Episode 251: Infestation of Honey Bees with Dr. Marc Schäfer

Jamie

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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.

Amy

Hello, everybody, and welcome to this segment of Two Bees in a Podcast. This is the second episode in a row where Dr. Cameron Jack is co-hosting with me. So, hey, Cameron.

Dr. Cameron Jack

Can't believe you invited me back.

Amy

I know. You're back. You're back as another co-host. Jamie is still gone. We're recording this in the same day, so Cameron is here chatting with us today and he's going to be my co-host. I am really excited to be introducing Dr. Marc Schäfer, who was with the Institute of Infectology at Friedrich-Loeffler-Institut, which is the Federal Research Institute for Animal Health in Germany.

And he is the head of the National Reference Laboratory for Bee Diseases. I'm really excited to kind of go lots of different directions with Marc today. We'll go into a little bit about the laboratory that he runs. We'll talk about some of the molecular tools that he works with, some of the other bee diseases.

He was telling us, behind the scenes, Marc, you know, you were talking about a famous island that you also work on. What is the island called again?

Dr. Marc Schäfer

So, the island is called Riems, which means like island of riems. And it's a very small island in the Baltic Sea in the northeast of Germany, very close to Poland. And on this island, there's actually nearly only our institute.

So, nothing else is on this island. And this is because some of my colleagues here in the institute, they work with very dangerous animal diseases and they have labs where they can work with, for example, Ebola with large animals.

And I think labs like this exist only three or four times on the planet. So, that's why it's a kind of a little famous island here in Germany.

Amy

That's amazing. Well, I may ask you more questions about it in just a little bit, but we'll go ahead and get to, typically our number one question for our speakers is, you know, could you tell us just a little bit about yourself and how you got into the beekeeping world?

Dr. Marc Schäfer

All right, my name is Marc. I'm 56 at the moment. I'm working since 2010 in this institute. So, I got actually quite late into the bee business. I was an electrician before.

And so, I had, like in Germany, you can have a normal school, middle school or high school. And I had middle school and I became an electrician. And while I was working, somebody told me that it's possible in my hometown to do high school after you have a profession.

So, I thought I could change my life. And I did three years of high school again. And after I started studying and because I like to travel, I thought biology could be a good option. And so, I studied biology.

I made my diploma and I changed during my studying to university in Wurzburg where they focus on social insects. And there I met ants, bees, like bumblebees and honey bees.

But actually, I thought, I want to take it easy, and I make my diploma work in a trio botanical theme. But luckily somebody told me that this professor I wanted to do it with is not so nice and I should look for something else.

And so, I skipped it and I was looking around in the university and yeah, it was very hard to find something. But suddenly I found a note on the wall, and there was a honey bee queen on it. And it said do your diploma in South Africa.

And so, I thought, oh, yeah, this sounds good. And I called the number and there was actually a friend of mine on the phone, and she said, yes, I'm working here in the bee lab. And there is like, Dr. Pierre next to me. He's doing this project.

Do you want to talk to him? And I talked to him. And it was like only a few months later we ended up that we wrote a proposal to get some money to get me to South Africa. And I was working there in Rhodes University in South Africa.

And there, luckily, I met someone who offered me about half a year later, a PhD position in a project where it was on the diagnosis and control of Aethina tumida, the small hive beetle. And this is how I came to all this bee work.

Amy

That's a very, very fun story. First of all, Cameron, I hope no one ever says don't take Cameron's class or don't work for Cameron because he's a mean faculty, a mean professor. Maybe they have. What do you think?

Dr. Cameron Jack

I'm sure there are people that have said that. Oh, for sure.

Amy

Definitely. Definitely not.

Dr. Cameron Jack

But that's also really cool, Marc, that your background was as an electrician. So, I mean, you were able to kind of do some work, kind of get some real-world experience, you know, and then you get it and find that you've got all these other interests. And then, I mean, everybody kind of takes a windy road to get to, you know, their ultimate career.

I think that's true for both Amy and I too. I mean, neither of us had started down honey bees since we were really young. But then kind of through some different experiences, exposure to different things, you kind of find your way into something that's really interesting.

And now, I can tell that you're really passionate about your work and this is a cool way. And of course, you've got the connection. It's kind of a shame that Jamie's not here because he's also got that Rhodes connection in South Africa. So that's really cool that you had that. But you know, I guess –

Amy

Cameron, not just Rhodes University, but doing small hive beetle work. Marc, you and Jamie, have you guys talked about this?

Dr. Marc Schäfer

I'm sure that we talked about it sometime. We met at some conferences, but when I was in Rhodes University, I didn't meet him. So, this was, I think after he had been there.

Amy

Interesting.

Dr. Cameron Jack

Yeah. Well, and I was going to say, I know that, Marc, you and I haven't interacted a whole lot. We have met a couple times through some different COLOSS meetings. So COLOSS is kind of a big international honey bee research group that works together.

And so, I know that you're one of the co-leaders of the small hive beetle task force. And so, a little bit of interaction there. So, I'm pretty familiar with a lot of the work that you're doing. But I know that you mentioned that you're conducting work specifically as part of this, at this like honey bee pest pathogen reference lab.

But could you provide us a little bit of an overview of the type of work that you do in this capacity?

Dr. Marc Schäfer

Yeah. So, as National Reference Laboratory, you are actually responsible for diagnostic methods for honey bee diseases in your country. And in Germany, we have 3 notifiable diseases, it's the American foulbrood.

Then infestation with the small hive beetle and infestation with Tropilaelaps mites. And the two last ones, luckily, we don't have in Germany. They are called exotic parasites. But the main thing I'm working with is American foulbrood, and we have, for all the diagnostics we can offer in the lab, we have to have standard operating procedures, which are actually checked by accreditation companies like every second year.

So, we have to, when we get samples, for example, we have to give this sample a name and then we have to document everything we are doing with this sample until we have a result. And these accreditation companies, they're coming and they're picking up any result and then they want to see the whole process, and every single step is documented, and they want to see all those documents.

And so, it's a very straightforward thing. So, you just have to be sure to have all your documents done for any methods you want to be accredited for.

And so, this is the main thing I have to do here. So, if there are new methods coming up for any diseases that I want to have an accreditation for, I have to validate these methods in the lab to be able to have this standard operation procedure and this accreditation for it in the end.

Amy

Marc, I have a couple of follow up questions about that. Who is the group that does the accreditation?

Dr. Marc Schäfer

So, this is actually a company, in Germany, it's called [inaudible]. I think every European country has another company, and they are actually hiring scientists that are working for them, and they are coming to the lab.

So, they spend, let's say, half a day with me in the lab just to check all my paper work and to see if also my technicians know what they're doing and that we have all the signatures at the right place. So, it's a very formal thing that is happening there in accreditation.

Amy

Oh wow, and you had mentioned, you all do not have Tropilaelaps and you don't have small hive beetles, right? Is that what I heard you say?

Dr. Marc Schäfer

So, in the moment, all of Europe is free of Tropilaelaps. But in 2014, small hive beetle arrived in Italy. So, we have small hive beetle in Europe, but only in Italy and only in a very small part of Italy.

It called Calabria, it's in the South of Italy. Just the tip of the shoe, let's say.

Amy

And you're working with American foulbrood. Do you all have a European foulbrood as well?

Dr. Marc Schäfer

Actually, the European foulbrood is not a notifiable disease in Germany. We actually don't have a lot of outbreaks, let's say, but I'm sure that there are some.

But as it is not notifiable, no beekeeper will tell me, you know. And we are working actually on a project to develop a lateral flow device for American foulbrood and European foulbrood in the same device.

And we asked, in Germany, for samples. I advertised it in German beekeeping journals and we asked at conferences. And yeah, it was during this last six years, we actually never got a sample from Germany.

So, all the European foulbrood we are working with we got from colleagues in Switzerland or other countries around Germany.

Amy

Very cool. Well, I hope you never get them. All right.

You just kind of discussed a little bit of the tools to detect some of these pests and diseases. You recently published, I say recently, this was published in 2022, a method to detect Malpighamoeba mellificae and which is an amoeba, Malpighamoeba mellificae, in 2022.

I guess let's start from the beginning. You know, can you talk about how, just from the beginning to the end, the start to finish, what this process looks like, since the process is really a big part of what you do?

Dr. Marc Schäfer

All right, so this process started because I'm also working in the German honey bee monitoring. And in this monitoring, we also look in the spring samples for Malpighamoeba mellificae.

And so, to do this, it's very time-consuming work because you have to prepare the honey bee, you have to take out the whole gut to get to the Malpighian tubules.

And to be really sure to see those, you really have to prepare them out of the bee and look at them under the microscope. Because inside of those Malpighian tubules, you can find the cysts of this amoeba.

And so, this is actually the only sign you can have of this disease in the honey bee. It's not possible to find the amoeba somewhere else. And as this was so time-consuming, I thought it would be so good to have a molecular tool to detect this disease.

And luckily, I had a colleague here in the Friedrich Loeffler Institute who is working on metagenomic sequencing, and she was actually interested in amoeba. And so, we came together and I gave her samples of Malpighamoeba that were infected, I mean samples of the Malpighian tubules that were infected with the Malpighamoeba and samples of the Malpighian tubules that were not infected.

And she was able with a metagenomic workflow to detect DNA of Malpighamoeba. And after we had this, we could look for specific primers.

So, we of course looked at several different places on the genome, and took, in the end, the one that was best working, that gave the best signal in our PCR.

And with this, we were able to detect this amoeba just with any sample of homogenized bees that are infected. And for example, we did tests with samples from many European countries and even we didn't expect to find it. We found it in several of those countries, especially in spring.

Dr. Cameron Jack

Yeah, that's awesome. And so, this is something, Marc, that we're actually really interested in as well here in Florida. I actually one of my PhD students, Julia St. Amand is her name, and she spent the last couple years, she did a big project during her master's degree where she was serving beekeeper colonies across the state of Florida and just looking at all different kinds of honey bee pathogens.

And she was really interested in the Malpighamoeba mellificae. And even though it didn't pop up too regularly, we still had a few hits, even including here around us in kind of North Central Florida. And so, she really as part of her PhD, she really wants to focus in a little bit more on Malpighamoeba.

And so, we've actually used some of your molecular methods that you've published. And, and that's exciting because we can at least attest to this, that this is really kind of a helpful bit of work that you're doing in creating some of these, maybe, new molecular diagnostic techniques for us to use.

So, you know, I know that you have conducted similar research looking for molecular tools for like small hive beetles and also for Nosema and, and of course, you know, some AFB work.

So, can you explain a little bit more of maybe why do you need new methods to be developed to help detect these pests and pathogens?

Dr. Marc Schäfer

Yes. So, new methods are mostly needed because many of those pathogens we are working with, they can change over time. So, you can have new haplotypes, for example, that you wouldn't detect with the old method.

So that's why we always have to keep up with the methods that are published in the world and to test them if they detect more than the method we are still using, let's say like this. So, with the small hive beetle, we found that the method that was used didn't detect all of those samples that a colleague of us in Switzerland had in his office.

And so, we found a new method to be able to also detect all those different types of small hive beetles in the world. And for Paenibacillus larvae, it's very important to have new methods because we find that we are having different ERIC genotypes in Germany.

So, it seems that you can find those two types, they are called ERIC types. So, there's an ERIC 1 type and an ERIC 2 type that is really found frequently in American foulbrood infected colonies.

And so, to be able to distinguish between those two genotypes is very important for us because the one genotype is really hard to find clinical signs in the colony. So, if you look at the colonies,

because there is suspicion, because maybe there's a case close by, you might not see any clinical signs.

But with, for example, our lateral flow device, you could pick up that it's an ERIC 2 type of this Paenibacillus larva bacterium which is causing the American foulbrood. And that's because things are changing.

I think it's very important to always see if your methods are still working, and if not, you have to develop new methods.

Amy

Marc, how often do you say you go through old methods to just ensure that they're still good? You know, at what point do you decide, oh, this is no longer working? Or, you know, how do you kind of identify that?

Dr. Marc Schäfer

So, this is not always me identifying this. It's just like that we are of course looking at what is going on in the bee signs in the world. So, if there are new papers published with new methods, and then sometimes in the paper you can see, OK, they were looking for different methods and some of them didn't work.

And so, we can see if maybe our method is one of those that did not detect all of those types. So, it's not that I'm trying many new methods, it's just that I'm trying to be updated with all the knowledge on bee diagnostics in the world.

Amy

Understood. You know, I want to pivot a little bit before we get into the next question. I do want to pivot a little bit into the beekeeping industry in Germany, what that looks like and also the comparison of that to a lot of the other beekeepers in Europe, and maybe some of the challenges that you have in your beekeeping operations there.

Dr. Marc Schäfer

So, I would say that, in Germany, we have mainly hobbyist beekeepers and only a very small percentage of professionals. That we have this many hobbyist beekeepers means that there's many beekeepers which just have like two or three hives in their backyard.

And then you have some in between that maybe have about 20 hives or something and only very few that go up to more than 100 hives. And those are the main professionals that are moving the bees to different places to get different kinds of honey.

Those small hobbyist beekeepers are more like a backyard beekeeper that leaves his hives always in the garden and has it as a nice hobby. Mostly, it's older people having this hobby, but in the last years also more younger people are coming.

And I think that in the last years, let's say the last 10 years, honey bees became very popular. And I think that's why we had many newcomers in the beekeeping scene.

And I think, in the moment, we have kind of a problem in Germany like, not we, but the beekeepers, they have difficulties to sell their honey for a good price, like the honey market seems to be overloaded in the moment in Germany.

Amy

Interesting. What is your primary honey source?

Dr. Marc Schäfer

This also depends on where you are in Germany. For example, in the South, you have more forest areas and, there, it's very famous to have a forest honey. And here in the Northeast, it's a very, very agricultural landscape with large fields and large canola fields.

Like in the moment, it just starts that everything is getting yellow and this will be for about four weeks now. And then every beekeeper, of course, tries to have their bees close to those canola fields and to have this rape honey in the end. So, this is, here, the most common honey in Northeast Germany.

Amy

Nice. Would you say that, you know, I think it's the same just about everywhere in the world, right? We have a lot more hobbyists than we do professional or commercial beekeepers. Would you say that also kind of holds true with the other European countries as well?

Dr. Marc Schäfer

There are differences, but I don't have all those differences in my head now. So, it's like, I think that we are having very dense population. So, for the small country, we have a lot of hives. In Germany, we have more than a million, and I think about 100,000 beekeepers.

And so, there are other countries which are maybe less dense but have more professionals. But it's like I would have to look it up. I don't know exactly. There are so many countries in Europe.

Amy

Yeah. What? You're telling me you don't know every single country and all the beekeeping in every country in Europe? I'm just kidding. I'm giving you a hard time. I'm looking at Marc right now. He's thinking about how to answer me. I won't make you answer that, Marc.

Dr. Cameron Jack

Well, so Marc, I mean, I think we can draw a lot of similarities to beekeepers in Germany and throughout Europe to the United States, at least where we are, right? I mean, there's mostly backyard beekeepers. I'm sure a lot of beekeepers in Florida really wish they were close to canola right now because we could really use a good honey flow.

But anyway, you've got the commercial beekeeping industry that's constantly moving bees around and looking for the next, either the big nectar flow or for going to commercial pollination contracts and filling that. And so, we're constantly moving bees around.

And the same is true within your country. And I mean, what would you say? Obviously, when you're moving bees around, you're going to increase the risk of exposing them and potentially spreading any kind of pathogen.

So, you know, I'm kind of asking you maybe a doom and gloom question here, but what would you think would be like the next big biological threat to honey bee health in Europe?

Dr. Marc Schäfer

All right. I mean, in the moment, we have like, in Europe, three invasive parasites I would say. We have Vespa velutina, which actually came to France and now has, I would say, nearly half of Germany infested already.

We have the small hive beetle in Italy. We actually are surprised that it's not moving from there so that their measurements that they are taking in Italy seem to work and it's not spreading from there.

But I guess the biggest threat which might come in a maybe not too long future is the Tropilaelaps mite. Like we have the Tropilaelaps mite already. And there is a suspicion that it is on the Crim island of Ukraine.

There was a veterinarian student's work in Belarus and in the northeast of Belarus, they also found Tropilaelaps mite. So, it's very close to Europe. And I guess it will only take a few years until it will enter Europe, maybe even shorter. And so, this will be the biggest threat that we can imagine, I guess.

Amy

Yeah, absolutely. You know, I've been on a lot of Vespa velutina work groups and also Tropilaelaps work groups. We have Vespa velutina not too far. You know, it landed here in the United States in 2023. And so, there's been a lot of talk about that, a lot of talk about, you know, surveillance and monitoring and traps and how do we deal with it.

And you know, I think there's just a lot of unknowns, right? And so, I guess the next question that I have is, you know, what are you all doing to kind of address the potential threat of Tropilaelaps? You know, I think outreach is a really big thing because, for us, with Vespa velutina specifically, you know, beekeepers weren't the only ones that were finding it.

It was the general public that was finding it. They would see a wasp nest, a hornet's nest, but with Tropilaelaps, it's a lot harder to find, right? It's a lot smaller than Varroa. That's one of our biggest concerns. It reproduces faster. What are you all doing to kind of prepare or prepare beekeepers, prepare researchers for the introduction, if or when that time comes?

Dr. Marc Schäfer

Yeah, that's a very good question. So, actually since 2022, I'm giving a lot of talks to beekeepers and to veterinarians that are inviting me to conferences or to their bee association meetings, their beekeeping association meetings, I mean.

And so, I give them all the information that is available about Tropilaelaps. And of course, I give them a big warning to really have a deep look at if we can find it very early, we might have a chance to stop the spread or something.

But it's like, as you said, it's so tiny and some beekeepers have difficulties seeing Varroa. They will never be able to see the Tropilaelaps mite if it's in the colony. It's so difficult to diagnose it that I actually guess it will not be possible to early detect it and to be able to stop it. I guess if it comes, we somehow have to live with it. And the problem is that in Europe we have these European laws, and if one country gets infested, like we have now, this Calabria region in South of Italy, which is infested with the small hive beetle.

So, this area, they cannot sell any honey bees out of this area anymore. So, they cannot trade honey bee colonies or honey bee queens anymore. And if we would have a country infected with the Tropilaelaps mite, it would be the same. So, they would be isolated out of the market, let's say. And I think this will only change, then, if the mite will spread very quickly and then we have it everywhere, then everybody is equal again. But in the beginning, I think it will be trouble for the countries that are reached by this mite first.

Dr. Cameron Jack

Yeah, I mean, it is kind of nerve racking to hear, I mean, that it being found in northeast Belarus like you said, I mean that's really just a one – I mean, Poland is the only country in between you and Belarus.

So, I'm sure there's a lot of beekeepers, in Germany especially, that are nervous about this, about Tropilaelaps. But you're right, I mean, it is kind of hopeful. I know that's a totally different animal, totally different parasite with small hive beetles and Tropilaelaps.

But it is encouraging to me that the small beetles really haven't spread like everybody expected they would out of Calabria because small beetles are just so prolific. And they've spread in many other places.

I mean, they've really spread rapidly. And so, it's encouraging to that end. But you know, you'd mentioned kind of some monitoring, but what other roles do beekeepers play kind of in this bit of work that you do, you know, with your reference laboratory and your diagnostics? Is there something that beekeepers do and help you in this work that you're doing?

Dr. Marc Schäfer

I would say yeah. I mean, they are giving me many ideas, and they are opening my few to other sites, let's say, that I would have thought about. Like many beekeepers, they're really creative and they are creators of things.

Like for example, they create new kind of traps for small hive beetles or something because they are interested in it and they want to get rid of it themselves and they make their own mind of it. And then their thoughts can help me have new thoughts, you know?

And so, for me, like I'm sitting in my office nearly the whole day and sometimes I go to the lab, and because I'm able to do research in the German honey bee monitoring, I have like 3 beekeepers.

I'm visiting 3 times a year in spring, summer and autumn. And so, for me, this is a very, very good resource of the knowledge of the beekeepers and the news from the beekeeping side. So yeah, for me, they really helped me to have new thoughts about honey bees and their diseases.

Amy

So, Marc, we appreciate you so much for being on the episode today. I learned so much from you. I learned a lot about the reference laboratory. I'm really happy that you all are doing that. Thank you again for all the work that you do with the methodology, and we look forward to seeing your work in the future. Thank you so much.

Dr. Marc Schäfer

Yes, thanks a lot for having me.

Stump the Chump

It's everybody's favorite game show, Stump the Chump.

Amy

Hello everybody, and welcome back to the question-and-answer segment. Jamie, the first question that we have today, this individual created a five-frame nuc.

They put a couple of queen cells in. They went back two weeks later for an inspection, and they found a very small, short queen. She appeared to have two or three eggs hanging off of her in the back of her abdomen. And there were several bees that were kind of chasing her that kind of looked like they were trying to remove the eggs.

So, I guess the question is, is this normal for a new queen? Or because she's so small, is it because her abdomen isn't long enough to stick the eggs to the bottom of the cell? This person had not seen any eggs in any of the cells so far. So, what are your thoughts on this?

Jamie

Perfectly normal. I want to restate the timeline that they said. I had a five-frame nuc put in a couple queen cells. Yesterday, 2 weeks later, I found this queen. All right, think about queens and queen development. Let's just say for the sake of an argument that this split that you made, this 5-frame nuc had ripe queen cells.

It's going to take a couple of days for those queens to emerge out of those queen cells. Alright, within two weeks of emergence, the queen is still within the mating phase. This is usually a one-to-two-week period. So, you are well within the mating phase of your new queen.

Even if she made it a week ago or just a few days ago, she's still immediately post mating. She can be quite small at this time in her life because mating triggers the fleshing out of those ovaries.

It's one of the stimuli that causes these physiological changes in the development of the queen. So, it is perfectly reasonable, even if she's made it, immediately made it at the end of this two-week period, for her to still be a small queen that will soon be in the process of growing.

And I say all of this to say that I have many, many, many times seen queens at this age – I don't know a better way to say except call it leaking eggs. It's almost like they're in that phase between I'm now mated, but I'm not fully developed yet.

And I'm starting to, you know, lay eggs because it's what I'm supposed to be doing at this point. And I have routinely seen queens in this transition period have an egg or two, or maybe even

three, stuck to the tip of their abdomen. It's almost like they're not even putting their abdomen into a cell to lay.

It's just that laying process comes naturally. It's this weird transition phase that you can see. Small queens, big queens, leaking eggs, no leaking eggs. All of this should fix itself in the next one to two weeks when the queen will gain substantial weight and start laying eggs in the bottom of cells.

Now, if you come back in two weeks and still see no eggs in cells, and you still see a small queen and she's still leaking eggs, then you might have a problem. But I really believe in my heart that all of this is going to fix itself in the next two weeks. And then when you go back two weeks later, you'll see eggs in the bottom of cells, you'll see young larvae in the bottom of cells, you'll see a much larger queen, and you won't see this phenomenon of eggs coming out of her anymore.

Amy

Right. And sometimes even, you know, new queens will lay a couple of eggs just like you said. I mean, we'll have a couple of eggs and people get that kind of confused with laying workers.

Jamie

Exactly, yeah.

Amy

Yeah. All right. The second question that we have is that this person is asking if they should move their colonies while doing yard work. If they decide to do that, and I think I'll add a little bit more to this question because I remember having a little bit of background, they were having a maintenance company come and the maintenance yard people would not do the yard.

Yeah, so it wasn't – at first, I thought this question was should I move the colonies so I can do yard work, but that wasn't the case. The case was I have to move the colonies to get people to do my yard work. If I'm going to do that, is it OK to move them and bring them back within three weeks?

Jamie

Yes, and in fact a couple of things. I'm a better safe than sorry kind of guy. And if the folks working in the yard will be in close proximity to the bees, then I either wouldn't get the yard work done or I'd move the bees. And assuming you want this maintenance to happen, whatever yard work you're getting done, I would move the bees.

And hopefully it's not a lot of colonies, you know, you can just strap the hive, close the entrance and tie them and truck them away. I'd leave them away for three weeks. If you've got a remote

site that you could put them, maybe some friends, maybe a rural area. And then once the yard work is done, you have no problems bringing them back. If they come back and sit in the original spot, that's 100% OK.

So, I think everything you described in your question is perfectly normal. I would move them away. Three weeks is long enough to move them away. All of that's good. Absolutely no problems at all.

Amy

What about less than three weeks? So, what about a week?

Jamie

I wouldn't even worry about it if it was a week. To me, it's more important to distance because you don't want them to be relatively close. And what do I call relatively close? Let's just say, you know, closer than two miles. If they're closer than two miles from where you move them, then you might have this problem of bees coming back even though colonies aren't there and then you would have bees in the area.

Honestly, I would move them at least a week before the yard work's going to be done. So now the bees have been gone a week and give them, you know, a couple of weeks and then move them back once the yard work is done. All of this is perfectly within the realm of normal. And I think it's perfectly OK to do and even advisable to do because you don't want the maintenance workers to be uncomfortable or even in a dangerous situation to them while they're out working bees or working, sorry, working in your yard.

Amy

Definitely not working bees at that point. But you know, the other thing is just making sure that you keep an empty box there so that just in case, those bees are coming back anyway.

Jamie

That will tell you if the bees haven't been moved far enough. Like, if you move your bees and you set out the empty boxes in the space where the beehives were and you're getting a lot of bees coming back, then, probably, you haven't moved your bees far enough away. Or the alternative is a lot of bees spent the night in the field last night, and so when you woke up the next morning, you've got a lot of bees coming back.

But that's why I want you to move them a week in advance of the yard work happening, because that would give you time to deal with whatever straggler bees are coming in.

Amy

Did I ever tell you about the time I hired an arborist, Jamie?

Jamie

You haven't, but I've got to hear it now.

Amy

Yeah, well, basically what happened was, you know, here in Florida, we have hurricane season, and I was trying to stay on top of things, hired an arborist to come out and do some pruning on some of our very large trees. And in that process, they had found either bees or wasps. They had stinging insects.

They were like, oh, we can't finish the job because there are stinging insects out there. They said, but we still need to clean this area. And I said, OK, well, I've got bee suits here for you and I have them in just your size, actually.

And so, two of the guys had put it on. And of course, it was a father who owned it, a son, and then one of his friends who worked for him. And basically, the father had the two put on the bee suits and just was taking videos and pictures of them. And they're like, now we feel comfortable enough to actually do the rest of the job.

So, we're good to go. You know, we're not going to stop. We're going to finish today. Yeah, so anyhoo, you could also just offer them a bee veil.

Jamie

There you go. You could do that too. Yeah, but 100%, you know, even when I was at UF, we had a yard team come in and manage the yard and they would cut grass around it. And I know that our lab manager would allow them to use our veils and would even hang up veils and bee suits and jackets on the back fence so that the guys could use those as they prep to cut the area.

Amy

Yeah, definitely. OK. So, the last question has to do with bacteria. You know, we talk about bacterial diseases in the colonies. We have American foulbrood, European foulbrood, and I had a question about beneficial bacteria. So, is there beneficial bacteria in a colony? And what is considered beneficial bacteria?

Jamie

Yeah, this is an interesting topic. I remember learning in microbiology when I was an undergraduate student that there are actually more bacterial and fungal cells in our body and on our body then there are human cells.

So, we actually have more non-human cells than human cells. Now the question is why can we see the human cells? Well, it's because the human cells are so much bigger. So, as a result, we are human, but we have a lot of stuff on us and in us and there is this huge science.

It's not new, but it's growing this huge science built around the idea of beneficial microorganisms. So, humans, in their guts, in our guts, we have bacteria and other organisms, some fungal organisms, etc,, that are actually of benefit to us.

They help us digest food and other things. If you look at, if you just do a Google search for beneficial gut microbiota, you're going to see all of these different things that, if you do a Google search for beneficial gut microbiota in humans, you're going to see all of these organisms that live in us that help us and the ways that they help us.

In fact, they talk, oftentimes, about when we take antibiotics, we kill a lot of the beneficial bacteria in our body. So, folks will take probiotics to replenish that gut microbiota that will actually benefit us. So, essentially, this is illuminating the science of organisms that live in us, that are of benefit to us.

So, what are the beneficial bacteria? These are bacteria that live in us and benefit us. Well, the same is true for honey bees. Essentially, most multicellular organisms, like humans and bees and other animals, have things that live in us that benefit us.

Honey bees are the same. They have multiple taxa of organisms, both bacteria and fungal things that live in their gut that are of benefit to them from a food digestion perspective, from an immune response perspective, and perhaps from other things.

And I mentioned this isn't a new science, but it's a growing science. It seems like all the time they're finding different ways that these things, our own microflora help us and the microflora of bees help them. And so, there's lots of discussions about, well, when we feed bees antibiotics, what might that do to the beneficial bacteria that live in their guts?

Or when they're exposed to pesticides, what might that do to the beneficial microbiota that they have in their guts? Maybe the pesticides aren't killing bees, but maybe it's killing the things that benefit bees. How does that affect digestion and other things? But the short answer to this story is we are more than just the cells that make us human or bees are more than the cells that make them bees.

There are things that are single-celled organisms, in this case, bacteria that live inside of us, that live inside of bees, that live inside of other organisms, that benefit those organisms either from a food handling or immune response or other response.

So, it's really remarkable science that's growing all the time and showing us how important these organisms are to our existence.

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Amy

Very cool. It's kind of crazy to think just all the research out there and how research has evolved through time.

Jamie

Crazy stuff.

Amy

Yeah, that's pretty cool. All right, listeners, that's all we have for today. Don't forget to keep sending us questions. We're also looking for, you know, other content that you all are interested in. What hot topics are going on right now that you have questions about? Jamie and I can definitely do some discussion on it, and let us know what your thoughts are.

Hey everyone, thanks for listening today. We would like to give an extra special thank you to our podcast coordinator, Jeffrey Carmichael. Without his hard work, Two Bees in a Podcast would not be possible.

Jamie

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