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EPISODE 202 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.

Hello everyone, and welcome to another episode of Two Bees in a Podcast. Today, Amy and I are very excited to be joined by Mike Allsopp, who's a Senior Researcher in honey bee research for the Agricultural Research Council in Stellenbosch, South Africa. I met Mike years and years and years ago and we've had plenty of e-mail exchanges and face-to-face times. We've seen each other and had lots of opportunities to get to know each other over the years. I'm really excited to have him on this podcast because he really knows everything about beekeeping and honey bees in South Africa. Mike, thank you so much for joining this podcast.

Mike Allsopp

Hi, Jamie. It's a great pleasure.

Jamie

And Mike, since this is your first time on the podcast, the first question we always ask our guest is just to tell us a little bit about yourself. Our listeners want to get to meet you before we dip into the questions that we brought you all to answer. So, could you tell us about yourself and how you ended up in your current position and how you ended up working with honey bees in the first place?

Mike Allsopp

What about myself? I've come from Johannesburg in South Africa, born and raised. Went to university in Johannesburg, University of Johannesburg, and objectives of working with ecological modelling, the early days of models and that type of stuff. I quickly found that I wasn't in love with that, carried on to zoology, just general zoology, animal behavior in general. I got into honey bees because my supervisor wouldn't provide me with the funding to work on bats. So, I then worked on honey bees and have become more appreciative and learned to love them, as many people do when they work with bees. Started working for the Agricultural Research Council in 1990 on honey bees in general, bee biology, and I've been working for them ever since. So that's 33 years.

Jamie

Well, shoot, Mike, we need to thank that supervisor for not letting you research bats because it really put you on the honey bee world, and we're all grateful as a result.

Amy

Yeah, I was going to say the same thing. It's really funny. You thought you were getting the next best thing, but little did you realize you got the best thing. The honey bee world. All right, so Jamie introduced you and he said the word research a lot. And so that kind of made me think, huh, I wonder what Mike does? Oh, he's a researcher. But as a senior researcher, what are your primary responsibilities in your position?

Mike Allsopp

So, I'm smiling because I'm the senior researcher but also the only researcher.

Amy

That's fine, you can have whatever title you want.

Mike Allsopp

So, we have quite a different situation in South Africa compared to what you might find in the US or in many places where we don't have substantial government research into honey bees. In the beginning, when I first started, the Agricultural Research Council had fairly substantial bee research sections for the six researchers. Historically, that's what we had and supported by the government, but over the years that has eroded. The Agriculture Research Council is a parastatal. We're not actually a government department, so we're not equivalent of the USDA. Our sort of mandate is to do funded research, funded by industry, funded by agriculture, funded by anyone who wants to fund us, but also to actually assist the government in terms of advice and extension.

Over the years, the level of government support has decreased, though it has recently picked up again, so maybe we'll go back to earlier days. So, if you were to ask what our primary responsibilities are, we have no sort of legislated regulatory functions in terms of doing this or doing that for, you know, extension work or primary research or management or anything of that sort. Our responsibilities are to just generally support industry and agriculture in South Africa as long as we can do it in a sustainable manner that we actually can get funded. And as I say, over the years, the bee research component has shrunk from six researchers down to one. So, my desk has now become the desk for all bee matters in Southern Africa, from research to pollination to extension to fundamental bee issues to adulteration to pesticides to forage, to any aspect relating to bees that you might imagine.

Jamie

Yeah. So, Mike, that's quite a responsibility. My introduction to you was actually when I was a PhD student in South Africa, and a lot of the papers that I was reading associated with the Cape honey bee and other bee related things in South Africa had your name on it. And you mentioned that you guys have gone down from six researchers to you, but you still in many ways remain the go-to person in Southern Africa when people have questions related to research. So, you've been involved in lots of different research projects, and I know it's going to be impossible to talk about all of them, but could you highlight some of the research projects that you've either led or been involved with over the years?

Mike Allsopp

So, Jamie, the disease component ones, you could look at it as a catalog of disasters or catalog of problems, mostly our Cape honey bee problem, which you mentioned. I was involved with that from early 1990 for a decade or more trying to actually manage or understand or develop mitigating measures to deal with our capensis-scutellata interaction problem that you know a great deal about. That continues to this day -- the problem, not so much the research into that, though. I'm hoping to restart some research into that because we still haven't solved that problem. Then we moved straight on to Varroa. Varroa arrived here in 1997, and I ran the Varroa research program, managed, you know, monitoring Varroa as it spread throughout Africa and the developing strategies and the processes to deal with that. Then we had a small break and then American Foulbrood arrived and it's still here. So, I'm currently still involved with the AFB program and managing that. So, those were the three major disease issues that I've dealt with over the years. Increasingly, commercial pollination component has become more and more significant. Now makes up, close to a decade, makes up the majority of my work. All kinds of different crops, blueberries, sunflowers, onions, macadamias, avocados, apples and pears that I started on and that just becomes more and more significant.

Our commercial pollination aspects, components of commercial beekeeping in South Africa is very substantial. More recently, less attractive issues that we have to deal with like honey adulteration, I've become fairly knowledgeable about that because we have a lot of fake honey floating around and having to deal with that. So those are the major projects. And then of course, a lot of beekeeping extension work, training and developing beekeeping amongst previous communities that didn't do much commercial beekeeping, I've done a lot of that as well.

Amy

That's great. It sounds like you're very well-rounded in the honey bees in South Africa and I'm happy to hear the different projects that you're working on. We've also been inviting people from all around the world to talk about the beekeeping industry and kind of an overview of beekeeping in their countries. I know you kind of touched base on commercial pollination, but I'd like to talk more about the overview of beekeeping. And can you tell us about what it's like beekeeping in South Africa? I know Jamie is over the moon about South Africa. He loves going there, he loves

working with bees, and I'm excited to visit one day as well. But can you tell us a little bit about the industry there?

Mike Allsopp

You'd be most welcome. Let me know when you come. South Africa doesn't really have a huge tradition of beekeeping. We tend to be quite a dry country in comparison to the moment you go bit further north where I was actually yesterday in Zambia and you get into Mamba woodland, you find a huge tradition of traditional beekeeping where thousands of people keep bees. Across the whole swathe of Central Africa, you find people keeping bees, but South Africa really doesn't have much of that because we, as I said, we are really too dry. We're not a major honey producing country, but you do find hobbyist beekeeping and small-scale beekeeping scattered around the country. Much of South Africa really doesn't sustain high bee densities, but there are patches where beekeeping is quite developed. But in particular, beekeeping in South Africa over the US has been sort of concentrated around plantation areas, forestry, eucalyptus plantations and also commercial agriculture. And then there are areas of natural vegetation where you have reasonably high densities of beekeepers.

In terms of the trajectory, we do not have many pathways for people to become beekeepers where they go through training programs and courses and become registered as beekeepers and go through different levels of training. Beekeeping is very informal here. The traditional pathways, someone will actually start because there's a colony of bees in their shed or in their garage, or they get given one and then they quite like it. And they go from one to five over a few years and then they get up to 20. And then they become sort of small-scale weekend hobbyists with 100 or 200 colonies. And then somewhere along the line they decide they don't like their current job, and they give that up and become a commercial beekeeper. So that's pretty much the pathway to beekeeping. Some, maybe, 30 years ago, no commercial pollination, paid pollination, but that has now changed. Depends on where you are in the country, but paid pollination now probably makes up 75 to 80% of the revenue of beekeepers, maybe even more than that in some areas. To the extent that you have some areas where big commercial operations are entirely pollination based and they do almost no honey production and pretty much whatever honey they produce, they just feedback to their bees.

Jamie

So, when I visit South Africa, I really found beekeeping pretty fascinating. In some ways, it's like what we see here in the US, you know, there's a lot of, for example, Langstroth style hives. In some ways it's just so different. You know, the bees, I don't know a better word, my God, the bees just really feel wild to me. What you just mentioned is that a lot of people get into beekeeping because these colonies just show up on their property in their tree, in their house, however, and I find that to be true. I've done a lot of research around the Graham's Town, South Africa area and a lot of beekeepers I meet there have that story, exactly that story. And so I'm

curious, Mike, is there a good sense, maybe even rough estimates of the breakdown between hobbyists and commercial beekeepers in South Africa? I mean, are we talking hundreds of people, thousands of people? The vast majority of them are hobbyists. Do you have a sense of those numbers?

Mike Allsopp

I've always been uncomfortable with the hobbyists and commercials definitions. I don't quite know what they mean in the sense that even people with a couple of hives tend to be commercial. Over the years, I've often used the term professional beekeeper, and a professional beekeeper by my definition is someone that makes 75% or more of the income from beekeeping. In terms of professional beekeepers in South Africa, as I said, they really almost all of them go through this long trajectory to become professional beekeepers and I think almost none of them ever plan it.

I've collected data over the years through a whole lot of questionnaires that I've actually had beekeepers fill in on all kinds of subjects where I've often included basic demography questions to get a better snapshot of the beekeeping industry. From those data, it takes on average, 21 years for a beekeeper to become a professional beekeeper in South Africa, from the time they first started keeping bees to the time they actually made it their profession. So, it is a long genesis to become a professional beekeeper. In terms of the numbers, we don't actually have really good data on that, but it's probably pretty accurate. By my definition, approximately 60 professional beekeepers in South Africa, something in that order. And then everything from, in terms of that pathway from one hive to nearly at the stage of becoming a professional beekeeper, you'll find everything in between somewhere in the order of 5000 hobbyist beekeepers and about 60 professionals, somewhere in that order.

Amy

Yeah, I think those numbers are pretty comparable to the hobbyists versus commercial professional beekeepers we have here as well. I'm laughing because you say 21 years to be a professional beekeeper. Jamie, are you at that 21 years? Would you consider yourself a professional?

Jamie

I know a lot about bees, but I don't know if I could go out and make a living with them at this moment.

Amy

Definitely. I think that's a really fun statistic. You've already mentioned working in extension. You've mentioned a survey which immediately takes me to the extension world. I am making the assumption that one of the questions that you have on the survey is asking what the challenges

are in South Africa. So currently, can you tell us what beekeepers are saying are the greatest beekeeping challenges in South Africa?

Mike Allsopp

Yes, certainly. I think if you asked beekeepers, you'd get a lot of different answers, but I think you'd get a fair amount of consensus on the major challenges. Our major challenge, I would think, and they tend to be all interrelated, like all bee problems tend to be interrelated. The world come up with nice cliched answers like CCP economy, collapse disorder and things like that. But they're all collections of issues rather than single problems. I think we very much are a case in point very similar to everywhere else in the world. Our biggest problem is diminishing forage. In particular, in our case, as I said, the development of our commercial beekeeping industry was really related to commercial forestry and commercial forestry has changed. Its profile has changed a great deal. Cultivars, trees, species that were used are no longer the same. The demand is no longer the same. They were primarily used for the mines and deep mining in the old days and that that demand is no longer required.

So, we don't have the same trees. Eucalyptus and forestry in general tends to be quite water demanding, and certainly in a lot of areas in South Africa that's quite a sensitive issue. So, we just do not have the plantations that we used to have. And from the Halcyon days of beekeeping in South Africa in the 1970s and 80s, honey production is down to maybe at best about 25% of what it was 45-50 years ago. And most of that is based on the loss of the eucalyptus, and then just general loss of forage, loss of land as development changes the landscapes. Without bashing, I'm just picking, you know, every golf course that goes in, every parking lot that goes in is forage is lost. So, our big problem is finding a sufficient place to keep our bees. This is keenly felt, more keenly felt in some areas than other areas. In the Western Cape where I am, it is pretty intense.

I tend to joke that the only way that you could become a commercial beekeeper quickly in the Western Cape is you need to find another commercial beekeeper, follow him, wait till he crosses the road and then run him over and steal his sights. There's no other way to quickly become a commercial beekeeper because every piece of suitable bee forage is already being utilized. Then unfortunately, we have a very significant problem of theft and vandalism. So, there's a great deal of time and money spent trying to protect your hives. And it's not just the direct losses in colonies, but it's the amount of time lost when you have to chain colonies, or you have to keep colonies in iron sheds or do something like that to keep them safe. It links to the forage issue in that there are areas in South Africa where there is relatively good forage, but you just cannot actually keep bees successfully. They get vandalized or stolen. So, that's not a good thing.

And then the third issue, I would guess, is paradoxically, we have too many beekeepers. That's a function of beekeeping development programs because government programs and other programs privately, I mean World Bank and USAID and everyone else, Kellogg's and everyone else does beekeeping development programs, and they're trained people to be beekeepers without

paying attention to the capacity of the country to absorb the beekeepers. So, we have been training programs for 40,000 or more beekeepers and we just do not have the capacity to have that amount of beekeepers. So, you end up with too many beekeepers and not enough places, not enough forage to keep them.

And if there was a fourth problem, there is limited, and somewhat unstructured government support, and we don't really have a structured government program in terms of how we want to manage or develop or organize beekeeping in South Africa. So, it remains a bit chaotic. I would guess the industry, if you spoke to most of the beekeepers, the ones that have been in the game for a long time, somewhere in those four issues would be their major problem. Interestingly, none of the pests or diseases will feature a high in any of those lists of problems. Those, the beekeepers will generally find are fairly easy to manage.

Jamie

Yeah, that is interesting. It's one of the things I saw when I visited there and talked to beekeepers, There's not a big concern really about the pests and pathogens that you guys have, but more so about the issues that you mentioned. So, obviously, you're spot on there. So, Mike, it's hard to have you on this podcast and not talk a little bit about the bee subspecies that's in your area, right? We've already spoken a little bit about your research, a little bit about beekeeping in South Africa in general, but you're right in the heart of Cape honey bee country. Could you tell us a little bit about this bee?

Mike Allsopp

Certainly, Jamie, Cape bees, as you know, most wonderful bees, they are just basically typical African bees. Perhaps, it's a subspecies that's a little less defensive than scutellata or the coastal African bees of litorea and adansonii, though I can take you to areas with Cape honey bees capensis that they are certainly pretty defensive, but I'm not even sure that they are significantly less defensive. But, in general, they're just fairly typical African bees, except dark bees like litorea and adansonii, except that they have one, well, they have a suite of unique characteristics, but it's all focused around one characteristic. And that is what makes capensis famous and what makes them so widely studied, and that is all other races or subspecies of honey bee in the world, if they are queenless, the workers will reproduce, but they will produce only males. They will produce by arrhenotokous pathogenesis, and they will produce males, and their colony will be hopelessly queenless and will die. They will have a flush of drones and then they will die out. Cape bees don't do that. Cape bee workers, when they reproduce, they produce females, so they can produce unlimited generations of worker bees that could keep the colony going or and they can produce a queen at any one stage. So, Cape honey bee, there's no such thing as a hopelessly queenless Cape honey bee colony. We often have these laying worker colonies that survive for long periods of time and then, for whatever reasons, they decide to go queen right again and go through a queen right phase. This thelytokous pathogenesis characteristic, this ability of theirs to

produce female offspring, is linked to a whole suite of other characteristics. They have very large ovaries, so their reproductive output is substantial. They produce queen-like pheromones very rapidly, so they become pulse queens. They become reproductively dominant quite quickly, and if you mix them with other subspecies, other races of bees from anywhere in the world, basically they are dominant to them.

So, it results in capensis being that potential lethal social parasite of other bee races. So, if you put a Cape honey bee colony amidst colonies of carnolians or Italians or any other bee race in the world, Cape honey bee workers will drift or directly invade these other colonies. They will develop their ovaries, they will develop their pheromones, they will take over those colonies. They will result in the queens of those colonies getting lost, and because these now developed Cape workers are able to produce more Cape workers, they will actually turn the whole colony into a Cape worker colony. And the problem with that when you get a mixture between Cape workers and the other race is they all think they're queens, and then the colony actually stops working and slowly collapses and dies. And that is what we define as the capensis problem, which happened when we moved Cape bees up into the scutellata area. Within the Cape population itself, we don't ever, we'll almost never see that. So, within the Cape population itself, the worker has never become so virulently sort of parasitic. So, we don't see inside the natural Cape population, we don't see that sort of impact.

It has resulted in Cape honey bees, capensis being specifically listed in legislation in the EU, in the United States, in Australasia as this completely unacceptable, totally undesirable, prohibited by law from moving this genetic stock anywhere in the world. The flip side of Cape honey bees, as I say, within our population, they are perfectly well-behaved, very good commercial pollinators, very good general bees, fairly easy to manage and seemingly the most tolerant bees in the world to Varroa mites and now also probably to American foulbrood. They seem to manage these pests and diseases without any problems whatsoever. Definitely a good example of it's not good to move bees outside their natural habitat, and definitely not a good idea to mix different types of bee populations.

Amy

So, Mike, I know that when I had emailed you originally to have you on the podcast, we sent you this list of questions and you basically said every single question we could talk about for you said months, right? And I know that is to be true, especially hearing you talk about the Cape honey bee. You're talking about mixing with other subspecies of honey bees. I'm wondering what other subspecies of honey bee are there in South Africa?

Mike Allsopp

We have only one other subspecies and that's Apis mellifera scutellata, which is what I call the Savannah bee because I think calling it the African bee makes no sense because we have 13

subspecies of honey bees in Africa. But the central drier areas of South Africa all the way from the Kuru, which is sort of three hundred 400 kilometers from Cape Town all the way up to the Sahara are taken up by Apis mellifera scutellata, the famed killer bee. The bee that took across to Brazil and now it's finally spreading through into the Florida, into your neck of the woods. In the Cape coastal zone of the Western Cape, we have Apis mellifera capensis, in the inland is Apis mellifera scutellata. And then right at the top of the East Coast, you will get a little bit of Apis mellifera litorea, which is a coastal bee which stretches from Mozambique up to Tanzania. Just as an aside, I will mention that Apis mellifera, the bee that took to Brazil, which was Apis melliferous scutellata, it is generally not well known, but he also took Apis mellifera capensis on the same trip and he had the same capensis problem happened in Brazil and threatened to actually take over the whole bee population in South America. But fortunately for him, he did it on a little peninsula and he was able to eradicate them before they got out of control. If it had been in the general population or if he hadn't been so reactive to it, you wouldn't have had a killer bee problem in the United States or in the Americas. You would have had a capensis problem.

Jamie

So, Mike, that's fascinating. I mean, gosh, we could talk to you so long about all these things. You and I had lunch together in South Africa. While we were there, I was telling you about some research that we're undertaking it, and you know, essentially as I'm getting older, I'm falling more and more in love with the idea of studying truly wild honey bee populations, unmanaged honey bees in their natural areas. And obviously, South Africa is a place I'm interested in doing that among other places.

I know it's difficult to know this with certainty since it's not overly studied, but could you tell just kind of briefly as we wind down our wonderful time with you, could you talk a little bit about the stability and health of the wild honey bee population in South Africa, those honey bees that are nesting in natural settings that aren't managed? Is it large? Is it stable? What do we know about it?

Mike Allsopp

Not a great deal. If you remember from that very nice lunch that we had, I said my Holy Grail of things that I wanted to do was to be able to actually monitor and track wild bee movements in South Africa because the law of, if you speak to the old beekeepers is how migratory our bees are, and there's a lot of general wisdom about how far they move and where they move. There's no data on it and there's no monitoring of our wild bee population. So, it is very much a thumb suck sort of estimate.

But before I answer your question directly, I just need to highlight that, you know, in contrast to the United States, in contrast to most places, the question is how healthy is the bee population in

South Africa? Because there is no difference between our wild bee population and our managed bee population. There's no such thing as buying bees in South Africa. You can't order bees, you can't order packaged bees, you can't order queens. You can't do anything of that nature, not because it's illegal, but because it's not profitable. People have tried to actually sell queens and all kinds of things, but because beekeepers can so readily catch their own bees, and you catch bees even when you don't want to catch bees, there's almost no market for it. And we don't practice swarm control at any level. So, colonies are continually swarming, colonies are continually absconding, colonies are continually moving in.

It's not to say that beekeepers don't do breeding amongst their own stocks. Some of the commercial beekeepers do, and they certainly do splits and increases. But most beekeepers also have a component where they actually catch new swarms every year. Some beekeepers may catch as many as 3 or 4 or 5 thousand swarms every year and just replenish their stock. As I say, bees move in even when you don't want them. In terms of how stable the population is, well, I mean, in urban environments, there are colonies everywhere. There are colonies all over the place in areas in the country where there is significant or substantial forage or sufficient forage. During spring, you know, you can catch 20 colonies, 30 colonies, 50 colonies of bees moving into empty trap boxes. So, the population is seemingly perfectly healthy and stable. Whether it's growing or decreasing, it's impossible to say. For myself, I'm sure that it actually has decreased. I can't think of a scenario where, given that we've lost so much of the forage, it must have decreased. But it seems to be perfectly healthy and perfectly sustainable. And because we don't, do, if you ask about healthy, because we don't have any medication at all, so, we don't medicate for Varroa mites, we don't medicate for American foulbrood, we don't medicate for any pest and disease both in managed colonies or in wild colonies. So, the bees are surviving on their own merits, and they clearly are doing well.

Amy

So, Mike, you know, while you're talking about the wild honey bee population, I'm just thinking about beekeepers and what they're doing. I'm also interested in the general public and the perception of honey bees. So, let's say I'm living in an apartment building and bees come and they're in the walls of my home. What is the kind of perspective and also from the public safety perspective?

Mike Allsopp

What a mixture. You'll get some areas in some groups in South Africa that have cultural beliefs about bees and that bees have significance, either good or bad if they move into your houses. So, those cultural differences and cultural perceptions have to be accommodated. But in general, and increasingly so in my opinion, the general public is quite tolerant to bees, and they certainly view them as having their place and that they're not something that should be just killed. Or, in general, most people are very antagonistic to killing or poisoning of colonies, so-called problem

colonies. There are more and more efforts to try and do humane and safe removals and when there are stinging incidents, for the most part, people don't sue about it or take legal routes. The bees have the right to be there, and you shouldn't have disturbed them.

We don't really have frequent issues that build up when you have to remove every colony from a built-up area. We have colonies everywhere. If you look for them in urban environments, you find them all over the place, and most people don't even actually notice they're there until sometimes they come too close to where grass has been cut or something like that. Then you need to remove them. So, in general, they're just part of the environment, like snakes and other things.

Jamie

I think that's a good example. I happen to like bees better than snakes, though, Mike. Well, Mike, we've covered a lot of topics with you. I mean, we could have taken any one of them and made a podcast episode in and of itself. I just wanted to say thank you for joining us. I feel like our listeners globally will have picked up a lot of interesting pieces of information from our time with you. So, thank you so much, Mike.

Mike Allsopp

Great pleasure, Jamie. Nice talking to you.

Amy

You know, Jamie, sometimes I feel like I'm in my own little world or my own little bubble here with the management practices that we have, the way that our hobbyists and commercial beekeepers are here in the United States specifically. But I love speaking to people from different countries because I can hear about some of the challenges and needs are very similar to what we have. But at the same time, they just have such different management practices. Like, I still can't wrap my mind around the fact that Apis mellifera and the different subspecies that they have there. Those are native, right? And here in the United States, they're not native. So, just hearing about that is very interesting to me. So, I'm just going to open it up and ask you about your experience and what you kind of love about the South African bees.

Jamie

Well, I mean, I'm a little biased, Amy, right, because I did my PhD in South Africa at Rhodes University. I grew to really appreciate it. But my guess is, is across the entire continent of Africa, the Apis mellifera is amazing. And Mike said that they have probably, you know, upwards of 13 subspecies. And he mentioned in South Africa specifically too, that they have capensis and scutellata, capensis being the Cape bee. He talked so much about scutellata being the bee that in the Americas we know as the killer bee or the African honey bee. But the bees are really amazing. Their beekeeping is different there. My guess is it's different really all across the

continent. Of course, our listeners don't have the benefit of this, but you and I were speaking to Mike before we pushed record and he was talking about his trip to Zambia and seeing how they keep bees there, and it was amazing.

There are some things that stand out to me, though, when I went over there. One thing particularly is every time I open colonies of bees in South Africa, I'm always surprised at how remarkable the brood patterns are. Just consistently solid brood patterns. And you know, over here we have Varroa and pathogens and just all kinds of things that lead to spotty brood patterns. But over there, it's like a lot of their colonies are just chronically healthy looking, at least from the outside. So, it's just a different bee in its native environment doing its thing. And it's just really fun to watch. I just get excited every time I go over and get to see honey bees in their native range.

Amy

Yeah. I mean, the other thing he was talking about was the capensis-scutellata relationship, you know, and from what he was saying with capensis, I guess I'm also wondering if capensis does go into colonies and they get mixed in with other subspecies and they take over, how do you prevent that from happening? And how is it possible that not every single honey bee there is capensis?

Jamie

Yeah. So, two very good questions, right?

Amy

I'm like how? I don't understand.

Jamie

So, I'm going to answer your second one first, why isn't every honey bee there capensis? So, scutellata is a remarkable bee. I mean, I say that about every subspecies. I hear myself sometimes. But capensis is also a remarkable bee. Scutellata, like Mike said, goes from South Africa all the way up to just South of the Sahara. I mean, it really covers a big, big, big area on the African continent. It is well adapted to those environments. I hate to over generalize here because in its natural distribution, it's going across a really large range. But in South Africa, there are some natural climate and environmental barriers between the natural territory of scutellata and capensis. For example, capensis is kind of in southwest South Africa and the winters are colder and wetter, whereas where scutellata is, it tends to be warmer and drier. So, I hate to over generalize, but you'll see in the literature a lot that scutellata likes drier, warmer environments whereas capensis thrives in this other environment.

One thing that Mike didn't mention that I think is really critical to understanding capensis is that the capensis distribution very nearly mirrors the Fynbos distribution. So, Fynbos is a plant biome in South Africa that is the most biologically diverse plant biome in the world. And so capensis, the honey bee, is a specialist of essentially the Fynbos biome. And so, it's funny when you overlay their distributions, they're nearly identical. So, climatically, environmentally what it likes is down in that area of South Africa. So, there is a zone of introgression where the two subspecies meet, but capensis never really pushed up into South Africa. So that's the second question's answer first.

So, the first question is essentially then how does this problem start? Well, the problem starts because scutellata from the north or eastern South Africa had been moved into capensis area and vice versa. So, while they were being moved together, you would get, you know, the introgression where capensis would move into these colonies. They call it social parasitism where they move into these colonies of scutellata and take over those colonies. That led to the spread of capensis. And there's really no great way to control it except not moving bees between those two areas. When you see a colony outside of the capensis area exhibiting capensis-like behaviors, you know, the best thing probably to do is just simply remove it, right? You know, maybe even consider eradicating the bees from that nest because as they're producing more pseudo clones, these workers that are going to go out potentially and parasitize other colonies, you're just leading to additional problems. And it's funny because what should lead to the next question is why is capensis not a problem in its own area? Well, Mike said, within the capensis area, capensis is not a problem. So, the question is why? Why don't you see this happening where capensis is? And it's really a remarkable story, which is the reason it's taken a lot of scientists there. I mean, you and I have interviewed multiple scientists who had worked on this particular issue for this podcast. It's just an interesting thing.

But South Africa is a unique place. And my guess is there are similar stories all over Africa. It's just that honey bees are not heavily studied across that continent, frankly, you know, except in certain places like Egypt and South Africa and maybe a few others. So, there's a lot to know about bees on that continent. They're fascinating bees and have a lot to discover studying honey bees.

Amy

Well, it sounds like we need to do a study abroad in South Africa, so maybe that's the next step.

Jamie

It's on my radar. I've already been thinking about doing that, maybe even starting in 2025, but we'll see what I can pull off. But it's an exciting place to do research, and frankly, more people need to do research there on honey bees.

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, the first question that we have today, this individual was wondering if they were a worker bee and found themselves in a hopelessly queenless hive, they would probably recruit a few buddies, few sisters, sneak into the hive next door, grab a couple of eggs and bring it back to their own hive to make a new queen.

Jamie

Well, this person sounds really cheeky. If they were a worker honey bee, I'm not sure I'd love them in my colonies.

Amy

Very dedicated. Surely a few of us can make it past the guard bees. What are your thoughts on this? I mean, about everything about this.

Jamie

You're a sneaky person, questioner. I'm not going to reveal your identity in case you are really. Just kidding.

Amy

Well, this person's name is Robert.

Jamie

Well, way to go, Amy. I wasn't going to do it. Anyway, good question. So, I think the questioner is basically saying, if we were hopelessly queenless, why don't workers essentially go out and collect eggs from other hives? So, let's talk about this because it's purely supposition, right? So, it's a fun thought exercise for me. When a colony goes queenless, obviously their first answer to that is to rear their own queen. Now, we all know if you've been a beekeeper at the time, we know that process can fail. It can fail for multiple reasons, but I'll give 2 right off the bat.

Number one, often times a lost queen could have had weeks to develop. Maybe she had stopped laying eggs for a week or two before she before she finally died or before the bees killed her, in which case by the time she's absent, there's no young female larvae from which to make queens, right? So, there's just nothing available. Maybe she died and there were eggs in the nest and the bees tried to rear larvae and failed. Maybe she died, the bees reared a queen, and the queen that they kept went out and got eaten by a bird on her mating flight. That's the third example, even though I only promised two. So, my point is there's lots of reasons that a colony can go queenless and then fail to requeen itself.

And so now let's pivot to the fate of the workers that are unable to rear a queen. Now, they're up the creek without a paddle. What are they going to do? Well, the questioner's saying, well, essentially, if I were a worker and found myself in this case, I'd just go steal an egg from another hive. I hate to say this on the podcast because I might eat my words someday, but we don't know with certainty that they don't do that, right? Every time I say this never happens or we don't know, honey bees surprise me. I don't think it happens. There's no literature evidence for it happening. But as a scientist, I always hold my conclusions very loosely. I know that honey bees do some pretty wacky things that we haven't even talked about here on this podcast.

So, I mean, I don't put it past their behavioral repertoire, even though it's no evidence that this occurs. So, then what would it benefit worker honey bees to do? Well, I don't want to get nerdy geneticist on you, but we know in a haplodiploid sex determinant system colony, workers tend to be more related to their sisters than their own, say, female offspring. It's a tricky, complicated mathematical thing that you have to follow, but that's just kind of the way it is. So, as a result, that's one of the reasons that people believe that workers forfeited the right to reproduce themselves and then raise the offspring of another queen, because technically they get more of their genes out that way than they would be having their own offsprings. It's complicated, I know, but that's one thing. But in the absence of a queen, the colony is doomed. So, there's really two ways of handling it as a worker currently that we know about. Number one, something like a Cape honey bee's workers can actually lay unfertilized eggs that become diploid and become females. So Apis mellifera capensis has solved this problem because workers can produce female offspring without mating. We've talked about it a lot on this podcast, maybe another story for another day, but the vast majority of other Apis mellifera subspecies workers dealt with it in an entirely different way, which is, hey, we're just going to lay eggs because it's kind of the workers and the colony's last ditch attempt to get its genes in the environment before the colony dies.

Remember, the production of drones still gives that worker a possibility of distributing her genes elsewhere because her drones are technically capable of mating with virgin queens and drone congregation areas around our nests. So, it's almost like the colony's like, oh, crud, we know we're going to die, so let's just put our genes everywhere we can out there and see what happens on our way out. So yes, I like the questioner's comment. Maybe workers should just go steal eggs from another nest. But they've really dealt with this queenlessness two ways. One subspecies develops this way to lay eggs without mating and become females, the capensis, and the others just say, hey, let's just get our DNA out there through drones.

Amy

You know what I'd do if I were that worker bee?

Jamie

What would you do? Take it all?

Amy

No. I would probably grab some nectar and pollen and go drift over to the hive next door, and then I would gift the guard bees with the resources and just pretend like I belong to the other colony. It seems like way less work. I don't know.

Jamie

You're the social bug, Amy. You're the social bug. But actually, Amy, there's clear evidence that that happens too. I mean, workers often in a hopelessly queenless colony can drift other nearby colonies. So, I didn't even think about that. Good job, Amy. I thought you were going to say, I was like, I'm going to quit working. no need to work. I'm just going to sip on honey.

Amy

Give up?

Jamie

Pass the days and watch the other suckers in the nest do stuff.

Amy

Nah, I'm feeling pretty optimistic today. I think I would just, if I can't beat them, join them, you know?

Jamie

There you go.

Amy

OK, that was a fun question. All right. Number two. The second question that we have is about clipped queens. So, we recommend clipping queens for swarm management. And the questioner is asking, will a clipped queen during swarm season try to leave with the swarm during this time? Or do you think that the queen is aware that she can't really fly very far, so she'll stay within the confines of the hives? What do you think about this? If there's a clipped queen trying to swarm, the beekeeper doesn't see the swarm. What would happen?

Jamie

I have very first-hand knowledge of this question.

Amy

I know, me too.

Jamie

Yeah, for the last, you know, 30+ years of my existence, I've been a beekeeper. Well, I guess 35 years. It's incredible to think about now. But anyway, I've been a beekeeper who's clipped his queen's wings. And so why do I do it? What results from it? Well, I clip queens for swarm insurance. It's not swarm control. Colonies can still try to swarm with a clipped queen, but it's swarm insurance because I won't lose the swarm because the queen can't fly. So, let's talk about all this. Let's unpack it.

We know that when colonies try to swarm, they swarm with the old queen, the one who's available in the nest for the swarm. It's not the queen who makes the decision to swarm or not. It's the worker bees who make the decision to swarm. As they're rushing out of the nest, they rush that queen out with them. They all fly in the air, they land together in that cluster, then they go find their home and the parent colony rears its own queen to replace the queen that left. So, my thought is a lot of beekeepers thought, this is not unique to me, I didn't come up with this idea, but my thought is, if queens can't fly then I won't lose the swarm. So, the questioner is basically saying, “Well, if you clip a queen what is she going to try to do?” She does not know she can't fly. So, with a colony that tries to swarm with a clipped queen, the bees are going to rush out. The queen is going to rush out. They're all going to take off in the air. Except the queen won't take off in the air. She'll jump. Whatever they do before they take that last little flight, she'll fall to the ground, she might glide to the ground and the bees swarming in the air will miss her and go back to the nest. A subset of bees swarming in the air will smell that she's on the ground, and they'll coalesce with her on the ground. So, you'll get this cluster on the ground. I've had plenty and plenty and plenty of colonies try to swarm with a clipped queen. So, now what? They're on the ground. Now what? Now what happens? Two or three different things can happen. Two or three or different things can happen. Number one, the hive is on some type of hive stand that the queen and the swarm can crawl back up and go into the nest. I've seen that happen plenty of times. When that happens, they usually try to swarm again the next day, and the next day, they'll try to swarm with her a couple of times, and if she can make it back into the nest, they make it back into the nest and try again tomorrow. Following that pathway to its logical conclusion, when I see this happen, the colony will try to swarm with the queen two, maybe three times, but at some point, it appears that they have had enough, that queen will disappear, and they will swarm with the first virgin queen that comes out of her queen cell.

So, you then, as the beekeeper, have clipped that queen for swarm insurance, but you've got to catch them within that week of her trying because if she doesn't do it successfully, then they're going to swarm with the next virgin queen. And clipping her was of no benefit to you because you still lost a swarm with the first virgin queen to come out. So, that's pathway one.

Pathway two is that the queen can't make it back into the nest. Maybe you've got the hive stand some convoluted way that she can't get back up. Maybe she drifted so far from the nest when she was kind of drifting from the hive entrance that that it's just too far. Those swarms will often stay with the queen until she dies of exposure, and those bees will ultimately go back to the nest

without her, and they'll swarm again with the first virgin queen to come out. In my case, kind of pathway number three, I tend to keep my colonies on screened bottom boards in spring and summer. So, what I do is if I ever go into my colony and there's clear evidence that they swarmed and I know that she can't fly, then oftentimes, I will find that swarm underneath my hive's bottom board. It's like they've committed to the swarm. They don't want to go back into the nest, but the smell of being underneath that hive since it's a screen bottom board is just too great. So, they coalesce as a swarm cluster underneath their hive. So, if I go in and see clear evidence that they try to swarm, often, I'll rock my hive up after I get down to the bottom most box and I'll find the swarm under there.

Let me just give you a couple of quick management pointers on what to do with this. And Amy, I know it's a long explanation. It's just that I've got so much experience with this, and I know what I would do in this case. If I ever have a colony try to swarm with the clipped queen and I see it happen, I know that they're going to keep trying. So, me putting that swarm back into the nest and cutting all the queen cells out probably won't help. Once they've tried to swarm, they're going to keep trying to swarm. One of the ways that I handle this is you can make a new colony from that swarm. It's almost like catching a swarm in a tree. You just move them into a new box. You've got a new colony; you go back in the parent colony and work with it to get it requeened successfully. So, that's one option. Option number two, though, is they're often swarming during the honey flow, and you don't want that to happen, right? So, in that case, I will find the clipped queen. This is tricky. So, listeners pay close attention. I will find the clipped queen in that swarm, and I will cage her. I will put the swarm back in the hive. I will go through and cut out all the queen cells. So, I've returned the bees, but not the queen, and I've removed all the queen cells. So, they're not going to have another queen to swarm with tomorrow. Then, I will go to the neighboring hive and find its queen and put it in as queen cage. Then, I will swap queens between hives. The one that tried to swarm will go into the neighboring hive. The neighboring hive's queen will go into the one that tried to swarm. I will leave those queens caged for four days, and then I'll go back in and manually release those two queens in the nest. Basically, I'm requeening the two colonies with the other colony's queen, and that has always worked to put the brakes on that swarming tendency of that first colony because I've requeened it. They have a new queen, and I've removed all the queen cells. So, they've got no backup plan. So that's a big, long explanation on yes, they will try to swarm, the bees will probably kill her if they're not successful, and that's if she makes it back into the nest. But I've given you a couple of workarounds on how to deal with that if you ever see it.

Amy

Yeah, for sure. So, you don't put it in like a sugar cork when you cage the queen, you just close it up, leave her in for four days when you switch them?

Jamie

Great comments. I usually just cork it up because I don't ever have that kind of sugar candy available, right? If you have queen cages that already have that preloaded, you could keep a couple of those in whatever little bucket or pail or kit that you standard take into the apiary so that you've always got them available.

In my case, I just always keep a couple of queen cages with me when I go in the apiary to solve these kinds of problems. I don't typically have candy in those cages; I just keep them corked and manually release them. If you have candy, you can let the bees release them themselves. That's just not something I often have access to.

Amy

Yeah, I feel like our lab -- we're probably experts at finding queens like on the ground in clusters, right, because we do clip our queens. One of the questions from this questioner was asking, does it increase the likelihood of lost queens? I would say yes, because you typically know that if she's trying to swarm, she's somewhere near, right? I mean she has to be. So, you kind of just look for that cluster. The amount of times I've found queens on the ground in those little clusters is, yeah, it's probably quite impressive.

Jamie

Yeah, I mean, you're right. Here at UF, we have our bees on campus, right? The baseball stadium is just a couple hundred meters from us, and we don't want our bees swarming, so we do everything we can to stop it. So, we clip queens, and when it's swarm season, we eat lunch in the break room and, you know, the break room, and we look out the window and we watch colonies swarm. We know they're not going to swarm successfully, so we can go out there and find the queen on the ground with bees around her. It happens a lot.

Amy

Okay. So, for the third question that we have, this person is interested in the number of visits nurse bees make to feed workers versus feeding the queens. What is the estimated total number of visits? Do the numbers change depending on the different developmental stages up until they're fully capped?

Jamie

Okay, good question and I happen to know the answer to the first half questions. The question again is how many times do nurse bees visit worker cells and queen cells in the development of the workers and queens? There is a cohort of worker bees in the nest called nurse bees. Their job is to take care of and feed the developing honeybee larvae, right? We know those bees. If you're listening to this podcast, you're aware of that cohort of bees. Because I have a lecture on worker bee behavior, I had to look up years ago characteristics of nurse bees. What do nurse bees do? So, there's a slide in one of my presentations on worker honey bee behavior where I talk about

nurse bees. They will visit the standard worker cells, so a developing worker larva, they will visit a developing worker larvae cell 5000+ times while that cell is uncapped.

I have no idea who counted that, but I mean probably a graduate student or a technician, right? Just count the number of visits that a worker -- but it's 5000+ times. One to two thousand of those 5000+ times, they are actually putting food into that developing worker cells. So, you could argue that a developing worker is fed one to 2000 times out of a total of 5000+ visits by nurse bees. So, I knew that for workers, I did not know it for queens. Unfortunately, the question is how many total visits and how many feeding visits. I can only answer the feeding visits. I don't know how many times a queen larva is visited while her cell is open, but I do know of all the visits that they go to queen larvae, queen larvae are fed about 10,000 times, so 5 to 10 more times they're fed than workers are.

So, it makes sense, right? There's such a volume of food put into the cells with developing queens. So much food, in fact, that the queens don't eat it all. We see this a lot in queen cells once they're developing and we pull out the queen cell, we see that leftover food. So, I don't know how many total visits there are for queen larvae, but they're fed, you know, around 10,000 or so times. And that's incredible to think about.

I actually had a graduate student, Ashley Mortensen, who's now a research scientist in New Zealand. She was wondering if those visits were important to bee development beyond just food. Maybe there's some sort of socialization that's necessary between larvae and worker bees and was going to look at an aspect of that and didn't find that that necessarily mattered. So, it does seem to be just purely assessing, do I need to put food in here? And if the answer is yes, they do it. So, it was interesting. It's interesting to know how much attention that developing larvae get from nurse bees.

Amy

Yeah, I definitely appreciate the researchers that do the work to do that because I don't think I would be able to count that many times. I can't even count to 10. You're supposed to laugh at that.

Jamie

Sorry, there was a slight delay. I had to process that. I was like, well, that's too bad, Amy, because counting's very important.

Amy

Oh my gosh. Okay, well, thank you so much, Darren, Robert and Denise for asking the questions. For all of you listeners out there, don't forget to ask us a question by sending us an e-mail or visiting one of our social media pages.

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 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.