

Episode 10 Mixdown PROOFED

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SPEAKERS

Dr. Boncristiani, Jamie, Honey Bee, Amy, Stump The Chump, Guest

Jamie 00:05

Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. In this episode of Two Bees in a Podcast, we'll be talking with Dr. Meghan Milbrath from Michigan State University who is an expert on European foulbrood. So over the course of two segments, we'll be talking about European foulbrood and its treatment. Our third segment will be with Dr. Bill Kern from the University of Florida. He is joining us to talk about Africanized honey bees. And of course, what Two Bees in a Podcast is complete without the question and answer session? So thank you so much for joining us on Two Bees in a Podcast. So I mean, this is really kind of an important segment because we're going to be discussing European foulbrood, bacterial diseases in general, maybe some hot topics on issues related to bacterial diseases and honey bees. And joining us to discuss this is Dr. Meghan Milbrath, who is an academic specialist at Michigan State University and the Michigan State University Department of Entomology. She also runs a side beekeeping business as well. So she knows bees in and out. Thank you for joining us, Meghan.

Guest 01:45

Thank you for having me.

Jamie 01:46

So now, we had you on a few weeks ago, and you're actually being interviewed, because when we put out a poll to beekeepers asking beekeepers who they wanted us to interview, did you know that your name came up multiple times if I'm not mistaken, right Amy?

Amy 01:59

Multiple times. Yeah.

Jamie 02:00

So you're one of our earliest interviewees because people wanted to hear you. What do you think about that?

Guest 02:06

Thanks, guys. That makes me feel good.

Jamie 02:08

Absolutely. So with that background, we brought you back kind of for these two segments to discuss things that are near and dear to you, the first of those being European foulbrood and bacterial diseases. So what I want to ask you is, can you give us just a short overview of your history with bees because we want to talk to you more about what's happening now, what you know now and the hot topics related to this, and what beekeepers need to know.

Guest 02:33

Sure. So, my background is in studying disease transmission and environmental risks that cause disease. So that's kind of the perspective that I view a lot of situations. And in 2015 to 2017, I was working on a completely separate project. It was the USGS project looking at the value of CRP land on honey bees, and we were evaluating a lot of colonies in the late summer, so July through September. One of the things that was interesting is that we saw a lot of European foulbrood-like brood disease really late in the summer. And historically, if you talk to beekeepers, EFB is around, a lot of people don't take it that seriously or hadn't been because historically, you see it in the spring, and then it always clears up. And so we were getting really good evidence that it wasn't clearing up. So I started to talk to the commercial beekeepers that we work with about it, and they said in the past years, it's gotten worse. It looks and smells different, and it's absolutely not clearing up. We could kind of anecdotally confirm that it wasn't clearing up, and everyone was talking about. And there's a really strong association with blueberries, like if you want to give your bees European foulbrood, it's always the ones that are coming in off of blueberry pollination. And the more I started to talk to people, I mean, that's universal. There are people working on this problem in Maine and Quebec and British Columbia and Oregon and New Jersey and all these places where they have blueberries, there's a really strong association with at least that time of year and colonies that are in blueberry pollination. And so again, we had beekeepers saying that it was a problem, but it's hard to write a grant saying it is a problem because beekeepers tell me it is a problem. So we went out, the first two years, we got what's called a green grant, which is internal to MSU in response to industry needs, and that allowed us to identify how bad it was. And in 2018, we found that 23% of the colonies that were in blueberries, this was working with three different beekeepers, were having European foulbrood, which I'm like, well, that's horrible if almost a quarter of them have it. We repeated it again last year and it was 56%.

Jamie 04:55

Well, Meghan, can I ask a quick question here? Because this is a big issue to us in Florida. So were the signs of disease manifesting, historically as what we would call European foulbrood, or -- the reason I'm asking you this is because we have a lot of beekeepers who have the crud, right? I want to ask because I have some sneaky suspicions but I want to hear it from you. Are the signs of disease similar with what the beekeeping community is calling the crud?

Guest 05:22

Yeah. This is one thing that I think we do need to get together and come to kind of a consensus on. It's really difficult to study because the crud is not brood atypical, EFB, all of that has been studied so differently too that it's hard to say what is what. So one of the things that I can tell you is we do see -- So we followed these colonies, we inspected them six times over the summer. I've so many photos of European foulbrood, and what we started to do is classify them based on the actual signs. So we had twisted larva, so we have little codes, and we counted how many twisted larva, how many visible trachea, how many yellowing, how many white blobs, how many brown blobs capped. And so we kind of went through and tallied to give a sense of what the squeuelette were in a particular colony. So we had colonies that had what we would call typical European foulbrood. So you had the corkscrew or the twisted larva, you had some yellowing of brood food, you had yellowing, you had the clear, the visible trachea. We definitely had some that had also the ones that people would refer to more as like the crud or snot brood, where it just looks like they melted. And the cappings, they were also living until the point that they were capped. When you get into those ones that are capped, they have a very different smell because there are definitely some interesting secondary bacteria. When we had those, we still sent samples into SAM at the National Laboratory. And those were testing positive for European foulbrood. I will tell you the things that I think, so one is there is European foulbrood in those colonies. That doesn't mean they don't also have something else. We just got a grant through Project Apis M and the National Honey Board to look at the viruses that are present because honey bees, like any animal, can have as many diseases at one time as they darn well please. And so it could be that there is a secondary infection. We're also working with the group at Tucson at the bee lab down there. We've done these ridiculous paired studies where we take a photo of every single sign of disease, we take 10 twisted larva, and we take photos of this is what we're calling twisted larva, we send them down, and they're doing the full sequencing and looking for the microbiome to see if there are different bacteria present. The other thing that might be happening is there could be a different virulence factor. If you have a more highly virulent disease, it's going to kill them right when they're a larva, or when they're young larva, like third instar. If it's less virulent, so it's less damaging to the bee, it could just be that it's not as severe of a disease at the bee level, they can survive until the pre-pupil stage, they can become capped, and then they die. So the University of Saskatchewan, we're working with them to figure out if what we see in the hive is different to those things.

Jamie 05:40

Agree completely. I think your statements are important because we hear this reported a lot in some samples of the crud that we've sent off before, years and years ago, came back very EFB positive. The struggle that I'm having is the lines between EFB, between the crud and even between, for me, parasitic mite syndrome are very blurred, and it's hard for me to confidently know what it is we have, and then, secondarily, make a recommendation to beekeepers what to do. So it's really good to know

that you're actually investigating that interface between these atypical brood losses that are clearly related in some way. So tell us more about how you're addressing that.

Guest 09:23

Yeah, well, in the cases that we are seeing the atypical EFB, there's always signs of the more classic one. Not always, but there generally is, especially when you evaluate them over time. So some of those earlier ones, a lot of times you'll see the melty -- like when the disease gets really bad is when it switches kind of all to melty. One of the hardest things about using only visual diagnostics for honey bee diseases is when a bee dies at a certain age, it tends to look kind of the same depending on what it died from. So with parasitic mite syndrome, that real white melty -- this is too bad this is over radio and not visual because I have some really gross photos.

Jamie 10:07

Well, gosh, man.

Amy 10:08

We can add them to our website.

Guest 10:09

Oh yeah, that's true. Show notes. I'll give you some really disgusting photos for your show notes.

Amy 10:15

Can't wait.

Guest 10:16

So when you're looking at something visual, like that white melty, it seems to be like a fifth instar. So right before they get capped, is going to die that's kind of the way that they die, not entirely regardless of how they die, but if you die at that age, you're going to kind of look like that. So with the viruses associated with parasitic mite syndrome, a lot of times you do see that white melty. The things that separate that for me is, one, a history or current situation of having hive mites, two, a lot of times, you'll have bees that are dying on emergence. So adult bees with their tongue sticking out that are dying is heavy in parasitic mite syndrome, but not associated with the bacterial diseases. That's always viral or pesticide. And then, three is the timing. At least for us in the northern states, we're so cyclical, we don't get the big buildup of mites until late summer, fall. At that time, the EFB, those colonies have dwindled way down. So you can kind of differentiate on those points. One thing that is interesting that we found this summer was that we did sample at the very end of the summer for deformed wing virus, and we found colonies that had deformed wing virus at high levels, even in the absence of having mites. So we knew that mites were managed very, very well, from May, and when we sampled them in August, there had been no peak in mites, mites had been controlled through that whole period, we were monitoring the whole time, and we had colonies in August that had high levels at that point.

Jamie 12:09

So Dr. Meghan Milbrath, that's very interesting. If you don't mind, we'd like you to stay on with us for a second segment where we actually discuss a natural segue, which is what can beekeepers do? And what have they historically don, specifically related to antibiotics, since it's a bacterial issue you're just discussing largely? And then how that antibiotic and new veterinary feed directive kind of interplay and limit beekeeper ability. So if you don't mind, we'd like to get you to hang around with the second segment.

Guest 12:37

Absolutely.

Jamie 12:38

Thank you. That was great insight on what you do at your lab there.

Amy 12:46

All right, welcome back from the break. We're still here with Dr. Milbrath. We just spoke about European foulbrood. We know that there are European foulbrood, American foulbrood that beekeepers kind of deal with and historically speaking, beekeepers generally used antibiotics to acknowledge these. So Dr. Milbrath what is your stance on foulbrood in general and using the antibiotics?

Guest 13:12

Sure, so I think antibiotics are an incredibly useful tool, and we're very lucky that we still have some that are effective against the control of these diseases. And I use the term control, and I'll come back to that. Whether or not they're appropriate really depends on the context. And a lot of it is not necessarily the risk of that particular colony, but the risk of that colony to the ones around it. So our focus with these bacterial diseases is a lot of times it's different than other animal care. And our focus is not necessarily on making sure that this particular colony gets back to perfect health immediately, but how do we make sure that this doesn't go into a full-blown epidemic? So in some cases, it might make sense to burn the colony. In other cases, antibiotics would be the most appropriate tool.

Jamie 14:08

It's interesting to hear you say that. So incidentally, before I ask you this question, I agree with you. And we're going to talk in a moment about the veterinary feed directive and prescriptions, etc. But when the VFD was announced, and again, we'll talk about that shortly, but when it was announced, I polled a lot of bee scientists around the US and said, "What are your feelings about using antibiotics in bee colonies?" And probably three-quarters of them said we shouldn't. But I agree. I have a big commercial contingency of beekeepers in Florida, and I feel that they need access to those antibiotics and there are appropriate uses of these things to control these bacterial diseases. So, you feel the same?

Guest 14:44

Well, I work a lot directly with veterinarians, and when I first started working with them, they really perceived this whole regulation as being a way to just get antibiotics out of beekeeping. And what I've done is really look at where are the judicious uses for it. It is probably 20 years too late that we've had antibiotics available willy-nilly because we don't have that many tools. And we do have to be careful

how we use them. But we are balancing that with bee health. There's no other animal system where you'd be like, "We'd be fine with having most of these animals die with a bacterial disease, as long as we're not using antibiotics." Like that's just not a thing that we do. With honey bees, we're putting them in situations where they're under a ton of stress for the sake of our food system. So there's no other animal that we drive to such levels of stress for something that's completely separate than the animal. So we put them under high levels of stress, then we put them in situations where they have high levels of mixing, then we transport them around the country. If you want to create an epidemic, that would literally be the way that you would do it. You would take all the animals, put them under stress with high levels of these pathogens in the background. So one of the interesting things about both European foulbrood and American foulbrood is they have high levels of infection, even when there's low level of disease, so disease being when you actually see the colony being sick and showing signs in brood, infection meaning the pathogens present in the colony. So when you've got an apiary that has a sign of European foulbrood, most likely, there are bees carrying *Melissococcus plutonius* in the background. Even in cases where you don't see American foulbrood, there are tons of the spores kind of out there in the world. So when we're dealing with these contexts, and we can use other animals as a guideline, so when we look at, for example, large groups of animals under stress, like you can look at feedlots for cattle. If you're going into a feedlot with cattle, if you look at the Merck recommendations, or the standard recommendations that a veterinarian would use, there's a whole list of vaccines that you would provide to that animal before it goes into a feedlot, knowing that the potential for it to get sick and to transmit disease is really high. We don't have those tools for bees. It would be awesome if we had vaccines and all these other tools, but really, our only tool right now to manage these epidemics is antibiotics. So we have to be really careful when we've got these large herds of animals under stress that we are seeing really high rates of disease that's actually killing those animals. We don't want to take away that tool. Now, there are a lot of other cases where people have been using them in ways that -- you've got the old beekeeper who's been doing it for 45 years and never seen the disease and it's completely removed. That's probably an extra use. But there's definitely places where it works. Really, it's very important.

Jamie 17:57

Let me ask you a slightly controversial question. You don't have to be held to it, but a lot of our beekeepers -- again EFB and AFB clear ideas on how to address those, there's a lot of information available, we'll probably even discuss it in a future podcast. But on the other hand, something like the crud, which a little bit more amorphous, we're not sure exactly what's caused by it, a lot of our beekeepers try to rescue colonies with the crud by using antibiotics, just under the assumption that it's bacterial linked. Do you have a statement about that? I mean, I'm not gonna say whether you endorse it or not. I'm just asking, do you have a statement about that approach?

Guest 18:33

Yes. So with EFB, and I do include the crud, we mostly call atypical EFB because we have seen it and we've done many studies. A PhD student, Gabriella Quinlan, led them here, on looking about the effectiveness of antibiotics compared to supplemental feeding and things like that and antibiotics do work, and they work more quickly. There is still a role for them in those contexts. The colonies that weren't getting it that were allowed to recover, recovered very, very slowly and did not make honey for

that year. So in those contexts, I mean, in my mind, honey bees are animals, and they do deserve to be in good health. There's a role for antibiotics when a colony is sick, or when a colony is likely to become sick. We want to make sure that they are in good health.

Jamie 19:34

So Meghan, you just said something I've just really heard no other scientists say publicly, this idea that honey bees are animals and they deserve to be in good health. That is something that's near and dear to me because a colleague from Europe, a couple colleagues from Europe, are putting a book together called *The Welfare of Managed Bees*. The whole premise of the book is honey bees are animals and they deserve to be in good health. And I had to write a chapter in that book and it brought to attention to me the ethics associated with keeping honey bees should be similar to those associated with keeping cattle or poultry, etc., where the animals deserve to be in good health while they are under our husbandry practices. So I love that idea, this idea that antibiotics play a role because honey bee colonies deserve to be in good health. Let me appreciate that statement for what it is. Thank you for making it and then let's move on to the next part. So despite all of this, despite the role that we think the antibiotics have, at least in certain contexts with European foulbrood, the crud, American foulbrood, and other things, beekeepers find it a little bit more difficult to get it than they did a few years ago. In 2017, the FDA put forth the veterinary feed directive, so beekeepers could no longer just purchase antibiotics, they now have to have either a vet feed directive or a prescription depending on antibiotic use to get those antibiotics before they can be administered. Could you give us a brief overview of the VFD and how beekeepers are having to get a hold of antibiotics now in order to address these bacterial diseases that you've been discussing?

Guest 20:59

Sure. So the veterinary feed directive was put in place in order to reduce the use of medically important antibiotics in food-producing animals. It was really targeted at poultry, cattle, and swine. Honey bees, though, do fit the definition and fish were also caught into that. And so by definition, they're considered minor species for this. But they did fit that. The FDA released this five-year plan a year later for supporting antimicrobial stewardship in veterinary settings. So there's this really big push amongst the FDA and the food community and the veterinary community to really reduce the risk of having antibiotics in our food system, which is lovely. It's going to be a tough transition, though, just to kind of sort that out and how people have access. I just went to a meeting with the AIA.

Jamie 22:04

The Apiary Inspectors of America. Too many acronyms in our business.

Guest 22:11

It was the ABF AIA ABRC meeting. We talked about it and a lot of them are really on the frontlines of dealing with a lot of these issues and talking to people from all around the country, different states, it's working perfectly fine, and in different states, they are really struggling. It really shouldn't be a hard thing. And it's not an enormous obstacle, once veterinarians understand it. So the big issue for beekeepers is to understand that the veterinarians license is at risk. So if they're seeing that they're not comfortable doing that, that's reasonable because they don't want to get hauled into court. They don't

want to lose their license. And ultimately, these laws do get played out in the courts. And so if your veterinarian doesn't want to deal with that, and they're not comfortable, that's fine. However, veterinarians are really used to dealing with these situations. One of the issues that I've seen is when people feel like they haven't been able to get antibiotics, it's usually because they're going to the wrong type of veterinarian. So your small animal, your cat and dog vet, is really used to saying, "Does this dog need antibiotics?" And in that case, like, yes or no, they meet your dog, you bring it in, that's very different. A large animal vet that is used to working at dairies knows that they don't need to go out there and inspect every single one. They're used to prescribing antibiotics for high-risk scenarios where you're controlling disease as well amongst the herd. And so there are different scenarios. They're also used to dealing with food-producing animals and withdrawal times and things like that. So a lot of times, it's finding maybe a large animal vet to work with who's completely used to prescribing those types of things.

Jamie 23:55

The beekeepers struggle with this issue because they have to understand the issue and maybe feel like they have limited access to antibiotics. So there's that education. From the vets' perspective, Meghan, what I tend to see the issue is, you just said, you see a dog, the question is does this dog need an antibiotic? With European foulbrood, that's pretty easy. A colony has European foulbrood, should I elect to try to rescue it with an antibiotic? On the other hand, they struggle with American foulbrood because when American foulbrood presents, it's fair for that colony to not exist, right? So, vets are going, "Well, I would prescribe an antibiotic to, quote, rescue a colony with AFB, when all it does is call the physical manifestation of the disease to go away but the spores are still present and the disease can come back." You don't actually cure, as it were, or treat a colony with antibiotics for American foulbrood. So they struggle with this idea of prophylactic use of antibiotics in context with honey bees, specifically with American foulbrood. Any comments on that?

Guest 24:55

Yeah, so I think you brought up, actually, kind of like four different topics in that. I've been working with veterinarians. Actually, I'll do the easy one first. So prophylactic use, I don't think is appropriate in the case, that term, for bees. There's another term called metaphylactic use. Metaphylactic is more based on control when something has shown up in the herd.. So if you've got a diseased animal, it makes sense to provide antibiotics to everybody who else is at risk, like if they're feeding out of the same feed trough. Whereas prophylactic means we've never seen it and we don't really see a chance of it. Most of the commercial beekeepers, the example of European foulbrood, if they've got five years where every time they go into blueberries, they're going to get EFB, that's not true prophylactic use because we know *Melissococcus plutonius* is present in those hives, it just requires those risk factors to actually cause the disease. So I think there's a perception that when beekeepers are using antibiotics, that it's not necessarily like necessary or not related to --

Jamie 26:09

This idea that it's the Wild West, right? The Wild West of antibiotics. I love what you just said, clearly, your human disease background is coming into play. Metaphylactic, I like that idea. I've never heard it explained that way.

Guest 26:23

The other thing that a veterinarian has to do is they don't necessarily have to understand everything about honey bee biology and splits and queen-rearing, they have to understand, are these appropriate contexts that would be good for antibiotics? So the example that I use is an animal veterinarian is licensed to treat a bearded dragon. They don't have to know everything about bearded dragon nutrition, they have to be able to go up, look through their resources and say, "Is this an appropriate time to give this treatment to a bearded dragon?" With honey bees, what we're trying to do is provide them with resources. So we have a guidance document on American foulbrood, and they can look at it and say, "Nobody would recommend just giving a colony with American foulbrood antibiotics." Where antibiotics come into play with American foulbrood is let's say you've got a beekeeper with five hives, one of them shows up with AFB. They can do a shook -- they're in a state that doesn't require the broker inspector to come in. So, Michigan, for example, and I've gone through the situation, they can come in, they can do a shook swarm, and shake that colony into new equipment, burn all of the old equipment, and provide everybody in that yard with antibiotics because you know that there are bees that still have the spores in their crops. And what you're trying to do is prevent reinfection of those other colonies until those spores have passed through the bees and we're back down to background levels. So that would be a context in which you're mixing the burning, and even in the case where if you have a beekeeper, and they burn a hive, that would still be appropriate to give antibiotics to the other bees in that yard knowing that there's a lot of that infectious material present that could just pop up again. And then you monitor after that, and if you don't see it anymore, then we're good.

Jamie 28:20

Yeah, I mean, I think that's super important. I mean, I think that's well said. Our beekeepers struggle with it a lot here in Florida. I know veterinarians are struggling. In fact, next week, I know when you say next week on a podcast, that's irrelevant, but next week, I'm going to actually train veterinarians on this particular issue. And you've certainly given me some food for thought. Meghan, you've been a fantastic guest telling us about EFB, a little bit about the crud, and telling us about the VFD and antibiotic treatments. I mean, I've personally learned a lot. So I thank you so much for joining us.

Amy 28:49

Yeah, absolutely. And can we just all agree that honey bees are just unique in their own world as far as how to treat them and how we manage them, and the recommendations that we give out?

Jamie 29:00

So Meghan, thank you.

Guest 29:01

Thank you so much for having me. I have lots of resources for veterinarians --

Jamie 29:07

Please tell us about it.

Guest 29:08

-- on our website. So it's pollinators.msu.edu. And if you go to the programs tab, there's something that says, "Bees Need Vets." And it's got examples of how to fill out a VFD, context when they're important to use, different places, there's online classes through AVMA, I'm starting an online class through the Veterinary Information Network. Well, it'll be tomorrow for me right now. So whenever. There's lots of online resources that veterinarians can use so that they're comfortable working with beekeepers.

Jamie 29:40

Meghan, if you could get us those links, we'll put them in our show notes and make sure that when this is published to the people, the listeners have access to it. So listeners, that was Dr. Meghan Milbrath, an academic specialist at Michigan State University and Michigan State University Department of Entomology. What a fantastic interview that was. I mean, Meghan, you're great. Thank you so much.

Guest 30:00

Thank you. That was fun for me. Thanks, guys.

Jamie 30:02

Thank you.

Honey Bee 30:05

For additional resources, visit the podcast page on our website, Ufhoneybee.com.

Jamie 30:12

Amy, have you ever wondered about African honey bees?

Amy 30:14

All day, every day.

Jamie 30:16

Why is that the case?

Amy 30:19

Because we're talking about African honey bees. I just thought about it. And then I just figured, I do think about it all the time.

Jamie 30:24

I know when I got hired, people were always emailing me and calling me about Africanized honey bees. The principal reason is because when I got to Florida and started working at UF, that's the thing that was the big deal. But very shortly thereafter, people were being concerned about bee losses. And so all the phone calls and emails I received shifted from African bees to that. Do you get those calls?

Amy 30:43

Actually, they shifted on because they shifted over to me, Jamie.

Jamie 30:46

Well, what do people ask when they're contacting you about it?

Amy 30:48

Well, they're just wondering if African honey bees -- actually, every time they see a wild or feral colony, they just tell me, "Oh my gosh, we have Africanized bees, we have Africanized bees." And I'm like, "Okay, just hold on."

Jamie 30:59

Well, depending on where in the US or even in the state of Florida they are, they could, in fact, be seeing Africanized bees. To get to the bottom of this conundrum, we are joined today by Dr. Bill Kern. Dr. Kern is Associate Professor of Entomology in the Entomology and Nematology Department here at the University of Florida. He works out of the Fort Lauderdale Research and Education Center. Dr. Kern, Bill, thanks for joining us on Two Bees in a Podcast.

Guest 31:24

Well, thank you.

Jamie 31:25

So before I ask you the first question, I want to set the stage just a hair for our listeners. Amy, there are nine species of honey bees, you know that, right? The one that we keep, Bill, as you know, is *Apis mellifera*, that bee is distributed in Europe, the Middle East, and Africa. So in those three regions, Europe, the Middle East, and Africa, there are different races or subspecies of this bee. So the one that we call the African bee is one of those subspecies or races from Africa. So Bill, from Africa, how did we get the Africanized honey bee?

Guest 31:34

Yep. Well, there was a researcher in Brazil who decided he needed to make a better honey bee for the tropics. Most of our honey bees are from Europe. They're European subspecies.

Jamie 32:14

Sure.

Guest 32:15

So they're adapted for long winters where they will store lots of honey. So they can overwinter. But they don't do well in the tropics. So he went to the same latitude, yeah, same latitude in Africa, and collected native bees from that part of Southern Africa and brought them back to Brazil to hybridize.

Jamie 32:42

So the one subspecies he brought, though, is *Apis mellifera*, that's genus and species, but *scutellata*, right? That's the bee that came over. Yeah, no, Amy, this is how you remember it. When you meet the African bee, you want to *scutellata* tail pretty fast. Come on, that's good, guys. That's good. I use that

joke every time I teach about African bees. Okay. Well, that's how you remember it. So this Brazilian scientist brings *Apis mellifera scutellata* to Brazil, what year was that? And what happened after that?

Amy 32:49

Scutellata what?

Guest 33:06

It was approximately 1957. There's a lot of folklore about what happened next. And depending on who you talk to, the story changes, of course. In some cases, they say a grad student or a technician saw the queen excluders on the front of the cages or the front of the hives and decided, "Well, that didn't look right." And he took all of the queen excluders off.

Jamie 33:36

It's always the grad student or technician's fault.

Amy 33:39

Yeah, don't blame anyone else but the student.

Jamie 33:41

Absolutely.

Guest 33:42

However, talking to other people working in South America, they said, "No, no, he was giving queens away for other people to try." So however it happened, they became established in South America, and then they were so successful that in a fairly short period of time, they literally took over most of South America. By 1967, they were all the way up into Colombia.

Amy 34:15

So what do you mean by take over? How did they take over this area?

Guest 34:18

They just multiplied and spread. Because the honey bees that they were using in Brazil were not adapted for the wet tropical environment, it was constantly a struggle to keep them going. But the Africanized honey bee, this hybrid, actually thrived and multiplied. One of the characteristics of it is it likes to produce lots of swarms. So, very quickly, it filled up the available niche in Brazil, Uruguay, Paraguay, all the way through the eastern part of South America. And eventually, it had to go up around the northern part and start working its way back down on the other side of the Andes. And then, approximately in 1967, it started working its way up through the Central American isthmus. And by 1980, it was as far north as approximately Nicaragua. By 1990, it had made it through Mexico and had just reached the southern tip of Texas.

Jamie 35:40

Now, let's think about that for a second because, Amy, you just asked about the spread, how did it spread, how did it take over, and Bill's talking about the spread. One of the things that people don't appreciate about African bees, And in my opinion, when we think about African bees, we think about killer bees, and all the stings and all that stuff, but one of the things that I don't think is appreciated enough, if they were introduced in '57 in one spot in Brazil, and in 1990, they had made it to the United States, they had conquered that region largely on their own. It wasn't really beekeepers who were moving these bees.

Amy 36:09

Yeah, so they weren't managed.

Jamie 36:10

Exactly. So a lot of scientists consider African honey bees one of the most successful biologically invasive species of all time, but once it got introduced, the climate conditions were right, and it spread largely on its own through this reproductive swarming, Bill, that you were talking about. So you keep saying and I keep using African or you keep using Africanized. What's the difference between an African bee and an Africanized honey bee? I think that's key as we talk about this moving forward.

Guest 36:40

When you talk about an African bee, I'm basically thinking about that subspecies located in the southern tip of Africa.

Jamie 36:50

That's right. Scutellata, yep.

Guest 36:51

Which is *Apis mellifera scutellata*. But there's also lots of other really cool bees located in other parts of Africa. So I don't particularly like the African bee for scutellata. Africanized is basically a hybrid that is of African descent. So it has *Apis mellifera scutellata* in its ancestral history.

Jamie 37:23

I think what's key, you listeners, to understand this is there were already European strains or subspecies of mellifera in South America. So when this African bee, this scutellata arrived in Brazil, it began to hybridize. How could it hybridize? It hybridized because it's the same species of bee. They're both *Apis mellifera*. So once it made it to South America, Central America, and then, of course, North America, it ceased to be the African honey bee, and it became the Africanized honey bee.

Guest 37:54

Correct.

Amy 37:55

So I guess one of my questions is, and I receive this question quite a bit, is you were talking about how they swarm more often, they probably have a different characteristics as far as the European honey bee that we keep. I hear that their venom is more dangerous, Bill? Is that true?

Guest 38:12

No, that's not true at all. I mean, it's the same species. It's *Apis mellifera*. So it is a Western honey bee. They all have essentially the same venom, same venom components. If anything, Africanized bees, because they tend to be slightly smaller, would probably deliver less venom.

Jamie 38:33

Per sting, yeah. European-derived bee. These bees move up through Central America, they move up into North America. And then we get all of these terrible movies in the 70s and 80s about the killer bees, the bees from Mars, or all these other dumb things.

Amy 38:48

The bees that swarm an entire car and make it blow up.

Jamie 38:50

Yeah. So why --

Guest 38:53

Amy, I didn't see that one.

Amy 38:55

I'll make it, don't worry. Coming out to a theater near you.

Jamie 38:58

So how did they get the moniker killer? And what's killer about them? Are they rad?

Guest 39:03

No, they're very defensive at the colony. We have had fatalities. But we've had fatalities with the Western honey bee. If you have somebody who's allergic, it only takes one sting to be fatal. No matter what most mothers tell you, their kids probably aren't allergic to bee stings. They swell up, which is called the large local reaction.

Jamie 39:37

I mean, I think one of the things that you said Bill was absolutely key there, this idea that they're defensive. They got the killer name because, you're right, there have been human fatalities, unfortunately. Obviously, that's terrible. There have been animal fatalities, etc. There have been a lot of people attacked by these bees. And the principal reason for this and the way that I teach it is these bees are simply more defensive than the bees that we typically keep. That simply means that when you agitate their hive, they're likely to respond with more bees and follow you a greater distance than a European colony would. So you're just simply getting more attention and more bees attack you. I think I

heard, Bill, that the average human being can take five to 10 stings per pound of body weight before you just die of venom toxicity. So the average 100-pound individual can take somewhere between 500 to 1000 stings before they die, simply because they have too much venom. So if people who are not allergic to bees are getting killed by these bees, that means they're getting 500-1000+ stings. So, with that in mind, what would be a recommendation to people who find themselves attacked, really by honey bees, in this regard, but yellow jackets and Hornets or anything that stinging them in great numbers?

Guest 40:52

Run away.

Amy 40:53

But don't jump into a pool, right? That's what I hear.

Guest 40:55

Don't jump into a pool. Don't jump into a pond unless you have gills because you're going to have to stay under for quite a while. So normally, we just say run away as quickly as you can. Get into a structure or a vehicle if possible. Close the door. And if you have a few bees come into the car with you, don't jump out of the car. Those handful of bees can only sting you one time each.

Amy 41:27

So should we be scared of them? Should I be scared and just stay inside for the rest of my life and never go out?

Jamie 41:33

Yes, but not for bee reasons.

Amy 41:36

For other reasons. The pollen right now is pretty bad.

Guest 41:42

I wouldn't consider Africanized bees to be a reason to hide in your house. It's just like, if you're living anywhere in North America, they probably aren't much more threatening than, say, a colony of yellow jackets.

Jamie 41:59

Yeah, that's how I usually tell people as well. I think one of the things when people are getting stung in a mass stinging event, now, we're not talking about you grabbed a flower and there was a bee on it or you're walking barefoot through the yard, step on a bee, but when you're being stung multiple times, it is usually because you are too close to the nest. So the bees are trying to communicate a very simple truth, "You're too close to our nest. We don't want you here. Go away." We kind of laughed when you said, "run" earlier but that really is the response. When you are being stung multiple times in a mass stinging event, the best thing you can do is get away quickly to remove yourself from what is likely a

nest somewhere right around you. That's why jumping in a pool is not good, jumping in the bushes aren't good. You need to get away.

Amy 42:45

I was gonna say, is there like a specific way you need to run? Because when you run away from gators, you are supposed to run in a zigzag because they can't -- that's what I hear -- because they can't turn. Jamie's looking at me like, "You're insane."

Jamie 42:56

The last gator that chased me, I just ran straight.

Amy 42:58

Well, they say run in a zigzag and that way the gators can't get to you as fast because then they have to turn.

Jamie 43:03

Are we talking about football now?

Amy 43:04

No, an alligator.

Jamie 43:05

It's easy to run away from the Florida Gators.

Amy 43:09

Is there a way that you need to run?

Jamie 43:10

You just need to run straight if you're trying to get away from a Florida Gator.

Guest 43:13

You're trying to get away as fast as possible.

Amy 43:16

That's fine.

Guest 43:18

Straight is good. I mean, if you're on a curvy trail, follow the trail so you don't trip.

Amy 43:25

You don't stop, drop, and roll?

Guest 43:27

No.

Amy 43:27

Okay.

Guest 43:28

Do not. That's for fires. All right. And trust me if you roll on bees, they will sting you. Even if they're just hanging on you, they will sting you if you squash them. So you want to run away, put as much distance as you can between you and the colony.

Jamie 43:49

It is interesting, though, that you raised that point, Amy, is there a correct way. When you read the literature on how to respond, how to get away from African bees, they will often have a cartoon drawing where the person being attacked will pull their shirt over their head. The idea is that you're trying to cover your airways, your face while you run. But I don't know what running through a forest with a shirt pulled over your head will accomplish. You're far more likely to be knocked out by a tree than stung by a bee.

Amy 44:14

That's right, unless you're wearing a really thin shirt.

Jamie 44:16

I guess. I think the key is to get away as quickly as possible. Now, we really talked about this from a public response. The other thing that I would say to the general public, if you have bees nesting in your property or a tree or in a wall of a house or a chimney, you really need to contact either a beekeeper who can provide removal services for you or a pest control operator who eradicates. That's true here in Florida. That's no doubt true in the Southwest where there's a much greater population of African honey bees. But African honey bees are not just an issue, Africanized honey bees are not just an issue for the general public. They're an issue also for beekeepers. If anyone is trained to handle honey bees that are stinging, that's the beekeeper, but there are some unique situations that beekeepers find themselves in, and they have to address African bees in those situations. So what are some things beekeepers can do to minimize the impact of African bees on their beekeeping operations?

Guest 45:11

Well, we've put together a list or a collection of best management practices so that if people collect either African swarms or do a, what we call, a cut-out, a removal of a full colony from a structure, there are certain things that the beekeeper should do if he wants to bring those bees back into domestication. First thing is requeen. Remove the original queen and replace her with a clipped queen of known genetic background.

Jamie 45:51

When in doubt, get her out. I made that up on the fly.

Amy 45:55

You did. I was very impressed.

Jamie 45:57

That was awesome sauce. Listeners, Two Bees in a Podcast, that will be our next t-shirt slogan, which simply means requeen. When in doubt. Bill, keep being professional. Alright, so we requeen.

Guest 46:10

And within a short period of time, the colony will revert to the new queen's genetics. We can convert an Africanized colony back to a European-derived colony. And there are certain benefits to that because European honey bees, because they're adapted for long winters, are better at honey producing. If you're primarily concerned about pollination services, Africanized bees are just as good as any other race or variety of honey bees.

Jamie 46:51

It is important to point out, though, that in some states, like Florida as an example, it's illegal to keep African bees and so, really the queen is the key. If you have a defensive colony and you suspect it could be Africanized honey bees, it's best to just requeen, right? That's the real key. And for that matter, that's just my general recommendation with defensive colonies, right? I don't feel like we should be stung a lot when we're working our bees. And if we are, just requeen the colony and hopefully, you'll get one that's more gentle.

Amy 47:21

Last question I have, I guess, for you guys is how long does that typically take? As far as once you requeen, how long should you wait? If I go back in a week or two after and I open it up and it's still just as defensive.

Guest 47:32

I would say you'd probably have to wait at least a month.

Jamie 47:36

Yeah, I'd say the same thing.

Guest 47:37

Because it's gonna take 21 days for the new bees to replace.

Jamie 47:45

One of the things I want to point out to you listeners, we're talking about requeening defensive colonies. Now, you've got to remember that it's very common in beekeeping for our colonies to just lose their queens. The queens die, they're usurped, they're replaced, she swarms, the bees make a new one. Even new queens that you produce in your colonies in areas where African bees are present are a risk to you because your virgin queens will go out and mate with drones from colonies available in the area. So even if you're doing the best you can to keep European-derived stock in your apiaries, your colonies

can become Africanized over time if you're not watching closely and addressing requeening or natural requeening in your colonies. So I think that's an important point to make as well. Dr. Bill Kern, you have been a fantastic guest and certainly an expert on African bees. Thank you for joining us for Two Bees in a Podcast.

Guest 48:43

Thank you.

Jamie 48:44

Guys, that's Dr. Bill Kern, an Associate Professor of Entomology from the Entomology and Nematology Department of the Fort Lauderdale Research and Education Center at the University of Florida.

Amy 48:53

We've also referred to him as Ant-Man in one of our previous question and answer sessions. So we'll hear more about that in future episodes.

Jamie 49:01

Well, Bill knows everything. Everything I ask him.

Amy 49:03

He's like a Marvel character.

Jamie 49:04

Yeah, he's good. So I really appreciate your expertise, Bill. Thanks for joining us.

Guest 49:08

You're welcome.

Stump The Chump 49:19

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

Amy 49:24

We're here with myself, Amy, Jamie, and Humberto answering your questions.

Jamie 49:34

Humberto, it's really too bad your name doesn't rhyme with ours because then we can be --

Amy 49:38

Amy, Jamie, Shmamie.

Jamie 49:39

Yeah, you are now Shmamie.

Dr. Boncristiani 49:43
People call me Dr. Bees.

Jamie 49:45
That still doesn't rhyme, Humberto. I'm not sure how that helps. Nevertheless, we did get a good question, Humberto. We gotta answer this question. They said, the listener said, "I treated my colonies for Varroa," and shortly thereafter, they didn't put a timeframe on but let's just say weeks, maybe six weeks or two months, close enough to the treatment, "I started seeing Varroa again, and my bees had deformed wing virus. So what's the deal?"

Dr. Boncristiani 50:16
Well, first thing that came to my mind is that the treatment didn't work correctly. Second thing that came to my mind is there is not any treatment that has 100% efficacy. So there is always leftovers of mites. And of course, if there is the virus there to be transmitted, this virus is going to continue in the hive and in about six weeks, things go back to normal. So we would say that, in cases like that, it's a good indication for the beekeeper to retreat it.

Jamie 50:50
Yeah, I agree. I mean, if you're seeing Varroa again after treatment, it's possible the treatment didn't work, or it gave you its best shot and Varroa population just rebounded too quickly. So retreat if necessary. Sample colonies, retreat. That's a good answer, Shmamie.

Dr. Boncristiani 51:06
Shmamie, that's me now.

Jamie 51:09
All right. Amy, your turn, I see you laughing but see if you can spit out a question for me.

Amy 51:15
So I'm a scuba diver, and there's this thing that people talk about where they don't allow bananas on a boat. That's actually a thing. Recently, I've been hearing --

Jamie 51:25
What if it's a banana boat, because those things are real, you know.

Amy 51:27
I mean, the next time you go to the beach, you should carry a banana on a banana boat.

Jamie 51:31
Okay, so why can't you take bananas on a boat when you're scuba diving? I have got to hear this.

Amy 51:36
I mean, it's bad luck. It's considered bad luck.

Jamie 51:38

Oh, it's bad mojo.

Amy 51:39

That transitions me into that question that I was going to ask you, people are talking about bananas in an apiary, they say that you're more likely to get stung, bees don't like bananas. What's going on with that? What is that? What's happening?

Jamie 51:50

I can tell you, Amy, it has nothing at all to do with luck because in the bee world we're not superstitious, you crazy scuba divers. All right. So the reason that question comes up is because the chemical responsible for making bananas smell like bananas is isoamyl acetate. And as all you astute beekeeper listeners know, that is also one of the ingredients of honey bee alarm pheromone. So when honey bees sting you, they deposit a pheromone on you that tells other bees, "sting here." And if, in that deposit of pheromone, there's isoamyl acetate, and it makes sense in our minds that if we eat bananas or have handled bananas, perhaps we have that on us, and when we work bees, we might be in for trouble. So I have never seen a research project on this topic. But I have eaten plenty of bananas before going and working bees and have yet to experience a problem. So I will not say that it doesn't cause a problem, I will just say that it has never caused a problem for me.

Amy 52:19

Interesting.

Jamie 52:36

I've never had bad mojo eating bananas before working bees.

Dr. Boncristiani 53:00

Neither do I. So, Amy, we receive some requests sometimes. And there is a question from a viewer. And the question is, why people have to charge for bee removal when they have bees in their homes and things like that.

Amy 53:22

Yeah, so that's actually a call that we get 95% of the time here at the office. And even when I was an extension agent, and people would always say, "We have feral bees on our property, and we're wanting someone to come get them. We'll give them away for free." And I usually let them know, "Hey, that's not really how that works." So, here in Florida, we have a Department of Agriculture list of bee removal companies or individuals, and they can go out and do bee removals. And I usually let them know it's not going to be free. It actually does cost a fair amount of money. And that's, generally speaking, because a lot of the people doing bee removals have either general liability service, general liability in general, haha, and it really is not free. I mean, think about the time that it takes to drive out to a property, pick up bees, and then the materials that needs to happen as far as some people use vacuums, you know, they'll vacuum up bees, and then bringing it back onto their property and having to maintain these bees.

Sometimes, these bees aren't exactly the healthiest. There are just a lot of expenditures that come with it. And really it's a time commitment as well. So there are lots of factors that go into bee removal. It's not just grabbing this free gift that you're having and taking it back to your property.

Jamie 54:39

Yeah, I think that's key. The premise behind the idea is, "Aren't you getting free bees? Then why are you charging me to remove them?" But there's work involved in bee removal. There's training involved in the background of these individuals, there's liability insurance, and so they should be paid. It is fair to be paid to remove bees.

Amy 54:56

Can you guys imagine having honey bees within the walls of your house, and then someone coming in and opening a wall in your house and just taking bees and going away and not cleaning it up.

Jamie 55:06

I can imagine that almost as much as I can imagine not having a banana on my boat because I'm about to go scuba diving. Hey, you guys have been listening to Two Bees in a Podcast. Thank you for those questions. You can always submit more questions through our Facebook, Twitter, or Instagram accounts @UFHoneyBeeLab.

Amy 55:23

Thanks, guys.

Dr. Boncristiani 55:24

Thank you.

Amy 55:30

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

Jamie 55:45

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!