# Episode 151 PROOFED

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**SPEAKERS**

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

**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. Today, we are honored to be joined by Danielle Downey who is the Executive Director of Project Apis M. Danielle, thank you so much for joining us on Two Bees in a Podcast.

**Guest** 01:00
It's great to be here. Thank you, Jamie.

**Jamie** 01:02
So Danielle, as we kind of go through this podcast, our listeners are always interested in meeting our guests who are our guests for the first time. So before we get into all the great things that PAM does for beekeepers, could you tell us a little bit about yourself and how you got into bees and beekeeping and ended up at PAM in the first place?

**Guest** 01:21
Sure. I was an entomologist by the time I was five years old, and I just didn't know it. So I was one of those kids that looked at bugs everywhere I went. That's what I was interested in. They captured my attention. I collected bugs off the front of the car, I collected them in the sandbox, and I didn't really know that was a career possibility until I got to my undergraduate. So I started beekeeping about 30 years ago as an undergraduate. My favorite bug, so far, is Apis mellifera, and that's the Latin name for the honey bee. And all of the years of studying other insects, I think that's the one where I landed and

it's led me to project Apis M, which is named for the honey bee. And it's a nonprofit in the US and Canada that funds research and we call it PAM for short. So all of my bug-loving years led me to a career of drawing it all together. So I started with bees 30 years ago in an undergraduate course in Minnesota. I worked for a commercial beekeeper in Texas and learned the economic side of beekeeping and how hard work it is. I did graduate work in Canada and France. I worked in France after my graduate work. And for about 10 years I've been breeding bees in Hawaii. I was a state bee inspector and part of the Apiary Inspectors of America in Utah and Hawaii. And I even did stunt work with bees. So for TV and film, I was a stunt double. In one scene, I was an alien queen being attacked by a swarm of bees and met her demise covered in bees. So I've done a lot of really interesting work with bees. And they've led me now to bringing it all together to work with beekeepers and researchers and donors who want to help honey bees to make a brighter world for bees and pollination.

**Jamie** 03:25
I'm going to have to look up the stunt double thing. I'm very intrigued. I knew a lot about some of this other stuff that you've done. I don't think I've ever heard the stunt double part.

**Guest** 03:34
Yeah, it's a show called First Wave. It's kind of like an X-Files theme, very popular in the UK, and it's about some teenagers who are convinced there are aliens on Earth and every time they get close to capturing the evidence, it disappears. So I was that queen that got vaporized on the football field covered in a swarm of bees.

**Jamie** 03:55
Jeez Louise, Danielle.

**Amy** 03:59
That is so funny. Jamie, we have so many podcast guests, and I think that this is officially my new life goal, to be like a honey bee stunt double.

**Jamie** 04:10
Of alien queens.

**Amy** 04:11
Yeah. Alien queen stunt double, why not? That's amazing. That's awesome. Danielle, I love your story. You just have so much experience. This year, we're recording in 2023, and we've had, in the past, lots of researchers talk about their research. We've recently been podcasting with executive directors of different organizations that cater to Apis mellifera and all the other honey bees that we have. And we're excited to have you here to talk about PAM. So Project Apis M, I think if anyone has been to any national conference, or they've looked at different research projects, they see PAM on there. Some of the individuals, when I first got into the honey bee world, I didn't know what PAM was. So I was wondering if you could tell our audience a little bit about Project Apis M, and how it started, what it's all about and what the group does?

**Guest** 05:14
Sure, that's a great question. PAM is very visible when you go to bee meetings, and especially when you hear research, and that's because we fund projects. So you interview a lot of guests who are doing work, and one thing that you may not think to ask is, "Where do you get money to do this work?" It's important, where does the funding come from, and PAM is kind of a big infuser of resources into applied work that benefits the industry. So it started as a grassroots effort back in 2006 when the sky was falling and colony collapse disorder was a new term, and everybody was very worried about bees, with good reason. And in that time, beekeepers and growers of pollinated crops, and we're talking about almonds, which is the largest partner for commercial beekeeping in the US, they were worried about their bottom line. They saw all these questions, threatening on the horizon, their livelihoods. And research is a great tool, but it's slow, and it's cumbersome, and it's expensive. So the beekeepers saw the research happening at the USDA labs and at the universities and thought, "Well, it's going to take them forever to get to the questions that we have. So let's pony up our own money and support applied research projects." And they did that by building PAM. So PAM is a nonprofit. Back then, it was guerrilla tactics and growers and beekeepers put in a buck a hive into a research [inaudible]. And the organization chose a question and a researcher and put their money into answering that applied question. Since then, we've grown and funded now over $10 million dollars in projects. So it's added up. Of course, that's been a lot of years too. But we are now a vehicle that is built with collaboration and hearing the industry needs, working with the scientists, and also, getting the donated money into applied practical projects that benefit the industry. So we're able to respond quickly. We're nimble. So when we have a call for proposals, if we get an idea from beekeepers, we can move on it right away. We can move that funding as soon as somebody's ready to start the work, and it reduces a lot of the administrative burden of trying to get research done. So we think we're a pretty good model if you want to harness all of the beekeeper questions and the research, cutting-edge science and drive the industry with good science. That's what we tried to do.

**Amy** 08:03
Absolutely. Now, you mentioned the United States. But do you also fund projects outside of the United States?

**Guest** 08:10
Yes, we have a very strong program in Canada. So the US and Canada are common proposals that we see. And we can accept proposals from anywhere. We have funded projects in the UK, we funded a project in Brazil. So the caveat is that it needs to benefit our industry. So, sometimes, the science that's happening is somewhere else in the world but it's the same question that our beekeepers are facing. And it's held to a measure of, "Does this meet PAM's priorities, which is helping research happen to move the industry forward in the US?"

**Jamie** 08:49

Danielle, I think that's a perfect segue into this next question. So, what are some of those current priorities for PAM? I know you guys have done a lot of different things in the past, but what are some things that you guys are really intent on addressing at the moment?

**Guest** 09:02
Sure. So, over the years, we've done a lot of things that beekeepers bring to us. So, early days, we did some of the first neonicotinoid work. We funded some early work on RNAi in your lab, Jamie. And over the years, beekeepers bring us things that are current and emerging that they're concerned about. And right now, for example, the four P's are always on the table. We need all of the work on mites, of course, Varroa mites, viruses, pathogens and pesticides, and honey bee nutrition. So those are kind of our standing priorities. But as an example, this year in Florida, there were some really heavy and sudden losses right as beekeepers were getting ready to take bees to almonds. And some researchers mobilized to take samples and interview and find out what's going on. The PAM Board of Directors is mostly commercial beekeepers, and they heard about this, and it caused quite a quake in the beekeeping world. In fact, I've never heard people talk about CCD symptoms again until this spring. So that was a pretty big deal. And so my board said, PAM needs to look closer. Is this a regional Florida thing? Or is something happening industry-wide? So we did a survey, and have infused that priority into the call for proposals that just closed on June 1, to say, we need to know more about viruses. We scheduled some meetings and are talking and doing surveys with beekeepers to find out exactly what happened this spring and feed that into a discussion so that we all know what's happening in real-time. So we're getting proposals about it, we're having meetings and surveying beekeepers, and keeping all of that discussion active on the table. Another priority that we added to that call for proposals is about tropilaelaps. So we're all familiar with Varroa and how harmful it is for the beekeeping industry. It's public enemy number one. And I think we've known about this other mite on the horizon. It's not in the US yet, but it's in places where they have both mites. Tropilaelaps is the primary concern that beekeepers manage for. It's harmful, it can kill half the brood in the colony, and so my board again came to me and beekeepers said, "Why aren't we doing more to prevent this and prepare for it? We know that things get moved globally and cause problems. So are we ready?" And the answer, of course, is that no, we're not really ready, we just hope it doesn't come. But we know we can do better. So we organized a meeting with a lot of stakeholders, like the apiary inspectors and researchers who have the capacity and experience to study tropilaelaps, and there's not very many of them here in the US because we don't have that pest. So it takes a special effort to encourage that work. So we don't know, for example, how the thing spreads, how it persists when bees move, so there are a lot of gaps in our knowledge about the mite. And also, we don't know how to control it. We suspect that some of the treatments for Varroa probably also control tropilaelaps. But having those methods known, in case we were to detect it, would be pretty important. So the priority this spring was to ask for better work and more work and proposals to study tropilaelaps, and we have gotten quite a few of them. So hopefully, I'll be able to report that we're funding some work on tropilaelaps too.

**Amy** 12:55
Yeah, absolutely. There are so many different topics and so many different research projects. And I know that PAM is available to make sure that we're doing applied research that will help the industry,

but sometimes, it just becomes a lot of information and a lot of research that needs to happen. And so my question for you is, how does PAM determine what becomes a priority? There are so many things going on, how do you decide at one point, okay, we need to look this way at tropilaelaps, or we need to look at neonicotinoids or anything else? How is that decision made?

**Guest** 13:38
Well, we take our cues from the industry. So the PAM board is comprised of mostly commercial beekeepers. Ultimately, they make all the decisions about where funding will go. When we get all of the proposals, we have a scientific committee that vets them and gives the feedback on the materials and methods and suggests how they can be optimized. And then those recommendations are part of the package that the PAM board sees to decide where we're going to put funding. So the beekeepers on the board know what issues they're facing. They are well aware of what's happening in the industry. Sometimes, they suggest a priority, and it works the other way around where we find a researcher to answer a question. So really, the priorities are dictated by what beekeepers are seeing in the field. Sometimes, there's a scientific discovery that leads to the next question. So that's exciting, and we pursue growing those bodies of knowledge as we can. But really, we're focused on answering what beekeepers need.

**Jamie** 14:45
Well, I love that idea. You're trying to do what beekeepers need done. So, my next question, then, is how do you get that information, the results from these projects to the beekeepers? How is that information disseminated?

**Guest** 14:56
Yeah, that's a really important part of what we do. A lot of research happens in worlds that never touch beekeeping or farming. Closing that gap and going full circle to report out to the people who need to know that information and who can use it and making sure it's actionable is a big effort at PAM. The pandemic has given us great opportunities to get better at communicating from a distance. We've got a lot of webinars. Our website holds a lot of resources. So on our website, you can find resources that are built to communicate back research results. So you can search and find the projects that we have funded over the years, what we're funding right now, if you want to apply for funding, that's all there. We have practical guides that not only include the recent research findings, but also technical information for beekeepers to use. So an example is this indoor storage of honey bees over winter. Beekeepers are using this more and more not only in cold climates, but in places that are hot, or places where the climate is erratic. That's really hard on bees when the winter gets warm, and putting them in a safe, climate-controlled environment can give beekeepers a peace of mind and save the management costs for feeding. And there's a variety of benefits to knowing that they're in a stable environment. But you can imagine a building that is climate-controlled for bees is pretty expensive. So beekeepers don't want to just take that risk and lose money. And there's been a lot of learnings from people that are building these big expensive buildings for bees. So PAM got them together, the scientists studying indoor storage, the beekeepers that have built these sheds, and has the science and also the practical knowledge of what mistakes they learned from and what's working best, where to find the best air

systems, who are the technical experts to help you build a building if you're thinking about it. So we have an indoor storage guide on our website that you can download. It's in Volume Two now. And we keep that updated as beekeepers and scientists learn and add to the information about building a storage shed for bees. We have similar guides for how to ship queen cells. There's a lot of practical knowledge, again, that makes you successful or not with trying to move queen bees around, banking queen bees. So there's a lot of this information that is built to communicate to beekeepers, what we have learned, and how they can use that knowledge in their own hands on our website.

**Amy** 17:56
I cannot wait to share all these resources with people, especially beekeepers, when they're emailing me and asking me questions about all these different topics. I'm excited that you all have created these resources for us. So we'll be sure for our listeners to make sure that we have PAM's website on our additional notes and on our webpage so that we can share that information as well.

**Guest** 18:20
Excellent.

**Amy** 18:21
So yes, Danielle, so you brought up a couple of, I would say, successes, I mean the resources that you have for beekeepers, basically working with beekeepers to make sure that the information is practical, that the research is there and available for the industry. What are some of the other successes you would say that PAM has had for beekeepers?

**Guest** 18:44
So, one success that is, I think, kind of a poster success of PAM's work is the tank mix and almond story. So almond growers have to protect their crop just like beekeepers protect their bees. One year, there was brood that was dying after beekeepers were leaving almonds and it looked different. There was obviously something happening. We didn't know what. PAM and the Almond Board were able to work together to fund research through Reed Johnson. And he studied what was happening in the field and was able to combine some of those compounds in the lab and in the field to recapitulate those problems and showed that although single compounds may not be hurting bees, when growers mix things in the tank and make one pass in the field, that can have some unintended surprise consequences that harm bees. And through taking that report from the field, putting the money into the research to study what was happening, and get that science, and then report back to growers and beekeepers, here's what we found: Don't do that practice. We were able to see in the pesticide use records that growers changed their practices. So that full circle of field, impact, research and then making better management recommendations was a great success. And it helped protect bees, which everybody benefits from more healthy bees. I would say there are other projects we're studying right now that are more focused on the return on the investment of beekeepers. As we're in this climate of heavy losses, finding ways to conserve your bees and those small edges are really important. So which supplements have a better return on investment based on their cost and the bee health outcome? We're studying things like that, things like how to overwinter more successfully in these storage sheds.

**Jamie** 20:50
So Danielle, everything that you've discussed, the successes, the history of Pam, etc., what do you wish every beekeeper knew about PAM? And since a lot of scientists are involved, by virtue of the funding, what do you wish scientists knew about PAM as well?

**Guest** 21:05
Well, I would like beekeepers to know that PAM works for you. This is a research vehicle that you drive. You have the most to benefit or lose from our success. So if you were to imagine the projects that you would get moving to protect your bees or to answer the questions you have about your beekeeping and bee health, PAM is probably doing that. If you imagine the research kitty, where you're putting money into support research even a little bit and put it into a good place that gets combined with corporate sponsor money that wants to help bees, PAM is that. We're doing what the industry wants us to do. There's an open window on PAM's website to apply for funding if you're looking for a project. Researchers bring us their applied portion of their project and carve out that piece to ask PAM for funding. We do a lot of that. We offer scholarships, and we take input from beekeepers. So if you have an idea about a project, if you need funding for yourself and your research, if you have a student you'd like to see do more bee research and open that opportunity, PAM does all those things.

**Jamie** 22:24
Danielle, it's been really great having you on the podcast today and hearing you talk about PAM. I know a lot of our international listeners are probably getting a lot of inspiration here thinking, gosh, we could set up similar organizations in our own countries to be able to support beekeeper research. I mean, one of the best ways to support beekeeper research is by beekeepers having direct investment in it, both monetarily and time, and I mean even thirdly, through input on directing that research. So thank you. Thank the PAM board. Thank you for your research partners for everything that you do on behalf of the industry. It's been really great to hear this.

**Guest** 22:58
Thank you, Jamie. I appreciate being here. And I'm happy to get the word out about what PAM is doing. Maybe we will have a good update soon.

**Jamie** 23:07
Great. Thank you so much, Danielle.

**Guest** 23:08
Thank you.

**Amy** 23:09
So Jamie, I was really excited to have Danielle on today because I've always seen PAM, I guess I've known a little bit about it. I think most of the time I see them on research projects, or especially the

scholarships that they provide to students, to graduate students to be able to attend different conferences. And so, what's your involvement of PAM and I just I love what they do.

**Jamie** 23:38
Yeah, and my team, and I have been fortunate to be funded by PAM in the past some years ago. And even Cameron, who's from our lab, Dr. Jack, he was one of the PAM scholarship recipients some years ago as well. So they do really great work. They support current research. They're always looking out for things that beekeepers, want done, some emerging issues, they support the future of research power by virtue of investing in graduate students. So really, it's a good organization. And one of the things that I said kind of post- one of Danielle's comments, which I really believe in, is it really helps beekeepers kind of have skin in the game with regard to research. They put up their money, their ideas, their solicitations, their review of proposals to get the research that they want to benefit their industry most.

**Amy** 24:25
Yeah, I agree. I feel like that's the only way to really make a program successful, right? Buy-in from the industry and just the support from the industry. So I like their nonprofit model. That's how extension works too. So when people are asking me, "What projects do you focus on? What are you doing?" I normally say, "Well, it depends on the needs of our community." And so it depends on the needs of our industry. I'm happy that PAM is there to support the industry in that way as well.

**Jamie** 24:54
Yeah, I can't really wait to see what they do in the future. They're always present. I was quite surprised to hear they were only birthed in 2006. It feels like the agency has been around for a long time doing really great work. And I just think that shows you kind of the level of impact that they've had. And I know if you're listening out there from an international perspective outside of the US, there are lots of opportunities to create similar organizations where you are. And it really was a grassroots effort. It was beekeepers making this happen. Danielle is a great leader for this organization. I look forward to seeing where they go in the future.

**Stump The Chump** 25:31
It's everybody's favorite game show, Stump The Chump.

**Amy** 25:41
All right, everybody, welcome back to the question and answer time. Jamie, the first question we have, I'm laughing because the last time I called a colony a hot colony, you made fun of me for doing that. Do you remember that?

**Jamie** 25:55
I don't but I do believe you. I'm getting to the age now that I forget a lot. But I do believe you.

**Amy** 26:00

Well, our questioner who I don't even actually know who it is, they also called the colony hot. So I did not just make that up out of nowhere. So the first question that we have is, what is the best method for managing a hot colony or colony that one might think is potentially Africanized?

**Jamie** 26:20
This is a very important question. I feel like I haven't answered it appropriately in the past. I know that this has come up in different ways, multiple times over the years, not just here, but also a way that I answer questions outside of this segment. Let's just kind of start from the top. The reason this questioner is asking about Africanized honey bees, specifically, is because in general, Africanized honey bees are more defensive than the bees that most people will keep around the world. Now, I feel like I need to explain that a little bit. And before I answer this question, I would say the vast majority of folks who are using Apis mellifera, the Western honey bee, in their beekeeping operation are using European-derived versions of that bee. The Italian honey bee, the Caucasian honey bee, the Carniolan honey bee, things like that. Now, in the Americas, bees were moved from Southern Africa to Brazil in the 1950s to try to improve beekeeping there for lots of reasons. We can go into that later. But essentially, that bee, that African honey bee that was moved over to Brazil hybridized with local European-derived populations that they had, and it became what we call the Africanized honey bee and that bee spread through Central America into the southwestern and southeastern parts of the United States. That bee is called the Africanized honey bee. The press calls it the killer bee. And that's the bee that exhibits heightened defensive behavior. What's funny to me about this particular bee is in South America and Central America, it's become the bee of choice. It's the one that beekeepers prefer to use. And the other funny thing about it to me is in Africa, or at least Southern Africa, where this subspecies occurs, it's also the bee of choice because that's the bee they have. No one thinks twice about using those bees where they are, but in the United States, they've got a very negative connotation because of their heightened defensive behavior. Here in Florida, it's actually illegal to keep bees that are known to be African derived, these Africanized honey bees. So the questioner is saying, I've got a really defensive colony, I don't know for sure if it's Africanized or not, but let's just start from the defensive standpoint, how should I requeen a defensive colony? Well, there are a couple of ways to think about this. Number one, if it's very defensive, and you are uncomfortable trying to find a way to requeen it, then it might actually be best to euthanize the colony, not only for your safety but the safety of animals or people in the vicinity of that colony. So that's where I've gotten in trouble in the past, I'm going to tell you how to requeen such a colony, but maybe the best answer, in this case, could actually be to depopulate that colony. A lot of folks, what they'll do is they'll solarize the colony, they'll put a black trash bag, for example, around the entire nest at nighttime on a hot evening so that the next day when the sun comes out, you euthanize that colony, and that may actually be the best response because if you're not comfortable finding the queen, if finding the queen poses a threat to your neighbors or animals in the area because working that colony causes them to be quite defensive, then it might be best actually to euthanize that colony to avoid having to requeen it and work it all together. So, euthanizing the colony might be a very good option for you. But if you don't have the threat of close neighbors or pinned animals in the area and you don't have concerns about people being affected if you worked that colony, then you can go into that colony, find the queen, dequeen the hive, and go through the requeening process some standard way, purchasing a queen, putting it in there, etc. A lot

of people have this long-held belief that colonies that are African-derived are less likely to accept queens that they don't make on their own. And if that's the case, you can put in a caged queen that you leave in for some length, you know, three or four days and you go in and manually release that queen rather than allowing the queen to be released by the bees. That way you can check and see if the bees have accepted the queen. You can requeen using a nuc or something like that. But it can be a little trickier because, occasionally, you can have these colonies kill the queen. That's why I really liked the idea of manually releasing the caged queen so that you can see the bees' response, or requeening with a nuc, which is generally a good way to requeen a defensive colony as well. But I will throw out this idea, it is truly a hot colony or a very defensive colony and you're not comfortable performing the requeening process, you might consider euthanizing it. Because listen, you can save the equipment, you can save the hive itself and put new bees in the future. It's really not worth the risk of trying to requeen a really defensive colony.

**Amy** 31:13
Yeah, so that idea of requeening takes me to the second question of our Q&A today. I guess, now after hearing your answer -- so let me ask the question first. The question is, if I requeened, how long would it take to start seeing the characteristics of the queen that they just introduced? So this is under the assumption that you're introducing a newly mated queen. But in your last answer, you had mentioned, and I know we've talked about this a couple of times in our Q&A, you discussed the idea of also requeening with a nuc, so I guess I'm not sure if that would change the answer at all. So the question is, if I requeened, how long would it take to start seeing the characteristics of that queen? And maybe you can answer from both perspectives of introducing just a mated queen and then also requeening using a nuc?

**Jamie** 32:04
Well, those are really good thoughts about, what's the ultimate outcome here, depending on which method of requeening I choose? I will tell you there's one method of requeening -- we'll get this off the table at the beginning -- there's one method of requeening I didn't even talk about because I don't recommend it, which is simply dequeening the colony and allowing the bees to make a queen themselves. That option, to me, is off the table because you will be producing a queen that will have a lot of the same genetics that her mother and her fathers had. If they're both defensive, then you might maintain that defensive personality of that colony. So I would not allow the colony to requeen itself. So Amy, you mentioned then, specifically, requeening with a caged queen or requeening with a nuc. Well, if you requeen with a caged queen, it's going to take 21 days before her first egg goes through all of the developmental stages and you have offspring emerging from the comb from that queen. So let's just do some simple arithmetic. Let's just say that colony has 20,000 bees, and you manage to requeen it. Well, bees live, during the spring and summer months, four to six weeks. So if it takes three weeks for those first offspring to emerge from the queen that you put in there, you're still nearly 100% of the offspring from that queen that you got rid of. And so it's going to take another four to six weeks from that first egg going through its developmental stages before you get a complete replacement of the old queen's offspring with the new queen's offspring. So what I always tell people is it can take up to two months before the entire demeanor of that colony changes if you requeen using a caged queen. On the

other hand, if you use a nuc, you're putting in the queen, the brood, and bees into that colony. So you can actually get a behavior change pretty quickly. Now, keep in mind, you're not getting a full behavior change, you're not getting rid of all of the offspring from the old queen. You're only adding bees that are less defensive to that colony. So, it still might be up to two months before you get a full replacement of the offspring of that original queen, but the behavior will be tempered much more quickly. And so those are things to keep in mind. That's why I like requeening with a nuc. Also, I think you're going to have a higher queen success rate when you're requeening a defensive colony using a nuc. But you can certainly do it with a caged queen. It's just like I said earlier, I wouldn't allow them to release one on their own. I would go in four or five days later, look at the bees' response to that queen on the queen cage, and if they're really tightly holding to that queen cage, like they're biting the wire of that queen cage, they have not accepted her. If they're freely moving on the surface of that queen cage, they probably have accepted her. Then I release her into that hive, and then immediately go and look and see the bees' response to that queen. If they're aggressively attacking her, I take her and put her back in the cage and leave her in for four more days. If they're licking her or grooming her, I leave her in there and believe that they have accepted her. But Amy, those are great questions because simply requeening doesn't solve the problem instantly because you still have all the original queen's offspring in that nest. And you have to wait for up to two months for them to die off maybe even longer. But after about two months, they make up significantly smaller proportions of the population than do the new queen's offspring. So you can get a behavior change, a scaled behavior change in as little as three to four weeks, but it's about two months before you change, overall, the demeanor of the hive.

**Amy** 35:51
Alright, so the third question, it's kind of a funny question. I got a phone call the other day from Mr. Stephen Cutts, who, Jamie you can explain a little bit more about the Cutts family. They're, I don't know, third, fourth, fifth generation beekeepers here that we collaborate with. And they're just really great people. But Stephen Cutts is one of our Florida Department of Ag Apiculture inspectors. And so every once in a while, Jamie, he will call me because he just has these pondering thoughts. And his pondering thought was, if sugar water gets hot from the sun, like it's basically a sugar water tea, a hot tea, do the bees still use it? Are they still using that water? Does it take more energy to cool the hive if this is not sugar water, but if they're collecting warm water? So I guess those are two questions.

**Jamie** 36:44
Yeah, so these are an interesting series of questions, by the way, for which I've never seen research answer. So, this is just me speculating. But I will tell you, let's just start from the top. Honey bees keep the brood nest around 94 and a half degrees Fahrenheit, which is about 34 and a half degrees Celsius. So with that in mind, it already would have to be really hot outside to heat the sugar syrup to a temperature above that, that the bees can keep the brood nest. And yes, in summer, we, here in Florida and elsewhere around the world, you can get those temperatures that exceed 34 and a half degrees Celsius. And there's a lot to unpack with this question. First thing that I was thinking about is, well, number one, how the bees access that sugar water is going to be important. So depending on where you are listening to us from around the world, you will know there are different ways to feed bees. One of the ways to feed bees is physically put the sugar water in a feeder that is itself inside the

hive. And so in that case, you don't really run the danger of the sugar water temperature exceeding what the bees would keep their nest temperature anyway. So in that case, this question would become irrelevant. But there are other ways to feed bees where the sugar water is put in feeders that are external to the hive. Here in the US, for example, it's very popular among commercial beekeepers to feed colonies with glass jars through the hive lid. So our hive lids, especially in commercial operations, might have holes in them that accommodate an inverted glass jar, the glass jar, a mason-type jar will have a metal lid that small holes are put into that lid. So when you turn the jar upside down, and then put that into the hole in the hive lid, the bees are able to access the sugar water directly through the hive lid. In that case, the sugar syrup or corn syrup, and whatever's in that jar is being heated directly by the sun to temperatures that can exceed the hive temperature. And so there are two questions here, if that temperature exceeds the hive temperature, are bees taking that sugar syrup? So I've never seen research to suggest that they're not. But, I suppose there is a temperature above which the bees won't touch that syrup. The good news in that regard is that that temperature will not occur in those jars all day long and all night long. And so you might get these temperature spikes where the bees will no longer take sugar syrup because it's just too hot. But at some point, it's going to cool off and the bees will start using it just fine. So the second question that he asked presupposes that the bees will, in fact, take sugar syrup that is above nest temperature and bring it into the nest. And since that's the case, maybe it super heats the nest because you've got this hot substance in the hive. Well, the bees have to work harder to cool the nest temperature, and I can certainly imagine that they would if they bring in something to the hive that is too hot for them to handle or not to handle but to have in the nest, it could create heat in the nest that the bees have to work actively to cool. But that all occurs under the assumption that bees will take sugar syrup that is much hotter than what they would otherwise keep the nest temperature. I suspect that they will, and then I will also suspect that they will have to work slightly harder to cool the nest temperature. But I don't believe it's going to be a significant impact in the hive but all of that is supposition until we have research data to show otherwise.

**Amy** 40:29
Very cool. All right, well, if you listeners have any other pondering thoughts about honey bees, and you want to Stump The Chump, go ahead and send us an email or write to us on social media on our Facebook, Instagram, or Twitter pages.

**Serra Sowers** 40:45
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.