

Episode 177_mixdown PROOFED

Thu, Aug 08, 2024 1:53AM • 54:23

SUMMARY KEYWORDS

apis, bees, honey bee, hives, beekeepers, honey bees, colonies, question, species, beekeeping, paint, flows, evolved, gloves, cavities, evolution, jamie, bee, wearing, find

SPEAKERS

Guest, Jamie, Stump The Chump, 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. Amy and I are going to be doing something quite different this episode. We're, in fact, interviewing Dr. Keith Delaplane, who's a professor and Walter B. Hill Fellow and Honey Bee Program Director in the Department of Entomology at the University of Georgia. He was able to sit down with us and give us a fantastic interview, and it was a longer interview, so what we're going to do is split that up over two episodes. In this episode, we're going to hear part one of that interview. In the next episode, we'll follow it with part two. So I hope you enjoy this interview with Dr. Keith Delaplane. Hello, everyone, and welcome to another episode of Two Bees in a Podcast. I've got a bittersweet podcast to announce today. It's sweet because we are fortunate, Amy and I, to be joined again by Dr. Keith Delaplane, who's a Professor, Walter B. Hill Fellow, and Honey Bee Program Director at the Department of Entomology for the University of Georgia, but it's a little bit bitter because we're only a couple of days from his formal retirement from a distinguished career working in the honey bee beekeeping world. Dr. Delaplane, thank you so much for joining us on our podcast again.

Guest 02:02

Well, thank you, Jamie, and it's an honor. You and your listeners may be proud to know that this is officially my very last educational event.

Amy 02:11

Wow.

Guest 02:12

This very podcast is the last pedagogic activity I'm doing in my career.

Amy 02:18

That's amazing. Jamie, you know what I was gonna say? We're recording this a couple of days before Dr. Delaplane retires, but by the time this episode comes out, he's gonna be, I don't know, sipping margaritas on an island or something.

Jamie 02:30

Well, it's tough for me, but obviously we're bringing you on to talk about a very specific topic, biogeography evolution. We're gonna get there. But if folks remember back our early interview with you in a past podcast, they'll know that you and I have history. A long time ago, I met you when I was 13 years old, fresh new beekeeper, went to your Young Harris Beekeeping Institute, and then my 4-H agent and I, my high school science teacher and I, bounced 4-H projects off of you, science fair projects off of you. I did my undergraduate at UGA and worked in your lab for all four of those years, and then did a post doc with you. So it's really an honor to be able to speak to you here now that you're on the last leg of your employment at UGA. We're going to get into that, but it's very monumental, and we're grateful that you've given us some time today.

Guest 03:14

Well, thank you. It's my pleasure. And it seems very appropriate, doesn't it?

Jamie 03:18

It does. Well, we are formally going to talk to you about honey bee biogeography and evolution. You dove into this very heavily, recently. But before we get there, Dr. Delaplane, if you wouldn't mind just reminding our listeners a little bit about your past, getting into bees, where you did your degrees, and how you ended up at the University of Georgia.

Guest 03:37

Sure. Well, I started beekeeping about the same age that you did, Jamie. At around 13, my parents bought me a beginner's beekeeping kit, and I was immediately hooked and obsessed. I mean, most of your listeners can understand what it's like when you get bitten by the bee bug. It just takes over everything, and that was me as a teenager, growing up on a farm in Indiana. I pursued my undergraduate degree in agriculture at Purdue, which is our local agricultural university, and for some strange reason, I never connected the dots that I could make a living off of honey bees even though I was attending an agricultural college and an agricultural major, I was all plugged into the idea of growing hogs and corn and soy beans, because that's what you make money off of, right? It wasn't until I had already graduated with my degree and I was finished with it that summer, and I was wondering to myself, "What am I going to do with a Bachelor of Science degree in animal science with a specialization in hogs management." I had a good friend who was actually a faculty member, and he taught one of the last courses I took at Purdue, and he called me into his office one day, sat down and said, "Keith, what do you want to do with your life?" And I sort of shuffled my feet and I said, "I don't really know." And he said, "Well, what do you like to do?" And I said, "Well, I like to keep bees." And he said, "So, why don't you go into graduate school in entomology?" And I thought, "Okay." And I swear that thought had never crossed my mind before. Four years taking classes here and there, and I even

took an entomology course at Purdue, and the thought never crossed my mind that I could continue this interest in bees. So at that point, I put out the graduate school applications. I wanted to work on a program that had a bee research option. And at that time, in the late 80s, the pickings were quite thinner. I applied to LSU and Virginia Tech, both of whom accepted me, but only LSU had assistantship money, so off I go to LSU, and I did my master's degree with Dr. John Harbo at the USDA Bee Lab there, and then I did my PhD with termites. And that happened because I had a social insect faculty member on my master's committee, and his specialty was termites, and he had money to fund a technician. He said, "Here's the deal, if you come work with me full time and just produce research, I'll let all of that count toward your dissertation." So that's like a win-win deal, a graduate student on a research technician salary. I mean, that was too good to be true, and so three years later, I'd finished my PhD in termite biology. So it was kind of a roundabout route, but right at that time, the University of Georgia had a vacancy, and honey bees open up, and I applied, and I got it, and boom, boom, boom, there I go. I've been at UGA since 1990, ever since. It's been a great run for my money. I tell people freely, I think I've had the best job in the world. Georgia has treated me well, the beekeepers of Georgia, the University of Georgia, and I'm just really pleased with how life treated me.

Amy 07:07

It's so fun to hear your story, Dr. Delaplane. You've had such a successful career. Many people know you for your book, "The First Lessons in Beekeeping." I would say that most beekeepers probably have that as just a staple with them. So we appreciate that book, and I know that you had mentioned evolution and biogeography. Before we discuss your next book and what you're planning on doing at retirement, let's just start with that. So let's talk about what biogeography and evolution looks like. What is that and what got you interested in this topic?

Guest 07:38

Yes, I can do that, and that's sort of a nice segue, Amy, to talk about what I have been doing for the last nine years, and that is producing a book. I consider it my magnum opus. It's my biggest professional effort that I've ever done, and that is a book coming out in November with Johns Hopkins University Press, and it's entitled "Honey Bee Social Evolution: Group Formation, Behavior and Preeminence." It uses the honey bee as a model for how not only social insects evolve, but how organisms in general evolve as complexity moves up the evolutionary chain of transitions. And in making that book over the last nine years, it has been life changing. It has been professional changing. It has been a deep and sustained immersion in the scientific literature, much of which I was not very directly familiar with, and has been really intellectually stimulating and a great use of my time. I'm grateful to my administration for letting me spend so much time on this one dedicated, important project. But as you say, biogeography figures prominently in this book. Biogeography is sort of the long term history of a species, and not only its evolution over that long time, but how that evolution was intimately tied to location. Species always evolved under the influence of their local habitats. So all evolution is local evolution, and that's why we don't have zebras in Europe, for instance, or American bison roaming the Serengeti of Africa. These species evolve in particular regions, and they evolve to be very adapted for those localities. And so that what biogeography is. It takes a look at the modern distribution of species, it takes a look at the modern distribution of subspecies, in the case of honey bees, and you can ask yourself, why does the one species *Apis mellifera* bust up into, depending on your count, 25 to 32 different races or subspecies or local bio types? What is it that made all of that happen? Each one of

these local races is the response of one species to the local conditions that encountered in that particular area. For example, the Cape bee of South Africa, which Jamie is quite familiar with having done his PhD in Africa, the Cape bee, *Apis mellifera capensis* evolved for high frequency queen loss during their mating flights. This is presumably because of the high winds that are experienced at the Cape of the African continent. Because of this, the Cape honey bee evolved some really peculiar behaviors, peculiar to those of us who are familiar with European honey bees, the workers, for instance, can lay parthenogenic fertilized eggs, and these eggs can, in turn, become a functioning queen. Well, that strikes us as weird, those of us who work with European honey bees, but that was a local reaction to a local condition that was very unique to the southern Cape of Africa, and that's why *Apis mellifera* evolved this peculiar race that had these peculiar behaviors. At the opposite pole, we can look at Northern Europe, even so far as southern Sweden, northern Germany and Denmark, and we find that very same species, *Apis mellifera*, but it sure looks a lot different. It nests in cavities. It has much larger colonies. It has much bigger food supply population over the course of 12 months. It doesn't swarm as frequently because it can't afford to. The nectar flows in Northern Europe are quite large, but they're also very periodic, and so *Apis mellifera* in Northern Europe responded with very large populations, very large honey stores, and they can only reproduce once, at most, maybe twice a year in the form of a colony swarm or a fission event. So the same species, in both cases, but both of them evolving very different behaviors due to their locality. And really, all evolution is like that. All evolution is local. And so biogeography is asking, how did *Apis mellifera* change over its long course of history, over its long migrations? Where did it come from originally? How did it end up where it is today? And then, of course, in modern times, we have the whole wild card of human movement. We have moved honey bee races all over the world, and that kind of scrambles the pot and mixes up the story, doesn't it? But we look back over those older, pre-human events and say, how does that explain the honey bees that we see today? So I'll take a pause there. That was a long answer to your question, and I'll let you reframe the next question for us.

Jamie 12:55

Dr. Delaplane, that's all fascinating. We're definitely going to dive very deep into some of the major findings that you've made and ask you some specific questions about your research. But I do want to pause here quickly and highlight something that you said, this idea that it took you nine years to put it together. And I think a lot of people out there are saying, well, he's already told us some things that are interesting, and he's going to tell us some things that are interesting. How does all this ultimately come together? So could you talk a little bit briefly, before we get into the weeds, how you do this? What are the methods associated with pulling this information together in the synthesis so that you can make some of these grand statements that you're going to end up making?

Guest 13:35

Wow, that's a great story. And I say that's a great question, Jamie, because it interests me and you kind of provoke me and makes me hold up a mirror to myself and say, how in the world this happened, Keith? The practical answer is, back around the year 2013, I got infatuated with the idea of a monthly column in *American Bee Journal* where I wanted to give a special treatment to one aspect of honey bee biology each month and talk about how that evolved with the goal of helping beekeepers understand how they can partner with biology rather than just be ambivalent toward biology. How can we look at the biology of the honey bee and say, how can I align my beekeeping management with biology, so that

it's better for both of us? It's better for the bees, and I still get a decent honey crop. That was my motivation. And so each month, I would sit down and I would ask myself, how did the annual cycle evolve? And then we talked about latitude and nectar flows and population size, and then the next month, I would talk about dance language. How did dance language evolve? I would write about that. And after a while, themes began to emerge, and I had lots of positive feedback from readers. I had people saying over and over again, are you going to put this in the book? Please put this in a book so that we've got all of this in one place. And I began to say, why not? That's a pretty good idea. And I was at a point in my career where my research interests were beginning to converge as well. That was about the time I started studying honey bee multiple mating, how the queen, it's called polyandry, she mates with multiple males, anywhere from 10 to 20 or more, and that creates a genetically diverse colony. And I started getting curious, why is this adaptive? I found that the literature was curiously silent on that. There was really no good explanation for why queens should keep mating, mating, mating, mating, mating. Where's the end in sight? So my research interests in polyandry sort of converged with what I was writing for American Bee Journal. So I picked up the challenge of just writing a full blown book, and these monthly columns in ABJ were certainly the foundation of it. But as I went back, and when I got a publisher with Johns Hopkins Press who liked the idea, and I started going back and looking at these monthly columns, I realized they barely scratched the surface, just barely touched upon the subject. I really needed to drill deeper. And I think, maybe a lot of people and your listeners may recognize when I say I kind of disappeared for about 10 years. In some respects, I did. I didn't write as many grants and I didn't do as many meetings around the country, in part, because I was just so obsessed on this one project. The fruit of it is going to be finally evident this November. So that's kind of how it happened, Jamie. It also married a couple other interests. I was keenly interested in illustrating my own book, and so it was an opportunity for me to exercise my art interests. I produced the illustrations for it as well. So it was a happy convergence of my interests in where I was at my career at the time, and I was able to really drill into my research on polyandry at the same time. I think I have the administration of the University of Georgia to thank for this because I think they trusted that I was working on something that was worth saying and gave me a long leash. So there you go. The kick off was a monthly magazine column, and that is what culminated in a 500 page plus book.

Amy 17:32

That's amazing.

Guest 17:33

Yeah, it was fun. It was kind of an unrolling adventure. There was no one more surprised than me.

Amy 17:40

Dr. Delaplane, once you retire, we've got a job here for you at the University of Florida. We're looking for a honey bee illustrator if you're interested.

Guest 17:47

Oh, oh, oh. Yeah. How about that.

Amy 17:50

All right, you're talking about your time with ABJ and compiling all this information. So we're really excited to get the book once it comes out. In general, what are some of the bigger discoveries that you made, and what are some of the hot topics, big discoveries that you're going to be discussing in the book?

Guest 18:06

Well, thank you, Amy. I think there's a couple big themes that came out of this book, and the first one is evolution sometimes gets a rhetorical bad rap because it is sometimes presented as manifest selfishness, survival of the fittest, selfish, it's all about me, me, me succeeding, reproducing, out competing you. Certainly, there's a lot of truth to that. Genes are unwaveringly selfish. Genes are, by definition, self-replicating molecules. That's what they do. Genes co-opt other genes to produce bodies, organisms that help propagate those genes. But it's also true that, more times than not, the best way to be selfish is to cooperate, and that, Amy, is one of the two big themes of this book. Evolution is not one side of a coin, it's two sides of a coin. There is individual selection on one side of that coin, and then there is group selection on the other side of that coin. And the great sociobiologist, the late great E.O. Wilson, he put it this way. He said, individual selection selected for our vices, group selection selected for our virtues. He says we need both. And he pointed out that one of the characteristics of human beings is to forever be conflicted between those two extremes. Think about any one of us in our daily lives. We are constantly, I would say, almost non-stop, even as I'm speaking to you now, this is on my mind, and that is, how can I take care of my own individual needs and interests, but at the same time, how can I be a nice guy? How can I be a good citizen? How can I be a good member of the group? I think most of us are always trying to wrestle with those extremes. We have to take care of ourselves, but we also have to be a member of the group. And I loved E.O. Wilson's presentation of that thought, that we are eternally in tension between those two evolutionary mandates. So the honey bee models this. It is through direct selection that organisms evolve, and we end up with individuals that are reproductively autonomous in a species, and they want to win the Darwinian pie. They want to reproduce and pass on their genes in the next generation. Well, there are social forces that push some of those species to live together in groups, and those are most famously known in the social insects: the social ants, wasps, and bees. But there's also other social organisms. There's eusocial shrimps, there's eusocial rodents in Africa, and others as well. These are individual organisms who abandoned individual reproduction in favor of helping another individual in the nest. In the case of honey bees, the queen does the reproducing. In other words, I subjugate my reproductive interests to that of the queen, and I'm going to help my queen produce more siblings like myself. So a central question in this book is, what makes species do that? What are the ecological advantages to giving up a little bit of my reproduction in order to help my kin and my family reproduce? If enough conditions are met, that answer is affirmative. There are conditions that help some species do this. There's even some argument that humans may meet the criteria of eusociality. It's kind of an interesting little aside, but one example from humans is female menopause. Think about what happens. We have a member of the species or a member of the family who has faded into non-reproduction, but yet they still have a long life ahead of them. Why has evolution selected for such a protracted sterile period in the lifespan of humans? This can be explained through using these same social evolutionary principles that I'm talking about in my book. Research has shown that those societies in which grandmothers remain at the nest, and that word nest is in quotes, or the home family unit, they can help their daughters and children with their reproduction. They improve the fitness of their grandchildren by staying alive long enough to stay

at the nest and help their children reproduce. So we see some of these dynamics even in the human species. And E.O. Wilson himself is on record affirming that *Homo sapiens*, humans, do qualify as a eusocial species, and human female menopause is one of the strongest pieces of evidence in that argument. I guess my point is, Amy, that these impulses that drive individuals to form groups, that drive individuals to practice altruism, drive individuals to give up their own special interests in favor of the group, these impulses are not unique to the social insects. They are general across every evolutionary transition. I think that is just really cool. Beekeepers can take a lot of pride in knowing that most of this knowledge has come from honey bee scientists. And for decades, honey bee scientists were just innocently piecing together this sociobiology, and it's only recently, in the last 15-20, years, that biology has begun to synthesize this knowledge and wake up to the fact that, hey, this happens at every evolutionary transition. Nucleotides glom together into nucleic acids, and nucleic acids glom together into chromosomes, and chromosomes glom together into cells, and cells glom together into multicellular organisms, and in the honey bee, multicellular organisms glom into one another to form a super organism. This happens at every one of these steps. Individuals subjugate selfish reproduction for benefits of the group. And that has happened over and over and over in evolution. Honey bees are sort of the poster child, I would say, of that process. And this book is about that. That, Amy, I think, is cool. And then what I said earlier that evolution is not just selfishness, it is equal parts cooperation. And that, I think, is an important message for today.

Jamie 25:20

So, Dr. Delaplane, that's really amazing. I mean, it sounds like what honey bees are doing is they're providing the great framework, the foundation and the case study for a lot of these higher level, even in some cases, philosophical paradigms in the development and speciation and behavior of everything that we see alive. So it's really interesting that you're able to make that headway in the book using honey bees as this model. So I guess to find out more about that specific branch of what you learn, people are going to have to get the book. I'm going to take us a slightly different direction now and kind of get straight to the bees. I really feel after listening to that answer, we could have had you on, really, for multiple podcast episodes to go a lot of different directions, but my question kind of pivots back specifically to *Apis* here. We've got a handful of species of *Apis*. We work one of those, *Apis mellifera*, but there are other species of *Apis* as well. And I know one of the things that happened as a result of you plowing through the literature is you learned a lot about the speciation of *Apis*. And so could you talk a little bit about that? What are some of the ancestral species of *Apis*? What species are around today? You know, things like that.

Guest 26:31

There are a couple competing models for where did the genus *Apis* come from? And the traditional model has always focused on Southeast Asia, and for very good reason, that is, to this day, the region of the world where we have the most taxonomic diversity of species of *Apis*. There's at least seven or eight different recognized species of the genus *Apis*, some of which are, for example, *Apis cerana*, *Apis nigrocincta*, *Apis koschevnikovi*, *Apis dorsata*, *Apis florea*, *Apis andreniformis*, maybe more, but that's all I can remember at this moment. And these are all in Southeast Asia, with one big exception, and that is *Apis mellifera*. *Apis mellifera* is exclusively in the western part of the Eurasian land mass. We have *Apis mellifera* from North to South Africa and all of Europe up to the Arctic Circle, and it's extremely Western in its orientation. And I've always viewed that as a curiosity, and I throw that out

there as a curiosity to my listeners too. Why is the Western honey bee exclusively the Western honey bee in its natural range? It doesn't even overlap with its Asiatic cousins, which are still comfortably nestled and focused in Southeast Asia. Well, one traditional model says that all *Apis*, including *mellifera* and *mellifera*'s ancestors, evolved in Southeast Asia. Well, there has been some challenge to that model, and there's a very vigorous debate out there that the origin of the genus *Apis* is, in fact, Europe, which would be modern day France and Germany. And for good reason, the oldest known fossils of members of the genus *Apis* are, in fact, from France and Germany. That's pretty powerful evidence. You don't get higher quality evidence than dated fossil evidence, and that's what we have. So there is a very vigorous counterargument to be made that the genus evolved, originally, in Europe. So there's many things to think about here. If you entertain the Southeast Asia model, then you have to answer a couple awkward questions, one of which is, why is *mellifera* entirely, exclusively, and discontinuously positioned in the Western African Eurasian land mass without any range overlap with its Asiatic cousins? That's one question. The second question you have to be prepared to answer is, why is *Apis mellifera* exclusive among all other *Apis* not have its own coevolved parasitic mite? I think that is a burning question, and that's a very pertinent question to modern day apiculture, because since, at least, the late 19th century, and especially in beginning in the 1960s, we have had the worldwide explosion of *Varroa destructor* on its nonnatural host, *Apis mellifera*. And I think that's a question that needs an answer. Why does *mellifera* not have any natural, native southeastern Asiatic parasitic mite. Well, if you consider a European origin for the genus, then that answers both of those questions. It makes it very plausible that you could have a unique and singular branch of that *Apis* genus ancestry that moved from Europe directly into Africa and radiated there into its various modern forms, and never, ever had a history in Southeast Asia whatsoever. So that's why I personally am very fascinated with what I will call the "out of Europe" model, because that answers those two big, I'd go so far as to call it elephants in the room, really, really big questions about *mellifera*, that the Asiatic model, it seems harder to come up with an answer if you say that the genus *Apis* came from Southeast Asia. I want to hasten to add, though, that it's still controversial. I mean, it's really hard to argue with a lot of the data from Southeast Asia. That's where all the rest of them are. And that is always a classical argument in defense for a species as home turf. Where you find the most diversity for that species is usually the home range of that species. So that is a couple big areas of my book that I'll be drilling on and developing more and talking about. So even if you have an "out of Europe" model, you still have a species that is evolving in warm conditions because, as you think about biogeography, you can't look at a modern map and modern weather conditions. You have to look at an ancient map and ancient weather conditions, and the regions of Europe, in which these fossils were found, did occur during a hot, protracted spell in Earth climate. So it's very plausible that the genus *Apis*, in spite of what latitude it evolved at, that it did, nevertheless, evolve in hot climates. And I think that's crucial to understand the biology of *Apis*. It is fundamentally a hot weather tropical species that then specialized and diversified into temperate tolerance. We find, for instance, in the more primitive members of the genus *Apis*, for example, the species *Apis florea* and *Apis dorsata*, we find that these live on single combs exposed outside of cavities. You'll find them on twigs of bushes. You'll find *Apis dorsata* under the limbs of trees. You'll find *dorsata* under the eaves of buildings, but you have this single exposed comb. *Apis cerana* and the other cavity nesting *Apis* have evolved the capacity to live inside cavities in which they build multiple combs. Now there's a couple things that happened. This transition from single comb exterior nesting to multiple comb cavity nesting. It did away with a primitive feature that you see in *florea* and *dorsata*, and that is a living curtain of bees. *Dorsata* and *florea* have this curtain of bees that hang together, foot to

foot, hanging in these chains and sheets, and this is sort of a proxy for a shelter. These bees are forming a curtain over the comb to protect them against temperature extremes, to protect them from predators, and to probably give them some degree of weather protection as well. Well, once the ancestor of mellifera moved into cavities, that freed up that curtain to other more productive uses. That large contingent of the population could now engage in other types of activity, chiefly foraging. And so this was an important step in evolving complexity in members of the genus *Apis*. When they moved from single exterior combs into multiple combs inside cavities, they were able to get rid of that large curtain of idle bees just hanging out, doing very little, and put them to more productive uses. And this is, no doubt, a synergy that helped the social complexity that we see in the cavity nesting bees like *cerana* and *mellifera*. Once you have the cavity nesting behavior happening, then you are pre-adapted for more temperature extremes, and this, we believe, was an important adaptation, allowing *mellifera*'s ancestors to start moving into cooler climates. We now start seeing penetration into higher latitudes. And where you get into higher latitudes, you start getting more strong seasonality, and when you get stronger seasonality, then this affects how you forage, how often you forage. It affects how large your food stores need to be. If you only get one big flow a year, and then you got a long, protracted cold spell, well, you need to focus all of your energies in making a big food supply during the brief weeks of opportunity that nature gives you. And this, in fact, is what we see in the cavity nesting bees. Their mode of reproduction is quite different. If the bees stayed in tropical latitudes, like modern day African *Apis mellifera*, you see very different life histories. You see much more frequent swarming, much smaller populations, much smaller honey supplies. And in *Apis mellifera scutellata*, which is the infamous African honey bee imported into Brazil and the New World, you even have vestiges of migratory behavior persisting in *Apis mellifera scutellata*. Migratory behavior, moving for where the food is, has completely been lost in the cavity nesting bees, which settled in cold weather Europe. That is kind of the big mega picture of what drives speciation at the level of the genus, whether they are in warm weather or cold dictated the presence or absence of that sheet of bees hanging on the surface of the comb. Once they moved inside cavities, that curtain of bees could be liberated to other uses. They could now start building multiple combs, larger colonies, more complex social behaviors, dance language, group decision-making behavior, strong seasonal swarming. All of this was an artifact that flowed from that decision.

Amy 36:49

So Dr. Delaplane, we just got done with the study abroad to Thailand. As you're talking about all these different species of *Apis*, I'm just thinking about reflecting on what we've just seen. It was an amazing time. And it's just so fascinating to see the *Apis* species that are cavities versus *dorsata* and *floreana*. And it's just incredible. So you are speaking to me right now. It's very fresh in my mind. I'm loving it. This is great.

Jamie 37:18

So I hope you've enjoyed that first part of our interview with Dr. Keith Delaplane, and that you'll listen to our next podcast episode where we have part two of our interview with Dr. Keith Delaplane from the University of Georgia.

Stump The Chump 37:37

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

Amy 37:46

Welcome back to the question and answer segment. Jamie, I feel like this Q&A is going to be pretty short, but I don't know.

Jamie 37:52

We'll see.

Amy 37:53

I guess we can make it long if we need to. We can always make things as long as we want to make them, right?

Jamie 38:00

As much as we make up stuff, we can keep doing that.

Amy 38:02

Yeah, that's exactly right. Okay, so for the first question that we have, where and when do migratory beekeepers follow the flow? My response is, where the flows at? But I'll let you answer that one. Yeah, I feel like another really great resource, especially here in the United States, is just your local extension office. One of the key programs that we have within extension nationally is a horticulture program. So there are specialists out there. Again, in the United States, I know that extension is starting to expand in other countries around the world as well, but having a local horticulture person who can be able to kind of help identify some of those plants is also a great resource as well.

Jamie 38:14

I've just seen this question. It's an important question. I will say it's a hard question to answer in a way that I think the questioner wants an answer. So the question again, is, where and when do migratory beekeepers follow the flow? And the answer is, well, it depends. It depends on where you are in the world. So, for example, where I grew up, my major nectar flow started about mid-April, so I knew to have supers on by mid-April. If I was living elsewhere in the state, and knew that the nectar flow in this particular part of the state was April 15, I'd move my colonies there. And commercial beekeepers who target certain flows usually have a long history of working those flows, and so, know within a week or two when those plants are going to bloom. And so they will usually move their colonies to those spots a week in advance. And so my first recommendation is, know your flow. What's the important honey flow that you want to move your bees to so that they can make honey? Here in Florida, that might be galberry, palmetto, citrus, tupelo, things like that. If you're new and aren't sure what the flows are in your area, find a commercial beekeeper and say, what are the important honey flows where I keep bees? And that commercial beekeeper is almost certainly going to be able to rattle off, here's your two or three important plants, and they're going to, almost certainly as well, be able to tell you, to the week, when those things are going to be in bloom. And I'll tell you something else, Amy, that's a bit of a secret that I really like to do. If you're only capturing honey flows near where you live, if you find out what the important plants are to your bees, in other words, the plants that compose those flows, or are responsible for those flows, buy some of those plants at your local garden shop and plant them in your yard, and then you will have a botanic time calendar for you. You're seeing these things in bloom, it will

tell you it's in bloom. I've done that myself. Galberry is an important flow in the area where I live. I purchased from a native plant nursery galberry bushes, and put them in my yard. I can see them starting to form buds, and I can say, hey, the flow is imminent. In the next week or two, these things will open. I've got saw palmetto that I purchased and put in my yard for the same reason. So my yard becomes my honey flow clock. It tells me when things are about to bloom. And of course, if you're chasing a flow that's 10 hours away, you can't easily do that because it wouldn't necessarily be the same botanic calendar, as it were. But, certainly in your own area, you can do this. So network with beekeepers, figure out what's important in your area, figure out what you want to go to, and then ask them when those flows start. And commercial beekeepers who have any experience just know these things. They just know because they've been working them for a long time, and they'd be willing to let you know these things as well. And like I said, you can put your plant calendar in your own backyard to tell you when things are about to happen. And so these are my recommendations in that regard. Amy, you're always keeping me straight. Thank you so much. I will add to that as well, that a lot, especially in the US, but I know this is true internationally as well, because I've seen them myself, but here in the US, a lot of county extension agents or state extension specialists, in my case, me and you, right here in Florida, may have generated bloom maps. So for example, we have a bloom map for North Florida, one for Central Florida, one for South Florida. We publish it monthly to tell beekeepers in those areas what are the major pollen and nectar plants in those areas that would be in bloom those months? And we don't just do that here in Florida. I know that there are people who do that elsewhere around the US and in certain parts around the world. So if you could check with your extension specialist or equivalent, there may be already bloom maps available in the areas where you keep bees, and those will tell you what you can anticipate coming into bloom during those times of year.

Amy 42:36

All right, so for the second question that we have, this individual is wondering, do you need to paint hives different colors and patterns? And if you do, why?

Jamie 42:45

So, my guess is the motivation behind that question is this idea of minimizing drift. Let me just elaborate on that idea. We are all at least taught that honey bees can find their own hive and that they're really good at it, and they can tell their hive from other hives, etc. And I know when I was growing up in the research world, when I was a young researcher, we would often, maybe, use hive boxes of different colors so that we can make each hive look unique to minimize drift because you don't want bees from one set of treated colonies to go into another set of treated colonies, because it can throw off some of the results associated with those colonies. All of that is true. All of that is good. I acknowledge all of that. However, I would say, in a managed setting where there two or more colonies, in that managed setting, you're going to have a high incidence of drift, regardless of the colors you paint your hives. I mean, obviously, if you've got 50 colonies in the backyard, and they're all white boxes, you might have high rates of drift, and if you have 50 colonies in the backyard and half of the hives that they live in are painted blue, the other half are red, it might be slightly less drift, but honestly, I think drift in managed settings is really high. So I'm not convinced that painting boxes different colors to minimize drift does a lot. It might help a little bit, but I'm just not convinced it does a lot. So honestly, long story short, painting is up to you. It's just up to your preference. I typically recommend folks not paint hives dark colors because they can collect and hold heat, which is not necessarily good for the bees inhabiting those

hives. I tend to stick to the lighter colors. These days, I just paint all hives white. But if you are a creative person and want to put designs and colors and patterns and shapes and all this stuff on your hives, totally permissible. I wouldn't do it for the bees' sake. I'd just do it for my own sake, if that's something that was interesting to me. But I would just recommend that you shy away from the darkest of colors. Don't paint hives black, for example.

Amy 44:54

Definitely. I would love to put a call out to our listeners. If you've got a creative mind, which I don't. I, personally, Jamie, also just paint my hives white. But if you've got a creative mind, I would love to see pictures. Send us an email of your painted hives. It's always fun to see what people come up with.

Jamie 45:09

Well, Amy, I'll add to that. I mean, I paint mine white as well. Here at the lab, we have them painted white, but we've got really creative students who've gone out and painted Pokemon and all that kind of stuff on our hives. Anytime I hear people talk about painting hives, they almost always make this recommendation. You probably are all aware that folks will buy paint from hardware stores, take it to their house, put a little bit on the wall, and go, this isn't the color for my living room or whatever. And so they'll bring that paint back. And often, those home improvement stores will sell that paint at a discount. So one of the recommendations often made to save on some of the financial aspects of having bees, especially if you're in a hobbyist operation setting, you can go to these stores and see if there's any of that throw away paint that's been returned. And in those cases, you end up painting your hives a lot of different colors because you're at the mercy of what the folks were trying before they brought it back, and it might save you some money. But even under those contexts, I'd say, just kind of be careful and don't use those darker hive colors.

Amy 46:07

Alright, this is the last thing I'm going to bring up with the paints, but I will say that when I first became a beekeeper, I took paint, I put my dogs paws in the paint, and then set it on the hive, and it was really cool because I had this really cute paw print of my dogs, but then I realized it was oil-based, and I couldn't get the paint off of my dog's paw. So, yeah, fun fact, I did that. My dog still has oil -- just kidding. Doesn't have oil on their paw. But, is there a difference between oil-based or other based paints that you would recommend using if you are going to be painting your hives?

Jamie 46:42

Yeah. My general recommendation regarding that is just make sure that you're painting your hive boxes a paint that is rated for use outside, right? You don't necessarily want something that would only be an interior paint. You want to make sure it's an exterior paint. And it doesn't really matter after that. I would say you wouldn't want to use a lead-based paint, but those have been phased out, I think, exclusively. For sure, anything that's rated for outside, I think, is fine. I might submit a question myself next week. When painting dogs, what's the best color to paint them? You'd be the expert to answer that question.

Amy 47:15

Yeah. I've got some tips and tricks for those who want to use paw prints on their hives. Okay, all right. So for the last question that we have, this is a fun one. How do you learn to work bees without gloves, without getting stung?

Jamie 47:33

Oh, there's really no great way to do it. Well, most of this is just going to be opinion, so I'll just go ahead and roll it out. I've always recommended to beekeepers to use the amount of personal protective equipment that you are comfortable using to work bees. And for most new beekeepers, that's a full bee suit. That's a veil, that's gloves, that's boots with taped ankles, things like that. Over time, you're going to usually find yourself not liking how hot it is. And so the first thing you'll tend to do away with is the whole suit, and you might end up with a jacket/veil combo. Then the jacket's hot and you might get out of that. And so now you're wearing blue jeans and a T-shirt and a veil and gloves. So I would argue that you don't have to race to do away with personal protective equipment, but if you feel that you are at the area or at the time in your beekeeping operation that you're ready to shed some of that personal protective equipment, I would say it's 100% up to you. But I would always recommend, always, always, always recommend wearing a veil. I don't care how comfortable you are without it. I would always recommend wearing a veil because you don't want bee stinging you in your airways, your nose and your mouth. You don't want them going into your ears and stinging you, and you certainly don't want stings on your eyeballs. So I would say, never, ever, ever work bees or approach colonies without a veil. But all the rest of the PPE, the personal protective equipment, is kind of optional based on your comfort level around bees. And so the questioner is saying, well, how do I get comfortable doing that? I would say, if you've got a set of colonies in your backyard, you know which ones are more defensive and which ones are less so. So anytime you get to your less defensive colonies, those that tend to be more, say, gentle, you can always step yourself down. The full bee gloves have the glove on the end and the gauntlet that goes up your arm. Well, if you go to your gentle colonies, you could step yourself down to maybe garden gloves, or step yourself down to those nylon gloves that you can purchase that are disposable like you might see your doctor wear. You can buy those at a lot of pharmacy stores to use around the house. Well, a lot of people, even in our lab, use those kinds of gloves when they work bees. So you can step yourself down from those very big, thick, old school beekeeper gloves to these easier to use gloves that have more dexterity. When you've done that, then you can start working your general colonies. And if you see the bees aren't attacking your hands or following your hands, you might take off gloves and step yourself down within your less defensive colonies, and then you can move up to your more defensive colonies and start kind of backing away from wearing gloves in those contexts. I would say there's no reason you have to work bees without gloves. So don't feel like just because you're advancing in your beekeeping years and skills doesn't mean you can't wear gloves. You can. But if you are truly interested in stepping down, start with your stepping down the style of glove, and then step that down when you're in your more gentle colonies, and then move to colonies that have a little bit more personality and work backwards from there as well. But again, you should only do what you're comfortable doing. I had a scientist tell me this years ago who worked in Brazil, where African bees are present, and he argued that people who wear gloves tend to work colonies with less dexterity, which causes the bees to be more defensive. And his argument was, we tend to learn what makes bees angry and stop doing it when we aren't wearing gloves, which is better for you and better for bees. So he would say, take off your gloves because that will teach you how to work bees in a way to keep them calm. I wouldn't necessarily say that, but what I will say is that once you take off

gloves and you realize the bee stings on the hand aren't the end of the world, as long as you're not allergic, then you'll get increasingly comfortable. But I would start by scaling back the type of glove I was wearing, then the type of colony I was doing that in, and you're just phasing yourself in easily over time.

Amy 51:31

Definitely. I'm not trying to downplay the whole whether we should wear gloves or not, but I'm just thinking about our time when we were in Thailand, Jamie, and working with the honey hunters there and how they wore flip flops in bee yards and wearing ski masks and not even a pair of gloves. And I don't know. It's always just interesting to see how comfortable people are or aren't. That really just depends on the threshold of each individual person, I think. Well, Jamie, I prefaced this Q&A by saying that it was going to be a short one, but I think we were able to drag it on, and this might be the longest Q&A we've ever had. So that was a lot of fun. But to our listeners, again, as always, don't forget to send us more questions. We always love answering your questions. We love reading your questions, so send us a question on our social media page or by sending us an email.

Jamie 51:58

You're 100% right, Amy, and just like you use the word downplay, I completely agree with you. Stings are a real threat, right? You can keep bees for 50 years and not be allergic to bees, and then your 50th year, get stung and develop an allergy. Obviously, wearing personal protective equipment, protecting yourself from bee stings on all parts of your body, it's kind of a personal choice, which is always, I tell people, you need to wear a veil. You need to wear a veil. But from a scientific standpoint, the fewer stings you get, the better. So in theory, you should be wearing full PPE all the time. So the rest of it really just boils down to how comfortable you are phasing yourself into it. I personally don't wear gloves, don't wear a bee suit or a jacket, but always wear a bee veil. And inherently, there's any risk associated with allowing yourself to get stung, and you just need to be aware of that. And so the safest recommendation is never stop wearing full PPE. That's always the safest option. So if you want to phase down, then that's kind of up to you, and I've given you some ways that you can do that, if that's what you elect to do.

Amy 53:38

Thanks for listening to today's episode. This episode was edited and produced by our podcast coordinator Mitra Hamzavi. Thanks, Mitra.

Jamie 53:47

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.