New Species Podcast
A New Bee Fly with Lisa Rollinson and Allan Cabrero
Published April 30th 2025

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[bright, tech-y introductory music]

Zoe: Welcome to the New Species Podcast. I'm your host, Zoe Albion. On this podcast we learn about recent discoveries of species that are new to science, but not necessarily new to nature. We ask scientists how they find these new species and why they matter. We learn what makes a new species, and hear some behind-the-scenes stories along the way. So join us as we explore the biodiversity of our planet with the scientists who help us better understand it.

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Zoe: Welcome to the New Species Podcast. I'm your host, Zoe Albion, and I'm here with Lisa Rollinson, undergraduate entomology student at Texas A&M College of Agriculture and Life Sciences, and Allan Cabrero, a NSF Postdoc Fellow, Smithsonian National Museum of Natural History.

They're here today to tell me about their paper published in volume 66 Issue 1 of African Invertebrates in which they and their coauthors describe a new bee fly from the Northern Cape of South Africa. Welcome Lisa and Allan, thank you so much for coming on the podcast!

Lisa and Allan: Thanks for having me.

Zoe: So tell us all about beeflies.

Allan: Yeah. So, I mean, beeflies are kind of, I feel like a charismatic poster child for flies on the planet. You know, they're, I always tell people they're very cute and fuzzy and arguably the cutest fly or insect on the planet. Um, you know, they're a really diverse group of animals, about 5,000 species. So when I'm interfacing with the public, I say they're as diverse as, you know, mammals think of all your bats and rats and bears and everything like that. And they're just as diverse.

Allan: You know, not all of them are fuzzy and cute. Some of them have more shimmery scales. Some of them look mosquito-like. Some just look really weird. Some are really small. And they're just really fascinating creatures. As adults, most of them are pollinators and some are really important pollinators for desert flowers. Some researchers in South Africa have found them to be the most impactful and keystone pollinator for the Cape Floristic province, which is the largest region of flowering plants, I believe. I'm not a botanist. But they're very charismatic pollinators. They're important for desert ecosystems. They're all widespread, so they're found in other biomes like rainforests and basically all over the planet. But they're mostly diverse in arid and semi-arid habitats.

Allan: And as larvae, as far as we know, all are parasitoids. mean, this possibly is species that isn't, but all records point to them being a parasitoid and sometimes in some cases, a hyper parasitoid. there are endoparasitoids, ectoparasitoids that's in and out of the host and then a hyper parasitoid. So they're really a diverse group of insects, honestly, in dire need of taxon. I mean, like most entomology groups, they need taxonomists. You know, there's very few bomb-related researchers left, less than 20, probably even less than that, and very few early career scientists working on them. all around charismatic and cute and really fascinating to study.

Zoe: And can you clarify what a hyperparasitoid is?

Allan: Yeah, so like a hyperparasitoid is kind of like, I like to say like a Russian nesting doll. So you might have a parasitoid, either another fly or a wasp attacking the host, let's say a caterpillar. So there's a parasitoid that's in that. And hyperparasitoid is a parasitoid that goes inside that parasitoid. It can get kind of mind boggling and like really, it's a really crazy unique system, but there are some instances that hyperparasitoid be flies. It's wild.

Zoe: I'm wondering if you guys have thoughts on who *Enica* parasitizes?

Allan: Unfortunately, we honestly have no clue. There was a study by David Yates in Australia that kind of summarized all known parasitoid host records and what they go for and only 10 % of records are known. Beeflies primarily go for solitary bees. They also go for ground dwelling beetles, like scarabs, grasshoppers as well. So when we think about, you know, parasitoid evolution, you know, and all of the beeflies have to, you know, evolve to match the flowering plants, but also their host and there's a huge diversity of like arid bees, right, mostly solitary bees. And so that's probably could be their host, it could be, you know, there's parasitoid, there's bee flies that parasitize the sea sea fly in South Africa. You know, there's grasshoppers, believe some spiders, but mostly I would say bees and beetles and grasshoppers.

Allan: So it could be any of those, you know, I have never seen them ovipositing. We looked at the records on iNaturalist. Also, no records of seeing what they host on. And during my dissertation, I tried finding a way to rear them in the lab. That's really hard. You know, talking to Neil, you're sifting all the sand, hoping you find the larvae. Many times they just die. And so unless we get lucky and camp out, which I'm happy to do, in South Africa and just stay there and observe, we might get lucky. But no, there's no, I don't know, one of those, I guess, desert taxa.

Zoe: If there's anyone out there who loves to go camping in South Africa and really enjoys staring at sand, let Allan and Lisa know.

Allan: Yeah, that would be awesome.

Zoe: Allan, I know you work with other arthropods, and Lisa, know you're quite involved at the entomology program at Texas A&M. So I'm wondering for each of you, what makes the bee flies compelling out of all the other amazing arthropods out there?

Allan: I guess for me, like, you know, what makes them compelling, it's kind of like a lot, I'll try to keep it short. But basically, when I took my undergrad arthropod course, I've obsessed with insects, I think I first started with beetles and I thought, ‘oh, beetles are so cool’. And then I learned about parasitoid insects and I just really fell in love with them. And so I did an entry internship, which Lisa was part of. So this was 11 years ago. And as an intern, I worked with Dr. Torsten Dikow on assassin flies.

Allan: But at that time I started to read more about bee flies and kind of fell in love with them. you know, even though I did work on other arthropod groups, that was more so just like learning methodology wasn't really about my true love. So I think internally I've stayed obsessed with bee flies since I learned about them. And I guess what makes them compelling to me is their, I love that they're parasitic, I think they just love parasitoid insects in general. And something about the twisted nature of bee flies being really cute, but you know, kind of having this sinister life history really drew me to them. And also just like their- growing up in Southern California, like in desert ecosystems, I just love the desert and I get to do a lot of desert field work. It was kind of like my happy place. That's kind of what draws me to them. Yeah.

Lisa: And so I'm an entomology major at Texas A&M and I have wanted to be an entomologist since, like, kindergarten career day, since I was really, really little. And so I decided to go into entomology and I got into a research lab studying a different type of fly and its morphology, black soldier flies. And so I was looking for summer research experiences, right? And so the natural, oh, what is it? NHRE, Natural History Research Experience at the Smithsonian, they had open projects. And I was looking through the projects and I saw that Torsten was working on flies. So Allan's mentor and my mentor was working on flies. And I was like, oh, that would be really fun.

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Lisa: And when I got in and I got my project, Allan had prepared all of these flies that I could revise. And so I fell in love with bee flies at the museum. And they really are, they're quite cute. They're really compelling. I don't know, I just adore them. And in general, I tend to focus on flies because they're really, really diverse and they do a lot of things that people don't expect them to. Like I feel like the general public might not know that they're parasitoids or hyper parasitoids or pollinators and stuff like that. And so I'm more focused on flies in general, but I just find them so cute and compelling and very, very diverse.

Allan: One thing I really wanted to point out, Lisa and I have been part of this NHB program. This is like a program where you apply based on projects, but mostly like divisions, not just entomology, but there's anthropology, herpetology, ornithology, at least my year, and botany as well. And the projects range from like taxonomy to phylogenetics to, I don't know what the

anthropology people would call it, the anthropological studies. But it's a really great internship that's paid. So that's an important thing to you. They provide housing here in DC, and it's a paid internship, and they pay for your conference travel for one conference as well.

Allan: But it's a great way to get involved in research, whether it's taxonomic or otherwise, all within the realm of the museum's divisions at the Smithsonian. But that's kind of how I got into it. I mean, I was already interested in science, but that kind of got me hooked. And it seems like we said hooked as well. But it's a rich program. And I think if any of your viewers would like to get involved, know, go through the reach out. I think applications are going to be due. I don't know when this will air, but they're due soon or already passed. But it's a great program to be a part of to get involved in collections based research.

Lisa: And it's just an absolutely fabulous experience to just do research full-time for a summer. I think that was the first time I had ever done a nine-to-five research job. And it's amazing how much you can get done when you're not also having to take classes. So I know a lot of people take classes and do research and I love that, but it was just a really special experience being able to do taxonomy full-time and see what this job was like and see what the Smithsonian was like, it really got me more deeply into like morphology and taxonomy and stuff like that. And everybody in the other departments loved it too, if any undergrads want to apply for any of the other sections.

Zoe: That is awesome. What's the internship called?

Allan: Yeah, it's the Natural History Research Experience for undergraduates and it's at the Smithsonian.

Zoe: Yeah, applications have closed, but we can definitely recommend it for the future. I'm glad those programs exist. I benefited from something similar and yeah, sometimes you don't know what you love until you really get into it.

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Zoe: Your paper includes a complete revision of the bee-fly genus *Enica*. I'm wondering if you can tell us a little bit about why that revision was important in the first place and what is the process of revising a genus?

Allan: So guess the project started initially with being in the field of Torsten in South Africa and maybe a lot of my research besides taxonomies into desert evolution and that kind of stuff. Being in the field of Torsten, we go to these locations and he knows the genera so well, he'll be like, oh, I think this is a new species or this is a new genus. And it's like, what, how do you know this? And kind of digging through the African bee fly literature, there hasn't been a lot of workers on them. There are some labs now doing revisions, which is just awesome.

Allan: Prior to a few years ago, Greathead was the last person who worked on African bee flies and that was like in the 2000s there's a lot of groups that, you know, people left notes like Hesse and Alisa will talk about later, like, oh, someone should look at this and no one really looked at this. And so as I'm visiting the collections, like Quasaralutl and Ezeko, which are some of the largest Diptera collections for South African fauna, I kept picking out these flies. So like, wow, there's a lot of specimens here. You know, they look interesting. Torsten's like, grab them all. There's probably a new species in there. I'm like, I don't know. Are you sure if he's like, there is a new species in there? I was like, okay, that's what he does. He knows these fauna so well and every genus he looks at, there's a new species, which is just crazy to think about, especially being early career.

Allan: And I started gathering them in other genera and accumulating this material, finding as much as I could, going to the unsorted material. then we got asked by an N. Chiri, do you have a project? you like someone to work on? And I was like, okay, how about this in the NICR project? I've accumulated enough specimens across collections. And, know, Torsten says there's a new species there, so maybe, and, you know, as we'll find out, there was one. But in general, it's just like a group that beyond that, there's all these notes of like, someone should really tackle this problem. And I thought that would be something worthwhile to like make an impact.

Allan: So one thing that goes into taxonomic revision that I think is important, as Lisa said, you want to, you know, we had over 300 specimens and you want to acquire as much material as possible, right? You don't want to do a revision just like, here's 20 new specimens. Let's go to, so I visited all the major collections in South Africa. But most importantly is I brought most of the types with me. And so, and if not, we got photos of those types mostly because in a perfect world, when you're revising a genus or genera, you want to compare to the type.

Allan: So we had those original descriptions from Hese, but we also had the original specimens that you looked at. Lisa did the painstaking work and all the hard work of going through it and she had that reference material because many times, like if you don't have the type to see and the description's not clear or the key is not clear, then how can you be certain? So I think that was really pivotal to Lisa's work was having as many of the types. I think we had all but one and the one we didn't have, we had like a of types of, and so she had all the type material needed to really put this revision in like a nice little like project, you know, versus like, oh, know, we can't find this or we're not quite certain here. Of course, sometimes types are lost and that's really sad. But I guess we're looking at this since I was able to acquire most of the specimens for Lisa to do on the summer project. kind of alluded to this problem.

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Zoe: There are disciplines within entomology in particular, but also across the natural sciences where there was a group of entomologists working on them for a very long time and there are no new entomologists coming up in the particular discipline. Is that a big problem in flies and in bee flies?

Allen: I think it depends on the fly group. think some fly groups have more robust labs that have maintained that kind of recruitment going on. I think in the US, there's very few taxonomic focused labs for diptera that might be part of a Systematics lab and have a taxonomic side project. For Bombyliids in the US, I think it's just me, Neil Evenhuis in Hawaii who's retiring and, I don't think there's any other people really. Brazil has a strong history of supporting Diptera. So as far as countries go, I Canada and Brazil have the highest amount of dipterists. They tend to have jobs for people who are doing taxonomy and recruiting them. South Africa as well, for other Diptera groups like Syrphids and Nemestrinidae. So there are some countries that are actively supporting and recruiting, I think Europe as well.

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Allan: But just in bee flies as well. mean, Lisa would be the next, the newest recruit for bee flies. So there's not many of us, but we're doing our best. Maybe this is good question for you, Lisa. Tell us about this new species. Yeah. So I'm going to kind of go into what I showed up to, which was fabulous, is Allan had brought about 300 specimens, a little bit more than 300 specimens back for me. And so before I could get to the new species, right, like I had never worked on bee flies before and it was an incredible opportunity. But basically, as he was saying, like the last person to review the genera was AJ Hesse in 1956. And so it had been quite a long time since there had been a revision of the genera. And when I started, there were like six species in

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What now doesn't exist, Pneumelonia and one species in Onica, which was synonymized. But the difference that AJ Hesse said was like two small cross veins in Onica, and we'll get more into that later. But essentially in discovering this new species, really, when I got there, my primary goal was to revise these genera.

16:58
to see whether we should combine them and then also to identify all of these specimens that had accumulated in the past like 50 plus years, all of the unidentified specimens and stuff like that that that Allan had brought. And so I guess I'll go into the general a little bit first, but I was reading the old revision and there's a quote from Hesse which I

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find a little bit funny is the absence or presence of cross veins is often such an unstable character that it may hardly be considered of generic value. So he was basically saying the thing that we use to distinguish these two genera should not be what we use to distinguish them, like they shouldn't be different. And then he kind of left it at that. He said they may quite reasonably be considered like a subgenus of Anika, the no millennial ones.

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And so we knew there was work to be done because 50 plus years ago they said, oh, these should be combined, but they didn't combine them yet. And so I got there and I read the

background literature. started looking at these specimens and my main goal was like to combine them. And if I found a species, that would be great. Like we expected it. But when you're doing this kind of work, like you can't.

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I wanted to be sure that they should be combined. And so I wanted to do all of the work in terms of like looking through all of the specimens, seeing how similar anicca was to what used to be at Pnumelonia and seeing if they should be combined because someone did split them. Like someone chose to do that a long time ago. And so I was going through these 300 specimens, sorting them, and I started kind of seeing a few anicca with three wing veins or one wing vein.

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or like two wing veins on one wing and one wing vein on the other. And it was definitely that moment of, like Hesse's right. This is not a super stable characteristic. Maybe these should be combined. Like I agree with him that Annika should be synonymized with Nimalonia. And then I think about five weeks into the internship, into the 10 week internship was when I had kind of sorted

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all of the specimens into the different species. And I had a couple set aside where I was like, I don't, I can't sort these, right? Like the key isn't really working. And that was where I started kind of wondering, okay, these could be a new species because the key isn't working on them. And in addition, like later on,

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I inputted all of the locality data, so where they had all been caught. And the thing that they could possibly key out as imitata was like 500 kilometers away from these two specimens that weren't keying out as anything really. And that was where the species discovery came in, was in the process of trying to sort all of these specimens and determine whether we should revise them to be synonymized. That was where...

20:17
species discovery was. That sounds like a really fascinating process. Can you talk to us about your specific new species and just visually what made it stand out from the rest? Allan described beeflies a little bit in the beginning, but if people haven't seen them, what does your beefly look like? Yeah. Beeflies generally are kind of set apart because they usually have this long proboscis.

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So they'll have like pretty big eyes and then they'll have a kind of tube-like structure that they use to suck up nectar and stuff like that. And instead of like rolling it up like a butterfly, it'll just stick straight out and look kind of funny. And so that's a big thing with bee flies and Anika Adelphi is the new species. So the thing that made Anika Adelphi look different was it had darker coloration on the legs.

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different markings on the back of the head, and then also this genus, a lot of them will have markings or stripes on the abdomen, and the stripes looked a little bit different on the abdomen. You were looking at specimens that were already in a museum, but do you guys have a sense of what ecosystem it might be found in in the wild, and then also what role it could play there?

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I did actually collect some in Nica when I was in South Africa, think along the Rostra. I don't think it caught any Namalonia. You know, many times when I'm doing field work for bee flies, he kind of just walks slowly among a trail. So they like or like a wash. But for people who don't know that, I think like very sandy, gravelly substrate. And basically a lot of the females like to gather sand particles there to lay their eggs. Not all bee flies do this, but many do. But generally you want to look around like

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A lot of times the bee flies will be resting on the sand or sunning themselves. And so you want to look for gravelly areas where, you know, they might look bright orange or yellow, separate, but they blend in quite well into the sand or the desert floor or among flowers. And I noticed if a Nika, when I had collected it, they have this more like brown, destructive coloration that they weren't perched exactly on the trail, but adjacent to the trail, kind of under bushes where there was a lot of twigs and like leak debris.

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that's where I noticed them. I was like, what's this weird thing moving around? Oh, it's in a Nika. Like, cool, I wanted to revise it and now I caught one. And so they have, think that disruptive coloration helps them blend in and probably protects them from predators. So that's kind of like where you can find them. Sometimes you can find them feeding on flowers. And then I'll also add here,

23:05
the types were especially valuable on this project because part of the taxonomic revision we were doing was rewriting the keys and rewriting the species descriptions. So something that Hesse tended to do was compare specimens in his keys. And so like he would say, this specimen has longer bristles than that specimen.

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And so it would be really, really hard to identify a species if you didn't have his types to compare. Okay, this one has longer bristles than that. And I think something we're definitely moving toward in taxonomy is language that's like very definitive and you can compare the specimen to itself rather than comparing it to other specimens. And so part of my work was to rewrite keys and rewrite descriptions

24:00

So that instead of saying like, like he would say wings are less directly tinged than this specimen. Instead, I would say like this part of the wing is darker than that part of the wing. And that way, hopefully people using my keys won't have to go get the types. And then we also did a lot of specimen imaging so that they can look at the specimens when they're doing it. And so that's really why another reason.

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that it was very necessary to have those types is to make sure that I knew what he was looking at. And then also like we're very far later. And so he probably had way fewer specimens than I did, like certainly had way fewer specimens than I did. So I was better able to see the variation within species versus the variation like among different species. And quickly adding to that, at least I kind of said is that, you when we do our descriptions and we wish we did them together,

24:58
Lisa created the descriptions, like what she described was not just on the type but a composite of all specimens we knew from that species. So we're trying to, she tried to account for that variation for each species versus here's the holotype, everything has to look for it. Let's look at the variation and account for that when we do these descriptions. And of course, like I'm very new to bee flies, right? And so was a lot of popping into Allan's office and saying, is this different?

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Because I think you get a certain feel for a group of organisms, right? Like even between the different types of flies, there are going to be different important features or things that don't vary among groups as much. And so it was really important to me to have the support of this museum and all of these specimens and then people who really know this group so that we do this right and we describe the parts of the fly that are taxonomically important.

25:55
Yeah, that's a great point. These specimens were found in natural history collections, like you've been saying, and some of these specimens are nearly 100 years old. They're really old. They're probably really fragile. So I'm wondering what it's like to work with historical specimens and what did you have to keep in mind given their age and their importance as type specimens? I think my experience working with

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Maybe Lisa's would be different because I think this is her first interaction of older specimens in this way. But generally, they're pretty robust. mean, all bee flies have this tendency where the head just falls off if you're not careful. It's connected to a very, very small part. But for the most part, even just looking at the table right now, all the specimen we have is from, I think, 1874.

26:48
They're pretty robust as long as you're careful and manipulate them on the pin. I brought them all back and I hand carried them. They weren't shipped and they survived multiple inspections

and security and turbulence. as long as you hold the pin well, they're okay. Things break off, it happens. We just want to make sure you put that next to the specimen and associate.

27:13
I try to glue them back together carefully. Some people don't like to do that because they're afraid to put too much glue just like while I'm on the whole specimen. Something that can happen of older specimens is they can get really dusty or dirty. Then the old pins will form like copper or vertigra whatever and like the metal, the rust will spread over. I don't know if you had anything crazy in Nica that way, but least it will have a better idea. But in general, like as long as you're careful and you're not like slamming things around, they're okay. And you know, they have six legs, so if you lose one and just put it next to it, that's okay.

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Yeah, we were very careful. then also, you get some interesting pinning techniques on older specimens, or at least techniques that I hadn't seen personally before. I think we had some specimens where it was, instead of putting a larger pin through the thorax of the insect, through the middle of the insect, they had a larger pin attached to like a little rubber. And then the little like rubber block was attached to an additional pin that the insect was on.

28:14
And so just being aware of the different ways that they're pinned and how to hold the pin to not disrupt them. But like Allan said, they're pretty robust considering their age. That's super good to hear. So could you talk about the process of actually determining and describing this as a new species? Because you talked a little bit about distinguishing the morphology, but there's a lot more work that you have to do to actually kind of prove.

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that it's a new species. I'll start this one and then maybe Allan can give me a little help. for a species description, I'll start on that is it's a lot of describing really, really minute details. And so I kind of had an outline of what was important to cover on a fly when you're describing it.

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So going like chink by chink in the little armor that is a fly and like, okay, so this little square right, this little area is this color with this color pubescence or like hairs on it and going part by part on the fly to describe it. And then kind of noticing the important differences between species. And so I think something we use to kind of

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justify the species as different is previously the occiput, so the part behind the eye of the fly, it has different markings depending on the species. And that's something that people have been using to distinguish the species. And so you kind of base it off what other people use to distinguish the species. And so that was different. And we looked at that. And then we also looked at the terminella.

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So an important thing is like when flies are mating, can they mate with each other? And we don't know that, but we can look at that last abdominal segment and we can say, okay, it looks sufficiently different. Like these two species look different and then our species and the other species look appropriately different. And additionally, just that big geographic kind of separation.

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which is also hard because you're not collecting the entire range of the fly. But generally, if we're seeing it in this different habitat, we can kind of assume that it's a different species. It's a culmination of a bunch of different little clues. I think that's a perfect way to put it, a culmination of clues. Not only was it like getting all available material, Jason Lahn, is the former curator of Quasarovia Natale, collected a lot of specimens.

31:00
And so, you know, we're not, don't just have one thing really far away because it could have been like, you know, what if it's like a vast species that's wide occurring and has this huge variation. It's like, okay, there's other things that have been sampled in nearby and they're kind of coming out the separate. So you're kind of using a lot of different clues from not only just coloration, but habitat, you know, where are they found? there, are there like species that also occur within the same range and they're maintaining their differences? So it's not just interspecies variation.

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So you're kind of just using all these factors to kind of state your case as to why you think this is new. So we we had geography, we had a coloration. Sometimes, you know, time of the year when they emerge can also be an impact. But the fact that there had also been other collectors nearby and they had, you know, know the specimens have been recorded, just you kind of just using all these clues to make a case when you submit your journal like based on morphology, the coloration, the life history. This is why we think

31:59
this is a new species. that's kind of when we do these revisions, as Lisa said, it's kind of exhaustive because we go part by part and it can be very tedious. But you know, it's better than some descriptions where it's just like, is brown, you know, like, what do mean by brown? So we try to be objective of colors, you know, I've had issues in the past, you know, everyone interprets colors differently. So you know, it's at least let's try to be as objective as possible, or have these colorations. And when we do our measurements and

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Yes, maybe if our descriptions are very long, because there's a lot of characters, but now we accounted for almost everything. So future researchers could see this and be like, okay, and also we took photos of those parts. know, okay, Lisa said the Ossiput, what does she mean by the Ossiput? What does it mean by dark spot? Like, okay, see these photos comparing all the

Ossiputs. Okay, now I know what the authors mean. And so it's a lot of work. But I think it makes for a really good revision that accounts for as much as we

32:54
possibly can, right? Could we have added more stuff? Maybe? I don't know. But I feel like we did an exhausting job. No detail is too much, it sounds like. So you made two different types of keys to Inika for this paper. Can you tell us about those keys?

33:12
Yeah, so first I'll kind of go into why we wanted to make a new key. Hesse, basically his key was workable, but it had these very long couplets. So a taxonomic key is kind of a choose your own adventure where the taxonomist will say, OK, if this part of the body is red, go to couplet three. If this part of the body is blue, go to couplet four and you kind of follow along.

33:42
where the researcher or the taxonomist leads you down this path and you end up at your species. Hesse's keys weren't quite that simple. And so a couplet could be like 200 words where he would say, if it's a little bit more bristly than this and browner than that, then go to like couplet four. And it worked.

34:10
but you definitely kind of wanted to have the types next to you and it took a while. So I was able to key everything out, but we wanted to make it a little bit simpler for future taxonomists. We wanted to limit it to a couple of sentences and we wanted to have a very distinct answer, right? So we would say like, if there's an oblique rectangular white stained area between R1 and QUA, which are like two parts of the wing.

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then go to couplet number four or whatever. And we wanted to do that so that when taxonomists approach this key, even if they're not necessarily dicturists, even if they don't necessarily study flies, they can work our key effectively and get to the answer they need. And so part of that was introducing two formats. And so the first format is the typical format you would see in a paper.

35:09
where you just kind of work it from top to bottom, going through all of the steps. And then the second format was an online kind of matrix-based key. And that way, if you get to the first step and you kind of say, have no idea what you're talking about, you can press a little skip button and it'll give you a different question. And so you can narrow down what species you have.

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without necessarily going step by step. And I think that kind of helps non-dipterists, people who don't study flies, work through the key and maybe people who aren't super up to date on taxonomic terms. An additional thing we did was we kind of standardized our language to a manual of afrotropical diptera.

36:05
And so we tried to stay consistent with one book so you can go look up what terms we're using. But I think having these two formats, like the goal of our revision was to make identifying these insects more accessible to people. And so having multiple formats helps us do that. I'm sure that's going to be really helpful to people. And I'll share those links in the description of the episode so people can go and check them out.

36:35
I'm wondering where you guys deposited your types and what went into that decision.

36:42
Some of the types that, so the Anika Adelphi would be deposited in the Kwasim Museum because the specimen was found in the collection there and belongs to the collection. So it wasn't something that I collected personally. So most of the material will end up back there in Ezeko, basically the home running institution. But as like, you know, through working with Torson, let's say I had collected personally a new species of Anika.

37:10
I'd probably send the type to KwaZulu-Natal because it's the largest collection of pin diptych material in South Africa and Africa in general. And mostly because we want those types available to researchers there and native workers in South Africa and Southern Africa. And so we don't want the type locked away in the collection hundreds of miles away. So as a personal philosophy, we try to send the types to the country of origin or where the sample was collected.

37:37
And of course we'd keep some paratypes or things like that. But yeah, the specimens belong to Cozumatel, so they'll all be going back there. Nice. I think this question is probably going to be for Lisa. Can you tell us about the name you chose for the new species?

37:55
Yeah, so when I was really, really little, I was quite insistent that I would be an entomologist. Glad to be here. But I promised my older sister, I was like, one day there's going to be a sister bug. And it was just kind of like a joke between us. Like, I wasn't sure if I was ever going to go into taxonomy. Like, I really like flies, but I wasn't sure if I was going to discover one. And so when I found Onika Adelphi,

38:24
I went to Allan and I was like, could we name this something to honor my sister? And so we were able to give it the specific epithet Adelphi, which is Greek for sister. And that was really special. That is so sweet. What did she say when she found out? She was very excited and she is not a taxonomist. And so she was like, can I have the fly for my office?

38:54

And I had to explain, no, that's not how that works. I don't, this is not my fly. But she's very excited and I think she might do a paint by number of it so that she'll have something for her office. But it's just, it was really sweet. That's so special.

39:18
Oh man. Well, clearly the beeflies bring both of you joy. But for some people, flies and beeflies might not really seem very interesting or maybe just not the most important way to spend your time. But I'm wondering if you guys could both tell me why you think that working on this group and in entomology is so important and why the description of new species matters.

39:48
So guess, you know, it's always the hard questions of biologists, right? Justifying why your work is important. I think for me and Beefly is that kind of beyond a taxonomist, just saw people like obsessive all layers of their biology. So, you know, I've studied their microbiomes to like their desert evolution and, know, my way of trying to connect with the public or especially like when I'm trying to get grants and stuff is not just focused on the taxonomy, but the larger picture.

40:17
And there are important desert pollinators and with increasing temperature changes, climate change, how are our desert ecosystems going to adapt and survive? Many of flies, these bee flies in Namibia just are like these extremophiles that can survive extreme amount of temps. I always tell people, bee flies are active in the hottest part of the day. The bees come out in the morning and they'll take their siesta. The moths come out at night. The bee flies have always collected them.

40:47
at noon at 100, 110 degrees and they're incredibly active pollinators. They're important pollinators. so, why study them? think they're very interesting. They can help us understand how life evolved in deserts and how life survived in deserts. And a lot of people consider deserts to be like desitue, barren wastelands, but it's not the case. There's a huge diversity of plants and animals that have adapted to this really extreme environment.

41:14
That's kind of what I'm interested in. And in general, it's just like the intrinsic value of understanding, you know, who do we share this planet with and who is also part of our environment. And they're just cute. And so just always try to convince people to that. But I just think they're really an interesting organism to study. Desert evolution, you know, I remember as an undergrad reading papers, like, know, rapid radiation of like lizards in Australia, and it's like, you know, less than 10 species or

41:42
There's a huge diversity of birds here and it's like four or five. And I've collected like 30 morphos species in a canyon of bee flies. And so bee flies are really diverse in deserts and that's kind of what I'm interested in.

41:55
From kind of like a human centric background, like discovering a bee fly has really like made me love them and made me love insects so much more. like coming in as an intern, not really having much background in bee flies. Like I just, I love that little fly. Like I love all the little flies I worked with. And I think to protect the environment, like we need to understand it and have a connection with it.

42:25
And so I'm hoping like revising bee flies and discovering a new species and trying to connect with the public and connect with other people over like, we need to protect these beautiful little insects. I think science can be really good for getting people curious and getting them invested in things that they don't think about very often, like flies.

42:57
Also quickly to add to that, you know, it's important to understand our environment before we can make these decisions about conservation or what, you know, I mean, we're all biologists here and so I'm sure everyone knows this little spiel, but you know, I think it's important to understand what lives around us before we can start to see like, you know, conservation efforts. And also I'll point out Lisa's efforts in terms of making, you know, a lot of people view taxonomy as like outside public, like, well, what is this?

43:26
why do we care? What's important to the key? But Lisa had this awesome, you know, as part of the entry internship, you have to do this outreach day. And Lisa had this really cool like tabling event where she kind of had walked people through the species discovery process. And how do you notice these differences? And how would you find, why would you make this a new species and kind of have this really interactive way of species discovery that a lot of, you know, the museum visitors to that day, you know, a lot of people of all ages really connected with and loved. And so Lisa found a way to make

43:55
this taxonomic process that other people might be like, oh, what is this? You know, as like a really fun interactive thing, which I think was really cool and what I like really fun to see. And so I think there's ways still that we can connect with the public and she's like, hey, taxonomy, you can do it too. It's really fun. Here's how you can get involved versus like, oh, you're locked in your office, neck deep and specimens don't talk to me, you know. Yeah. And I was, I loved that part of outreach because I wasn't like, it was my first time during that sort of outreach. And kids are really, really smart. Like, I would give them a box of, like, wasps and a box of flies, and they could tell that the flies had two wings and the wasps had four. And they could kind of make that delineation, oh, that's why it's a fly, because it has two wings. And I think people are a lot more scientific than sometimes they think, because they can make these really fast connections of

44:52

these two things are different because of this. And it's like, yes, that's what taxonomists all agreed with. Like you're making the same connections we made, which is fabulous. That is wonderful. I completely agree. And it's been really fun to learn about Beeflies with both of you. And I'm really looking forward to reading whatever you publish next. So thank you so much for coming on the podcast. Thank you for inviting us. It's a lot of fun, know, nerding about taxonomy and Beeflies and

45:22
just talking about all of that. So thank you a lot. Thank you so much. This is great.

45:29
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45:56
I covered everything. Hopefully, maybe I ramble too much, but I think I answered the questions right. This podcast is like 98 % ramble. Perfect.

[bright, tech-y music returns]

Zoe: Thanks for listening to this episode of the New Species Podcast. This podcast is created by Brian Patrick, and is edited and produced by Zoe Albion. If you would like to support us, please consider subscribing to our Patreon at https://www.patreon.com/NewSpeciesPod. And if you'd like to get in touch with questions or feedback, please e-mail us at newspeciespodcast@gmail.com.

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