# Episode 171_mixdown PROOFED

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**SPEAKERS**

Amy, Jamie, Stump The Chump, Guest

**Jamie** 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast.

**Amy** 00:49
Hello, everybody, and welcome to this segment of Two Bees in a Podcast. Today, I'm excited to be introducing Dr. Michael Brown, who is a practicing family physician, also a hobbyist beekeeper. There are lots of other things that he does. He's a president of the Missouri State Beekeepers Association and a master beekeeper in the Great Plains Master Beekeepers program. He is located and calling in from Smithville, Missouri, which is right outside the Kansas City, Missouri area. So, go Chiefs, but we've brought Dr. Brown in today to talk about honey bee stings. So he, again, is a practicing family physician. I'm really excited to have someone in the medical field to come and talk about stings with you all. I don't think we've had this topic covered yet. So I'm excited to hear what you have to say. But thank you so much for joining us, Dr. Brown.

**Guest** 01:36
Thank you, Amy, and thank you, Jamie, for having me on your program today.

**Amy** 01:39
Of course. At the very beginning, when we haven't brought in guest speakers before we love to introduce our guest speakers to our audience. So tell us a little bit about yourself and how you got into the beekeeping world.

**Guest** 01:49
So actually, I kind of was lucky enough. My father was a beekeeper, and he was a teenager when he became a beekeeper. I think he had a friend that kind of got him in on the hobby. And so one day when I was eight or nine, my dad came home and said, "Hey, we're getting bees." And I was like, "Okay, that sounds interesting," and never even thought about it. And honestly, we started going to conferences together as he got back into the hobby. I remember very vividly, when I was a kid, they were doing a swarm demonstration at one of the conferences we were at. It was outdoors at a farm in rural Kansas, and they wanted to volunteer to come up and put their hand in the swarm. I don't remember to this day why I volunteered but I stood up and put my hand on the swarm as a young kid and you get that relationship with honey bees and you realize that they're to be respected, but they can also be dangerous. But if you treat them right, you can have a great hobby. And here I was, I was hooked as a kid. And so I've been a beekeeper ever since.

**Jamie** 02:41
So Michael, you are here to talk about an incredibly important topic in the honey bee world. In fact, I think it's like grossly overlooked, especially when I go to beekeeping events. Very few people actually talk about these things, and that's because most of us just kind of put up with it as a necessary evil, but they can be incredibly dangerous. And it really behooves us as beekeepers to understand what they're doing when we're getting stung, how that sting is working, and how our body's responding and signs we need to watch out for. So let's just kind of start from the top. You give a presentation on honey bee stings, which is great because it's linked to your experience both as a beekeeper and a practicing family physician. Can you describe for us the anatomy of a bee stinger and what biologically actually happens when a bee stings us?

**Guest** 03:28
Absolutely, Jamie. Before I ever start a presentation about honey bee stings, I always like to kind of put it in perspective. Whenever we talk about any medical condition, we like to talk about how common it is and how dangerous it might be, just like you mentioned. I was starting to ask my audience what the most dangerous animal in the world is. Most biologists know the answer to this question, but it's actually mosquitoes. They carry pathogens. They kill over a million people in the world every year. But if you go down very quickly about what the most dangerous animals we might be exposed to, honey bees are very much on the top of the list for humans, particularly in the United States where we don't have as much exposure to other types of more dangerous animals. If you put aside domesticated animals, and you don't consider a honey bee a domesticated animal, then it's actually one of the most deadly animals in the United States as far as mortality goes and human life goes. But that's still, when you put it in perspective, it's only about 100 people a year that we attribute to some type of death related to a honey bees sting, and that's not just bee stings. That also includes wasp stings because can be hard to isolate the two but they are definitely something that you have to be aware of, and they're something that needs to be taken seriously, particularly for beekeepers. If you dig further into the the harm that's caused by honey bee stings, beekeepers are of course one of the main groups that would be associated with those types of exposures. And so beekeepers do have to be aware that we are taking care of a potentially deadly animal, and so we've got to be very cognizant of that. The other question I get by beekeepers is do wasps hurt more people than honey bees? I think we like to think

that wasps are the mean animals because they hurt our bees as well. But unfortunately, most of those deaths from stinging insects do come from the honey bee itself, and that just tends to be because of the amount of exposure that we have. But it also has to do based on the anatomy, like you talked about. So, we know that the honey bee has a apisimin on their abdomen, which we call the stinger. And we know that those stingers are different based upon whether we're talking about a drone or queen or a worker bee. The drones do not have a stinger that they use, whereas the queens and the worker bees do. And I always tell people to think of the stinger on a queen bee versus the stinger on a worker bee as being the difference between like a cake knife, those cake knives that are just round and there's nothing jagged, and then a bread knife, where you have a serrated bread knife, which just jagged. So the worker bee has that jagged end to its stinger, whereas the queen bee's is very smooth. And I'd encourage any listeners that are interested to actually just look. You can just Google the images, there's some great electron microscope pictures that show these and they compare them, and if you look at stinger on a queen bee, it looks a lot like a hypodermic needle from a physician. So it's very smooth. And then if you look at the the worker bees, it's very, very jagged. And you can just imagine what happens when that goes inside human skin, and then those barbs just catch in and leave the remaining part of that worker bee's abdomen. And that's important to understand because that remaining part that gets ripped out of the honey bee after it stings you has some muscles on it, it has these retractor muscles surrounding their venom sac or their venom bulb there that continue to pump venom into your arm or hand or wherever you've been stung even after the bee flies away.

**Amy** 06:46
So you mentioned a little bit about just the difference between the bee and the wasp and their stingers. I was wondering about the venom. This is a question that I, Jamie may agree with this, there are a lot of people who ask, is there a difference between bee and wasp venom? And if so, what is it?

**Guest** 07:02
So what's interesting is when you think of the venom from a bee, it's not just one substance in there. It's kind of a cocktail of multiple enzymes and proteins that do very different things, but they do their business very well. The difference between honey bees and wasps is actually fairly minimal. There are some differences. But for the most part, those proteins do the same thing. The majority of most bee and wasp venoms is a protein called melatonin. It's a pothead type. But basically, it takes those red blood cells and basically they expand and they can even explode. And there's also a chemical in it called histamine. And many people are familiar with histamine because it's the main thing that causes allergy symptoms when you're having allergies. And that actually makes your blood capillaries leak and it allows the venom to spread very quickly and rapidly from the site of the sting. So there's very little difference in the actual the venom itself, but where there's a difference is the quantity that you get injected with. So the wasps, they have that reusable stinger, similar to the queen honey bee, so when they sting you, they kind of withhold their venom. They don't they don't give you as much venom. It's actually about between two and 15 micrograms of venom from a wasp sting. But a honey bee sting, unfortunately, has about 50 micrograms, or five times the amount of a wasp sting. And so that's where when I talked about earlier that, unfortunately, honey bee stings are associated more with the more serious reactions and deaths. It's because the quantity from a honey bee because of the anatomy, that stinger being left behind, is so much greater than a wasp.

**Amy** 08:39
Wow. I had no idea. For some reason, I always in my mind just thought because wasps are a little bit bigger that they were injecting way more venom. People always ask, "Oh, which one hurts more? A bee or a wasp?" And everyone always says, "Well, the wasp." It's probably because they sting multiple times. But that's a pretty cool fun fact.

**Jamie** 08:56
Michael, I think it's so important to do what you've done, which is just talk about the biology of things and how they sting and all that that happens, but we really need to focus now on a human reaction to bee stings. Ultimately, there's a different scale, depending on your body's reaction. And I'm going to ask you to talk a little bit about that grading system for reactions. For example, yesterday, I got stung on my right pointer finger. Today, my fingertip is red, my finger is tight, and there's a little bit of pain around the tip. Am I in trouble? Let's talk about the grading system and our reactions to bee stings.

**Guest** 09:32
Absolutely, Jamie. There's so many different grading reactions of allergic reactions. And this doesn't just involve honey bee stings, it involves all other kinds of exposures that can occur to humans. I like to really simplify it with my patients and with other beekeepers. What you really have are two main categories of reactions. You have local reactions, and then you have systemic reactions. We can kind of delve into those, but the local reactions can be then further subdivided into what we would call a small local reaction and a large local reaction. So what you're describing, Jamie, is what we would consider a small local reaction. And what that means is that all of your reactions from your body are occurring at the site of the sting. Typically, within about five centimeters is what we would label a small localized reaction. So I'm guessing that that's probably about the same area that you're being affected with right now.

**Jamie** 10:25
That's exactly right. Do I owe a copay now?

**Guest** 10:28
Yeah, exactly.

**Amy** 10:30
Oh my gosh.

**Jamie** 10:33
But you're exactly right, Michael. Sorry to get us off track.

**Guest** 10:35
No, no, you're fine. So that's your typical bee sting right there. That's your small, localized reaction. Now, and again, all your symptoms are around that site. Now, a large localized reaction is kind of like a reaction to the next level. Typically, that's something that's anywhere between 10 centimeters or

greater, that's where you're getting a large, localized reaction. And what's important about the large localized reactions, they're still localized, meaning that everything that's going on is associated with the tissue connected to the bee sting itself. So you can easily follow point A to point B, there's no jumping over to point C somewhere else in the body. Those are the systemic reactions, which we'll talk about, and the more serious matter that we need to talk about. But it's those large localized reactions, that that's where beekeepers start questioning, "Do I have a problem?" And this happens to me occasionally, too. I think that I've gotten a very good tolerance to bee stings, and then, one of them gets me, I can't get the stinger out right away, and I end up having half of my forearm swollen up later on the next day, or, you know, later on that day. And again, it's still localized, but it sure doesn't look pretty. And those are the kinds of things that get people into their physicians. And I will say, overall, that when a beekeeper tells me that, "I have a very bad reaction to bee stings," typically, you're talking about these large localized reactions, and not the systemic ones, which we'll talk about in a bit. It's still localized, it's still an area, it's just a lot bigger than those small reactions. These are still not systemic reactions, though. They are still localized. They're still your body doing what it does, which is responding to the venom that the bee injected. Part of good care or after care of a bee sting involves trying to do things that limit the reaction to just that small local reaction instead of that large, localized reaction.

**Jamie** 12:16
Michael, this is a perfect segue, I want to ask you specifically about that because this is a very interesting thing from my past. My mother was a nurse, and I was very young when I got into beekeeping. So my father would help me, and my father got stung once on his hand, and his entire arm was swollen the next day. My mother pronounced him allergic to bees and wouldn't let him work bees with me anymore. So from that point forward, I was kind of alone. And now that I've grown up and work in the bee world, I realized that what he had was basically just a large local reaction, and you're spot on. Those stings, really, especially a lot of new beekeepers, they'll see that and get really worried. And beyond swelling, are there other symptoms that may occur with large local reactions?

**Guest** 12:58
Well, yeah, I mean, it's gonna be very itchy, it's gonna be warm, it's going to be uncomfortable. But your question really leads into more of the systemic problems. So if you go beyond just your swelling, your itching, your redness in the local area, then you're getting into what we call systemic reactions, which then we use the word that everyone's really scared of is, which is anaphylaxis. But when you still focus on that large, localized reaction, it still is just localized symptoms, it's just an a larger scale than that small area. And this is the area where I like to talk about with beekeepers the most because there are a lot of beekeepers that I think possibly give up the hobby, and maybe they're just using this as an excuse to give up the hobby, because it can be tough sometimes. But I see some give up the hobby when they have that large reaction, and they're like, "Well, I'm done. I'm gonna have anaphylaxis." And the reality is it's still a localized reaction. And the risk, we probably should spend some time talking about the data behind this because we have very limited data. But as of right now, the best research I could do is that you still only have a 3% chance of having a large localized reaction, and then having an anaphylactic reaction the next time you get a sting, so it's still a rare risk of you going into anaphylaxis the next time you get stung. Just because you have a large localized reaction does not necessarily tell

us that you're going to have anaphylaxis in the future. Yes, you do have a risk for it because every time you get a bee sting, you have a risk of going into anaphylaxis. But it's not much greater having a large one versus a small one. When you look at the percentages overall, you still have to take it very seriously. And I do think at that point, if you're questioning anything at all, you should always go talk to your physician. But at the same time, just because you're having your entire arm swell does not necessarily mean that you've had anaphylaxis or that systemic reaction.

**Amy** 14:42
So let's move into that systemic reaction. What does that look like and what does that mean? And at what point do you decide, "Okay, this is a problem."

**Guest** 14:51
So first off, just to answer, I love listening to you guys's podcast, and Jamie, whenever he's talking about treatments, he always uses the statement that the label is the law. And so I have the same statement in medicine, it's very similar, but it's talk to your doctor first. Always talk to your doctor. So just know that when I'm giving advice here, this is on a general level. But this is not for an individual, you are an individual, and so always bring your questions to a physician. And we can talk a little bit later about, how do you find the right physician, but a systemic reaction is really just that it's one that is not connected to the actual bee stings. So there's symptoms in another part of your body, another organ system in your body. The biggest one that people would be familiar with is you get a bee sting, and then you start having difficulty with breathing. So now, you're having symptoms that are remote site that's separate from where you had the actual bee sting itself. So your respiratory system is now having symptoms, that is definitely probably the easiest systemic reaction, which by the way, most people equate the word anaphylaxis and systemic reaction. They are pretty much equivalent. And so for the purposes of our discussion, if I switch back and forth between anaphylaxis and systemic reaction, I mean the same thing. So you have a local reaction or a local bee sting, but then you start getting symptoms somewhere else in the body, such as the respiratory system. Now, you're in anaphylaxis. Now you're in a serious event, and you need to be seeking some more immediate care, particularly with respiratory issues. But there's other symptoms that you have to worry about as well, or that can happen as well. Respiratory is one of the most common ones. The second most common that people would be familiar with would be generalized skin reaction. So you get stung on your right hand, but you're now getting a rash on your left arm. That's a systemic type of skin reaction. Or you're getting wheals, which are little bubbles underneath your skin, urtacaria, all these things. You can Google if you want to see what they look like, but if you're getting a generalized rash throughout your whole body, that's not just connected to the actual bee sting, now you're in a systemic reaction and those are definitely more concerning. One symptom that you also have to worry about that you see more in kids probably than in adults, they'll get GI reactions as well. So you'll get a bee sting, and then suddenly, the kid'll start vomiting or have a lot of GI issues. That, again, is a systemic reaction, where the reaction has gone from just a local area to affecting multiple organ systems. And of course, these are emergencies at that point.

**Amy** 15:01
So what should someone do if they get stung, and what is the correct way to respond to a sting?

**Guest** 16:53
When you first get stung, the most important thing, like we talked about earlier, is remembering that biology that if you still have a stinger in you, you still have a pump that's pumping venom into you. And so when I was a young boy scout, I remember being taught that you go find the credit card in your wallet, and then you approach it from the right angle, and then the idea is to get that stinger out without squeezing the end of the stinger tip so that way you don't squeeze more venom in. And all that can be true. But we've actually shown in data and in studies that in about eight seconds, that stinger has pumped in all the venom into you that is going to pump into you. So while you're looking for that credit card and that perfect way to remove that bee stinger, it's still pumping venom into you. So the best advice we can give is that the moment you get stung, the very first thing that you should do is try to get that stinger out of you. That's going to minimize the amount of reaction. And in fact, in one very, very limited study, it showed that if you can get that stinger out in less than eight seconds, it'll reduce the size of the welt by about 30% compared to if you leave it in there. So try to get it out of there. And then if you take more than 10 seconds to get it out, at that point, removing the stinger, while you need to do that eventually, it becomes less important at that point because it's already pumped into you all the venom that it's going to pump into you. You move on from that point into secondary measures, which are the things like putting ice on it, you can take some over the counter medications. I recommend the the newer antihistamines, such as Zyrtec or Allegra or Claritin, which go by cetirizine, levocetirizine, or loratadine, which are the generic names for those medications. Benadryl is a popular one that people recommend for bee stings. I don't recommend it as much because Benadryl isn't as safe. I mean, elderly patients and elderly population, it's a first generation antihistamine. The newer ones work just as good and don't have the side effects of the fatigue that comes with it. But you can still use Benadryl. It's still an appropriate medication, just know that there are newer ones on the market. Your aftercare is important. And again, we're still talking about just the localized reaction. There are some common myths. Some people have studied things like vinegars and vinegar paste. They've shown that those actually don't work that well. Again, cool compresses and just keeping the area clean and free of infection, and like I said, you still want to get the stinger out at some point, so you don't have a source for further infection that's going on. Interestingly enough, some people have asked whether or not the bee sting itself could introduce bacteria, or some kind of like tetanus or something like that. And they actually have done some studies, there's been no cases of a human getting some kind of bacterial infection from the actual stinger itself. I mean, the the wound itself can become infected, but the actual bee sting does not seem to carry any kind of bacteria that humans need to be aware of, and they specifically give the example in the emergency room that, no you don't need to get a tetanus booster from getting a bee sting in the emergency department.

**Jamie** 19:59
Michael, I have to tell you a story since I'm full of stories. When I was a kid, I was cutting grass at my grandfather's house and got stung. And I was already a beekeeper at this point. So I'm not sure why it mattered to me. But I went and saw my grandfather, and he was a Southern farmer, and he always walked around with tobacco in his mouth. And so he just hawked up a big ol' spit, spit that thing on my arm, because he told me, "Tobacco will make sting problems go away." So all of that you just said, you're telling me I just endured hat big old thing of spit on my arm for nothing?

**Guest** 20:33
Well, it may have done something. I mean, it still feels good, and there's lots of things that are what we would call distracting. So you could consider that the treatment. It distracted you from the sting.

**Jamie** 20:39
I'll say.

**Amy** 20:49
Should we go into like jellyfish stings now? No, I'm just kidding.

**Guest** 20:53
We'll save that for a different podcast.

**Jamie** 20:56
So Michael, that does lead to an important thing, right? You just talked about what people do when they get stung, get the stinger out, some ways that they can treat the site instantly. But you've already mentioned it, there are people who do have true allergies to bee stings. And so, at what point should an individual, after they are stung, at what point should they go to a doctor? What's a worrying symptom where they should go to their physician? And secondly, who is the correct physician to visit?

**Guest** 21:23
Those are great questions. So let's first start with the emergent cases because that's how doctors think. We start with what will kill you first, and then we work down, that's just a good way to keep people alive. So if you're having those systemic reactions, if you're having generalized rashes across your body, if you're having GI symptoms, if you're having breathing symptoms, if you're feeling confused, dizzy, lightheaded, these are all systemic anaphylactic symptoms. Those are an emergent situation. And my best recommendation is seek immediate help as quick as possible. These kinds of situations can go downhill very rapidly, blood pressure can be lost and go down very quickly. So if you're having some wide systemic reactions, you need to be get some immediate care. And if that involves calling 911, that's what I would recommend, especially if you have a known history of this happening before in the past, and it's happening a second time, then this is very serious, and you need to get help quickly. So hopefully, you have some access to some kind of epipen or something like that, if this has happened in the past, and if you do, then you need to administer that right away. So that's the emergent cases, seek help, seek care. I always also tell people, we can talk more about epipens in a bit, but remember that an epipen usually only lasts about five to 10 minutes. So if you're in a rural setting, when you get prescribed that epipen, don't split up that epipen 2-pack, they always come in a 2-pack. They come in a 2-pack not so you can keep one at home and you can keep one in your car, they come in a 2-pack because they only last about five to 10 minutes. And if you're in a rural setting, you probably is going to be a little more than five to 10 minutes before some help can get to you. So make sure you have both those epipens available. That's the emergent kind of setting. So then the less non-emergent setting where you're questioning it, you're not having breathing problems, but maybe you're having a large localized reaction, that's where you can go in and you can talk to your physician, you can go to an

urgent care, you can seek immediate care. But you have to be careful when you're talking to your family physician or the urgent care. You have to realize, and as far as I can recall, I don't remember having any good sit down talk about how to treat bee stings in med school. It's not that doctors don't know how to treat bee stings. It's just there's a lot of things we have to learn to become physicians, and bee stings tend to be pretty self-limited. As we said earlier, only about 100 people die of them a year, and there's a lot of other diseases and pathogens that we need to learn about that are more important and that we're going to run across in our career. So you have to talk to the right physician in the long run. Urgent care and immediate care, that's great. But if that person says, "Well, you had some bad swelling, here's an epipen. Just carry it around the rest of your life." I would always say, before you write yourself off as never being able to see bees again, find a physician who has treated these kinds of diseases before and that's most likely going to be an allergist and immunologist. They're going to be somewhere, you may have to go drive a bit to find one that you know you can work with. But an allergist/immunologist should be the final say, in my opinion, as to whether or not you need to carry that epipen around for the rest of your life. Now, I'm not saying ignore your family physician or ignore that first doctor. You see, I'm just saying get a second opinion before you say that I can't ever be around bees again. Because like I said, an urban physician is not going to see that many bee stings. They're just not going to treat them. It's a statistics game, right? And they're just not going to see that many, so they're not gonna have that much experience with it. Whereas an allergy and immunologist is dealing with these kinds of things for a living and so they can give you the right opinion and the right direction. But there's been studies that have shown that doctors do over prescribe these epipens and they cause actual harm to people because, now, for the rest of their life, they're carrying around these epipens and they're worried that "Is today the day that a rogue bee is going to find me?" So you want to make sure you have the right diagnosis from the right type of care provider. And they can also give you the right type of education on how and when to use those epipens that you need. So, again, I guess my take-home message from this is, please don't write off bees just because you walked into your doctor and you weren't having systemic symptoms, and he said, "Oh, here's an epipen." Seek a second opinion from that allergist and immunologist. And the cool thing is that in today's day, we actually now have some prescribed honey bee antivenom that we can actually use for immunotherapy. So if you're a die hard, and beekeeping is your living, and you want to continue beekeeping, there are some options available now to your allergist and immunologist to actually expose yourself to gain a tolerance so that you can have less risk in the future.

**Amy** 25:30
That's all great information. So Dr. Brown, before we started recording, I was kind of asking you a million questions. And we have a lot of beekeepers who reach out to us who tell us stories and just things that have happened to them. And I had one beekeeper, in particular, who said he got stung in the eye, and then he went to the doctor, and nobody really knew what to do, and so they weren't sure if they should leave the stinger in or if it was going to cause more harm to try to get it out. And so we were kind of talking behind the scenes about maybe some of the challenges, and you've mentioned it a little bit. But let's talk about that just a bit more as far as the research that is out there on these cases.

**Guest** 26:05

Yeah. So Amy, that's a great example there of what we were just talking about where the physicians themselves were not familiar with what to do with a bee sting. And it goes back to my point that you need to seek a physician who actually has some training and some exposure in this. I work in a rural setting as opposed to an urban setting. So I do see a random amount of people coming in with stings and wanting to know what to do with that. Also, being a beekeeper, other physicians contact me and say, "Hey, Dr. Brown's a beekeeper, he must know how to treat a sting." And so they call me and ask me for advice. So over the years, I've just built up an exposure and experience with this. So, finding that right physician is terribly important to do. In the case that you gave, the example is, yeah, we gotta get that out of the eye, I would not have left the stinger in the eye. But at the same time, if they felt uncomfortable removing something like a stinger from an eye, they should have called an ophthalmologist or something like that to get that removed and taken care of so. So again, it's a great example of finding physicians that have that exposure. Most physicians are going to be able to do a fine job of stabilizing and treating the really, really bad stuff. But in my world, just like in beekeeping, it's the stuff that's in between, it's the gray areas that are the hardest to treat, and you've got to make those decisions, and realize that your physician is motivated to not kill you. And what I mean by that is that they're going to err on the side of saying, "Yeah, just carry an epipen," because you know, we carry malpractice insurance, we don't want to get sued, we don't want you to be the person that gets stung by a bee and then dies, and we forgot to give you an epipen. Physicians are going to err on that side, and that's why it's so important working with a professional. And again, we're very limited in this data. So you can't go and do a study and say, "I'm going to sting 10 people and and then another 10 people, I'm just going to inject with saline, and we'll see what happens to the people get stung." We can't do those kinds of studies. So all our data on beekeeping stings is done what we call retroactively, which is the lowest grade, lowest quality of evidence, Well, besides professional opinion, which is what I'm giving you right now. So what I'm giving you is the lowest grade of medical evidence, but the next lowest grade would be what we call a retrospective study or looking backward. And that's unfortunately, where our data is. We're just very limited on that data. And so that's, again, why it's important to work with experts that have some kind of experience so that they can give you the best professional opinion out there.

**Amy** 28:24
Absolutely. As beekeepers, we are going to get stung. That is just part of the fun of having bees. Right? But my last question for you is, do you have any recommendations besides not keeping bees on how people can avoid getting stung?

**Guest** 28:39
Yeah, so that's actually an interesting question. The question you should also be asking, Amy, is should beekeepers avoid getting stung? Does that raise the risk of anaphylaxis or systemic reactions in the future? There is some very limited, once again, retrospective. So it's what we would call very poor evidence. But there is some evidence that, basically, you should either get stung very little, which will be one or two times a year, or you should be get stung more than 10 times a year. And it's those people that get stung in between that seem to have a higher rate of having systemic reactions on the line. So once or twice a year, usually gonna be okay, or more than 10, you're getting exposed so your body's not having the anaphylaxis, but it's the in between that's really the gray area that we think,

again, we think based on retrospective data, that would increase your risk of having systemic reactions in the future. So that's why it's an interesting question that you ask. And so I leave it at that. If you're not going to get stung, do a good job, wear your equipment, wear your veil, and YouTube can teach us better about how to make sure your bees aren't angry and trying to sting you than I can. But if you are getting stung, then my advice to beekeepers is, well, keep getting stung, and don't make it an irregular event so that way your body can get used to it. And again, it's hard for me as a physician to say, "Oh yeah, go out and play with the venomous insects and get stung as much as possible." It doesn't sound like the best advice in the world. But like I said, we have limited evidence that shows you should either get stung very little, or you should get stung a lot. As we said before, we're dealing with very small percentages here. So, 3% of people who get stung usually go into anaphylaxis, or have a history of anaphylaxis. And then when you talk about, at least in the United States, a country of several hundred million, we're only having 40 to 100 deaths a year related to stings. That's extremely, extremely small amounts. Again, we're getting to that low quality of evidence, but that's my opinion. And I'd say it's worth the two cents that I put behind it.

**Amy** 28:39
I think that's great. All right. Is there anything else that you wanted to share with our listeners before we finish out?

**Guest** 30:31
Once again, I always hate to see a beekeeper leave the hobby because they've had a bad sting. And what I mean by bad sting is going back to those large local reactions, not the anaphylaxis. But I really encourage, get an opinion from a physician who's familiar with these kinds of things, and see if that really is what needs to happen or needs to occur. Again, like I said, follow your physician, follow your physician's advice and their direction, but make sure that it's somebody that you trust and has that exposure in stings. I tell patients, one of the reasons I keep bees is because it's cheaper than therapy. For me, keeping bees is so good for my mental health. It's something that is just relaxing, I can't wait to do those first inspections every spring. I sure hope the snow that I see on the ground goes away quickly here so I can get into my beehives. I'd hate to see somebody who has that same love and that same experience have to leave this hobby just because of what really isn't a very serious reaction in the first place.

**Amy** 31:31
I think that's great advice. Thank you so much, Dr. Michael Brown, for joining us today. So excited to have Dr. Brown on. I mean, we've had doctors, obviously, like PhD doctors. I don't know if we've had any medical doctors on our podcast.

**Jamie** 31:54
May be a first.

**Amy** 31:55
It may have been a first after what? We're in year four?

**Jamie** 31:59
Shame on us.

**Amy** 32:01
I know. I think just something to know as far as things go, again, as beekeepers, we're always getting stung. And especially at the lab, we always have the beekeepers working with one another. So there's not ever a single time where someone's out in the apiary completely by themselves. And I think that that's something to at least take note of here. As far as things go and being able to recognize problems, not just a sting incident with yourself, but if you're with someone, recognizing what to do if someone is having a bad reaction.

**Jamie** 32:33
Amy, there's so much to unpack here because this is really an important topic. And honestly, when I go to see beginner beekeepers or go to beginner beekeeper conferences, this isn't really covered enough. People tell you what stocks to bees to get, whether or not you should use this style of hive or this style hive, but in reality, one of the first things you need to teach people relates to stings. And so it's great that we had Michael on to talk about that, because stings can kill. They can do other things to you, right? If you get stung in your eyes, for example, enough or whatever, you might lose your eyes. So this is an important topic, and it needs to be covered. So we were fortunate to have him here. As beekeepers, we tend to think about ourselves, the longer we keep bees, the more we're stung, the less we think about it for ourselves. But we're often taking friends, we're often taking spouses, our children, we're often taking people from the general public, who we're giving tours of our apiaries, all of these things happen under our watch. So we have to be able to recognize the symptoms that would require us to take ourselves to the doctor, or recognize those symptoms in others to know whether they need medical help as well. And that's why it was so good to have him on board.

**Amy** 33:45
Absolutely. And I thought the other recommendation that he had was either like don't get stung at all or get stung often. So I guess we just need to go out to the backyard and get stung more often because not getting stung at all is probably not an option.

**Jamie** 33:59
It's funny you say that. That's one of the things that he said that I actually didn't know the answer to. I've taught on stings a lot myself and everything else I've heard before, but that was particularly interesting because I do know bee researchers, as an example, I've employed people who've could tolerate stings for a while, and then got one sting and had a true allergic anaphylactic reaction to it. And so he didn't give a recommendation. He just mentioned data. But he said you can develop an allergy to bee stings, an anaphylactic level allergy to bee stings. But more often than not, it happens to people in that middle ground. They're either not really getting stung a ton, 10 or more times, they're not getting stung a few, one or two times, they're kind of in that gray area per year, and that can lead to developing this out, and that's why it's so important. You could have kept bees for 70 years and still become allergic to bees. So you have to recognize those issues. And I will tell you, to me, the most important thing that Michael said, and I say it a lot when I talk about bee stings, because I'm a PhD and not an MD, I tell people,

when you are in doubt, seek medical attention. If you are stung, and you are experiencing a symptom that you're worried about, don't go through your mental checklist of is this a problem? Seek medical attention. When in doubt, talk to a physician. That's always the safest recommendation. When in doubt, talk to a physician.

**Amy** 35:25
Yeah, I think that's great. It was really great to have him on and hopefully, well, I don't know, maybe there'll be more research with stings in particular. So we'll bring on more guests who have the medical experience to be able to help advise us without that copay that you were talking about, Jamie.

**Stump The Chump** 35:50
It's everybody's favorite game show, Stump the Chump.

**Amy** 35:59
Welcome back to the question and answer segment. So our first question today, this beekeeper's wondering, why is it that in early spring, this person goes to the hive, it's booming with bees, it looks like this. This colony is just exploding. But then there's no queen, no eggs, no evidence of the queen, no brood at all. So what has happened to the queen? And why are the bees even still there? I think that takes me to my next question, actually, the follow-up question. So let's say you've got a new queen, she's gone on her mating flight, a dragonfly snatches her out of the air and she doesn't come back. Okay, so from a beekeeper's perspective, at what point do you requeen on your own?

**Jamie** 36:26
So I've got two possible explanations, Amy, and they both basically lie at the feet of swarming. So let's start with the first explanation. It is conceivably possible that the queen simply died, right? You go in your colony, she died. In order for there to be no brood, she would have had to have died three weeks ago because it takes three weeks for the last worker egg to make all its way through the developmental stages to emerge as an adult bee. So 21 days later. So if she died, she would have died three weeks ago. This individual is saying there's no queen, there's no eggs, there's no brood, there's nothing. Maybe she died, and you're just seeing the final results of the colony not having a queen. You would say, "Well, it's still full of bees." That's correct. But remember what they're doing in spring? There's a massive growth of colonies in spring anyway. At the end of winter, beginning of spring, there's all these incoming nectar and pollen resources so colonies are growing fast at this stage. So the death of a queen three weeks ago, all of the eggs she laid up until the point she died will have gone through their full developmental stage. All of that would eventually have to emerge. So you could have a colony whose population is booming simply because they were in growth mode when the queen died, and now you've got all of these bees. My guess is, if there's no brood, truly no brood, then the colony would have tried to requeen themselves early after the queen's death. If it's three weeks later, you should have a queen that has emerged, probably around week one or two after the queen died. And she should be going on her mating flight and laying eggs soon. So I would say somewhere between weeks three and four post queen's death, you should have a laying queen. Wait just a minute, you might actually have a virgin queen in the nest, she might start laying. My second explanation beyond the queen simply dying is that your colony quite possibly swarmed. And I said early that both of these explanations lie at the

feet of swarming. Well, how does the queen die lie at the feet of swarming? Well, the colony could have tried to swarm and the queen been unable to go. And so she leaped out of the entrance of the nest, hit the ground because she couldn't fly and was eaten or picked off or died in the process. So the bees that tried to swarm went back to the nest and now you've got this queenless hive. Or if she tried to swarm but couldn't crawl back into the nest, the bees might kill her and try with the first virgin queen and the second virgin queen that emerges. So lots of things that could lead to a dead or missing queen during swarm season. My guess is, given the time of year, the second explanation is the likely explanation, that your colony actually swarmed, that your old queen and 30 to 70% of the bees left. And then you would say in your question, "Well, Jamie, that can't have happened because I've got all of these bees in the nest." Well, remember, colonies swarm as there's lots of resources available in the environment, so that colony has been in growth mode for a month or longer. So when they swarm with the old queen, yes, you lose half of the bees and yes, intuitively, you think you would notice that missing population. But that's not a fair intuition. That queen would have left with the swarm having left behind tons of brood and all of that brood is going to emerge at some point. So three weeks later after a swarm, colonies often don't even look like they swarmed because the bees that left were replaced by the bees that emerged. You don't usually notice the colony swarmed in spring until you see the absence of a queen. A few weeks later, it catches up with them because they're not producing any new brood, and then the population starts to go down. So my guess is the answer to the question is that the colony swarmed, the brood replaced the bees that left, and your old queen has gone with the swarm and your colony is in the process of producing a new queen. Great question. In that case, Amy, the colony is potentially doomed. So let's let's think about this from the biology of a colony effort swarm. So when a colony swarms, they typically leave with the old queen, the first swarm does at least. And it leaves behind roughly half of the adult bees, all the brood, and colonies typically swarm after they've already begun making queen cells. So the queen that will replace the one that left. So usually, the first queen to emerge basically has two choices: become the reigning matriarch or leave with another swarm. So that's when you can get secondary swarms with virgin queens or tertiary swarms, because the next virgin queen will also go with the swarm. But let's just say that the swarming process has stopped. In other words, the first virgin queen to emerge doesn't leave with the swarm, she'll kill her developing sisters in their cells so she becomes the queen of that nest. If she goes on a mating flight and is picked off by a dragonfly, by a bird, by bad weather, whatever happens, that colony has no backup plan, because by the time she's taking a mating flight, that queen will have killed her competition. So there usually would be no more queen cells in development. So if the mating queen dies, that colony is essentially doomed. So usually, what will happen at that point is a couple of weeks later, workers' ovaries will develop and you'll get laying workers. And so in that case, when you see that, it's very problematic because it's difficult to just requeen the laying worker colony. So what I do, if what this individual is asking about happened to his or her colony, they go into it, it's queenless, it's early spring, there's lots of bees, I usually give them a week or two after I find them queenless, I'll judge based on the amount of brood that's in the nest how long they've been queenless, and I'll usually give them a week or two to get a new queen and for her to mate and start laying eggs. If I don't see that happening, then I will order a queen to replace her with or I will move frames of eggs or young larvae from colonies that do have queens into this colony so they can begin making queen cells from those young larvae because you don't want them to develop into laying workers because that's a little bit trickier to deal with.

**Amy** 43:23
Alright, so for the second question, do worker bees eat royal jelly?

**Jamie** 43:27
I have been getting this question a lot lately and there must --

**Amy** 43:31
You have? I wonder why.

**Jamie** 43:32
Yeah, yeah, I've had a couple of email questions about this. Someone posted a question to me about this, and now there's this. Usually, when lightning is striking more than once in the same place, it's because someone has given a talk somewhere, someone wrote something on some forum that lots of beekeepers are questioning and they want my opinion about it. So do worker bees eat royal jelly? Well, the general teaching around the food that immature bees eat is that drones, queens, and workers are fed similar diets the first couple, and I'm rounding everything off, the first couple of days of their larval development. And after that, queens remain on that diet, and workers and drones get a modified diet. And as workers and drones age, there will be pollen and nectar included in the diet as well. So essentially, the way it's typically taught is everyone starts off with what is called royal jelly. And then queens remain on that throughout their lives, but around day two ish, the drones and the workers fork off of that diet to a modified diet. As they age as larvae, there will be bits of pollen and nectar or honey mixed into their food. So technically, yes, worker bees, as immatures, do start on royal jelly.

**Amy** 44:55
But what about adults?

**Jamie** 44:57
So if you damage a queen cell, worker bees will clean out that royal jelly. So this is a supposition. So I'm going to take off my knowledge hat and put on my suppose hat. Worker bees don't typically waste stuff. So my guess is they are removing that royal jelly from queen cells that are destroyed. They probably consume it. That's my supposition. I don't think if it's put into the cells of developing larvae that there will be worker bees that come behind those and eat up that royal jelly. So I don't think they consume it in the sense that the word consumption means take it in and use it for future purposes. But I do believe, probably, if you remove a larva from a cell or you damage a queen cell, the worker bees will go in and clean out that brood food or royal jelly and probably not discard it, they will probably just take it back in. But that's just my guess.

**Amy** 45:53
Yeah, that's really interesting. I have seen that behavior before. If we're doing like swarm control and and taking out those queen cells, then usually the bees will come in and do something with it. Cool. All right. So for the third question. The third question is does the size or shape of a queen cell predict the queen quality?

**Jamie** 46:14
Yes, but it's only generally. If you're listening to this podcast with regularity, you know that I say these kinds of things all the time. It's biology. Biology is messy. There's lots of variation with any one statement I can make about a behavior, task or whatever. So in this case, I'm overgeneralizing. But generally speaking, the larger the cell, the more royal jelly it holds, the more royal jelly that a larva gets younger and throughout its development, the bigger the queen it will be. And generally speaking, the bigger the queen, the better the queen. Now, small queens can be amazing. Big queens can be terrible. But big cells are an indication of big queens developing in them. They are big because they are well-fed, attended, beginning at a very young age and optimally reared, so to speak, and become these, quote, good queens. But again, you can go through the trouble of only having big cells and still get the occasional bad queen and only having small cells and get the occasional good queen. But because of this, because larger cells usually mean larger queens, which usually means better queens, when I find a queenless colony that has multiple queen cells in it, let's just say 10, I will remove all but the largest two cells. I'm basically selecting for myself the cells that I want the new queen to emerge out of. I'll remove, say, the eight smallest out of this pool of 10 cells. There was a time in my beekeeping career I would have just removed all but one. But these days, one cell can be bad. So I don't like to put all my eggs in one basket, so to speak. So I usually leave two cells, the two largest cells, and I usually leave them close together so that the first queen to emerge won't have to search hard for that second queen and can do away with it. I don't really want to emerging at the same time because you can get secondary swarms or fights to the death where both die, things like that. I use this, quote, larger cell mentality to make decisions about which cells to leave when colonies need a queen. But again, that's kind of overgeneralization. It's not foolproof, but it's generally what I do and generally leads to a better result.

**Amy** 48:49
So, our listeners don't know this, but David Tarpy was one of our seminar speakers, and we had breakfast with him and just asked him all these questions about queens and who emerged, and he was talking about the different behaviors that some of the virgin queens had as soon as they emerge. Sometimes, they will, what did he say, Jamie? He said some of them will even wait inside the cell, even if they're ready to emerge, but they'll just kind of wait for the other queens to emerge that they can battle to the death and then they're exhausted. And that last queen will come out and re-energize and, and will win all? Do you remember that conversation?

**Jamie** 49:21
I do. You're opening a can of worms because I'm going to say some more. But, Amy, you're making a good point. So Dr. David Tarpy is a professor at North Carolina State University and you're right. Very recently, a few weeks ago here at the University of Florida, he was an invited seminar speaker for our department. So you and I and Dr. Cameron Jack and others from our lab got to spend some time with Dr. Tarpy. And if you're a listener out there, you know he's been interviewed on this podcast. Among his many skill sets is studying queen honey bees. He knows a lot about queen honey bees. Amy, you're right. He's making exactly those claims. If you, again, go back to my scenario and take out the humans, okay? So you got this colony that's queenless. Let's just say the colony builds 10 queen cells and let's

say they're all healthy enough to survive. David was mentioning all the conflict that will go on between those queens. For example, the first one to emerge, if no one else emerges, can just go kill her developing sisters. And how she'll find them is she'll use a series of piping noises, and she'll pipe and then the queens developing in their cells may reply back. So she'll find them that way and kill them. So there's this communication that's at work. Now, if two emerge at the same time, they'll fight to the death and the winner might go kill the other ones that are still developing. But another alternative is that they work really hard, just like what you said, Amy, tire one another out, while all the while, queen in cell number eight is just waiting for her chance for her sisters to get tired and weak, and go kill the other ones and damage each other before she comes out of her cell and takes out her competition. So imagine all of this conflict between these queens, all who want to be the one who are pushing their genes out into the future population. So yeah, I mean, Tarpy has researched, other people have researched. I mean, gosh, the conflict that goes on in the nest is really remarkable. And so it's funny all this discussion came from the idea of, well, do bigger cells typically make bigger queens? Oh, there's so much to know here. So much to study. Great questions today.

**Amy** 51:32
Alright, so for our listeners, you know what to do. Go ahead and send us questions on our social media pages, or you can send us an email. Thanks for listening to today's episode. This episode was edited and produced by our podcast coordinator Mitra Hamzavi. Thanks, Mitra.

**Jamie** 51:57
Visit the UF/IFAS Honey Bee Research and Extension Laboratory's website, UFhoneybee.com, for additional information and resources for today's episode. Email any questions that you want answered on air to honeybee@ifas.ufl.edu. You can also submit questions to us on X, Instagram, or Facebook @UFhoneybeelab. Don't forget to follow us while you're visiting our social media sites. Thank you for listening to Two Bees in a Podcast.