus, they're really closely related. Virus taxonomy is weird, and I'm not a real virologist. But the demarcation of this is a new virus species versus this is a strain of the same virus is confusing to me, too. But we've had detection of Kashmir virus dating back to, I think, the 1970s. And so some argue that, well, IAPV may just be an evolution of that. But I think it's very likely that this did emerge somewhere and then was spread very quickly. As we know, at least in the US, if a new pathogen is introduced, in nature, it would take maybe hundreds or like thousands of years to disperse across a continent. But now, because of modern beekeeping practices, if a new pathogen or pest is introduced in Florida, it's probably going to be spread throughout the United States within a year. So I suspect, that's probably what happened with with IAPV. Again, I suspect it was never always linked to Varroa. It is transmitted readily by, again, all these other routes of exposure, right? Like, we predominantly feed it to bees, actually, and they become infected, and so it has these other routes. Also, we know that it's infectious to some other bee species. There are several studies showing it effects some bumble bee species, and we're doing some work currently in my lab, now, to try to better understand how many bee species actually are infected by this virus.

Jamie 22:42
One of these things that really triggered all my thoughts about all this, when I was a graduate student in South Africa, I read Paul Schmid-Hempel's book on "Parasites in Social Bees." And that's just a

fascinating book about all of these behaviors like what you're talking about, with other bees, this idea that parasites and pests can rig the behaviors of bees. You mentioned why beekeepers should be concerned about it. Amy asked you about that. So my question is, as well, given that they should be concerned, given all that you found, what should they do about it? How can they change their beekeeping practices? Or can they change their beekeeping practices to help, at least a little?

Dr. Adam Dolezal 23:20
Wow. Yeah, I mean, I think that's a really hard question. We get questions a lot, especially with the virus stuff like, what can we do to make it better, and it's hard because there's no treatments for viruses. Viruses are hard enough to treat in humans or in livestock, you know, mammals. There's really no medicine for a virus infection in honey bee colonies. I think that the things that we recommend now are the kind of same old things that most extension beekeeping people are saying about keeping up with your own monitoring and keeping up with Varroa treatments, being kind of careful about your timing of treatments. We also note that it probably is beneficial to organize apiaries in a way to reduce drift so that bees are less likely to kind of go to the wrong entrance. But that's not a really a practical recommendation for lots of beekeepers. If you've got four bees, four or six colonies on a pallet, like that's how they are. There's some evidence that you can put different types of markings on the front of colonies to help bees find their way to their colony, specifically, better. Whether that is helpful when the virus is coming into play, we don't know. And I think the other part of it, though, is that if other beekeepers are near you, that what you do in your own colonies isn't necessarily going to solve that problem. I think that's why it's also kind of, to me, a beekeeping community issue about taking care to monitor for mites and to treat for mites and kind of to keep your general area low in the mite infestation realm. But yeah, the practical recommendations, I think, are really hard because, if you wanted to get rid of this problem completely, it's like, well, only have one bee colony. Well, that's not really, it's not really a very good recommendation.

Amy 25:27
Yeah, that's totally fair. I think one thing I love about honey bees and just entomology is that there's so much research that still needs to happen, there's so much that we still don't know. And so there are plenty of opportunities to move forward and look at different factors that go especially into honey bee colony losses. I know that your lab is doing a lot of really great research, and we just wanted to share with everyone what your research is focused on. So can you just provide us a brief overview of some of the different projects that you're working on right now?

Dr. Adam Dolezal 26:03
Sure, yeah. So we do, again, a variety of different things. One of the things that we're doing with IAPV now is trying to maybe get at some of those recommendations and better understand, well, what happens in real colonies when they're really infected? This, of course, is challenging for lots of reasons. I'd love to bring Varroa into the picture better, but we're still working on how to do that. But one of the things we really don't know, and Amy, I think you're right, there's so many questions. We actually know very little about really what happens when bees are infected with different viruses. When a bee gets infected and doesn't die, what happens? Do they remain infectious, and they spread that disease to others? Do they clear the infection very quickly and are just fine? We actually don't know for a lot of bee viruses, including IAPV. What happens when a bee gets infected as a late stage pupa or larval bee or a nurse bee or a forager? Are they more susceptible at different times in their lifecycle? We don't know.

We're working on that a little bit now, too. There's been some recent work showing that queens can get infected by just oral transmission from workers. What does that really translate to in a real colony? We don't know. So we're trying to answer some of these basic questions about IAPV. Kind of taking it to Varroa, one of the things that I've become really interested in is just having better tracking of what are the Varroa loads that real beekeepers are seeing across a large area over time? And how can we look at look at those data and combine those with what we know about the landscape around their colonies and beekeeping practices people are doing to just both document what's working and what's not working, and also think about how Varroa is occurring in different places in the landscape. We've started to do that by working with the Illinois State apiary inspector. So Illinois actually has quite a well-staffed inspection program. Illinois is also is a registration required state. So if you have hives, you are supposed to, by law, register them in their location. We've been really lucky to be able to work with the apiary inspectors, who historically have not, in their inspections, measured Varroa mite levels. That is historically not something they've done. They've been primarily focused on foulbrood diseases. And so we've worked with them to create some protocols that allow them to do Varroa washes on at least a subset of beekeepers across the entire state of Illinois, and so we're kind of accruing that data to be able to compare to a bunch of other factors that we ask about in surveys and things like that. And so again, some of that seems quite an obvious to some beekeepers, but we actually have remarkably poor records of what the kind of Varroa pressure beekeepers were having five years ago, 10 years ago, whatever. And so this kind of tracking, I think, has a lot of value. We're hoping to answer some other questions along the way. We also have started a project that I'm excited. I've read lots of Dr. Ellis' papers about this, which is working with small hive beetle. This is a pest that, Floridians, you guys have had for 20 years or more.

Jamie 29:23
Yeah, yeah, it's been a while, it feels like.

Dr. Adam Dolezal 29:25
Yeah, and it's something that, for me, is still quite new because when I was working colonies in Iowa, I had only seen like one. You get like 2, 3, 4 small hive beetles on a package from California or from Georgia, you just kind of crushing them with your thumb. And that was small hive beetle control for the year. But in central Illinois, we have quite a lot of small hive beetle pressure. In southern Illinois, it's much more problematic, probably more like what you guys see down in the southeast. Southern Illinois is quite a different climate. But then in Northern Illinois, nobody has them at all or very, very infrequently. The inspectors never see them. And so I'm excited because small hive beetles are like new to me. And so we've started some projects, rearing them in our lab, and I'm really interested in their role in spreading other pathogens. We know that when colonies die, the beetle adults leave and go somewhere else, so do they spread diseases? Does that matter? We're also working with a collaborator, also at the University of Florida, to try to develop better tools for controlling small hive beetles. We're also interested, and I mentioned this a little bit earlier, in how these types of diseases might affect other bee species. I don't know how much beekeepers in different regions experienced this. But there's been a real, I think, upswing in controversy about the use and kind of localization of honey bee colonies in natural areas, conservation areas, CRP land, natural or like state parks, things like that. And some places are becoming quite strict in restricting access to those lands from honey bees, based on the perception that these are conservation lands and they're supposed to be for conserving natural wildlife, and that honey bees have detrimental effects on these wildlife populations.

We're doing some work to, A, understand is that the case? Are honey bees using the same resources? They probably are sometimes, but maybe not others. How likely is it that they transmit diseases to these other bees? And what are the repercussions of that? Does it matter? If it infects the bees, but then they don't actually have any symptoms, well, maybe that's not a big deal, but we really don't know. And then kind of one other project I'll mention, because I'm also kind of excited, because I haven't really worked on this that much before, is the effects of different types of stresses on queens, and queen health, and queen physiology. One of the things that has been really exciting is that we had some really great data that was produced by a graduate student, who's now a postdoc working in my lab named Ashley Sinclair looking at how sublethal pesticide exposure at the colony level in a real field, like colonies that are out in soybean and soybean get sprayed with an insecticide. And we saw in those experiments, effects on the egg-laying rate of the queens and the survivorship of brood. But it was really difficult to link that to any single factor because you're out in the field and there's lots of things happening. And so we've been lucky enough to start to use a really nicely controlled laboratory queen assessment system that was developed by Jean Robinson's lab and some other researchers here for kind of totally different reasons. And so we've been working with some people at the USDA to see how these different types of treatments like diet and pesticide exposure, I'm really excited to be doing this work on queens because we have a system that we can use them, keep them in the laboratory, and then still observe them laying eggs, and they lay eggs kind of properly in these specialized little plastic plates, and so we can treat bees really, or treat queens with lots of different things and see how it affects their egg-laying rate and their survivorship and their physiology. And it's really amazing because I've only ever done this kind of thing with field colonies, which is just really, a lot of work and very challenging. And so suddenly, we can now look at queens, 100 queens at a time in a single incubator in the lab in a way that we've never been able to do before.

Jamie 33:55
So Adam, it sounds like you've got a really busy program there at the University of Illinois. How many years have you been there?

Dr. Adam Dolezal 34:01
I've been there about three years.

Jamie 34:03
It sounds like you're doing a lot of great things. All of these are topics that are incredibly interesting. I know that they'll be of great value to beekeepers, and I really think that your trajectory is heading up. So it's great to hear about your program and all that you're doing.

Dr. Adam Dolezal 34:16
Yeah, thank you so much. I really appreciate it, especially coming from such a great bee researcher.

Amy 34:21
You're talking about me right? Haha. I'm, like, hold on.

Jamie 34:26
No, I really, really, I mean, a lot of the things that you mentioned that you guys are up to are things that are interesting to me. I've typed some things down, just listening to you, I'm like yeah, these are all

things that are just great. I really think if you're able to address some of these things, it will be really beneficial to beekeepers. I really appreciate you joining us on this episode of Two Bees in a Podcast.

Dr. Adam Dolezal 34:26
Yeah, my pleasure.

Jamie 34:30
Everybody, that was Dr. Adam Dolezal, an assistant professor for the Department of Entomology, University of Illinois, Urbana Champaign, a focus on Israeli acute paralysis virus but also about some of the other projects that he has going on in his lab. Thank you for joining us on this segment of Two Bees in a Podcast.

Honey Bee 35:09
For additional resources, visit the podcast page on our website ufhoneybee.com.

Amy 35:21
All right, in today's Five Minute Management, we are going to talk about re-queening and how to do that. In our last episode, we were talking about why anyone would want to re-queen and so this is going to be how we re-queen. Jamie, I'm going to start the timer right now.

Jamie 35:41
Well, thanks Amy. I generally tell folks that there are four ways to requeen a colony. Those four ways are: number one, allow the colony to requeen itself. Number two, you can insert a ripe queen cell. It's a bit of a variation of number one, but I'll talk about it in great detail. Number three, you can introduce an adult queen, and number four, you can requeen a colony using a nuc. Now, there are pros and cons to each of these ways. And I'll quickly go through all four of them and tell you a little bit about them. So number one, allowing the colony to requeen itself. So bees are biologically wired to solve their own problems. So if they go queenless, or if there's an issue with their queen, and they need to replace her, they can do that. So that's good. There's two main problems. Problem number one is that even though they're biologically wired to do it, they do not always pull it off with success, or sometimes, they become hopelessly queenless. This can lead to laying workers. I think it's a reasonable percentage of the time, as well, somewhere in the 10 to 20% range colonies fail to requeen themselves, so it happens with enough frequency that we often have to step in and address it. The other downside to allowing a colony to requeen itself is that it just takes time. /if a colony goes queenless, and you discover it a week later, you know that queen cell will be a week or two weeks old, you're going to want to remove all the queen cells except the largest two, so the first queen to emerge will kill the other one. I don't ever leave just one queen cell because in that case, you can leave one that's poor, bad quality, or that's dead, and you wouldn't know it until it's too late. But the first one to emerge will kill her competition. Well, if it takes a week or two weeks to emerge, and then two weeks to mate and three weeks to lay eggs, and those eggs go through the developmental stage and come out 21 days later as a worker bee, you've lost six to seven weeks of productivity. So while this method is free, it's not so labor intensive, it comes with some risk and certainly take some time. I tend not to do this method in advance of the honey flow. But I'm far more liberal during the summer when there's no productivity happening. And I'll permit this method to happen if I lose queens during the summer. The second option, inserting a right queen cell is kind of a variation of that first option. Rather than allowing the colony to construct a queen cell itself,

you can either purchase queen cells from producers, the same people who produce queen bees will often sell queen cells at a much cheaper rate, you can just stick that right queen cell right in that hive. Or you can go to some of your other colonies and move frames that have queen cells from them into your queenless colony. So again, the downside is it's going to take time, it's a little bit of a risky procedure because it may not result in a queen, but it's still a reasonable way to get the ball rolling and it's certainly the cheaper way to do things. The third way, introducing an adult queen is probably the most popular way, which is where we just simply purchase queens from queen breeders who mail us those queens in cages and we insert those cages into the queenless colony and the bees will become accustomed to the queen through the screen mesh on that cage. And by the time they release the queen from that cage, they will have accepted her as their new queen. The downside of this is it's a little bit costly. Queens ar $30, $40 or more these days. Even still, it's not foolproof, the workers can release her and kill her. But it's still good because you're bringing in some outside genetics, you've got a mated queen, when she comes out of that cage, she's ready to get going, and all of that's good. The fourth and my favorite way of requeening is requeening colonies using a nuc. Now, we actually talked about this a few podcast episodes ago. So rather than to go into great detail about this one, it's simply using a nuc, transferring the nuc queen and all into the full-sized hive and basically moving that queen over there, and instantly, you have a queen in that colony. A couple pointers I'll give before we kind of sign off this Five Minute Management, number one, it's always better to requeen colonies when they don't have a queen. So if there is a failing queen, she's present but failing, you need to de-queen it before you stick that queen in there. You're also going to want to check the process every week or so to make sure things are heading in the right direction. We'll have a lot more information about all these in the show notes especially on that one about requeening using nucs.

Amy 40:01
Very nice. You have 39 seconds left. I'm very impressed. I have one last question. When you're talking about buying a queen cell, would you recommend buying one or two? And where do you actually stick that on the frame?

Jamie 40:16
Yeah. So what you'll find, Amy, is that a lot of commercial beekeepers will requeen their colonies this way. Think about if you've got 10,000 colonies and you need to purchase a mated queen and they're all $30 apiece, you can very quickly --

Amy 40:30
Expensive.

Jamie 40:30
Exactly, but on the other hand, you might get a ripe queen cell in the neighborhood of $5 or so apiece. So a lot of commercial beekeepers will purchase, large bulk numbers of queen cells. And what they'll do is they'll go into their hive, and stick that queen cell between two frames in the brood nest, usually in the very center of the brood nest, and they'll just stick it right between two frames. They might use their hive tool to spread the frames apart just a little bit. They'll stick that queen cell in, and just one quick word of warning here. When you were asking specifically, kind of from a hobbyist perspective, would you buy one or two, I'd probably buy two or three just to make sure that I got ones that weren't dented, and then you can always use the extras elsewhere. But another thing, too, is that when you requeen

using this method, it will occasionally happen where the bees from that colony don't recognize the queen cell, they didn't construct it, so they might destroy it. So you can actually purchase queen cell protectors from the equipment companies and they look almost like little hair rollers. I don't know if those are popular these days. But I know the ladies and other folks who use perms, they have these hair rollers. So it's almost like putting one of those around a queen cell so that the sides can't be damaged. But she can still come through the tip of that queen cell.

Amy 41:47
Got it. Well, everyone, you had your Five Minute Management plus some, so until next time.

Stump The Chump 41:57
It's everybody's favorite game show, Stump the Chump.

Amy 42:09
Welcome back. It's the Stump the Chump time. We've got three questions. Jamie, you sounded like you're about to say something.

Jamie 42:17
I was gonna say, "I'm the chump. I'm the chump ready to be stumped."

Amy 42:19
Haha, well, we'll see if we can stump you. Okay, so the first question, is there anything that can be used to deter wax moths?

Jamie 42:26
So there's a couple things we need to consider with this question. It wasn't necessarily overly detailed. So we can be deterring them from living colonies or we can be deterring them from stored equipment. So let's do it from kind of both perspectives. Okay, from living colonies, there's nothing you can do to keep wax moths out of your hives. You keep your colony strong and the bees tend to solve the problem on their own. Every colony has low levels of wax moths already present in the nest. I've had people say well, "I don't see wax moths." Trust me, they are there, the bees are just keeping them managed. And from the bees perspective, life is good. So keeping the colony strong really deters wax moth problems in the nest. Now, deterring them from stored equipment can be much more difficult. And there's three ways that I recommend addressing wax moth issues in stored equipment. The best way, the way that I like the best is simply freezing the combs and keeping them in the freezer until you need to use them later. Now, I fully recognize that not everybody has free access to freezers. Not everybody has a freezer big enough to store all of their combs. So to me, this is the ideal option but not necessarily the practical option for everybody. Option number two is you can protect combs from wax moths using wax moth crystals. You can purchase these from a lot of the equipment manufacturers. These are actually commonly sold at some of the big box stores as well. Folks use moth crystals and moth balls to keep moths out of clothes. So you can often find them in the sections of the big box stores where they have clothes hangers or any of the stuff that they would sell related to closets. It's important, though, that you need to use moth crystals, which have an active ingredient of Paradichlorobenzene rather than mothballs, which is Naphthalene, because moth crystals are safer for bees since you can air them out of the combs after you've used them. So let me explain all of this. In the moth crystal case, you will

stack your comb in supers and the moth crystals will have some sort of information on the label about it. It's usually every three to four supers that you have. You'll stack three to four supers on top of one another, maybe put a little piece of newspaper, put some moth crystals on it. Stack three or four more supers another piece of newspaper some more crystals. And so again, follow the label. It'll tell you how much and how often to use. Keep checking those crystals in there because they work by evaporating and dissolving. So if you leave them in there for years and years and years, there won't be any crystals left over. So it's important to check every so often. But before you use those combs from old colonies, you're going to want to air them out a week or two to make sure there's none of that residue left on the combs before you use them on the hive. The third way to deter wax moths from your combs is to make sure a lot of light and air gets into stored combs. And the way to do that is some beekeepers will store their combs in open air sheds, sheds that might have a covered ceiling, but may not have walls. It'll be outside for example, and you can store your supers that contain these combs kind of in a criss-crossed fashion. They alternate. This allows light and air into those and it really deters wax moths from going in there. This works really well with white combs, but very poorly with combs that have already had brood reared in them. If the combs are black, there's very little you can do from a light and air perspective that keeps wax moths out. The wax moths are going to try to get in there and reproduce. There's a fourth way that I like to do it that I didn't mention earlier. But that fourth way is sometimes I will just store my excess combs directly on strong hives even outside of honey flows. Once the honey flow is over, I might extract the honey, put the combs right back onto the hives and let the bees patrol themselves just to keep the wax moths out. But those four ways are ways that you can keep them out of those stored combs.

Amy 46:42
Yeah, I remember I sent you a photo the other day. I guess I didn't even realize what damage they could do to the side of the frames. When I saw it, it looked like little indentions of like these little, I guess, caterpillars was, you know, wax moth larva. And I had never seen it before, or I don't think I put two and two together when I sent you that picture.

Jamie 47:05
I mean, you're right. It's absolutely amazing. It's one of those things that I've never seen talked about in bee meetings. We all know the damage is -- what happens is these larvae, once these caterpillars, once they finished eating, they have to pupate. They're like butterflies in that regard. They're a moth. So they'll spin a cocoon around themselves. Well, in the process of doing that, they will actually excavate little divots in the wood, wherever they elect to pupate, they're going to kind of scrape out these kind of boat-shaped divots. And I've never seen anybody talk about the power of the jaws of these larvae or how they create these divots in woodenware. It's amazing. Because, yeah, they can damage wax, but if it's so bad -- they always try to squeeze in the tight crevices on the corners of frames. It can be so bad, that they can certainly mess up the integrity of the joints in the frames. It absolutely can happen.

47:05
Yep. It's always fun. Okay, so the second question we have, this person just started keeping bees. They're wondering if they should start feeding them nonstop? Or do we skip a couple days to teach them how to forage? So are we teaching them how to forage or are we making them lazy by keeping food right next to their hive?

Jamie 48:30
Yeah, I love that question. It takes me back to the days when I was yearning, sorry, learning how to keep bees. My mentor finally gave me my first colony of bees, and I was so excited to move it to my grandfather's dairy farm. And I was asking him, "How many weeks is it going to take them to figure out where to go forage?" He's like, "Oh, Jamie, they'll know within an hour." I was like, "That's nonsense." And I remember taking my hive, opening it up, the next morning, first thing I went to look thinking that I'd get there earlier than the bees would start foraging, and I got there and they're already bees coming in with pollen loads on their legs. So they had been fully relocated 50 miles away. Already, before I was early enough to get there had already canvassed the countryside and found blooming flowers. We don't need to teach them how to find nectar and pollen. It is out there. They are going to find it fast. They're remarkable, remarkable creatures. Think about us. When we move, we drive around. I mean, I've lived in the Gainesville area now for 14 years and still don't know my way around. But bees move to an area and within an hour or two figure out where all the resources are. So the question is really kind of, I'm going to back up a little bit and say, when they start keeping bees, should they feed them nonstop or skip a few days, you should only feed them if they need food. So, it all depends on how you start the hive. Did you start it from a package of bees. Did you install a nuc? If you move them during a major nectar flow, gosh, they're gonna find it fast and not need your help at all. So the bigger question to be answered is, do you really need to feed the bees? If yes, feed them? If not, don't. And if you don't need to feed them, they're going to find everything they need on their own without our help.

48:36
Sure. All right. So the third question that we have, it is also related to starting a colony, and so this person just purchased a package and received it in the mail. I remember when I first became a beekeeper in Virginia, that's what we did. We thought it was so insane that we were able to receive these in the mail. And I'm pretty sure the post office was not too happy about it. But, when they arrived, some of them are dead. When we're looking at a package, and we receive one in the mail, is there a certain percentage of dead bees that's okay to expect or is that just a really bad sign?

Jamie 50:55
Yeah, bees are going to be dead in the package. That's absolutely undeniable. The process of getting bees into a package can be a little bit much for the standard beekeeper to watch. Basically, there's these big huge funnels that they put over the opening of the package, and they shake bees from a frame into those funnels. And they keep doing that until they get a density of bees in the package that's acceptable, or that's what they believe to be the weight limit that they tell you that they're selling you. Now, in the process of shaking, in the process of working these hives, dead bees, just by default, can be inserted directly into the packet. So it's not necessary that the bees that are dead in the package are dead as a result of traveling to you. But you've got to remember, you're buying three pounds of bees, there's thousandss of bees in that package. 8, 9, ten thousand bees. Some of them are already at the end of their lifespan, when they get put in there, just randomly. If you randomly sample the colony, some are gonna die within the next few days. So I don't generally have a concern about dead bees in a package until I see hundreds and hundreds of dead bees, maybe half an inch of dead bees in the package. At that point, they might have gotten chilled in route to you, they might have gotten exposed to cold temperatures. Unlikely, but maybe pesticide exposure. Again, that's unlikely, but it's possible. Maybe they're starving to death, can't access the sugar water or corn syrup that's in the feeder can that's in the package. There's a few reasons but I don't usually start to get overly concerned unless I've

got a half an inch or deeper layer of dead bees in the package. Frankly, I've never even seen that number of dead bees in a package. I've only ever seen maybe a couple of hundred. And really, I worry less about the dead bees in the package and more about what's the volume of bees left behind. If there's enough bees left behind in the package, they're going to overcome it. You install it and they should be okay.

Amy 52:52
All right, that makes a lot of sense. Hey, everyone, thanks for listening. Today, we'd like to give an extra special thank you to our podcast coordinator Lauren Goldstein and to our audio engineer James Weaver. Without their hard work, Two Bees in a Podcast would not be possible.

Jamie 53:16
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!