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EPISODE 233 TRANSCRIPT

Jamie

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

Hello, everybody, and welcome to this segment of Two Bees in a Podcast. Today, I am excited to be joined by Dr. Joshua Jakum, who is an MD, he's a medical doctor. He's a board-certified pediatrician, the Fellow of American Academies of Pediatrics.

He's also an Eastern Apicultural Society master beekeeper and is calling us from Virginia. I'm really excited for Dr. Jakum to speak to us today because we actually met at Apimondia in Copenhagen in Denmark. And he came up to me and said, I really want to talk about honey and botulism.

And this is something that I feel like not many beekeepers are really talking about. So, we brought him on to talk about honey and botulism, and I'm really excited for that. But yeah, thank you so much, Dr. Josh, for joining us today.

Dr. Joshua Jakum

Thank you so very much for having me. I'm very excited to be here.

Amy

You are also a listener of the podcast and so as you know, we always ask our podcast guests to tell us a little bit about yourself and how you got into the beekeeping world.

Dr. Joshua Jakum

Thank you. Yes, I think my background will explain why I'm interested in this topic within beekeeping. I grew up on a small farm in Maryland. We had a small orchard, and my dad kept bees. I loved science as a child, and my parents were actually teachers, and beekeeping was just part of that education.

But when I was a sophomore in high school, I was accepted into a program through George Washington University that places students in science apprenticeships at Department of Defense laboratories to foster research experiences.

And I was fortunate to work in the US Army Medical Research Institute of Chemical Defense, and I started in the Neurotoxicology branch before transitioning to the Biochemical Pharmacology branch. And the mission of this lab is to protect members of the military from chemical and biological warfare agents.

And I continued to work at the lab through high school and all four years of college. I attended the University of Maryland at College Park, and I studied physiology and neurobiology, but I grew to learn that I just wasn't a bench top researcher and I enjoyed clinical science.

So, I applied to medical school, and I attended Emory University School of Medicine in Atlanta, where I loved the heat and humidity. And for those that don't know, Emory University is located next door to the Centers for Disease Control and Prevention, the CDC.

And I was fortunate to learn from many professors who taught both at the medical school and were CDC medical officers. And it gave me a really great appreciation for public health. After medical school, young physicians attend an internship and then residency.

And I attended Brown University in Rhode Island studying Pediatrics. But the chill in New England was much too cold for my southern sensibilities. And so, I needed some heat and humidity again. And I decided to commit myself to rural medicine. And I've practiced primary care pediatrics for the past 20 plus years in Virginia.

And one summer, two of my emergency medicine physician friends invited me over to harvest honey from their apiary. And then I gathered up my own children, and we had an amazing time. And it struck me how much I missed beekeeping. And so, I had planted, by that time, my own small orchard.

And I was always gardening, but this gave me an opportunity to farm while on the intense work schedule of hospital admissions and stat C-section deliveries and a very busy medical office. So, within pediatrics, one of our philosophies is the concept known as anticipatory guidance.

And at each well child check, your pediatrician provides what we call age-appropriate advice before problems arise. And this includes helping parents to know what to expect next in a child's growth and development. Things like how to place an infant to sleep safely or how to baby proof a house for a busy toddler.

And one of the things that pediatricians are trained in is to caution parents at the four, six, and nine month well child checks, do not feed your infant honey. So, I love beekeeping. I love honey. I'm in my office. And I realized the duality of this moment.

I know why you shouldn't feed infant's honey. As beekeepers, we're tasked with educating the community about the wonders of beekeeping, the importance of bees and pollination in our food systems and our appreciation of the products, such as honey. However, I never heard beekeepers warning consumers or understanding the importance of this age-appropriate caution.

And the key is that honey is the single identifiable and avoidable food source of a bacterial spore that causes a disease known as botulism. And this toxin is one of the most lethal neurotoxins known, and infants are an especially vulnerable population.

Jamie

So, Josh, you are absolutely the person to have on this conversation about this topic that's actually fascinated me for a long time because you know, I often get asked about it. I've got four kids of my own. I had to think about it myself when my kids were young. So, I want to explore this further with you.

So, let's talk about honey and botulism. First things first, what is botulism and can you give us an overview of the history of botulism?

Dr. Joshua Jakum

Absolutely. Botulism is a rare but serious illness caused by a toxin that attacks the body's nerves. And when we absorb this toxin, it inhibits the release of acetylcholine, a chemical signal from a nerve ending to a muscle fiber.

And if your nerves can't communicate with the muscles to move, the result is weakness and paralysis. And the key is, the blockage of neurotransmitter release is irreversible. This neurotoxin is so deadly that the 1972 Biological and Toxin Weapons Convention prohibited research and production of it as a bioweapon.

The Japanese, called Shirinko, used it in Tokyo, actually, on three occasions in the early 1990s. But the attacks failed, and it's so deadly that an estimated one gram of the aerosolized toxin could kill 1.5 million people.

Clinically, botulism causes trouble swallowing or speaking. You get a dry mouth, you get facial weakness, blurred or double vision through the eyelids. You begin to have trouble breathing, you're nauseous, you vomit, you get stomach cramps and muscle paralysis, which can unfortunately lead to death.

And the toxin is made by the bacteria Clostridium botulinum. And these bacteria can release the toxin into food, into wounds. But you know, obviously, I want to discuss specifically within the intestines of infants. But first I want to describe, you know, some of the important aspects of these bacteria because it's key to understanding why and where we worry about it.

It's known as an obligate anaerobic bacillus, which means that oxygen destroys it. Most importantly, it produces spores, and a spore is a dormant phase of a bacteria with a protective coating as it waits for the ideal conditions to begin growing once again.

Clostridial spores are found everywhere in the world, in soil and dust, and they're very resistant to temperature changes, sunlight drying out, and even radiation. Spores can survive boiling for several hours at 212°F, which is 100°C for the international podcast listeners.

Spores help the bacteria survive in the environment even in the most extreme of conditions. And the breakthrough in discovering botulism was actually from a public health investigation. In 1895, a botulism outbreak occurred after a dinner in a small Belgian village, and there was a professor of bacteriology that was sent to investigate.

And the story goes that after a group of musicians attended a dinner at a local inn, the musicians consumed both pickled and smoked ham and fell ill. But reportedly, the horn players in the band were spared the illness because at their table they only ate the bacon.

And of the nearly three dozen members in the band, ten became seriously ill, and three of the youngest members actually died less than a week later. And so, the professor examined the food and the victims, isolating the bacteria from spleen or autopsies and from actually the insufficiently cured ham.

And the Latin word for sausage is actually botulus, which is why Clostridium botulinum earned its name. And so, several outbreaks of botulism in the United States led to what are our current federal regulations for food preservation.

In 1919, an outbreak with deaths from canned olives led to the use of actually high temperatures as an industry standard for preserving foods. And in 1973, an outbreak from canned soup led to further regulations for actually the safe processing of canned goods, specifically.

And so, you can unknowingly consume the toxin that's already created within improperly stored foods. You can get the disease from an open wound that is dirty and the bacteria enters the wound from soil. And we actually use the toxin in medicine.

And you've certainly heard of Botox, but that's actually what it is. This is medically administered botulinum toxin, and in my world, pediatric orthopedists use it for patients with cerebral palsy who have contractures or spasms, and neurologists use Botox for migraines.

Dermatologists use it for cosmetic purposes. And these are controlled uses of the toxin. But where the toxin is most deadly is when an infant consumes the spore and the bacteria actually grows in the intestine, releasing the toxin.

Amy

There's so much to unpack with that, and now I'm scared, Jamie. I'm scared of eating anything and you know, oh my gosh, and eating this bacteria. You never know. Wow, that's interesting. So, you know, in Extension, Dr. Jakum, we actually have different programmatic areas. And so, Extension agents, they have lots of different topics that they specialize in. One with the family consumer sciences agents, they are all about food safety and food preservation.

And so, I'm glad that there are educators out there that kind of help with that stuff. So, you were talking about botulism and the bacteria, the history of it, you know, and controlled uses of it, which I learned something new today. I'm learning a lot, but I didn't realize that Botox was also part of that.

But what makes honey specifically a risk for botulism? And then of course, on top of that, you had mentioned this before, but specifically with infants, why is it more even more of a concern with infants?

Dr. Joshua Jakum

Oh yeah, so honey can be a perfect place for spores to remain and actually wait to regrow as the bacteria. Honey has a low water content, and that's why you use a refractometer to check the water content before you extract your honey.

And there's very little oxygen in honey and those spores can survive in that anaerobic state, that low oxygen environment. The low pH in honey keeps bacteria from growing but does not prevent the spores from surviving and waiting.

Overall, Clostridium botulinum spores are found in 4% of honey samples from around the world. Here in the United States, 7 to 10% of honey samples contain the spores. And for reasons we do not fully understand, when infants consume spores, the bacteria emerge in the large intestine, they grow, and then they begin to produce that toxin.

Infant intestinal botulism is the most common form of botulism, and the infant gut microbiome, which means the bacteria that are growing in our intestines, in the infants, it has a low species diversity and a high variability among individuals.

And over the first few years of life, humans achieve, you know, a stable microbiome through our diet. And we believe this keeps older children and adults safe from intestinal botulism. When I talk about this, you know, I think of vulnerability as akin to an invasive plant in a meadow.

If native plants are growing successfully, they can compete with the invasive or non-native plant and prevent it from flourishing. However, if the meadow is not established or patchy in native growth, then invasion is easier.

This is of course a promotion for native plantings and promotion for forage for honey bees in our world. But in the infant or intestinal form of botulism, it only requires ten to one hundred Clostridium botulinum spores to cause infection.

And one study suggested the infectious dose or an infant botulism case, it's thought to be as low as a single spore. A gram of honey can have tens to thousands of spores. And so, honey consumption is so linked to intestinal botulism that it's one of the systematically collected pieces of information for all clinical cases in the United States.

Jamie

So, Josh, that's a really good background. I'm curious what the clinical signs of botulism poisoning are. You know, how does this express and manifest in those infected?

Dr. Joshua Jakum

Yes, most cases occur between three and five months of age, when parents often transition from exclusive breastfeeding or formula feeding to the introduction of solid foods into an infant's diet. But there are case reports of infants infected less than one week of life.

Symptoms are initially subtle in an infant. Constipation is often the first symptom. And if you're a parent, you know how much you talk about babies' stools, and lots of kids get constipated, but other symptoms will progress. The infant will appear floppy due to worsening muscle weakness, they will have trouble controlling their head, they will have a weaker cry, they will drool more, they appear tired, they often will have goofy eyelids, and sadly, they progress to difficulties with feeding or sucking.

An important feature is that they never have a fever, and other than a disruption of their vision, they maintain all sensory response. So, the really remarkable thing about this disease is they can feel, but they can't correctly move due to the progressive paralysis.

Greater than 99% of infants are hospitalized when they're infected, and greater than 20% of infants actually require intubation, which means that we need a machine to support their breathing because their muscles are so weak from the toxin. And if correctly diagnosed early and treatment is initiated, the average hospitalization is more than two weeks long, even with interventions.

The average hospital stay with untreated patients is actually six weeks. So, even with treatment, it takes weeks to months for these symptoms to recover and their nerve endings to regrow to resolve the symptoms of paralysis.

And the United States is actually currently experiencing a spike in infant botulism cases. The average is 159 cases per year in our rolling numbers. However, an outbreak associated with powdered infant formula erupted in 2025, with 35 cases in the last quarter of 2025.

And a total of 51 infants in 19 states are linked to this formula. The formula is now pulled from the market, and I can give a link to the FDA website detailing the recalls for the listeners. And this formula was sold internationally as well, in Canada, plus Asia, South America and the Middle East.

Amy

So, Josh, you had mentioned treatment and time in the hospital based on treatment versus non-treatment. Can you explain what the treatment is for this infection?

Dr. Joshua Jakum

Yes, antibiotics are actually not effective in the treatment of infant botulism. In fact, there is concern that treating with an antibiotic will actually cause the bacteria to burst and release more toxins and worsen a patient's symptoms.

There's only one pharmaceutical treatment for botulism, and it's the administration of an indiglobulin. A single treatment is about $70,000, and it's only produced by the California Department of Public Health.

The cost of the medicine is not-for-profit, and it only funds the program to support the treatment and prevention of botulism, not just in our country but actually internationally. And we call medications like this orphan drugs because the medication developed treats rare diseases that affect a small number of people, which is unprofitable for large pharmaceutical companies to produce.

The other treatment is time, actually. The neurotoxin effects takes weeks to months to resolve and many of these infants require ongoing physical therapy, but they will recover if, again, our interventions are early enough, and it takes time for the nerve functions to return in those nerve terminals to actually regrow.

Jamie

So, Josh, this is all great information, and in many ways, it's quite alarming, right? So, I want to bring it down to some recommendations to beekeepers, right? We're the ones who are putting this honey in our jars. People are buying it. We're labeling sometimes, sometimes not. So, could you tell us all about all that? What do you recommend to beekeepers in the community? And throw in some comments about labeling laws and honey.

Dr. Joshua Jakum

I want to applaud the US National Honey Board, which supports medical guidance on the age for safe introduction of honey into the human diet. The American Academy of Pediatrics and the Center for Disease Control recommend that honey not be given to infants younger than 12 months of age. Since honey is an avoidable source of Clostridium botulinum spores, honey should not be added to water or food fed to infants.

Do not dip a pacifier in honey before offering it to an infant. In 2018, there was an outbreak actually, of infant botulism from pacifiers that were imported from Mexico, which actually held honey in the bulb of the pacifier.

That's how it was sold, was with honey in it so the infants would suck on it and unfortunately had an outbreak. In Texas, here in Virginia, where I'm located, honey producers are actually required by law to warn consumers not to feed honey to infants younger than one year old.

Florida honey labeling laws don't require this, but the IFAS website actually includes the recommendation that beekeepers display on their labels “do not feed to infants less than one year old,” and its efforts like these help reduce infant botulism cases.

Honey is not a necessary food for infants, and honey is the one identified and avoidable food reservoir for the spores which cause the dangerous disease botulism.

Amy

So, Josh, that leads me into my last question. Kind of thinking about, you know, the recommendation of not feeding to an infant that's less than 12 months. So, I guess at that point, the infant turns one and how do you start introducing honey to their diet at that point? What is a safe way to do this?

Dr. Joshua Jakum

You know, as a pediatrician, I'm absolutely comfortable with the introduction of honey into the diet after one year old. The microbiome that I described has matured enough that it can take that. If your consumption of honey includes one of those spores, you're safe and you're going to be able to withstand the emergence of those bacteria. And so, it really has to do, almost back to real estate, location, location, location. Your gut biome is healthy and prepared. And so have a one-year-old honey party then.

Amy

One year old honey party. That sounds good. All right. Is there anything else that you wanted to add for our listeners to know? And we'll be sure to make sure that we link all of those resources that you mentioned in this episode.

Dr. Joshua Jakum

I think the best thing is that we as beekeepers, we love what we do. We love the products from the hive, and we promote beekeeping and the impact that beekeeping has on our foods and the sustainability of our foods around the world. And with that also comes some responsibility, and that's simply to certainly educate anybody that's in your orbit that honey is just not necessary as a food for infants less than one. It's an identifiable source and reservoir for these spores that produce a dangerous botulism. But after one year of life, please go and enjoy that honey.

Amy

Sounds good. Thank you so much for joining us today, Dr. Jakum. I learned so much and I know our audience did as well.

Dr. Joshua Jakum

Thank you so much, have a wonderful day.

Stump the Chump

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

Amy

All right, welcome back to the question-and-answer segment. Jamie, there has been this post on social media. Actually, it's not really a new post, but it always resurfaces for some reason, every once in a blue moon. And then I start getting the same emails every single time and people will just copy and paste this list of things that they've seen on, you know, on Facebook or Instagram or X or whatever.

And so, the first two questions we have for the podcast are from that post. And so, I thought maybe we could answer it, and then I could just take this recording and send it over to everyone whoever sends me those questions.

Jamie

You've got me nervous now.

Amy

All right, the first question is, is it true that when honey comes into contact with a metal spoon, the metal kills off the beneficial enzymes in the honey?

Jamie

Yeah, I do like this question.

Amy

I hear you laughing.

Jamie

Yeah. Yeah, I know. So, it's funny. So, let's break it into its constituent parts. Is it true when honey comes into contact with a metal spoon, the metal kills off the beneficial enzymes in the honey? So, there's this discussion, commonly, that using metal can kill off beneficial enzymes in honey.

So, let's talk about this. First of all, enzymes are not alive. You can't kill them, right? They're not living organisms. They are produced by living organisms. But you cannot kill them. The correct phrase then, which is not can I kill the enzymes. It's denatured. So, enzymes can become denatured. So, for example, heat can denature enzymes. If something gets too hot, that enzyme essentially falls apart and ceases to be able to do what it was created to do. But that doesn't change the premise of the question.

If I just change that word instead of kill off, if I just change it to denature, the question is, do metal spoons have any impact on the function of enzymes? So, there are enzymes in honey. One of those is invertase, for example, that breaks up sugars that can be affected by metal. And it's interesting because, Amy, the question is always asked to us from a metal spoon perspective, right? You know, the spoon that you're putting in there to eat the honey, but most honey that you're going to eat in jars sat in a metal storage tank and was extracted in a metal extractor.

And nobody ever makes that link. They're all worried on the tail end about using that spoon right before the honey is eaten, right? It's like no contact with metal prior to that has had any impact at all. But now all of a sudden because I'm using this metal spoon, all the enzymes are denatured.

Yes, metal can cause enzymatic issues throughout the honey processing, but I don't think it happens, certainly when you stick your spoon in it, measurably enough to impact whatever food quality that you're trying to get out of the honey.

I often think about this, and I don't want to chase this rabbit far. It's important for me to say before I go too far into this, is that I'm not a medical doctor and so I cannot make human health claims, which is good because it's going to save me from being able to make a few claims coming up.

Amy

Yeah.

Jamie

But you know, honey's full of sugar and you could argue that, what is it that we're trying to get from honey that's healthy for us? Now, a lot of people mention the secondary plant metabolites

and enzymes and things like that, but I think I said in an earlier podcast, it is okay just to eat honey because it's good rather than to have to worry about whether or not we're getting certain enzymes.

But to answer the specific question, there is ample research evidence that metal can denature or impact the enzymes that's in honey. But I think by the time you get to the metal spoon, that pales in comparison to the metal that honey's experienced up until that point.

So, yeah, I don't think it's a major issue for human health. So why do people think that honey is impacted by metal? Well, it's possible that this was a big deal prior to the invention of stainless steel, right? When there are other things that honey being slightly acidic could corrode and maybe it could interact significantly with the metal.

But since that time, you know, honey is processed and stainless steel, stainless steel extractors, it's stored in stainless steel tanks. A lot of the utensils that we use are high quality metal utensils. I just don't think storage or contact with any of those metals does anything meaningful to the quality of honey and to any of the health benefits that people are worried about this metal impacting. So, when we scale it all the way down to a spoon, I just don't think it's a problem at all.

Amy

I'm glad we finally figured that one out.

Jamie

I don't know if it's figured out, but we'll–

Amy

OK. So, the second question, you had mentioned heat earlier, and so the second question is related to heat temperatures. So, is it true that honey becomes carcinogenic when heated to high temperatures? Like a lot of people bake with honey, so is that true?

Jamie

Yeah, I had to look this up. Again, this is a human health claim, and I really shy away from making big statements about human health claims since I'm not a medical doctor. But I will say that the principal concern seems to come from this idea that honey and sugar in general, when it's heated, can produce something. And oh, Amy, this is, I'm going to butcher this, produce a compound called hydroxymethylfurfural.

Amy

Say that five times.

Jamie

Yeah, I can't say it one time, let alone five times, but beekeepers often refer to this as HMF. That's the acronym for hydroxymethylfurfural. It is a product of something called the Mallard reaction found in food. So, when you heat sugars, it can undergo a chemical process that produces hydroxymethylfurferol. And incidentally, Amy, that's why beekeepers don't like to heat sugar water and store it in metal containers because metal can speed up the sugars and honey transformation to hydroxymethylfurferol, which can be a problem for bees.

It's a toxicant for bees. So, the longer the sugar sits in these metal containers and experiences warm temperatures, the more of this compound that can be produced. And if you look online, a lot of people believe that hydroxymethyloroferol is carcinogenic for humans.

And I'm not going to say it is or it isn't, but I was able to find some research projects where this has been looked at. And, you know, again, I'm not going to make human health claims, but it does make the statement in some of the papers that I read that the levels produced in honey or any heated sugar for that matter, seem to be, you know, usually below what's considered carcinogenic.

And again, I'm not an expert in that topic, so others would need to read that for themselves or ask a doctor. But I just don't think in the most standard recommended uses of honey and baking that it's going to pose a big risk to humans based on what I have read in my limited movement in the field of human health.

Amy

I think that's fair. So just to preface, this person, just a preface afterwards.

Jamie

Yeah, just to post this.

Amy

The person did say that they had seen multiple claims on social media that could be a red flag. So, I'm glad that they at least acknowledge, you know, that they took it and wanted to question it instead of just immediately believing it and re sharing it.

Jamie

For sure, Amy. But the issue is there's a little bit of truth in it, right? That the metal can denature your enzymes and that, you know, heating honey and other sugars can produce compounds that may not be good for humans. But the question is, is that happening at the levels that we are

consuming and at the levels that we're using in our baking, etc. And that's just not something that I think we, as honey bee researchers, are able to go very far into.

Amy

I think that's fair. OK, so the third question that we have, this has to do with queens. So, this is not part of the social media, you know, list of claims. The person was asking if there's a queen cup, does a queen lay in them and a worker decides whether it's going to be a queen or do they kind of push the queen to lay in a specific cell?

Jamie

Good questions. And I think it's important to start with a little bit of definition here. So, if you go into a colony at any given time and you're working this colony of bees inside of its hive, you're going to find queen cups interspersed throughout most of the combs. And so, what is a queen cup? Essentially, the queen cup is the foundation of a future queen cell. If you remember, drone and worker cells are oriented horizontally, but queen cups and queen cells are oriented vertically. So, the opening of a queen cup or queen cell points down.

There are these queen cups available, maybe if you pull out an average comb at any given time of the year, you might see three to five queen cups on both sides of the comb. And basically, there are these little cells that are pointing down. They're not elongated. They're not the length of a peanut hole, for example.

They're just starting to turn and point down. And these are available throughout the nest. These are called queen cups. And what will happen is queens will lay eggs in these queen cups and then the workers will feed the developing larvae in those queen cups a lot of royal jelly, and they will grow that queen cup into a queen cell and they'll produce a queen as a result of this process.

So, queen cups are really just the foundation of a future queen cell. They're always in the nest. The question is, are queens always laying in them? Queens do lay in them, probably throughout much of the year. Therefore, it's the workers' decision or whether or not to raise the queen that would result from that egg deposited into that queen cup.

So, what might influence that decision? Well, if they're in late summer or fall, the queen lays into a queen cup, the workers are not going to produce a queen. They don't want to swarm, they don't need a queen, and they're just going to abort that egg, they're going to consume or they're going to cannibalize that egg.

But in spring, as queens lay eggs in the queen cups, the workers might make the decision to carry those developing larvae to queen adulthood because they want to swarm, they want to split their colonies, etc.

So, the queen is likely the one, based on the research that I've seen, making the decision to lay the egg, but it's the workers' decision on whether or not to carry that young larvae all the way through the developmental stages to become an adult queen.

Amy

Sounds good, Jamie. I actually had that question last week at a vet workshop that I had. So, I'm glad that we have the answer to it, and I will definitely, again, I love taking these Q&As and forwarding them to people because there are usually a lot of other people who will ask or have the same question. So, appreciate it. All right, listeners, you know what to do. We are always looking for questions from you. If you are interested or you have a follow-up for any of the questions that we've had, please feel free to send us an e-mail, send us a message on social media. We'll be sure to answer it on air.

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

Jamie

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 An Equal Opportunity Institution. 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.