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SPEAKERS

Jamie, Stump The Chump, Guest, Amy

Jamie 00:10
Welcome to Two Bees in a Podcast brought to you by the Honey Bee Research Extension Laboratory at the University of Florida's Institute of Food and Agricultural Sciences. It is our goal to advance the understanding of honey bees and beekeeping, grow the beekeeping community and improve the health of honey bees everywhere. In this podcast, you'll hear research updates, beekeeping management practices discussed and advice on beekeeping from our resident experts, beekeepers, scientists and other program guests. Join us for today's program. And thank you for listening to Two Bees in a Podcast. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. Today, Amy and I are very privileged to be joined by Dr. Larry Connor, who is the owner and founding member of Wicwas Press, LLC. Larry, thank you so much for joining us for the podcast.

Guest 01:05
Well, thank you, Jamie and Amy. I appreciate the invite and look forward to doing this.

Amy 01:10
Jamie, I wanted to tell you that it was very difficult for us to figure out what we wanted to interview Larry about because he's so knowledgeable in so many different topics in honey bees.

Jamie 01:22
Yeah, Amy, it's funny you say that because I thought exactly the same thing. When I saw that we were going to have Larry as a guest, I'm like, "Oh, I wonder what we're bringing him on for," because he can talk about so much. And for the listeners out there, I've known Larry for decades. He and I end up speaking in a lot of the same meetings, and I've heard about all the amazing things he's done in the bee world. So I'm so excited to be able to let him share that with you. And Larry, as we kind of go through your story as a beekeeper, as a bee scientist, as a bee educator, we'll even end this podcast today with a little bit of a discussion on brood patterns and why brood patterns are important. Could you tell us about yourself and how you got into the beekeeping world? And don't spare any details because

you've been involved in so many ways. You're so influential and important to beekeeping here in the US and globally. Just tell us how you ended up where you are.

Guest 02:09
Well, thank you, Jamie. I was born and raised in Kalamazoo, Michigan, where I'm living now. I've been away in different places. So over the multiple careers, if you will, that I've had, I was a 4H kid and we had a forty acre farm with about eight acres of apple trees. And we had a commercial beekeeper who kept bees in my backyard. When I was a toddler I used to play around the beehives not knowing that they could sting me. Yes, I knew they could sting me because they did, but it was just suddenly part of my life. When I was in 4H then, I was the bug kid. I did everything with 4H entomology and bees were part of that. We had hives of bees written about that. And there was at least one other brother involved at the time. And then I have a third brother that has become involved in bees. I don't know if that's my brother, Mike. He's about a Dadant branch manager and helped my son with learning how to keep bees. So we've kind of got a dynasty here going, but because of the 4H involvement, I went to Michigan State University, and I had good fortune to work with some really notable people there, Roger Hoopingarner was one of them. But the person who had a great deal of influence on my career as a graduate student was my major professor, Dr. Bert Martin, or E.C. Martin, and he was a great storyteller. You knew that if he got into one of his story modes, that you were going to be late for dinner. But it was a good way of him teaching and it's a way of understanding what's going on. And he would share some of the things that, if you will, fill in the void about what do we know about bees? And how do we know it? And what did we think before we knew that kind of thing? So he would speak about all kinds of things, including what we've learned about breeding bees and the effects of inbreeding and so forth, and how this impacted on Michigan commercial beekeepers when they constantly bred from their best stock and their production went down because they were increasing the level of inbreeding. My first job was at Ohio State University as an extension specialist. I enjoyed that job. I just wish the university and I got along a little bit better. I didn't get into trouble. I just got into that one of those financial conundrums that universities get into sometimes and they don't have enough money. And I was offered another job so I took it. But while I was at Ohio State, I had the opportunity to work with Dr. Walter Rothenbuhler. Walter was an interesting fellow. He's an Ohio beekeeper and scientist and very, very humble man and he did some amazing things with bee genetics. His appointment at the university was in three departments: zoology, entomology and genetics. And I didn't imagine how you could keep your schedule straight with all those meetings and scheduling things that you'd have to do. But what Walter did is he was very careful in explaining how he and his technician Victor Thompson had worked out the entire issue of the double recessive resistance mechanism of honey bees to American foulbrood, which is now the platform for what we call the VSA, Varroa sensitive hygenic, stock Marla Spivak and others have worked on. It was an excellent thing in many genetics textbooks. This is an example of a recessive Tullio system in the examples section. When I was at the job I was offered through Dadant and York Bee Company, Harvey York, but I worked with Dr. Bud Kale, and that was Bud Kale, Jr. Yeah, he and his father share the same name. His father was, I believe, the editor of the American Bee Journal for Dadant. When Bud had finished his time in World War II in the Navy, he decided to go to school and become a geneticist. So his doctorate was in genetics from Iowa. And he had worked with the breeding and he had based the bee breeding methods that he developed, more or less, along the lines of the people he was studying with who had developed hybrid corn. And so there

was a process of inbreeding and then hybridizing, and he started this in the 40s. I came on to the program in 1976. And my charge was to move a program to South Florida, we were in Labelle, Florida, and try to maintain the starline and midnight hybrids, as well as develop a commercial instrumentally inseminated queen. Well, you know, you can't buy that now. So that tells you how that worked out. But it was an expensive education in terms of what I learned and what other people learned about what we can and cannot do with some of these things. Dr. Kale was an interesting person to work with because he had done many studies. He looked at selecting for hive pollen collection for alfalfa pollination. And he had worked very closely with some of the USDA programs that were going on at the same time. So it was a very productive way of finding out an awful lot about what was going on in the bee breeding / queen rearing part of the beekeeping industry. My mission there was to learn both queen rearing and instrumental insemination in one summer, and then move to South Florida and set up a business. All of those things, you can check the boxes, never done before. I hadn't done any of them, and so it was a real challenging time. It was a bit of a stressful time. My ex-wife said that it was probably the most stress she'd ever seen me go through. Well, we found out that we spent too much money on this whole project in 1980. I moved the family to Connecticut and there, we started doing a variety of things. And one of the things I did, I was a Mr. Mom for a while. My wife was a speech pathologist, or is a speech pathologist. We're not married anymore, but we're still good friends. So I help raise two kids. One is Andrew, who many of you have met at meetings. And I have a daughter who lives in Alaska and she's a pediatric nurse. I'm proud of the relationship I've got with the kids as a result. I'm just going to put that in there for those of you that are stay-at-home dads. And you know, I was Mr. Mom before the movie came out. I'm the guy that had popcorn ready at the end of the school day for the kids, the elementary school kids so they can come in and have a snack and I knew where they were that way. I didn't have to go chasing after them to find them. I also did a lot of teaching at that time. I was doing things with EAS, and eventually, several other groups. In 1988, I had the opportunity to buy Wicwas Press from Roger and Mary Lou Morse, and don't minimize the role that Mary Lou had in this business because she was at the meetings with Roger and they would sell their books. I still have several of their titles in print. Roger's book, Making Mead, Comb Honey Production, and the book he did with Bill Coggshall on beeswax are classics, and they're usually on the list of, on that particular topic and what you should get. And so I've kept them in print. Covers have changed a bit but we try to keep that going. In 1988, then, I started the process of buying Wicwas Press. I surprised the Morses by keeping the name. The name Wicwas Press, by the way, is named after the lake in New Hampshire where Mary Lou Morse grew up as a child, and I believe they still own, the family still owns property at Lake Wicwas, which is not too far from Lake Winnipesaukee for those people that know the region. So, it was a good learning experience and I was able to do a variety of books, and we'll get into that in a minute, but the benefit of working with Roger and Mary Lou Morse was just to develop a personal friendship. While I had considered doing a PhD with Roger, I did it with Michigan State with Bert Martin. I had a close connection with Roger Morse, both before and after buying the business, and we continued to be good friends until his death. I'm still communicating to their son. And I believe Mary Lou is still functioning well into her 90s living in Thailand, last I heard. While I was doing all these things, I had the opportunity to work with a Harry Laidlaw, a professor at University of California Davis. And Harry was an amazing man. He was one of the three people that was really responsible for perfecting the process of instrumental insemination, what some people call artificial insemination. That was a judgmental thing. It was not artificial. It was a natural event in his mind. Harry was just a very good resource and contact for me. We

did the book with Harry and Dr. Rob Page on bee breeding, genetics and queen rearing. And that book, hopefully will soon be replaced with the new one that Rob Page is working on. So although these things are sort of a continuum and updating, but it's been a really interesting process. So for the last 20+ years, I've been working on growing Wicwas Press. We've got about, I think the last time I counted, 32 titles that we've published, and I've got about 12 that have my name on them in various capacities. So it's been a real experience, most of it positive. And I've enjoyed that. So I'll come up for air and let you see if any questions here. I haven't talked about the books yet. So that's the next thing on my mind.

Jamie 11:53
So Larry, in addition to all that stuff, I see you most at meetings that I travel to around the US and sometimes elsewhere, where you are selling books, of course, but you're also lecturing and training beekeepers. So teaching people is still within your wheelhouse. I see you do it with regularity.

Guest 12:09
I started, of course, I was an extension specialist at Ohio State University. So from the very beginning of my professional career, I was out there doing County and regional meetings in Ohio. And then I get invited to go other states and I got involved with the Eastern Apicultural Society. There was a little group of us that put on the short course every year, Dr. Dewey Caron, Dr. Clarence Collison, Dr. Bob Berthold, Dr. Larry Connor, the four of us will do this two and a half day short course at EAS. And we did that for a number of years. And of course, the long term friendships with Clarence Callison, we're very close to them. And Dewey and I, of course, continue to do a lot of projects together, both teaching, and also our textbook that we now have out. So this has been a good experience. Once I got on the speaker's circuit, if you will, which is a thing, I'm not too sure if it's well-organized or not, you would get the invites to go to a meeting. And then people say, "You want to be paid?" And I know there's some people that have university positions where they pay all their expenses. Well, I gave that up in 1976. I don't have anybody that will cover my mileage or my hotel bill or my meals, or much less even think about a speaker's fee, which, if you're working for somebody, you don't ask for that. But now I've gotten to be somewhat militant about some of these things. And I'm saying now it's gonna go for the next cruise I'm gonna go on. Well, I haven't been on a cruise for quite a while, but I've been on one. So I am working on another one. So people say, "Well, aren't you getting a little greedy? You're selling books and you're charging to speak." But I think that what I've learned is that most people are interested in what I have to say. And I know the meeting in Louisville was January, we certainly had a positive response. So nearly, I'm guessing between 800 and 1000 people in the room each time I gave a talk. So that helps ego but it's also probably one of the more interesting experiences to have that many people interested in your topic. Both of those dealt with topics of books that I've written. It's both humbling and challenging when you find out that a large percentage of your audience have purchased or at least read the book, and know what you're talking about in advance of what you're saying, sort of like some of these inspirational speakers. So I guess maybe that's in my next category, provide inspiration.

Amy 14:46

So Larry, you mentioned earlier about the books and this is something that people are very well aware of, the queen essential books and all the different other books that you have. I was wondering if you could tell us a little bit about your books and the inspiration to writing them.

Guest 15:01
The direct answer is the influence I had from people like Bert Martin and Walter Rothenbuhler, Bud Kale, Roger Morse, Harry Laidlaw. They provided me with a platform of information that I knew that I needed to share some of the things they taught me with new beekeepers and existing beekeepers, because they never knew these people. And there is another person I need to add to that list, and that's Dr. Eva Crane. Eva was an amazing influence on me. She was the founder of the International Bee Research Association in England. I didn't realize how honored I was to be actually to be her house guest toward the end of her life. And we'd have these very open conversations about books and authors and science and everything. And she was absolutely hard on me in terms of my Latin pronunciation, and everything else. Let's just put it this way, she improved my editing skills enormously. So getting back to the inspiration, when I had left the security of a monthly paycheck, I went through one of those periods of time when I had to decide, what am I going to do when I grow up? And that's a question I still ask, of course.

Amy 16:16
I was just about to ask if you've figured that out yet.

Guest 16:18
No, no. And I joke that I'm gonna go another 20-30 years, but I have enough material for that. That's what concerns me. But I took a class on goal setting. And I recommend that everybody read a book, listen to some YouTube videos, whatever you need to do to find out how do you do goal setting. And it's pretty simple. One of the things that I did is I made the goal that I was going to write 10 books. It's interesting that I would pick that. But I felt like it may have been the tail wagging the dog. But I had a list of things that I wanted to see books on. And I said, "Okay, we need to have a book on queen rearing." And I said, "Now, who can we get to, to write a book on queen rearing?" I said, "Well, I'm probably the person who knows the audience." I had been teaching classes on queen rearing, since about 1976, when I was still in Florida. And in the offseason, in September, I did a queen rearing class and I had people flying from Europe and South America to come and take that class. And I couldn't believe it, that there was that much interest in learning how to raise queens, and all it's done is grow. The interest in raising good quality queens is increased. So that was sort of the inspiration for several of the books that I've done, "The Queen Rearing Essentials," that I've done, "The Bee Sex Essentials," which actually is one of my favorite books, because most people don't understand the importance of drones. People keep rediscovering drones about once every 10 years in the bee literature, and it's the hot new thing. So don't forget about the drones. But, I've been talking about it since the 70s. Drones were the critical factor for us in our instrumental insemination program in Florida. We had as much labor going into drone production as we did in the queen production. And people don't appreciate the importance of that, especially when you're doing a bee breeding program when you can't rely on just any drone out there. In many of your inseminations, you have to have a specific drone or target drone that you need to have in your breeding program. So all of the books that we've done, Jamie, you and I worked with

the Koenigers on that book on mating, so we've got several books that have come out that deal with the whole area of queen rearing, mating, and bees and genetics and so forth. And then from there, we get into, you got all these queens, what are we going to do with them? So that was a logical segue into "Increase Essentials," and then we got books that are more or less been driven by feedback from beekeepers. So a beginner book I did, "Bee-ssentials: A Field Guide," which I wrote was Rob Muir, who is a young man who absolutely knew absolutely nothing about bees. But he was he was a writer. And I had him put together the the outline, and then I did another book on keeping bees alive because that's the question. Excuse me, Dr. Connor, can you tell me how I'm gonna keep my bees alive? I'm losing them every year for 10 years. It's not rocket science necessarily. It's learning what kills your bees and how to avoid it, how to manage around that. And then we've got a number of books that I've done with other people, probably one of the best examples is the one that Steve Repasky has done. Steve's a pest control operator, commercial beekeeper and EAS master beekeeper out of Pennsylvania, and he wrote a book on swarming. So he and I came up with "Swarm Essentials," and has become a very popular book. Just yesterday, we had a big flood of orders. Well, it's that time of year and people are anticipating the needs to know something about swarming. So all of this seems to fit together in a very loose and somewhat random way. But maybe there is a master plan, but it gets back to that goal setting and having, okay, I want to do 10 books. By the way, I've done that and a couple more. And will there be more? Well, stay tuned, find out. The final book, though, of course, was the textbook with Dr. Dewey Caron. When I first saw this book, he was doing his mimeographed guide for his beekeeping class. I think he was still in Maryland. It was a 50-page mimeograph. I know some people are like, what's a mimeograph? So look it up. And it's not a ditto, it's a two mimeograph. So that book is now 480 pages. We're in our third edition. We're coming up with another printing this year. And it's been a very successful book, it's been a humbling process to do this because you're writing a textbook like this. It's just plain old fashioned hard work. You've got to spend a lot of time doing everything that you know you have to do in advance, and then double checking everything and triple checking things. And then when you think you've got it right, you send it out to review or stand back because you got to open up the barn doors and let a couple of loads of comments come in and you have to process these comments. And then as we did, we get the first printing out, and everybody comes in and says, "Well, you spelled this wrong. You've got this reference wrong." And so it's all that fine detail that keeps you humble. And then I've had an interesting experience. Our book is in color, and I have people that can't read some of the color combinations that I did. So sometimes you try to be modern and contemporary and it doesn't always work as well as you hoped it would.

Jamie 22:05
I'm probably one of the people who can't read color, I'm colorblind.

Guest 22:08
I appreciate that. And I'm thinking well, maybe I need to go through and tone down some of these things. And I'm of that generation that I've got a magazine on another topic and I've stopped getting it. Why? Because I can't read it because the font is too small. And I spend enough time looking at eight point fonts on my computer screen or the equivalent when I'm reading a computer screen and I usually try to double or 200% so I can see it in Word or Excel. Excel spreadsheets just drive me crazy. I love them. They're a real irritation when the fonts are small.

Jamie 22:46
Well, Larry, let's segue a little bit towards brood patterns, brood rearing, and all of that stuff. You've got such a storied past in the beekeeping world. As you mentioned, you have a lot of mentors who have influenced you. And you've learned, practically, as well yourself as a beekeeper. So let's talk about brood patterns. Can you talk to our listeners about good brood patterns, why they're so important, etc?

Guest 23:10
Well, I think that most beekeepers get a sense of the efficiency of a good brood pattern that if you have a brood pattern that's solid, that the colony is working at a very high level of productivity. If you've got less than 5%, they can hold on a frame of steel brood. Most of us are happy with that, because we know we're going to have some holes, and we'll talk about that in just a minute. But those blanks, we want to keep them to a minimum, because the bees are being very efficient. They're spending a lot of time generating heat and beeswax and providing food for these larvae that the queen is in. The queen, she has to have a behavior, a good egg laying behavior to produce those patterns. And so that's probably the first thing that every commercial beekeeper is looking for is a queen line that has a good egg laying pattern. And then the second thing they want, and this is what I learned from Dr. Bud Kale, they want a queen with a very good egg laying rate. When I was running the program in Florida, the business was called Genetic Systems, and we had 13 inbred lines. These lines go back to, sometimes, the 1940s, sometimes to a single colony that's been inbred and maintained with different levels of proficiency because it's hard to maintain inbred lines like that. It's expensive. It's another reason they don't, this program doesn't exist anymore is a tremendous expense involved here. But when you do the crossing between these different combinations, 13 factorial, if my math skills go back. So A times B, A times C , A times D, and you go through and do all the combinations, well, we did that. And we put those queens in production colonies in Hamilton, Illinois because of the Dadant connection. And then we evaluated these colonies for the amount of brood they produce, the square inches of brood, and the amount of honey these colonies produced during the nectar flow, and we try to time the brood measurements to a period of time that the bees that were going to produce that honey flow are the ones we're measuring so that we would have a good correlation. And we had egg laying rates that were fairly small, down around 1200 eggs per day for an individual queen. And this is done by measuring the amount of sealed brood and doing the math and backing out what you've got. And we had other combinations, that the egg laying rate was about 1800 eggs per day. 1800 eggs per day, those are enormous brood nests. And what we discovered was, so there's an optimization that goes on here, between the egg laying rate and the amount of food all those bees are going to eat. Somewhere in all of this, we found that around 1500 eggs per day, which is still a lot of brood, gave us the biggest bang for the buck, if you will, in terms of having a large colony that produced a good crop of honey, and they didn't eat all the honey before the beekeeper could get in there and extract it. Now, if you left that honey on there, they would probably eat it, turn it into brood, and you come back and you'd have a good brood nest late in the season early next year, which was fine for people that are producing packages the next spring. But sometimes, we'd have warming weather, in September, it's fine, but in December, warm weather, the bees are brooding up, you go out there and feed them, that just simulates the heck out of them when the weather's warm. And so we had people complain about our starlines that are brooding up in December in New Jersey because it's been so warm. So all of these things become factors. Back

to the topic, Larry, the brood pattern, you're trying to get every cell, as many cells as you can and why are there holes in the cells? Well, it's because of this haploid diploid, diploid mechanism of sex determination that you're going to have some individuals, some eggs that are going to be produced by the queen that will be fertilized by sperm, where the egg and the sperm carry the same gene for sex determination. And so this creates a drone. And so now you've got an occasional drone being produced in this worker brood. And the bees don't like to make mistakes. So they basically go in there and remove that drone larvae. Probably don't remove it as an egg but they detect it as a larvae. What do they do? I think that they eat them, they destroy the evidence, maybe the queen will lay back into that. But this is why we expect to see some spotiness in the brood nests.

Amy 28:14
So you mentioned a couple of things as far as different factors that you believed are influences. You mentioned the queen weather, nutrition. What other factors do you believe are influences for brood rearing and the patterns?

Guest 28:26
Well, I've got a very short list here of the spotty brood. You've got everything to do with hygienics. So if we have a stock that we've paid money for a breeder queen, or we've paid for a stock that's been selected for a high level of hygienic behavior, we're just going to see some spotiness. And I've seen this spotiness actually look like, you know, this is where bees are going in and removing any cell that's sealed that's got a Varroa mite in it. They remove it. Any cell that's got a chalkbrood mummy in it, they remove it. Any cell that's got foulbrood, either European or American, they remove it. So this becomes a concern in terms of the spotiness. Of course, there are other things that probably cause spotting aside from short food supply, although that's generally a reduced area of the brood nest tself. And you get unusual patterns in the combs, you get these lines that develop, may still be there but they've been uncapped, and usually they find that there's a wax moth larvae that's tunelled underneath the base of the comb. So you have all these other factors that will come into play. And they generally, with the diseases it's always a concern, but the wax moth larvae, usually not a problem unless of course, you're in Florida and you got a big wax moth problem. Anybody have that problem anymore?

Jamie 29:53
Just a time or two.

Guest 29:55
Yeah, yeah. And I've been getting into small hive beetle so I don't know if they influence brood because they just line everything up and make it a miserable mess. Right, Jamie?

Jamie 30:04
They do. And, Larry, I do want to ask you a question that's a little off script here. Recently, David Tarpy and colleagues published a paper that brood pattern is not always predictive of queen quality. And they did kind of a cross fostering experiment where they took queens with good brood patterns and queens with bad brood patterns and swap them between colonies. So the good brood pattern queen went to a bad brood pattern colony and the bad brood pattern queen went to a good brood pattern colony. And

then they found the queen that formerly had the bad pattern in her colony, when moved to a colony that had a queen with a good brood pattern, ended up having a good brood pattern herself and then vice versa. So there were clearly some environmental impacts. And it wasn't just all kind of laying at the feet of the queen. And so that leads me to this question here. What do you believe beekeepers can do to ensure good quality brood, because it's not always the queen that's the main contributor, it can be environment, right?

Guest 30:59
I think one of the biggest things that most beekeepers don't do is, and I'm guilty of this, I don't replace combs often enough. I should probably go out. I have three colonies that are alive right now. That's three out of three that went into winter. Some would say we haven't had winter yet here in Michigan. It's always a guess, we can get some really cold weather in March and April in this state. So I like to see beekeepers that have a planned replacement of combs. And why is that important? Well, I get into some of these minor things like this one behavior in particular, where bees will, they'll have cells of pollen in the colony, and there's something in that pollen they don't like. Some people say it's pesticides and some tests have shown that. But I think if you just replace these combs, or you replace two or three combs out of every 10 frames that you've got in a box, or two or three, or one or two out of every eight, whatever system you've got, that you're removing the oldest, darkest combs. And while there are beekeepers that are out there that are bragging on having combs that are 50 years old, I don't think that's necessarily where we should be going as an industry. I think we need to be keeping our combs fresh and doing whatever we can. Beyond that, there are people who say, "Oh, you need to use probiotics," and so forth. I haven't personally seen any thing so strongly positive on that. I mean, they don't hurt. But I want to see something that's going to have the same benefit as taking out the old combs and replacing the new ones. So that's kind of where I'm at right now. I'll ask you a question, Jamie. What would you do?

Jamie 32:46
When I see bad brood patterns, a lot of things go through my mind, and there are a lot of bases that you've tagged kind of in the conversation. I think maybe the queen, well, I used to think queen a lot until that paper that I just mentioned, this idea that maybe sometimes it's environment. So I think queen, my mind goes there. But then I also think, well gosh, is there evidence for high Varroa loads? Is there evidence for nutritional deficiencies? Is there evidence for brood disease? For example, American/European foulbrood, chalkbrood. I feel like, when you keep bees long enough, you can start to recognize these things, and I usually am able to zero in on why I think the brood pattern is spotty, and I try to remedy it the best I can. I will say, in my experience here in Florida, a lot of it, we can lay at the feet of Varroa. They're just bad. If you're not controlling Varroa with regularity, you've got high brood loss. But I do think there's this massive push towards queen improvement. And I think this can go a long way potentially into improving brood patterns as well. Do you think that's a solid answer, Larry?

Guest 33:49
I like that answer. I'm going to add to it. I think that if we can master some of the issues with queen quality and master Varroa mites, we're going to take care of well over 80-90% of our problems with brood vendors. That's my opinion. I don't have any data on that. Sorry. Now, I did make an observation.

People send me photos that I had a photo that came in the other day, and this is a lady beekeeper that I know and respect a lot, and yet, she has been treating her colonies for Varroa mites. And she sent me the screens on the bottom boards and she still got a lot of Varroa mites. I mean, I wouldn't be able to predict what the actual percentage of mites per brood cell would be, especially this time of year, but it has to be pretty large. And so here's my concern. She's going through all the efforts of controlling Varroa, but is she controlling them? Is she being successful? So you've got to sample. People that treat without sampling, it's either wasting their time, their money, or both. And you've got to have some basis of going in there and saying, "I've got X number of Varroa mites per 100 cells. And this is when I'm going to treat, and the other times, I'm just gonna say, okay, I'm going to wait and sample again."

Jamie 35:15
Larry, that's a great observation because we see exactly the same thing here. In fact, we're about to publish a paper. I know, our listeners don't know when we're recording this, but it's early February 2024. We've got a paper in press just about that lack of efficacy, a lot of the available products we looked at those products across seasons and saw exactly what you saw. We put in treatments, you think that they should be controlled, and then they're not, and then that quickly gets reflected in brood patterns. And again, it gives a lot of beekeepers this false sense of, "Oh, gosh, it can't be Varroa because I just treated so there must be something wrong with my queen. I must have a brood disease," when in reality, it was just ineffective Varroa control. So that's a great observation, Larry.

Guest 35:53
I think that the other take-home I have from that experience is that I need to go back to having everybody bring in, or maybe they can't bring them in, but out in the bee yard, you need to pull out those screens in your screen bottom boards, you need to pull out that tray. And you need to make some very close up photos of those to study later. But you need to do an evaluation of what you see there. And the reason this woman had sent me the pictures was that she had wings and legs of bees but no thoraxes and no abdomen. And so I kind of came up with maybe it's some mouse or shrew or some other critter had come in and fed on bees that may have been underneath the screen of this hive and they were eating the bees. But when I started looking, then you look for the other things that are going on. This was not a super great colony based on what I could see on that screen because I saw wax moth droppings, the fecal pellets from wax moths, I saw Varroa mites, I saw chunks of comb, not little bits of ground up comb from opening up brood cappings, but pieces of wax that indicate somebody's in there feeding. So the easy answer is a mouse got into that colony and there were some issues, but every beekeeper needs to be conscious of the fact that reading that screen bottom board could be a very useful thing. I don't want to have to do a book on this topic because I don't know enough about it. But somebody out there needs to pick up this idea and use it for a really strong teaching program. And maybe just a collection of 20 different trays from different hives that are brought in, maybe in your lab we could do this sometime, Jamie, and just have them from different colonies, have beekeepers bring in, bee inspectoes bring them in. They know what happened but then let the audience try to figure it out and work backwards, a little CSI kind of thing. And most people like that approach, and get beekeepers to open their eyes to say, "I really need to take a look at what's going on with my bees." And I'll be honest, my three hives that I've got in my backyard, I have not done that. Guilty as charged.

Jamie 38:17
Larry, that's great information. It's really been good to hear about your rise to the top of the beekeeping education world, all that influence that you've had and hear your thoughts about brood patterns and how important it is for beekeepers to keep an eye on them and manage them for productive colonies. So thank you so much for joining us on this episode of Two Bees in a Podcast.

Guest 38:36
You're welcome. Have a good year.

Amy 38:49
Jamie, when I became a hobbyist beekeeper, I had his books. I still have his book, actually, two of his books in my office. And it's funny because I didn't meet Larry until last year. It is just so much fun to sit with him and chat about his experience in the bee world. And I just hope one day, when I grow up, that I can have all the knowledge that Larry has.

Jamie 39:12
The older I get, the more I just love listening to people talk about their really incredible storied past. And I mean, if you listen to what Larry was saying, he was just name dropping everywhere, right? Eva Crane, Rothenbuhler, all of these other folks who are instrumental and so big and pivotal in the bee world. And I don't know, it's just great. He's got so much knowledge, he educates beekeepers around the world. We've had him at our own programs before, and on top of that, he runs his book business, Wicwas Press. And I just love the fact that he continues to give information out and he has such a long history and tremendous impact in our world, our beekeeping world.

Amy 39:48
Yeah, I think not only does he give out information, he's very knowledgeable, but I think he's just very humble. He's always seeking to learn something new, and I think that that is something that's really important. And of course, we're on this podcast and there are beekeepers out there who are hoping to find new knowledge. And so I just think that beekeepers are just continuously learning. And what you and I have said is just the more that we know, we realize, the less we kind of know with the beekeeping world. It's always fun to hear him move forward with just always increasing his knowledge everywhere he goes. So towards the end of the episode, Jamie, we talked a little bit about brood rearing, brood patterns, and what different factors are maybe influences for this. And so what are your thoughts on that?

Jamie 40:29
I think it's an important topic. I think the science around brood patterns is definitely evolving. My thoughts five years ago are different than my thoughts today, again, given some of that research that we've cited about good queens can have bad brood patterns, etc. But I will say, as a beekeeper, when I see a bad brood pattern, my mind instantly goes to what might be causing that, and I try to look for any type of information that I can find that will help me determine if this is an okay thing. Is it something I need to worry about? And again, right off the bat, like Larry mentioned and I followed up with, Varroa

comes to mind first. Are the Varroa populations under control? If they are, do I see any evidence of brood diseases? The standard ones, chalkbrood, American foulbrood, sacbrood, European foulbrood, etc. Is there evidence of nutritional deficiencies? If all of those things are fine, then my mind starts going over in the queen direction. Well, maybe the queen is old, maybe she's failing, maybe she's poorly mated. And if it's truly a bad brood pattern, like the colony is suffering significantly and might be on their way out, if I don't try to remedy it, and if it's not all those diseases and pests, I might consider requeening it as a last resort to see if I can clean up that pattern a bit. But lots of things, like Larry said, lots of things can contribute to bad brood patterns. As beekeepers, we have to sort through our mental checklist of what might be causing it so that we can remedy it and make sure, if there's nothing we can do, there's nothing we can do, but if there's something we can do that we address it appropriately.

Amy 42:00
Absolutely. It's funny, Jamie, because Larry, at one point, said that when he was speaking to an audience, it was almost like they had read his books. They already kind of knew what he was going to say. I wonder if our listeners do the same thing with us just as far as the podcast goes. When people start asking questions, they say, "I think Jamie and Amy would probably say this, and I feel like Varroa and monitoring for Varroa." We're always talking about Varroa. So there's no way that that's not going to be brought up whenever we're giving advice or just speaking to beekeepers in general.

Jamie 42:28
Well, Amy, we hope, through our podcast, we're not just talking to talk. We really hope this podcast, of course, entertains. We want people to want to listen to us. But we more importantly than that, we hope that our guests, our Q&A, our discussion, all of this leads to changed behavior in beekeepers for the betterment of bee colony productivity, health, and longevity. That's why we do this. We do this to improve the sustainability of beekeeping everywhere. So, Amy, an answer to your comment, I hope people say, "This is what Amy would say. This is what Jamie would say," and that they're able to do it and that they benefit and their bees benefit as a result.

Stump The Chump 43:19
It's everybody's favorite game show, Stump The Chump.

Amy 43:29
Hello, everybody, and welcome back to the Q&A segment. So Jamie, I was speaking to the South Carolina Beekeepers Association earlier in 2024, and so a couple of these questions for today were from my talk there. So the first question that we have, we know that there are different species of Apis. Here in the United States, we manage Apis mellifera, but there are different species of Apis in the world. Some of those are known to, I guess, deal with and handle having Varroa destructor a little bit better. If that's the case, why would we not want to bring these Apis species over here to the United States?

Jamie 44:05
So those are good questions, Amy. I'm going to kind of answer it with a little bit of natural history and biogeography of honey bees. You are correct. There are multiple species of Apis. So Apis is the genus,

so the word that would follow Apis would be the species level. So Apis mellifera would be the genus Apis, the species mellifera. So the genus Apis is referred to as the honey bee genus. So all the species of Apis would be referred to as honey bees of some sort. Apis mellifera is the one whose natural distribution is Europe, the Middle East, and Africa. It's the species that's most used around the world. It's been carried outside of its distribution to Australia, to Asia, to South America, North America, other places all around the world. And it's that species that we keep here in the United States that is broadly kept by beekeepers around the world, and it's that species that struggles most with Varroa. So why does it struggle so much with Varroa? Well, the answer is actually quite simple. It's not the natural host of Varroa. Another Apis species is the natural host of Varroa. Varroa originates in Southeast Asia, or at least in Asia. And a species that is its natural host is Apis, the genus, cerana, the species. So Apid cerana, often referred to as the Eastern honey bee. If our bee is the Western honey bee, it's the Eastern honey bee. So this species is the one that's the natural host of Varroa. Now, I'm going to point out, depending on which taxonomist you ask, there are eight or more other species besides mellifera and capensis. So, for example, there are two dwarf species, florea and andreniformis. There's three other cavity nesting species, koshevnicovi, nuluensis, and nigrocincta. There's at least three giant species, those being dorsata, breviligula, and laboriosa. Again, some taxonomists would split some of those groups further, there could be 11, 12. We recognize 10 in our lab. So the questioner is saying, well, gosh, if there's another species, like I shared, Apis cerana, that can handle Varroa better, why don't we just bring them to the US? Well, first of all, the assumption of the question is correct. Some of the other species, namely cerana, does, in fact, handle Varroa better than our bees do because it's the natural host, it's had time to develop resistance and tolerance mechanisms to this mite. However, the other nine species, the Apis mellifera species, the other nine species, generally speaking, are tropically adapted bees. They would not do well in temperate climates, may not even survive at all in temperate climates, a few of those species, for example, wouldn't survive in temperate climates. So as a result of that, they would not be good, really, outside of their native range. I know I'm going to make this statement here that could get a lot of people unhappy with me, might be other Apis species proponents. But honestly, mellifera is probably the most manageable of the Apis species, probably produces the largest colonies of the cavity nesting species, and would therefore produce the most honey of the cavity nesting species. So it's a better manageable bee. A final cause against moving bees from other Apis species into other countries where they're not currently native, is that's potentially what led to the movement of Varroa. Mellifera was taken to Asia, mellifera had never seen Varroa before, and it became a host. Well, when you move these other Apis species out of their native territories, they could be carrying with them other pests or pathogens that could kill honey bees, and for that matter, maybe even other bees, other places around the world. And so rather than moving these other Apis species outside of their natural distributions, I think it would be better to learn how to manage Varroa in our colonies of mellifera in better ways that we are currently doing.

Amy 48:02
Okay, so for our second question. This is kind of a maybe we don't know what we don't know, type of question. We know that we've got Varroa in our managed colonies. We also know that our managed colonies swarm. They abscond, they go to a bunch of different places, and then at that point, they're kind of wild, right? They're considered wild colonies. I don't know if you agree with that. But so then we look at different pests and diseases in our managed colonies. And the questioner was asking about,

what do we know about these, maybe I'll call them feral colonies, we'll call them feral colonies. So what do we know about feral colonies and the pests and diseases that they have with specifically Apis mellifera?

Jamie 48:38
So Amy, that's a simple question with a slightly complex answer. So first of all, your terminology is correct. Apis mellifera, we'll just pick on the United States because it's easier to discuss here. We don't have any currently living native Apis species in North America. So Apis mellifera is an introduced species. You can only be wild where you are native from a biological perspective. So we don't have wild honey bee colonies in North America. We have feral. Feral implies that they were once managed, and escaped management and established in the wild, and that's why people tend to put the word wild on them. But the more appropriate term, as you suggest, is feral. So we do have feral honey bee colonies here in North America and other places that Apis mellifera is not native. The questioner is saying, well, what do we know about disease and pest populations in the feral honey bee colonies that we have not only here in North America, but elsewhere? Well, if you think about it, the feral population in North America would have established from the managed population that has all of these diseases and pests with which we are familiar. So we have every reason to believe that all of these things that our bees face would be faced by the bees that are living in feral environments. Now, I'm going to give you a bit of a hot off the press sneak peek. I literally learned this information yesterday. I have a PhD student in South Africa, Amy, as you know, Kaylin Kleckner, and she's studying truly wild populations of honey bees. Apis mellifera, where they're native. Part of what she's doing is collecting samples from these wild honey bee colonies. And she was telling me yesterday, on our weekly phone call, that she is finding Varroa in large numbers in these wild populations of Apis mellifera, and that's interesting because Varroa is not native to Africa, certainly not South Africa. Neither is it a natural parasite, like I mentioned, with a previous question, neither is a natural parasite of Apis mellifera. So she's seeing, in the wild population of honey bees in South Africa, Varroa. In a lot of these cases, they're not near managed colonies. These Varroa have just gotten into the wild population. Well, here in North America where honey bees are feral, we see the same thing. Varroa are in the colonies. The viruses are in the colonies. The small hive beetles are finding them, they're infected with Nosema. The only catch is, Amy, we don't know a lot about epidemiology, disease and pest movement, in feral colonies because there's not a lot of research, comparatively, on feral colonies. Most of the research is on managed colonies and we know so little about feral colonies. The research of which I am aware, usually looks at feral colony development of resistance to Varroa. So there's been documented populations of Varroa on feral bees in feral colonies in places like New York State with Tom Seeley's work in other places. So we know that the feral population is getting the same disease and pests that our managed population is, but a lot of people are interested, increasingly so, in the fact that these feral bees aren't managed, they're not being treated. So maybe they are developing resistance traits to some of these diseases and pests. And we can understand, maybe, disease and pest resistance better in these feral bees. So there's a lot to unpack with that question. And I really believe that there's going to be an explosion of feral bee research in the future. But it's really interesting and so little is known. So if you're a budding PhD or master's student out there, this would be a great topic to explore.

Amy 52:20

Definitely. Okay, so the last question I have has to do with the queen, specifically, what a queen retinue is. First of all, what is a queen retinue? And for those who know what a queen retinue is, that's basically when those worker bees kind of circle around that queen, right? They're tending to her, those bees that are tending to that queen, do they rotate in and out of that retinue? Or will they leave and come back? Or if they leave, they're done, their job is finished? What's the research with that? And let's start at the beginning, what is a queen retinue?

Jamie 52:53
So a retinue is that group of attendants that are looking after the queen. If you watch a queen actively moving throughout the nest of a bee colony, you'll see that, sometimes, she's sticking her head into cells, sometimes she's laying eggs, sometimes she's just walking. But every time she's doing these things, she's drawing attention to herself. She produces a set of pheromones that let the bees know that she's the queen. So she's meandering about the nest. The workers who are nearest to her will often turn and lick her, they'll feed her, etc. And these attendant workers are often referred to as her retinue. And you can see this most clearly when she stops moving. These attendant workers will circle around her, all of them looking at her, and that is the queen and her retinue. So these bees are licking her, they're feeding her, they're taking care of her, cleaning her, etc. So the questioner is saying, well, are bees moving into and out of this behavior? And the answer goes back to this idea of temporal polytheism, which is what the scientists would call it, or age-related division of labor, which is what the beekeepers would call it. What it simply means is worker bees are not born into tasks in which they remain their whole lives. Instead, as they age, they progress from task to task to task. So young bees do what young bees do. Middle-aged bees do what middle-aged bees do, and old-aged bees do what old-aged bees do. So there is a cohort of bees that attend the queen. They are usually between birth and up to about 35 days old. But you will see this behavior most when bees are about five to 15 days old, averaging somewhere around 10 days old. So that five to 15 day old bee is the one who is most likely to show up at the queen retinue. And we know these behaviors are very plastic. So technically, bees can jump behaviors, they can reverse behaviors depending on colony need. And in the case of retinue behavior, my suspicion is a lot of it has to do with who's nearest the queen when she needs help. So these younger bees who the queen is meandering by are more likely to turn around and engage in this retinue behavior than, say, some of the older bees that are just strictly interested in foraging. So from that perspective, you can get bees bopping in and out of the retinue during their period of retinue engaged behavior. So yes, it is something that a bee can do, maybe multiple times, while doing other jobs intermittently between her joining the retinue and leaving the retinue.

Amy 55:50
Yeah, definitely. I feel like I just love a really nice retinue around that queen. It's just beautiful. A beautiful thing.

Jamie 55:56
It is a beautiful picture. It is. Seeing those pictures are always amazing, especially those really tight retinues where they're all facing her and they're all taken care of her. It's a really majestic looking thing, which is part of why she gets the name "queen." She demands that attention from those who are around her. It's really a beautiful thing to see.

Amy 56:13
Absolutely. All right listeners, you know what to do if you have any questions, feel free to send us an email or send us a message on one of our social media pages. Thanks for listening to today's episode. This episode was edited and produced by our podcast coordinator Mitra Hamzavi. Thanks, Mitra.

Jamie 56:40
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.