

WEBVTT

12

00:01:31.350 --> 00:01:36.810

Denise Ellsworth: I appreciate everyone being here, this is a it's a great turnout we've had so much interest and I think just.

13

00:01:37.530 --> 00:01:43.440

Denise Ellsworth: The heart and the enthusiasm behind the world of wild bees is is really exciting.

14

00:01:44.070 --> 00:01:56.490

Denise Ellsworth: olivia Carol is joining us this morning for webinars she's an author and biologists, many of you know and recognize olivia she's taught for most all of our webinar series just a great educator and a great resource.

15

00:01:57.120 --> 00:02:05.880

Denise Ellsworth: Has a vast background in biology and also amazing writing and photography skills, so you probably know.

16

00:02:06.990 --> 00:02:17.250

Denise Ellsworth: her book with Joe Wilson, the bees in your backyard, she has a new book, along with Joe the common bees of Eastern North America and they're hard at work on.

17

00:02:18.090 --> 00:02:26.010

Denise Ellsworth: A be a book for the Western us, so I saw your eyes get big olivia so a lot of big projects on your plate, along with fieldwork and.

18

00:02:26.490 --> 00:02:45.450

Denise Ellsworth: Writing and teaching in fact olivia and I are working on an online big course that we hope to really rely on launch in a in a big way in October or November of this year, so look for that she's a great educator really helps break down the be scientists science into pieces that.

19

00:02:46.590 --> 00:02:59.760

Denise Ellsworth: We can take in and learn about and just just a great resource so olivia Thank you so much for being here with us this morning i'm going to turn the the virtual podium over to you, let me and my screen share here.

20

00:03:01.260 --> 00:03:01.860

Olivia Carril: perfect.

21

00:03:02.970 --> 00:03:06.300

Olivia Carril: All right, first let me make sure you can hear me right.

22

00:03:07.470 --> 00:03:07.770

Denise Ellsworth: Okay.

23

00:03:08.880 --> 00:03:21.030

Olivia Carril: How is good to check that first thanks to Nice that was a really nice introduction and it's always always great working with Denise and meeting all of the wonderful people she gets to know you guys, who are all here today.

24

00:03:21.780 --> 00:03:26.130

Olivia Carril: from all over the country, my goodness, I was looking through the chat at where you're from and.

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00:03:26.760 --> 00:03:32.610

Olivia Carril: it's quite the list it's very impressive i'm happy also to see all of the people that want to know more about bees.

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00:03:33.000 --> 00:03:45.600

Olivia Carril: And, and I also see all of your questions over here i'll try and answer there's some pretty good ones here that i'll try and answer and a few of them, I think I will answer with my talk today so hopefully hopefully that'll help out a little bit.

27

00:03:46.620 --> 00:03:58.140

Olivia Carril: As far as that be poster that you saw behind Denise and marshes desks at the end of my my presentation there's a link and if you go to that link you could probably find a copy there.

28

00:03:58.590 --> 00:04:08.250

Olivia Carril: Alright i'm going to try and share my screen here let's make sure this works and push that button there can someone Denise.

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00:04:08.370 --> 00:04:09.660

Olivia Carril: or Marshall you let me know that that.

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00:04:10.020 --> 00:04:10.950

Denise Ellsworth: looks great olivia.

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00:04:11.250 --> 00:04:21.600

Olivia Carril: Thank you alright so Denise give me a little bit of a different topic today not something that I it's something I think about a lot, but not something that I really talk about very much and I was kind of excited.

32

00:04:21.960 --> 00:04:36.240

Olivia Carril: To take on the challenge of trying to talk about what it takes to do be research or be search get it oh haha okay um and so that's what i'm going to talk about today is and i'm going to pull from a lot of studies that.

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00:04:36.900 --> 00:04:41.190

Olivia Carril: i've read and enjoyed reading to try and illustrate a little bit about.

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00:04:42.120 --> 00:04:57.510

Olivia Carril: inner workings of doing the research and where where people like you, who don't get to do it all the time might fit into this, and so the first question that I thought we'd start with is how do researchers come up with the questions that they want to ask.

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00:04:57.870 --> 00:05:01.140

Olivia Carril: And I have to say that this is actually the easiest part.

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00:05:01.710 --> 00:05:09.240

Olivia Carril: I can come up with questions in my sleep and looking at the chat box or the question Q amp a box over there, I can see that you guys can to.

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00:05:09.540 --> 00:05:22.620

Olivia Carril: coming up with questions is no problem for anyone that's them that's pretty simple, the challenge is in answering those questions, how do we answer that question in a way that we can be confident in our findings when we're done.

38

00:05:23.010 --> 00:05:30.180

Olivia Carril: And so walk you through a little bit what we do here, and so the first thing once you've come up with whatever question you have.

39

00:05:30.420 --> 00:05:38.640

Olivia Carril: is to filter out the questions that maybe have already been answered by other scientists so which of these questions are things that we already know about.

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00:05:39.450 --> 00:05:48.510

Olivia Carril: My favorite way to do this as go to this lovely website called Google scholar i'm a little leg Denise Can you see all my tabs up there are computers always like that too.

41

00:05:48.840 --> 00:05:53.160

Olivia Carril: So I go to google.com backslash or forward slash scholar.

42

00:05:53.760 --> 00:06:04.080

Olivia Carril: And it has this lovely little search bar and down below based on my past interest it kind of recommends articles for me and I put a little star by the ones I want to come back and read later.

43

00:06:04.470 --> 00:06:14.490

Olivia Carril: And then on there, you can type in a question or some freezing and words that may be of interest to us so here I typed in how many be species live in Michigan.

44

00:06:14.850 --> 00:06:23.040

Olivia Carril: I hit the search and all of these different articles come up the top one is actually a pretty good one for me the bs of Michigan.

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00:06:23.640 --> 00:06:28.860

Olivia Carril: My answer my question directly and I didn't have to do any research, other than typing into Google.

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00:06:29.370 --> 00:06:35.100

Olivia Carril: And turns out 465 species are currently known in Michigan so that's a great question.

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00:06:35.400 --> 00:06:45.090

Olivia Carril: And it's one that's already been answered so, then we could, if we were still interested in this hone in on something more specific what ECO regions are those bees in or something else.

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00:06:45.450 --> 00:06:54.960

Olivia Carril: When we go to do research and similarly that question what effect does the invasive purple blue stripe have on pollinator networks, this is one that's been studied.

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00:06:55.680 --> 00:07:04.410

Olivia Carril: I think, even by some people that that have been on denise's series before here and so purple blue stripe is an invasive plants that can be.

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00:07:05.070 --> 00:07:13.440

Olivia Carril: Pretty prevalent when it's found and what effect does that have on the the native plants that are in the area and even the native bees, and so I type that into the.

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00:07:13.830 --> 00:07:21.840

Olivia Carril: Google scholar search bar there and found this paper that talks about how, when the purple loose strife is present, there are less.

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00:07:22.710 --> 00:07:36.330

Olivia Carril: Be visits on the native plants that are in the area, so that was interesting and right below that related to it, I found a paper that suggests the same thing happens with other plants in there, the non natives that are in an area so.

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00:07:36.960 --> 00:07:46.410

Olivia Carril: Just by doing kind of diving down the rabbit hole that is Google scholar I learned a little bit about not just the purple loose strife, but maybe what invasive plants in general.

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00:07:46.950 --> 00:07:57.990

Olivia Carril: are doing in these areas, and then I found it an interesting follow up paper that actually suggested that the presence of purple that it might be more complicated and that the presence of this plan.

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00:07:58.350 --> 00:08:06.780

Olivia Carril: might actually attract these in some cases that otherwise wouldn't be in the area and can help co occurring native plants like this.

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00:08:07.320 --> 00:08:15.960

Olivia Carril: deck of diamonds here so um now I have even more questions and more things that I could look into and research, and I think that's where a lot of it begins.

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00:08:16.650 --> 00:08:24.000

Olivia Carril: Is kind of you know diving in and looking at some of those rabbit holes another great place to look for interesting information.

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00:08:24.630 --> 00:08:38.340

Olivia Carril: is to look for reviews of topics that interest you so, for example, this is a lovely review that talks about the floral microbiome, believe it or not, within a flower inside that flower there's all sorts of little.

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00:08:38.880 --> 00:08:50.850

Olivia Carril: microbes yeasts and bacteria and who knows what else that are in there that are their own little ecological community that move between flowers on the visitors so in a be visits a flower it can.

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00:08:51.600 --> 00:08:57.120

Olivia Carril: sort of seed other flowers that it visits after that, and so this was a great review that kind of summarized.

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00:08:57.660 --> 00:09:10.770

Olivia Carril: Some of that work here was another I really like to look at plant pollinator networks and so here was one that kind of reviewed, some of the things that we've learned in some of the techniques that we use to analyze our plant pollinator networks.

62

00:09:11.340 --> 00:09:19.740

Olivia Carril: So step one is to filter out the questions that have already been answered spend some time just kind of cruising and the same way, you might I don't know get on.

63

00:09:20.550 --> 00:09:29.730

Olivia Carril: Facebook or instagram and just scroll through the feed, you can do the same thing with Google scholar, based on a couple search words and it can be very kind of fun.

64

00:09:30.900 --> 00:09:41.040

Olivia Carril: Some questions on this list aren't answered, and the reason they're not as because they're too big and they need to be sort of refocused reframed into something more manageable.

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00:09:41.250 --> 00:09:45.660

Olivia Carril: So as an example on this, we have the one here that says what is the role of floral scent.

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00:09:46.020 --> 00:09:59.160

Olivia Carril: in the way of flower smells in plant host choice for specialist be so specialist be finds its flower somehow is it related to floral scent but the way this is where did, that is a giant question.

67

00:09:59.790 --> 00:10:09.780

Olivia Carril: Spending all of floral scent in all of the world, all of the plans and all of the specialist be so that could be be be reframed refocus down to something simpler.

68

00:10:10.530 --> 00:10:18.660

Olivia Carril: And then we have the question that was something about how many bees species live in Michigan the question why do so many bees species live in Arizona.

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00:10:19.020 --> 00:10:24.300

Olivia Carril: Again we're talking about a pretty big subject there and it might be better to sort of narrow that down.

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00:10:24.600 --> 00:10:29.130

Olivia Carril: and come up with a few little pieces that might lead to an answer to that bigger question.

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00:10:29.430 --> 00:10:37.470

Olivia Carril: So we could rephrase the floral scent question to asking if the floral scent of the flowers, that the bees are visiting are more similar to each other.

72

00:10:37.800 --> 00:10:51.180

Olivia Carril: than they are to plants that they don't visit maybe there's something in common, among them, or what ECO regions in Arizona support the most bees and then take that a step further after that and I'll get to that here in a second.

73

00:10:52.320 --> 00:11:03.750

Olivia Carril: So, of the questions that we want to answer I think they can be classified rather broadly this is kind of general and there's a lot of Gray area bell shaped curves are pretty standard in biology, no matter how you look at it.

74

00:11:04.020 --> 00:11:12.630

Olivia Carril: But there are two main kinds of questions that we can look at here one is observation and natural history questions So these are the questions.

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00:11:13.380 --> 00:11:22.740

Olivia Carril: That you're not manipulating anything, or if you are it's pretty subtle mostly you're looking for patterns that are already out there, but maybe haven't been.

76

00:11:23.580 --> 00:11:33.180

Olivia Carril: quantified in some way before these can be very informative they suggest answers to really big questions So these are landscape level questions or.

77

00:11:34.440 --> 00:11:43.560

Olivia Carril: An entire (inaudible) you might be looking at some sort of pattern there and the nice thing about them as they can feed into cause and effect questions which I'll talk about in a minute.

78

00:11:44.580 --> 00:11:49.140

Olivia Carril: And they handle the high variability that occurs in natural systems pretty well.

79

00:11:49.680 --> 00:12:01.470

Olivia Carril: They don't really worry so much about all of the confounding factors that are there sort of the way that the study is set up incorporates those into it, or just accept that you know there's only so much interpretation that will happen.

80

00:12:02.040 --> 00:12:07.620

Olivia Carril: The downsides to these are that they're hard to replicate when you're talking about sampling bees across.

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00:12:08.670 --> 00:12:20.490

Olivia Carril: All of new Mexico there isn't a replicant of new Mexico that you can go to so it can be tricky to kind of parse down the way to do this in such a way that some sort of replication can happen.

82

00:12:21.510 --> 00:12:23.010

Olivia Carril: Maybe you want to look at just.

83

00:12:24.210 --> 00:12:34.440

Olivia Carril: I was talking to marcia this morning about beach understory and maybe you want to look at that, but again, finding beach under stories that are equivalent to each other so that you can replicate it could be tricky.

84

00:12:35.220 --> 00:12:43.740

Olivia Carril: Results are often more about finding a correlation between two things like this, and this seem to change together and maybe that means something.

85

00:12:43.980 --> 00:12:48.270

Olivia Carril: But it's a little harder to establish cause and effect with these observational studies.

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00:12:48.660 --> 00:13:01.260

Olivia Carril: And that correlation the fact that there isn't a mechanism that's been identified in these studies can leave them open to lots of different interpretations and maybe criticism with the way that you or someone else interpreted it.

87

00:13:02.010 --> 00:13:12.330

Olivia Carril: On the other hand, we have cause and effect studies, which are the ones that kind of, say, if we do this, then this happens, so it just SAP establishes a mechanism it.

88

00:13:13.410 --> 00:13:22.500

Olivia Carril: it's it's a little it's it's informative and it's easier to replicate for sure, but it's a little narrower and terms of the sort of questions that are being answered.

89

00:13:22.860 --> 00:13:32.460

Olivia Carril: you're more likely to get to the mechanism you're more likely to successfully explain something in that sense, but the downsides are that they can be hard to design and have them go well.

90

00:13:33.060 --> 00:13:40.710

Olivia Carril: an elegant study is a beautiful thing in science and it's hard to draw large conclusions, because you fall into the the.

91

00:13:42.060 --> 00:13:50.280

Olivia Carril: The problem of induction of taking your one data point and making too big, of an assumption about the world at large, based on what you found in your study.

92

00:13:50.940 --> 00:13:58.380

Olivia Carril: And so, in this case it's the methods it's the way the study was designed the tend to be a little more open to criticism, so these are the two.

93

00:13:58.650 --> 00:14:04.710

Olivia Carril: Big kinds and the idea in all of these cases is that we reach a conclusion in which we have some.

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00:14:04.980 --> 00:14:13.140

Olivia Carril: measure of confidence, and I want to emphasize that word measure up there we've really want some measure of confidence in these studies.

95

00:14:13.410 --> 00:14:22.860

Olivia Carril: And so let's look at an example here this, the question that I had before, that said, what is the preferred habitat of parents idiom Jupiter, and this is the sort of study.

96

00:14:23.130 --> 00:14:31.050

Olivia Carril: Where you're going to go out and look for this cute little be and where you find it tells you something about its preferred habitat it's all observation.

97

00:14:32.070 --> 00:14:43.110

Olivia Carril: Alternatively, the question that we had on there that says do all these respond to me a nigga to noise in the same way, is more of a sort of steady where you would take two b's and see how they how they do.

98

00:14:43.500 --> 00:14:54.960

Olivia Carril: In normal conditions, and then you would maybe expose them to it, some neo naked tonight and see how they change, and if the amount of change in reproductive rates is the same for both of them.

99

00:14:56.190 --> 00:15:02.550

Olivia Carril: What urban plant species will encourage the greatest diversity of bees again, this is the sort of steady where you might go out.

100

00:15:02.790 --> 00:15:10.890

Olivia Carril: And look at all the plans in some particular garden and document, the number of these on each and say one plant does better than another.

101

00:15:11.550 --> 00:15:21.210

Olivia Carril: Does adding linalool all to cactus flowers increase the number of floral visits by day deja here's something very specific where we're going to look at what's happening, naturally.

102

00:15:21.450 --> 00:15:29.760

Olivia Carril: And then we're going to treat the flower will have a treatment will add something to it and see how that changes so it's an if then cause and effect question.

103

00:15:30.810 --> 00:15:43.260

Olivia Carril: Is floral scent more similar between host plants, then between host and non host plants, this might seem a little bit late cause and effect, but really we're just sampling what's already out there and then looking at the patterns between them.

104

00:15:44.130 --> 00:15:58.140

Olivia Carril: Are Lazio glass some species ecological equivalents in other words, can you swap one sweat be for another and get the same result This again is a sort of steady where you might manipulate what's in a place and see how seed set changes.

105

00:15:59.400 --> 00:16:11.430

Olivia Carril: What ECO regions in Arizona support support the most bees and which bees, and this is the sort of study, where again you're just going to go out and sample see what's there see what the patterns are see what they're associated with.

106

00:16:11.730 --> 00:16:19.530

Olivia Carril: Maybe look at which bees are in those, and this will probably lead to follow up questions what characteristics are shared among these in these different eco regions.

107

00:16:19.890 --> 00:16:33.810

Olivia Carril: And what differences are there between them and that might lead them to something that's more of a cause and effect questions so observations and establishing those patterns are generally a first step to getting to something that then establishes the mechanism.

108

00:16:34.980 --> 00:16:43.950

Olivia Carril: Just mowing less often in your yard, increase the diversity, well, we could easily come up with some treatments there and try that and see what happens.

109

00:16:44.250 --> 00:16:57.180

Olivia Carril: And can specialist be larvae develop our non host pollen can we manipulate can we change the pollen that a BBB is growing up on and can we see any changes, then in how the be larvae develop so.

110

00:16:57.570 --> 00:17:10.590

Olivia Carril: I want to show you a couple examples of these with the cause and effect the general idea for these sorts of studies, is that you have a treatment, a thing that you do that, you manipulate and compare it to something where you didn't do anything.

111

00:17:10.770 --> 00:17:18.060

Olivia Carril: and see what sort of differences are there, they can often be framed as sort of if then statements, it requires.

112

00:17:18.780 --> 00:17:28.560

Olivia Carril: Controlling for as many factors as possible so that the only thing that's changing between the control and the treatment is the one thing you're interested in.

113

00:17:28.920 --> 00:17:37.320

Olivia Carril: which can be a little bit tricky sometimes and, ideally, you have a large enough sample size that you can get that measure of confidence that you want, at the end.

114

00:17:37.560 --> 00:17:48.480

Olivia Carril: So let's look at a couple of examples to show you how this plays out in the real world in science here, this is a paper it was written many years ago, but I just think it's such a great paper and so cool I wish I could have.

115

00:17:48.930 --> 00:17:51.750

Olivia Carril: been there and done this and see what happened, it was really neat.

116

00:17:52.020 --> 00:18:01.950

Olivia Carril: So this is i'm going back to one of those questions that was on the list and the title of the paper it's by Neil William says use of novel Poland species by specialist in general a solitary bees.

117

00:18:02.310 --> 00:18:13.500

Olivia Carril: So he took two b's aws MIA login area cute little mason be kind of this blue blue green thing and it's a generalist it'll visit any plant that it wants it has things that it prefers but.

118

00:18:13.950 --> 00:18:28.980

Olivia Carril: It generally in the field seems to go to anything and another be called as nia californica, which is a specialist and only visits flowers in the asteroid ice and even more specifically seems to prefer certain groups within their the helium fee.

119

00:18:29.700 --> 00:18:41.550

Olivia Carril: So you gave each of these different species of choice about the flowers from which they could collect pollen right as they emerged from the cocoon so they have no life experience yet he had them a little greenhouses and let them loose.

120

00:18:41.850 --> 00:18:43.440

Olivia Carril: And they he Let them choose.

121

00:18:44.040 --> 00:18:58.560

Olivia Carril: Between the preferred pollen The thing that it normally visits and the pollen, of the other so in the case of Oz MIA like marissa it would be it's the thing of visits most in the field and also President was asked racy so which one would it visit.

122

00:18:58.980 --> 00:19:05.460

Olivia Carril: And then he gave them the choice of their preferred Parliament and something totally different that neither of those bees had ever seen before.

123

00:19:05.910 --> 00:19:12.210

Olivia Carril: And then, to finish this up as if that wasn't cool enough he then manipulated, he did the cause and effect part.

124

00:19:12.810 --> 00:19:25.020

Olivia Carril: where he removed the pollen that they had that the mama had collected for her baby and replaced it with something else and watched how the baby grew up on a different pollen so just to make sure this is clear.

125

00:19:26.220 --> 00:19:34.410

Olivia Carril: He took a be like this a little mason be and he gave it two choices, one that this is the the what it's a generalist but it tends to.

126

00:19:34.740 --> 00:19:44.310

Olivia Carril: Like Cecilia a lot, so you gave it a choice between for Celia and helium this, so the B is let loose in this greenhouse that has equal members of both of these.

127

00:19:44.700 --> 00:19:53.130

Olivia Carril: And he did that, for four days and then he removed the facility of the preferred one to see if he could convince them to go to something they never actually visit.

128

00:19:53.880 --> 00:20:02.370

Olivia Carril: And he could date and then after that he put back the facility after they'd been alive for a while and had some life experience to see if they what they would visit them.

129

00:20:02.790 --> 00:20:11.070

Olivia Carril: And then, finally, he repeated this was something that neither of them have ever seen before, and how do they do when they're faced with a brand new plant.

130

00:20:11.700 --> 00:20:15.720

Olivia Carril: And what he found was the Omnia like marissa the generalist.

131

00:20:16.290 --> 00:20:27.990

Olivia Carril: Always picked for Celia even in the presence of the astor aceee it wouldn't visit it even when that was the only food available they wouldn't collect from the sunflower group of plans.

132

00:20:28.680 --> 00:20:35.190

Olivia Carril: So this is choice, one is the first four days, the second four days, where they only had the astor AC.

133

00:20:35.790 --> 00:20:41.790

Olivia Carril: And then the third four days, where they had both this specialist, on the other hand, this is kind of interesting.

134

00:20:42.090 --> 00:20:48.780

Olivia Carril: would take from both so in the case where I had for Celia and to pick from and also.

135

00:20:49.080 --> 00:20:56.400

Olivia Carril: it's it's host plan it took a little from both of them, it was fine taking a little here and a little there when Given a choice between the two.

136

00:20:56.640 --> 00:21:06.450

Olivia Carril: When when the choice was removing it only had the one plan it would take facility yeah it would wouldn't starve it's babies, it would still take something and then, when the choice came back again for both plants.

137

00:21:06.750 --> 00:21:18.150

Olivia Carril: Again, it would visit and collect pollen from both of them, the females so in the case where it was a totally new thing that had never seen before the brassica the mustard flower and.

138

00:21:18.720 --> 00:21:21.600

Olivia Carril: It would take a mixture, though, as Mila marissa would take a.

139

00:21:22.530 --> 00:21:30.240

Olivia Carril: mixture of both of them together, it would visit the brassica and nothing else was available, but it wouldn't visit that aster AC which is interesting.

140

00:21:30.600 --> 00:21:40.950

Olivia Carril: And it would take a mixture there in the case of the specialist be when brassica was the alternative facility, it was Okay, but when brassicas a mustard was the alternative.

141

00:21:41.370 --> 00:21:44.940

Olivia Carril: To be would not visit it will only take the helium three pollen.

142

00:21:45.720 --> 00:21:56.460

Olivia Carril: mastery see so we can then then, then you follow this up with this cool little thing, where he took the pollen mass out and replaced it with something else to see what would happen.

143

00:21:56.760 --> 00:22:06.480

Olivia Carril: And this is fascinating i'm gonna put some arrows to make it really clear what's going on here the generalist be that should be able to eat absolutely anything, the more.

144

00:22:07.020 --> 00:22:19.590

Olivia Carril: pollen that wasn't what it was supposed to visit that there was the smaller the final larval mass, the smaller the baby, so the babies didn't do as well on these foreign pollens.

145

00:22:20.010 --> 00:22:23.370

Olivia Carril: Alternatively, in the case of the specialist be.

146

00:22:23.790 --> 00:22:33.750

Olivia Carril: In the presence of a different pollen it did just find it did okay with those so kind of a fascinating study and it makes me wonder a lot about what it means to be a specialist be.

147

00:22:34.050 --> 00:22:41.100

Olivia Carril: So to sum that up as nia like Mary I refuse to collect sjc pollen it will collect some of the mustard pollen.

148

00:22:41.610 --> 00:22:46.710

Olivia Carril: The specialist will collect a little facility appalling but wouldn't take any of that brassica pollen.

149

00:22:47.460 --> 00:22:56.040

Olivia Carril: aws nia login area doesn't grow well on asterisk he pollen but as me to California QA the specialist will do okay i'm both it'll make it through.

150

00:22:56.790 --> 00:23:03.900

Olivia Carril: kind of fascinating to look at and think about what this means really here, but a nice example of a cause and effect study that's been done.

151

00:23:04.500 --> 00:23:14.100

Olivia Carril: And it turns out that those Asterix eat plants have a pollen count on them that might be really hard for bees that haven't specialized on them to to be able to digest.

152

00:23:14.610 --> 00:23:22.590

Olivia Carril: So here's another, this is what about mowing lawns This is great I love that in the paper itself they actually had a picture of the people who are out doing the lawn mowing.

153

00:23:22.860 --> 00:23:32.790

Olivia Carril: And it was a very simple study design they looked at, they took 16 households that volunteered to participate in this two year study, some of them did one year, some of them were happy with two.

154

00:23:33.120 --> 00:23:37.890

Olivia Carril: And they assign each house to a treatment, where you're going to get your lawn mowed every week.

155

00:23:38.310 --> 00:23:41.520

Olivia Carril: Every two weeks or every three weeks, and then they measured.

156

00:23:41.760 --> 00:23:52.260

Olivia Carril: floral richness and abundance, as a result of this, and the height of the grass and the total line area that percent bare ground, and they also measured as the thing that was going to change the dependent variable.

157

00:23:52.590 --> 00:23:59.460

Olivia Carril: The species, just before moaning and they use pan traps and that's to do this pretty cool what they found here.

158

00:24:00.120 --> 00:24:08.520

Olivia Carril: 93 species were collected, overall, including 14 that were new to Massachusetts county so that was kind of neat for the area.

159

00:24:08.970 --> 00:24:17.880

Olivia Carril: The lawns that were most every three weeks had more flowers and you can see that, here in this Green square up here, this is floral abundance for three weeks.

160

00:24:18.150 --> 00:24:25.920

Olivia Carril: They have significantly more flowers, but the logs made every two weeks had more individuals, and you can see that, here in the bottom.

161

00:24:26.460 --> 00:24:30.030

Olivia Carril: Left where it shows the two weeks in the orange bar there in the middle.

162

00:24:30.630 --> 00:24:41.730

Olivia Carril: had more be individuals that doesn't necessarily mean more species and when they looked at species and they combine this with abundance they did sort of measure that combines the two together.

163

00:24:42.030 --> 00:24:53.250

Olivia Carril: They found that lines made every one or three weeks one or three, but not to have the the greatest sort of beat overall be diversity in terms of evenness and how they were distributed.

164

00:24:53.700 --> 00:24:59.580

Olivia Carril: There are some questions, of course, that come as a follow up to this was the height of that grass influential.

165

00:24:59.820 --> 00:25:08.760

Olivia Carril: Like maybe that green bar there at the end that shows the richness, should have been higher, but maybe when the grass gets too high, the collecting method that you're using.

166

00:25:09.420 --> 00:25:14.610

Olivia Carril: makes it hard to actually sample the bees, maybe the grass was tall in those little pan traps were hidden in there.

167

00:25:15.090 --> 00:25:21.060

Olivia Carril: So here we are again a cause and effect study, leading to more ideas for more cause and effect studies to come.

168

00:25:21.510 --> 00:25:31.980

Olivia Carril: But they their conclusion is that the lazy lamar approach might be a good idea, and they want to do some follow up studies on being nesting requirements in the area and how that might influence things.

169

00:25:32.310 --> 00:25:40.710

Olivia Carril: So again, a great little cause and effect study when we're talking about observation and natural history studies, the general idea is to find a pattern so.

170

00:25:41.700 --> 00:25:46.320

Olivia Carril: Look, for patterns have some sort of variable that's changing and compare something between them.

171

00:25:46.740 --> 00:25:57.270

Olivia Carril: It requires recognizing and adapting to all sorts of confounding factors things that are changing, along with the thing you want to study that you really can't control in any way.

172

00:25:57.660 --> 00:26:10.170

Olivia Carril: And well the other one it's ideal to have large sample sizes with these sorts of studies it's essential that you have really large sample sizes in order to get past all of that, confounding stuff that's in there.

173

00:26:10.770 --> 00:26:17.580

Olivia Carril: And it usually is there's a lot of really fancy visual techniques to look for those patterns, so the papers are always fun to look through with these ones.

174

00:26:17.880 --> 00:26:24.570

Olivia Carril: So as examples to show you what I mean that study that was what urban plant species will encourage the greatest diversity of bees.

175

00:26:24.900 --> 00:26:30.000

Olivia Carril: I picked this one, I see some of you are from California so take note, maybe this will be of interest to you.

176

00:26:30.330 --> 00:26:39.390

Olivia Carril: They looked across California and they look to see which native and non native plants attracted the greatest diversity of bs in urban areas in California.

177

00:26:39.960 --> 00:26:47.820

Olivia Carril: They had a whole bunch of different studies sites they caught, a lot of bs almost all net collecting so that they could see which flowers were the most important.

178

00:26:48.150 --> 00:26:53.400

Olivia Carril: And they found in terms of the native species that were in people's yards that were really important.

179

00:26:54.210 --> 00:26:59.340

Olivia Carril: They had several here see a notice, which is a big old shrub was really important.

180

00:27:00.120 --> 00:27:09.660

Olivia Carril: California poppy supported quite a bit for celiac again that same one that was in the past eddie which is kind of amazing to me that facility, which is over here was really important.

181

00:27:10.230 --> 00:27:20.400

Olivia Carril: Some solid day goes some salvias and, of course, several aster AC they always factor in so all I did was go out and look for a pattern they looked at how many bees were on these different plants.

182

00:27:21.060 --> 00:27:30.840

Olivia Carril: They also did the same with non native plants and here's just a selection of the non natives that they found that were super important different varieties, maybe you know cultivars and things like that.

183

00:27:31.740 --> 00:27:41.580

Olivia Carril: Not necessarily invasive because they're non native and they found an aster That was really good a whole bunch of things in the mid family that tended to be quite good and.

184

00:27:42.540 --> 00:27:50.220

Olivia Carril: Yet quite a range of things, I found it fascinating that the top ones were all purple I have no idea if that's important but here we are with another question.

185

00:27:51.210 --> 00:28:01.500

Olivia Carril: And so it goes this one was great and I just have to point out this isn't actually about bees, but the grass turned out so nice that I put this one in instead of, of the one that had little bit Messier graphs.

186

00:28:01.830 --> 00:28:12.000

Olivia Carril: And this is a case where again in a totally different way from looking at a bee species we're still looking for a pattern in something we see on a plant okay So here we have.

187

00:28:12.990 --> 00:28:25.020

Olivia Carril: floral scent and these people went out they had four different plants in the same genus and they look to see what floral scent compounds were present in those different.

188

00:28:25.560 --> 00:28:32.070

Olivia Carril: Plants and then they map them against each other, and so the reason I put this in So you can see in the upper left corner.

189

00:28:32.280 --> 00:28:38.460

Olivia Carril: All of the circles are one species, all the diamonds are another the squares are one and the triangles.

190

00:28:38.730 --> 00:28:47.310

Olivia Carril: And you can see the distance between any two points, whether they're two triangles together or two circles together or a circle and triangle.

191

00:28:47.550 --> 00:28:56.310

Olivia Carril: indicates how similar the the scent compounds in there were to each other, so what it shows is that these four very closely related species.

192

00:28:56.610 --> 00:29:09.480

Olivia Carril: All have very unique sense so from the point of view of the pollinator this could be really important and we can't say how we can't say what's happening there, all it was done was looking for the pattern here in this.

193

00:29:10.290 --> 00:29:18.990

Olivia Carril: In this wonderful plant and seeing that sentence different between them, but that's that's how a lot of Sciences done so let's take a short quiz because.

194

00:29:19.380 --> 00:29:23.580

Olivia Carril: In case you're all falling asleep, maybe i'm a little boring this morning, no.

195

00:29:24.210 --> 00:29:35.820

Olivia Carril: let's take a short quiz here and see if you can figure out which which of the two that I talked about natural history and cause and effect these two are so here's a paper published a little while ago now.

196

00:29:36.210 --> 00:29:42.000

Olivia Carril: we've come a long way with our felonies they tend to be prettier now but I liked this one, just because of what it shows here.

197

00:29:42.240 --> 00:29:52.410

Olivia Carril: So he compared a group of bees that are all close relatives to each other and the letters up here, show the name of it abbreviated So these are the names of different bees in the group.

198

00:29:53.010 --> 00:30:05.550

Olivia Carril: That at the time was called Evelyn and he looked he looked at how similar those bees were to each other so kind of like a family tree so for these two here on the end that says mela and line.

199

00:30:06.120 --> 00:30:17.490

Olivia Carril: The distance that you would walk to get from this branch around and over to here is shorter than the distance you would go to get from mela and laddie which is down here, I like this.

200

00:30:17.730 --> 00:30:27.120

Olivia Carril: One over and back over here so that means that mela and laddie are less closely related to each other and mela and line are more closely related to each other.

201

00:30:27.330 --> 00:30:33.930

Olivia Carril: So then he mapped On top of this, different be characteristics and he found that the one that is least closely related.

202

00:30:34.800 --> 00:30:47.190

Olivia Carril: To all the others, is a solitary be but all the others are semi social they have some social stuff going on inside their nests that ranges from pretty close to completely social to a little more modified.

203

00:30:47.640 --> 00:30:57.540

Olivia Carril: He also found differences in how many generations, how many broods of daughter cells were made, each year, and so what would you think based on this, if you manipulate anything.

204

00:30:58.440 --> 00:31:05.610

Olivia Carril: He can alter anything you can't alter DNA and he didn't alter generation 10s or anything like that to see anything so in this case.

205

00:31:05.970 --> 00:31:11.580

Olivia Carril: Again, even though it's a beautiful biologically and we're looking at genetics and it seems super complicated.

206

00:31:12.150 --> 00:31:15.870

Olivia Carril: it's just observation it's just looking for patterns in the data.

207

00:31:16.380 --> 00:31:26.430

Olivia Carril: here's another, so this one came out a few years ago I don't know how many of you are familiar with Dave cool somebody's written some great books on bs and he actually documents, the story behind.

208

00:31:26.730 --> 00:31:29.460

Olivia Carril: This paper right here and it's kind of a fun read if you.

209

00:31:29.820 --> 00:31:39.810

Olivia Carril: guys are into that sort of thing, and this one's about neo naked tonight's and he found that neo nicki tonight pesticides, reduce bumble bee colony growth and queen production.

210

00:31:40.140 --> 00:31:46.020

Olivia Carril: And so the way that he did this was he took 75 Bumblebee colonies, all of these in Europe.

211

00:31:46.290 --> 00:32:03.420

Olivia Carril: Any assign them to one of three treatments that should clue you in on what we're doing here I control one with what he called a low dose of a neo naked tonight called a medical bread and then a low dose was what he thought you would find in the field, naturally, on.

212

00:32:04.440 --> 00:32:15.330

Olivia Carril: What was it a mustard and then a high dose which was doubling the amount that you might naturally find in the field, so he exposed to these to these for 14 days, right at the start of their colony.

213

00:32:15.570 --> 00:32:24.180

Olivia Carril: And then he released them into the field and let them go about their normal business, but he measured queen production, how many how many Queens were made at the end of the year.

214

00:32:24.420 --> 00:32:29.880

Olivia Carril: And the size of the colony, as determined by how much that colony weighed at the end of the year.

215

00:32:30.150 --> 00:32:37.020

Olivia Carril: So here's what he found this is the number of Queens produced in the control which wasn't exposed to me onyx.

216

00:32:37.320 --> 00:32:45.690

Olivia Carril: In the low treatment, it was two and a high treatment, it was, I think, 1.5 on average across them so pretty big differences there.

217

00:32:46.020 --> 00:32:53.790

Olivia Carril: Any also found that the bees, so this is how much those bee colonies weighed and, of course, through the season, as the colony grows.

218

00:32:54.030 --> 00:33:07.980

Olivia Carril: That way it's going to increase, but the dash line at the top here is the control, so the weight increased much more in the control very naturally compared to the low and the high treatment so less.

219

00:33:08.610 --> 00:33:17.010

Olivia Carril: individually, the conclusion is less individual bees were made in colonies that had been treated with low and high amounts of neo nicks.

220

00:33:17.580 --> 00:33:26.910

Olivia Carril: And a smaller the colony is the less Queens they make so very nice elegant study, if you will, so the question is which kind of this.

221

00:33:27.810 --> 00:33:35.370

Olivia Carril: say in your mind say it out loud if you're by yourself, this is a cause and effect this is where we have actually manipulated something to see a cause and effect.

222

00:33:35.850 --> 00:33:45.000

Olivia Carril: And finally, and this answers a little bit one of the questions that somebody had posed in here where they asked something about dry environments.

223

00:33:46.260 --> 00:33:55.710

Olivia Carril: And this one was sitting for one particular be, and it was based on this question that we biologists we be biologists have and have a really hard time answering, which is why.

224

00:33:56.010 --> 00:34:06.180

Olivia Carril: Is be biodiversity so high in arid regions of the world around the world, whenever you get to a desert, you can be guaranteed really high diversity and.

225

00:34:06.810 --> 00:34:20.640

Olivia Carril: there's lots of hypotheses there's lots of problems possible explanations and it's probably a all of them put together, but one is that it might be related to the unpredictability of rainfall, because what happens when you have unpredictable rainfall.

226

00:34:20.850 --> 00:34:31.950

Olivia Carril: Between years right so when yours really wet and then you have a dry year and then another dry year and then it's wet again is that flowers, because they require that rain in order to you know get past vegetative growth.

227

00:34:32.490 --> 00:34:39.480

Olivia Carril: Quite often won't bloom in those years, and it can create isolation between these different groups of these that otherwise might be connected.

228

00:34:39.870 --> 00:34:50.100

Olivia Carril: And we might see this more in specialist bees, it seems possible because specialists are on a smaller subset of flowers anyway, so if they're on a smaller subset of flowers and then it.

229

00:34:50.700 --> 00:34:59.430

Olivia Carril: rains now you've really isolated these and when they don't get to hang out and meet with each other all the time, we should see differences in the genes, they should become.

230

00:34:59.940 --> 00:35:05.010

Olivia Carril: More similar to each other, because they're not sharing genes between different groups as much.

231

00:35:05.730 --> 00:35:16.650

Olivia Carril: And so, Brian damn forth and a couple other people studied this on a tiny teeny teeny little be that lives in southern new Mexico and southern Arizona, and this is what it looks like.

232

00:35:16.980 --> 00:35:29.340

Olivia Carril: And this is further complicated by the fact that this be the male's come in two forms and one of them has this giant head and these tiny wings and can't even leave the nest so the next that it's born into.

233

00:35:29.640 --> 00:35:38.730

Olivia Carril: It stays in because it can't fly with that huge head, which might lead to even more similarity in terms of the genes because.

234

00:35:39.540 --> 00:35:50.910

Olivia Carril: it ends up meeting with whoever uses that nest, which is quite often it sister so that's kind of interesting so he looked at this you looked at the genetic makeup of different populations of this be makoto fatalis.

235

00:35:51.240 --> 00:35:56.280

Olivia Carril: And you compared similarities in the genetic makeup to the distance between them and found.

236

00:35:56.580 --> 00:36:04.320

Olivia Carril: The populations that are further apart are indeed less similar to each other, so it kind of support this idea that maybe the.

237

00:36:04.680 --> 00:36:11.850

Olivia Carril: unpredictable rainfall and the droughts that seem so naturally to be part of desert regions may play a role.

238

00:36:12.450 --> 00:36:20.220

Olivia Carril: In isolating and causing huge speciation events in bees in desert regions and maybe that's why there's so many species there.

239

00:36:20.580 --> 00:36:31.380

Olivia Carril: He also found evidence of inbreeding suggesting that those giant males are in fact meeting with their sisters and that might cause some similarity in there as well, so what kind of study is this.

240

00:36:31.740 --> 00:36:39.750

Olivia Carril: This cause and effect if you manipulate anything not really all he did was look at patterns in this data here.

241

00:36:40.260 --> 00:36:49.320

Olivia Carril: So now let's look behind the scenes i'm going to talk through what I did for my PhD and i'll go fairly fast let it out bore you too much with all of the specifics, but just to let you see.

242

00:36:49.620 --> 00:36:59.790

Olivia Carril: How it is that we go from our or going backwards from one of these big studies that turns into a beautiful paper that you can read all of the work that goes into getting to there.

243

00:37:00.090 --> 00:37:06.390

Olivia Carril: So i'm going to talk specifically about a specialist bee, this is an illegal electric bee that's the fancy word.

244

00:37:06.660 --> 00:37:12.780

Olivia Carril: and specialist bees usually collect pollen from like one kind of flower one species or one genus.

245

00:37:13.110 --> 00:37:21.990

Olivia Carril: And it's it's a trait that's maintained between non overlapping generations, which means that even though the mother never meets her offspring she still.

246

00:37:22.680 --> 00:37:27.510

Olivia Carril: manage the the offspring that come out of there still managed to visit the same plants that their mother did.

247

00:37:27.900 --> 00:37:40.530

Olivia Carril: And this is something that persists throughout the geographic range of the beast so wherever you find that be it's always i'm always doing the same thing and it's usually one way, so the plant, the plants that specialist bees tend to be on.

248

00:37:42.330 --> 00:37:52.050

Olivia Carril: Our our visited by lots and lots of other bees and not usually reliant on just that one specialist be to do it so everywhere, you would find this, be it would be on the same plants.

249

00:37:52.350 --> 00:37:59.520

Olivia Carril: This happens between non overlapping generations and it's usually not one species it's usually like at the genus or family level.

250

00:38:00.120 --> 00:38:09.540

Olivia Carril: So one group that does this is called diet Asia, this is a very cute V that's very common out in the desert Southwest, as you can see from the yellow area that's on this map.

251

00:38:09.930 --> 00:38:17.640

Olivia Carril: there's about 45 species around the world, and they are what we call emphatic typically distributed, which means they're on either side of the tropics.

252

00:38:18.060 --> 00:38:21.360

Olivia Carril: And petrovic on either side, but not in the tropics.

253

00:38:21.720 --> 00:38:29.850

Olivia Carril: And they specialize on a couple different plants, if you look at here's a family tree again, so the distance between the branches tells you how closely related, things are.

254

00:38:30.120 --> 00:38:36.120

Olivia Carril: And you can trace it back to the very beginning here on the left side, where the orange branches kind of come off of each other.

255

00:38:36.750 --> 00:38:48.630

Olivia Carril: That is the common ancestor that's the ancestor that shared by all of those species that came after and we think that be there was probably a specialist on mellow flowers so i'm.

256

00:38:49.050 --> 00:38:57.510

Olivia Carril: out where I am that's a beautiful orange flower called Globe mellow there's other things that that occur throughout the North America that are in the same group.

257

00:38:58.260 --> 00:39:11.070

Olivia Carril: But here's The interesting thing about them one has changed has switched hosts and now specializes on the morning glory family one has switched on to the evening primrose family, the owner gracie.

258

00:39:11.610 --> 00:39:19.740

Olivia Carril: group of maybe five or six of them have switched to cactus and two separate times they have switched specialize on aster AC.

259

00:39:20.280 --> 00:39:30.930

Olivia Carril: So what is it about these particular plant families that diet Asia find so great of all of the things that are blooming in the desert Southwest and there is so much that blooms here.

260

00:39:31.200 --> 00:39:37.830

Olivia Carril: Why is it that when the choice came to switch hostess something else the post was one of these other things.

261

00:39:39.150 --> 00:39:46.050

Olivia Carril: We don't know for sure we're kind of guessing and trying to figure this out, this is one of those things where there's lots of will, maybe it's this and maybe it's this.

262

00:39:46.320 --> 00:39:51.990

Olivia Carril: And also lots of looking through the literature to see what's already known so one of the things that we know.

263

00:39:52.830 --> 00:40:05.550

Olivia Carril: fairly certainly is that the first bees were most likely specialist bees so generalist came later, maybe as an adaptation to all of the flowers that were you know sort of emerging on the planet.

264

00:40:06.060 --> 00:40:14.940

Olivia Carril: Maybe generalization is an advantage is trait and specialization is the default, the thing that you are when you aren't special.

265

00:40:15.600 --> 00:40:23.880

Olivia Carril: strange as it may sound and and and, as I showed you earlier specialist bees that are raised on generalist pollen actually do just fine.

266

00:40:24.120 --> 00:40:32.220

Olivia Carril: So perhaps what's happening here is that they're hardwired to only recognize certain plants and when presented with other options, like all of these.

267

00:40:32.520 --> 00:40:41.310

Olivia Carril: They don't recognize them these plants all bloom in the desert, at the same time they're super abundant the very predictable they bloom from year to year.

268

00:40:41.550 --> 00:40:47.070

Olivia Carril: And they're visited by a lot of other bees so we know they're good plants but bees don't visit them.

269

00:40:47.670 --> 00:40:50.730

Olivia Carril: And some of them even look kind of similar so what's going on there.

270

00:40:51.150 --> 00:41:05.700

Olivia Carril: Well, the thought that we had was that perhaps sort of big picture here is that diabetes you recognize their host flowers, based on the way they smell, and the way they look and plants that don't smell or look like them aren't considered good hosts so.

271

00:41:06.930 --> 00:41:19.710

Olivia Carril: What this means, if we were to sort of break it down into very simple language is that maybe the globe mallow and the cactus flower smell more similar to each other than they do to economics, or some other plant or MIT or something.

272

00:41:20.010 --> 00:41:29.970

Olivia Carril: And so that's why they switched to that host is because they smell similar so to answer this question, I took a tiny little vacuum cleaner and I went out and I sucked the scent off of plants.

273

00:41:30.600 --> 00:41:41.430

Olivia Carril: And not kidding that's actually what I did this is the little vacuum right here, this is the tube that goes into a little almost like a ziploc bag, except without any of this sense that's associated with the plastic of ziplock.

274

00:41:41.760 --> 00:41:54.210

Olivia Carril: And it was wrapped around the plant this thing is turned on and the sentence pulled out of there it's pulled into a little tube that contains a substance kind of similar to charcoal that absorbs all of the all of the.

275

00:41:54.540 --> 00:42:05.760

Olivia Carril: compounds that are emitted through the scent of these flowers and stored in there and then I can take that back to the lab and wash it so wash all of those components out and kind of concentrate them down.

276

00:42:06.090 --> 00:42:10.200

Olivia Carril: And then plug them into a machine called a gas chromatograph.

277

00:42:10.440 --> 00:42:21.510

Olivia Carril: coupled to a mass spectrometer which is just a fancy way of saying that you get to see each of the compounds separately, as they emerge out of this machine, they all bake off at different temperatures.

278

00:42:21.750 --> 00:42:30.240

Olivia Carril: And so you can see, each one passing over the course of an hour, it takes an hour to bake a sample and see each of the compounds and.

279

00:42:30.750 --> 00:42:32.640

Olivia Carril: What could you what is this similar to.

280

00:42:32.970 --> 00:42:43.710

Olivia Carril: In the same way that when you're cooking dinner, you know you put the onions in first because they take a little longer, you know, and you put maybe the spinach in last because it goes really fast there's differences in how long it takes to.

281

00:42:44.220 --> 00:42:49.470

Olivia Carril: Get compounds to sort of volatile eyes and become airborne so that you can you can see what they are.

282

00:42:49.740 --> 00:42:59.550

Olivia Carril: So here they are and they come at one, at a time, and each time there's a peak it means there's a different compounds that came out, then you can see, on the side, it says for alycia, these are all different.

283

00:43:00.060 --> 00:43:06.450

Olivia Carril: Globe mellow flowers and you can see that they all have peaks and kind of the same spot, so the setting was similar between them.

284

00:43:06.750 --> 00:43:14.370

Olivia Carril: And in fact I saw that when I met them, this is one of those fancy math So here we are doing some pattern work right we're looking for a pattern.

285

00:43:14.670 --> 00:43:32.220

Olivia Carril: In this floral scent of these different flowers and all of us rousey try to come out in an area together and other things come out in areas together and, overall, we do see these trends that maybe indicate there's some similarities and differences in the sense that could be important.

286

00:43:33.300 --> 00:43:39.090

Olivia Carril: and, interestingly there's some non host plants that fall within that same area.

287

00:43:39.330 --> 00:43:49.050

Olivia Carril: And those are often alternatives, when the V can't find its normal host that's the one they go to so that also lend support to this idea that the floral scent may be as important.

288

00:43:49.530 --> 00:43:59.340

Olivia Carril: But to follow this up the next pattern that I look for is which of those floral compounds that comes out that is emitted by this file car or by the cactus flower.

289

00:43:59.580 --> 00:44:05.070

Olivia Carril: is actually something that the little baby can sense, with its antenna so I use this.

290

00:44:05.370 --> 00:44:18.300

Olivia Carril: Very fancy machine here it's got the the oven that bake the compounds their and their admitted out of this little too right here into this oatmeal and tinfoil box, which contains inside it a little bit antenna.

291

00:44:18.900 --> 00:44:28.470

Olivia Carril: So I would take the antenna off of a B and put it between two little electrodes and then blow sent over that antenna.

292

00:44:28.830 --> 00:44:41.760

Olivia Carril: And if the be was capable of sensing the compound that was there, it would cause an electrical pulse, because of the electrodes that were attached, and I could see that the be was capable of recognizing that compound.

293

00:44:42.120 --> 00:44:49.950

Olivia Carril: And so I did that comparing a glow mallaby to the Center of the globe mellow of the sense that comes out of Globe mellow which ones, does it like.

294

00:44:50.130 --> 00:44:57.120

Olivia Carril: And I did it and I compared it also I let it smell a cactus flower, to see what it would do, and then I reversed into the opposite.

295

00:44:57.390 --> 00:45:04.050

Olivia Carril: And then I took both beads and compared them to something that they never visit a beautiful plant called are Gemini it's a prickly poppy.

296

00:45:04.680 --> 00:45:12.300

Olivia Carril: So here's what I found on the top here at the peaks all of those peaks are where floral scent compounds came out.

297

00:45:12.600 --> 00:45:20.670

Olivia Carril: And where there's a spike at the bottom, it means to be was capable in blue there the Bu is capable of recognizing that compound.

298

00:45:20.940 --> 00:45:30.570

Olivia Carril: So the first thing to notice is that there's quite a few floral scent compounds that are present, that the be just doesn't recognize it registers, no response in their antenna.

299

00:45:30.840 --> 00:45:46.650

Olivia Carril: But there are a handful that do and even for the be the only visits cactus when exposed us for lcs sent to a Globe mellow sent it still had an exciting response and those compounds were in common and I found the same exact pattern for the.

300

00:45:48.240 --> 00:45:59.160

Olivia Carril: The Gemini that plan that neither of them visit in the sense that there were certain compounds that they responded to many that they didn't notice, but this part right here is what's really interesting.

301

00:45:59.400 --> 00:46:07.950

Olivia Carril: Because the citron know all and is a huge file or two plans that they've been never ever or two cent compounds that are never found in the host plant.

302

00:46:08.160 --> 00:46:19.830

Olivia Carril: But they're capable of recognizing them so they can smell compounds that they don't like and maybe that causes them to avoid plants that have those things, so they register the scent they think it stinks and they don't go to it.

303

00:46:20.340 --> 00:46:28.080

Olivia Carril: Now i'm done with the patterning part so, then I headed out into the field to actually test this and manipulate and try some cause and effect stuff.

304

00:46:28.530 --> 00:46:38.430

Olivia Carril: And I just have to say field trials truly our trials and I had a lot of trouble getting the views to behave the way that I wanted it to multiple tries to get anything to happen.

305

00:46:38.730 --> 00:46:46.920

Olivia Carril: I tried, putting them in little cages, I put the cage right over their nest and I put flowers in so they could pick whatever flower they wanted, and I could do something kind of neat.

306

00:46:47.550 --> 00:46:57.870

Olivia Carril: They hit their heads, on the ceiling of this until they killed themselves rather than visit a beautiful flower that I had put in there for them, they did not like being caged at all.

307

00:46:58.290 --> 00:47:07.440

Olivia Carril: So, then, I tried another experiment, where I painted their antenna with something that we paint on to nerve endings in humans, when we do surgery, so that I kind of plug their nose, if you will.

308

00:47:07.950 --> 00:47:17.430

Olivia Carril: To see what would happen there if they could only see the flowers and again they would rather die with that stuff on there antenna trying to get it off and participate in my study.

309

00:47:18.120 --> 00:47:32.280

Olivia Carril: And so, then I tried this little thing it's called a choice to her why to peer and in the one end on the right side, you can see some orange glow mellow flowers and on the other, it was playing, and I wanted to see if they would pick the path that had the scent of.

310

00:47:32.910 --> 00:47:39.840

Olivia Carril: Globe mellow and again they would rather die at the beginning of that to them participate in my experiment, so it goes.

311

00:47:40.830 --> 00:47:54.690

Olivia Carril: So, finally, I took it to their terms that we went I went out in the field and I took a bunch of flowers cactus flowers and I added I manipulated the way the flowers smell by adding particular sent compounds and watch to see how that changed visitation rates.

312

00:47:55.020 --> 00:47:59.310

Olivia Carril: And so what I found was when I added a scent that was already in the flower.

313

00:47:59.580 --> 00:48:11.970

Olivia Carril: Something that they had already experienced in their life and they we knew they liked because it's always there, there was no change in visitation they would visit those flowers, no matter how much of that stuff you dumped in they didn't care at all.

314

00:48:12.360 --> 00:48:28.200

Olivia Carril: But when I added even the tiniest little bit of something that isn't part of their their flower normally they stopped visiting and you can see that, by the height of this bar that says before compared to the one that says, after so visitation rates dropped really significantly.

315

00:48:29.610 --> 00:48:34.890

Olivia Carril: When I added those compounds and these aren't weird rare compounds, these are things that are.

316

00:48:35.370 --> 00:48:45.360

Olivia Carril: Common throughout all plants little isn't something like 60% of all flowering plants but it's not in cactus and Globe mellow flowers and the bees don't like it.

317

00:48:45.750 --> 00:48:54.810

Olivia Carril: So I was reading this about the time that I was wrapping all this up, I was having my girls who are now older and I don't have these problems anymore, but they wouldn't eat anything.

318

00:48:55.080 --> 00:49:02.820

Olivia Carril: That wasn't totally bland and boring, and even though it says, you should try and feed them a variety of foods with different tastes textures and colors.

319

00:49:03.120 --> 00:49:10.800

Olivia Carril: So I like to think that the diabetes are are pretty similar to a four year old kid that just wants that bland food they're not ready for that adventure yet.

320

00:49:11.880 --> 00:49:22.410

Olivia Carril: So relative to other Co blooming flowers have similar color glow mellow and cactus flowers are both very mild they're very bland flowers in terms of the floral scent compounds that they could have.

321

00:49:22.680 --> 00:49:31.080

Olivia Carril: And this seems to be what attracts the bees to them and what's interesting is so here's in this is, I think, goes well with that idea of the cause and effect.

322

00:49:31.710 --> 00:49:41.340

Olivia Carril: here's an example of a be that does a certain thing but it's very different from the other studies of one be and what that be did in a similar situation.

323

00:49:41.580 --> 00:49:49.560

Olivia Carril: So you have to be very careful of cause and effect studies to draw too broad, of the conclusion because someone may study another be in Europe and come to a.

324

00:49:50.010 --> 00:50:05.190

Olivia Carril: totally different conclusion so how far you can stretch your results is a little tricky um the other part, that I really want to talk about here is how we can build on each other's work, and this is i'm giving you an example of something that's happening right now that's very.

325

00:50:06.480 --> 00:50:11.910

Olivia Carril: written about a lot in the science literature as we try and debate and find the best way to handle this.

326

00:50:12.210 --> 00:50:25.650

Olivia Carril: We all know that these are in decline, we hear this phrase all the time, but the data to back this up is limited to pattern data data that looks at a pattern, and one of the questions and things that we've we've kind of.

327

00:50:26.190 --> 00:50:40.020

Olivia Carril: come to realize is that, in addition to looking at patterns in nature, we can look in pet patterns in the way that we collect our data and there might be something interesting there, so this study came out in 2021 in January just barely.

328

00:50:40.680 --> 00:50:50.220

Olivia Carril: And they looked at all of the data that's been collected in databases from around the world, all pulled together over the last 5060 years even.

329

00:50:50.580 --> 00:50:59.130

Olivia Carril: And they parse it out by every decade and for each decade, they looked at how many specimens how many individual bees had been recorded.

330

00:50:59.400 --> 00:51:07.920

Olivia Carril: And how many species, so you would think if you have more specimens you should have more species, but what they found is that, even though this blue line here.

331

00:51:08.220 --> 00:51:18.750

Olivia Carril: we're collecting more we have way more species specimens than we used to the number of species that we're recording is dropped pretty significantly here.

332

00:51:19.410 --> 00:51:27.000

Olivia Carril: They broke it out by different groups and and and by decade and all sorts of different things, but the general conclusion is even though we're sampling.

333

00:51:28.050 --> 00:51:35.700

Olivia Carril: More broadly than ever before, it appears that we're collecting fewer specimens So the question is, is that, because a lot of bees are becoming more rare.

334

00:51:36.540 --> 00:51:41.790

Olivia Carril: Or is that because the collecting techniques that we are using have changed pretty dramatically in the last little bit.

335

00:51:42.150 --> 00:51:52.020

Olivia Carril: And they even kind of highlight that in here, they say biases introduced as a result of targeted collection efforts or local regional events are possible they talk about.

336

00:51:52.950 --> 00:52:04.200

Olivia Carril: Declining trends might happen because of an increasing tendency for collectors targeting rare species would increase the number of species, but shifts and collection trends.

337

00:52:04.740 --> 00:52:16.440

Olivia Carril: hold on such as defunding of natural history and research or implementation of systematic monitoring problem programs or all of these other things could cause a shift away from rare to the more common species.

338

00:52:16.710 --> 00:52:29.820

Olivia Carril: So I want to talk about one way that that might happen that's in the literature and hotly debated right now, and that is pan traps so nowadays, one of the ways that we can passively go out and collect these is using these little tiny.

339

00:52:30.390 --> 00:52:37.680

Olivia Carril: yellow cups or bowls filled with soapy water, maybe yellow maybe blue maybe white, you can use all sorts of different colors.

340

00:52:37.980 --> 00:52:46.770

Olivia Carril: And coming back later to see what you found in there, the bees are attracted to the color of that and they'll fall in, and you can collect them all that way they don't swim well so.

341

00:52:47.850 --> 00:52:54.300

Olivia Carril: it's a nice way for people who aren't really good with a net and maybe don't have a lot of experience.

342

00:52:54.870 --> 00:53:06.060

Olivia Carril: to collect and it's also a good way, if you have a limited number of hours because you can throw them out go send them out somewhere else and do something and come back later and pick it up without having had to spend the whole day they're collecting.

343

00:53:06.360 --> 00:53:13.770

Olivia Carril: With a net there are definite drawbacks, but the downside to this is that these Pam traps preferentially collect.

344

00:53:14.070 --> 00:53:26.460

Olivia Carril: These in the family holic today it's Everywhere you go that seems to be the case, and so, and more than that, they collect a few species really well and some groups never show up there.

345

00:53:26.820 --> 00:53:37.290

Olivia Carril: So if we've increased the number of pan traps that we're setting out as be scientists in the last 10 years that could cause a huge increase in the number of specimens that we have.

346

00:53:37.560 --> 00:53:42.210

Olivia Carril: But a decrease in the number of species because the pan traps don't pick up a lot of different groups.

347

00:53:42.690 --> 00:53:49.860

Olivia Carril: I use pen traps in my room work, but I have to be really careful about how I interpret those results and so right now.

348

00:53:50.430 --> 00:54:04.350

Olivia Carril: In the literature, the question is, do we do pan traps with matt some studies seem to suggest that they go better together, because then you get the full complement of what's in an area, and if the goal is to document be declines you kind of need to know everything that's an area.

349

00:54:05.520 --> 00:54:09.240

Olivia Carril: But other people have come out pretty recently, this was last year 2020.

350

00:54:09.780 --> 00:54:20.100

Olivia Carril: Saying that Pam traps are a waste of time and a waste of resources and result in so much biomass of stuff we don't care about but it's not worth even putting them out.

351

00:54:20.610 --> 00:54:26.760

Olivia Carril: And then other people have pointed out that pan traps work best when there aren't a lot of floral resources in an area.

352

00:54:27.030 --> 00:54:33.390

Olivia Carril: And so it's you should be kind of careful with how you interpret them because they may not reflect the habitat that you think they do.

353

00:54:33.750 --> 00:54:37.230

Olivia Carril: If you're in a desert like I am and it's a really dry year like it is.

354

00:54:37.560 --> 00:54:46.770

Olivia Carril: And you put pan traps out the bees will go to that because there's nothing else to go to, but when there's a lot of flowers in an area they may skip your pan traps in favor of.

355

00:54:47.250 --> 00:54:58.470

Olivia Carril: Things with sweet nectar and stuff like that, so this is an ongoing debate, as we try and work through the best method, but again, this is the sort of science, all pattern driven here, in this case.

356

00:54:59.010 --> 00:55:01.470

Olivia Carril: That that scientists end up doing.

357

00:55:02.070 --> 00:55:15.300

Olivia Carril: So what does this all mean here in terms of practicality, like what are we getting out what's the big main bullet point here, these are hard to manipulate we were talking about a group with over 20,000 species around the world.

358

00:55:15.630 --> 00:55:25.470

Olivia Carril: it's a huge group and they're all different from each other, I like to say that they each have their own story and so trying to capture all of those when doing something really big can be.

359

00:55:25.770 --> 00:55:32.910

Olivia Carril: tricky and they don't respond well to most of the treatment methods that i've tried they don't like to be manipulated, they are wild animals.

360

00:55:33.270 --> 00:55:45.240

Olivia Carril: And so, in order to answer some of our pressing questions about be declines we're kind of left to do some of these observational studies, just because the bees don't prefer manipulation and it's hard to do that well.

361

00:55:45.570 --> 00:55:53.070

Olivia Carril: So many of these studies fall into the observational category most of what you read out there, right now, falls in this looking for patterns sort of data set.

362

00:55:53.460 --> 00:56:03.510

Olivia Carril: But the cool part about, that is, it means that we can get giant data sets because it's easier to get observers designing that perfect experiment is almost the harder thing.

363

00:56:04.020 --> 00:56:21.780

Olivia Carril: We have tools like I naturalist now where all of you can go add your observations and help grow the data set that we need to establish some of these patterns and figure out where there aren't any bees, where there are which ECO regions what times of year phenology all of that stuff.

364

00:56:23.220 --> 00:56:31.290

Olivia Carril: Studies that rely on observations can benefit a lot from a massive people who are interested in documenting what they see.

365

00:56:31.860 --> 00:56:40.140

Olivia Carril: So that's kind of great is there, bad science sometimes it's kind of easy to pick out, especially if you go down that rabbit hole like we talked about.

366

00:56:40.770 --> 00:56:50.910

Olivia Carril: Because the thing that makes us so great is you can often find the rebuttal to follow up for someone says, I don't think you did that right, so an example of one that I found not too long ago.

367

00:56:51.300 --> 00:57:01.680

Olivia Carril: These people looked see worldwide declines in eskimo fauna and they reviewed the drivers and the way they did this was to do a I think it was even in Google scholar search for the word.

368

00:57:01.950 --> 00:57:06.660

Olivia Carril: insect and decline insects survey and decline, I think, were the three words.

369

00:57:07.260 --> 00:57:13.890

Olivia Carril: Obviously, their study is biased by the fact that they only searched for papers that have the word decline in them.

370

00:57:14.280 --> 00:57:23.070

Olivia Carril: By the by not putting in something about insect increases or something about you know going the opposite direction, their study was biased in terms of what it's found.

371

00:57:23.400 --> 00:57:28.230

Olivia Carril: And Sure enough, within a couple months of them publishing their paper someone pointed that out to them.

372

00:57:28.890 --> 00:57:39.960

Olivia Carril: So this is the sort of thing that sometimes happens, I would say it's pretty rare and the nice thing about science is we're always ready to sort of catch each other and keep keep ourselves going in the correct direction.

373

00:57:40.500 --> 00:57:48.540

Olivia Carril: As far as sound quality science there's a lot of of double checking and triple checking of each other, which is a good thing, which is a really good thing.

374

00:57:49.050 --> 00:57:58.170

Olivia Carril: More often than bad science or poorly done science are poor interpretation so as an example, this paper came out not too long ago, and in.

375

00:57:58.530 --> 00:58:16.290

Olivia Carril: two locations in Germany, the authors found a 75% decline over 27 years in flying insect biomass, so they weighed the number of insects that were collected in a couple traps and they found a huge decrease in the weight, how much all those insects weighed.

376

00:58:17.430 --> 00:58:23.760

Olivia Carril: This is important, this is very interesting research, but we have to be careful about the conclusions that we draw from this.

377

00:58:24.060 --> 00:58:33.600

Olivia Carril: The New York Times picked up this paper and concluded that this was the sort of study that we'd really needed and that the insect apocalypse around the world was here.

378

00:58:34.350 --> 00:58:44.100

Olivia Carril: Not knowing the fact that biomass changes could be a result of some other things that well, maybe, maybe there are as many insects in there, but they're all smaller.

379

00:58:44.460 --> 00:58:49.950

Olivia Carril: We don't know for sure what the change in insect biomass means, but to go quickly to a conclusion.

380

00:58:50.280 --> 00:59:00.120

Olivia Carril: That insect apocalypse is around the world are inevitable is a bit of a stretch so those poor interpretations are the things that really, we need to be watching out for a little bit more.

381

00:59:00.660 --> 00:59:09.600

Olivia Carril: So i'll wrap this up really quickly with the conclusion here, there are a bazillion questions to ask about bees, the more questions that are asked, the better.

382

00:59:09.960 --> 00:59:18.930

Olivia Carril: At the challenge is answering those questions, because these are so finicky because they don't like being manipulated and because of the way that we have to look for these patterns.

383

00:59:19.410 --> 00:59:28.710

Olivia Carril: that's kind of where we're at the first thing if you have a big question that you can do is check and see what's already known i'll tell you how to reach out to me if you want some help with that at any point here.

384

00:59:29.010 --> 00:59:40.650

Olivia Carril: And then, after that you either are going to look for patterns and use those to come up with a mechanism that you want to test or you're going to start with looking for that mechanism and tweak something and watch for some changes.

385

00:59:41.070 --> 00:59:49.950

Olivia Carril: And as a responsible good science test, you should interpret your results with caution, be careful not to induce a little too far and.

386

00:59:51.120 --> 00:59:57.750

Olivia Carril: Consider broader implications but very cautiously when you do that remaining open minded is so important.

387

00:59:58.950 --> 01:00:07.740

Olivia Carril: As any scientists will tell you, and then being open to hearing what other people think once you've published it and then repeat the process again and again and again.

388

01:00:08.370 --> 01:00:13.680

Olivia Carril: And i'll stop there, and take any questions Denise I guess you're probably feel these to me.

389

01:00:14.040 --> 01:00:20.970

Olivia Carril: And i'm putting up here, let me just point out, this is, if you want to know more about bees in general which wasn't totally the focus of my talk today.

390

01:00:21.480 --> 01:00:30.390

Olivia Carril: You can go to any of these social media websites and joe's way better at it than me, but he post pictures and informative things a little pop quizzes and stuff all the time.

391

01:00:30.750 --> 01:00:39.660

Olivia Carril: And if you have a question or you're trying to do some research on bees in one a little helper a little guidance feel free to reach out the bees in your backyard@gmail.com.

392

01:00:40.320 --> 01:00:53.310

Olivia Carril: we'd be happy to answer questions at that blog site there, I think you can order the poster from there if if you want to and i'm going to should I stop sharing my screen, I feel like I should leave this up for a minute, just in case it's helpful.

393

01:00:53.550 --> 01:00:54.540

Denise Ellsworth: that's fine sure you can leave.

394

01:00:56.430 --> 01:01:04.950

Denise Ellsworth: Wonderful so thanks olivia Thank you so much, you know folks every time I hear olivia talk about her research with the electrodes and the intent i'm just fascinated.

395

01:01:05.610 --> 01:01:15.180

Denise Ellsworth: How that whole scientific process it's really amazing and digging deep into the science each of these papers each of these strategies, you get into those.

396

01:01:15.930 --> 01:01:20.940

Denise Ellsworth: Really fascinating manipulations and so much thought and technique that goes into it.

397

01:01:21.750 --> 01:01:29.070

Denise Ellsworth: I forgot to mention when I introduced olivia that she also teaches middle school science and it makes me wish I was a middle schooler again.

398

01:01:29.550 --> 01:01:38.520

Denise Ellsworth: Because I love the way she's able to break the science down and make it practical and and you know something that you can understand would love to be in one of those classes.

399

01:01:39.240 --> 01:01:49.230

Denise Ellsworth: With you so um so with the Queen I know olivia you're really seasoned in zoom since your classes were online with your middle schoolers last year, we can.

400

01:01:50.550 --> 01:02:00.600

Denise Ellsworth: We can take the questions i'm happy to have you kind of scroll through and decide what questions you want to answer as well, we just need to make sure we repeat the question since the people who are watching the recording.

401

01:02:00.960 --> 01:02:16.500

Denise Ellsworth: can't see the whole question and and, if you would, if you want to answer the question but also put it in that framework that you've presented to us how would a researcher figure this out or how do we know more to answer that question yeah.

402

01:02:16.920 --> 01:02:21.090

Olivia Carril: I love that yeah i'm happy to go through, and I see some of these have been would you call it up.

403

01:02:21.210 --> 01:02:22.920

Denise Ellsworth: up what voted yeah so.

404

01:02:24.510 --> 01:02:29.940

Olivia Carril: i'll start at the top and kind of scroll through but Denise if you see something in there, that you think seems really relevant.

405

01:02:30.450 --> 01:02:36.900

Olivia Carril: Go ahead and shout it out, but i'll stop with linda's question she asked this I saw before the whole talk even started.

406

01:02:37.710 --> 01:02:44.970

Olivia Carril: She said what happened to all of the bees, this year, last year, my perennials were absolutely full of bs and this year i've only seen a few.

407

01:02:45.300 --> 01:02:53.490

Olivia Carril: All of my neighbors in the local towns are saying the same thing my gardens are organic we don't know what happened that has been addressed during spring.

408

01:02:53.790 --> 01:03:01.980

Olivia Carril: Where I live in new Hampshire is in a borderline drought would that make a difference in the bee populations and the answer is absolutely yes i'm.

409

01:03:02.460 --> 01:03:14.100

Olivia Carril: Not necessarily in a way that indicates a long term, be decline bees fluctuate naturally from year to year by 10 or 100 fold and some of my studies, where I have looked at the same place.

410

01:03:14.460 --> 01:03:23.790

Olivia Carril: and documented bees for four years in a row, you know one year i'll have 10 the next will be 100 and there'll be 10 again then there'll be 1000 it's really all over the place.

411

01:03:24.090 --> 01:03:34.050

Olivia Carril: And so to truly say what's happening there, as a scientist, I would probably monitor for several years and try and document when I started seeing things.

412

01:03:34.710 --> 01:03:47.880

Olivia Carril: Whether in the area and see if I can find some sort of pattern there as a result of that, I see that you say that all of your neighbors in local towns, so that suggests to me that something about maybe the climate there this year isn't as conducive.

413

01:03:48.750 --> 01:04:05.730

Olivia Carril: But wait and see what happens next year it's possible things will be back again um but yeah drought drought such a big deal here, where I am as well Jeff asks how far do native bees, for it when nothing is in bloom in my yard, how far will they go um.

414

01:04:07.440 --> 01:04:19.110

Olivia Carril: It depends on the bees so some of the tiniest tiniest little bees and I didn't put a picture of them in today but take the number of of your marker something about that big we're talking about just.

415

01:04:20.640 --> 01:04:27.630

Olivia Carril: the tiniest little thing there's so little there's so little and those ones, probably don't make it further than a football field in their life.

416

01:04:27.930 --> 01:04:38.430

Olivia Carril: they're really little their distribution is quite small i've read papers that talk about some of the larger bees, including like some orchid be some bumblebees things like that that can make it several miles.

417

01:04:38.760 --> 01:04:43.800

Olivia Carril: And these are what we call central place foragers, which means that wherever their house is.

418

01:04:44.700 --> 01:05:00.840

Olivia Carril: From the House, then they go out in sort of reading lines in different directions from that place so I guess if you took that six miles, potentially, you could say that the radius is it radius diameter diameter would be no not David or what's the word not radius.

419

01:05:03.030 --> 01:05:10.170

Olivia Carril: Double that I can't think of it right now 12 would be 12 miles anyway, through the circle yeah that's it, I was right.

420

01:05:11.580 --> 01:05:22.290

Olivia Carril: And so, so when nothing is blooming they will go about that far now what might happen Jeff is that between years if they find some other spot let's save that they emerge from the nest.

421

01:05:22.500 --> 01:05:33.570

Olivia Carril: They make their first flight out and it's a really long ways they may, from that point set up shop closer to the flora resources they find and not be in your yard, the next year and have to make their way back so.

422

01:05:34.200 --> 01:05:42.000

Olivia Carril: It can go both ways now if I wanted to study that How would I answer that question, this has been tried a couple different times and it's tricky but.

423

01:05:42.330 --> 01:05:51.570

Olivia Carril: i'm kind of waiting for technology to kick in because I think there could be some cool stuff with like little tiny chips that maybe you could put on the back of a B and follow them around and see what happens.

424

01:05:52.590 --> 01:06:04.110

Olivia Carril: But some stuff that has been done is take a B, as it emerges from its nest and paint on it pete them different colors and then watch how far those beads that are painted different colors go so maybe something along those lines.

425

01:06:05.010 --> 01:06:10.710

Olivia Carril: Winnie when a friend who I saw was from salt lake she said it was near California, but.

426

01:06:11.700 --> 01:06:21.360

Olivia Carril: Still, I grew up in salt lake and she says, why do some bumblebees appear comatose sitting on flowers, I see this from time to time too, but it's usually on a cold day.

427

01:06:21.780 --> 01:06:29.760

Olivia Carril: bumblebees we'll just hang out and wait to get warm or at the end or beginning of a field season, that seems to be the time I see that most often.

428

01:06:31.830 --> 01:06:35.070

Olivia Carril: that's the only times, I see that come to think of it i'm not sure, maybe.

429

01:06:36.180 --> 01:06:42.510

Olivia Carril: Maybe they had a giant meal and our day I don't know i'm not sure I would say it's probably because it was a cold day that's My guess.

430

01:06:43.260 --> 01:06:49.230

Olivia Carril: Susan says my neighbors are using a no mosquito company to spray their yards does that hurt the bees.

431

01:06:50.160 --> 01:06:57.030

Olivia Carril: i'm possibly the research is still being done on this, so we don't have a conclusive answer.

432

01:06:57.600 --> 01:07:04.050

Olivia Carril: And it probably depends on what it is that they're spraying in their yard and I don't know the specifics on that, so I can't say for sure Susan.

433

01:07:04.470 --> 01:07:12.210

Olivia Carril: But it's, it is possible, so design a little study do it in your yard and tell me what happens see what you find from year to year could be interesting.

434

01:07:13.140 --> 01:07:21.480

Olivia Carril: kendra says my neighbor recently pointed out a very aggressive be in her garden attacking any other view that came to its flowering plants even hummingbirds.

435

01:07:21.840 --> 01:07:32.400

Olivia Carril: identified it I knew, you were going to say this one and video medical Adam which seems to be a fairly recent immigrant in the US and Northwest us where I am is this be a threat to native bees.

436

01:07:32.880 --> 01:07:40.650

Olivia Carril: Potentially yeah there was a paper not too long ago that kind of hinted at this, they are very aggressive they're kind of bullies in the garden.

437

01:07:41.160 --> 01:07:50.400

Olivia Carril: And they will shew other bees off of flowers it's the males that are doing this and they're setting up a territory, so that any female that comes in, there is is theirs alone.

438

01:07:50.910 --> 01:07:56.910

Olivia Carril: And there is some thought that they may be a threat how big a threat compared to the other threats to our native bees.

439

01:07:57.450 --> 01:08:09.090

Olivia Carril: Probably not probably there are other things that are worse, but yes, they can impact the beast is a Google image search on a photo would be likely to come up with an accurate species level ID.

440

01:08:10.050 --> 01:08:22.500

Olivia Carril: Robert I would say, probably not if I it's hit or miss, for me, I don't always find the image searches to be great, but I do find the I naturalist and bunk guide wants to be pretty good.

441

01:08:22.830 --> 01:08:31.290

Olivia Carril: So it might be better to go to a site that's dedicated to identification and look there to see to get your visa identified.

442

01:08:32.130 --> 01:08:34.980

Olivia Carril: Linda says, thank you, Linda she said she likes my research.

443

01:08:35.370 --> 01:08:45.450

Olivia Carril: But i'm wondering what I can do and how I can do it to be helpful to you and other scientists, what do you need from all of us citizen scientists who don't have much specialized knowledge and how can we be helpful.

444

01:08:45.960 --> 01:08:53.280

Olivia Carril: Truly Linda I have to say that putting the information that you find in the areas around you out there.

445

01:08:53.730 --> 01:09:01.680

Olivia Carril: Is a great first step, because you are contributing real data to scientists who look at I naturalist all the time to see what they can glean from it.

446

01:09:01.980 --> 01:09:12.150

Olivia Carril: There have been some amazing things that have been found on there and it's it's that's a great very helpful way, I think, to help scientists Beyond that, I would say.

447

01:09:13.050 --> 01:09:15.870

Olivia Carril: From my point of view, and this is a little more vague.

448

01:09:16.830 --> 01:09:32.790

Olivia Carril: i'm being a responsible reader, if you will, of the stuff that you read and kind of keeping that open mind, the same way that a scientist, what about some of the stuff we read can be really helpful because then there's less misinformation, as we move forward so as an example.

449

01:09:34.290 --> 01:09:45.450

Olivia Carril: And you know, things have changed a little bit lately, but for the past 10 years or so there's been many times when someone says, I heard that beans were decline and I really want to help them, so I put a hive in my backyard.

450

01:09:46.020 --> 01:09:55.170

Olivia Carril: And that's that's a lack of understanding of what the real issues are and it's probably exacerbating some of the problems rather than actually helping anything so.

451

01:09:55.740 --> 01:10:10.200

Olivia Carril: finding ways to educate yourself about what's really going on, maybe doing some of those Google scholar searches and reading through abstracts now and again, or attending toxins, you are today, I think, can go a long ways towards making sure that whatever efforts do happen.

452

01:10:11.400 --> 01:10:15.210

Olivia Carril: Even without talking to a scientist are are responsible ones.

453

01:10:16.410 --> 01:10:23.970

Olivia Carril: Mary Jean says how, why do some being seem to rest on flowers, as if they're not being Are they really napping I don't know if they're napping.

454

01:10:24.240 --> 01:10:32.430

Olivia Carril: they've definitely rest on flowers i'm certain of this female bees will often rest in their nests they'll just kind of sit in there, hang up not do anything for a little bit.

455

01:10:32.790 --> 01:10:44.400

Olivia Carril: Maybe they're napping there but oftentimes when I see them resting on flowers it's either because they got cold, maybe there is a change in the weather or because there are males and it's the evening time, and that is where they sleep at night.

456

01:10:45.150 --> 01:10:49.410

Olivia Carril: So I usually see that sort of similar to the comatose bumblebees same sort of thing there.

457

01:10:50.490 --> 01:10:54.960

Olivia Carril: fran says, I would like to find a Bumblebee nest how do I search and find one.

458

01:10:56.910 --> 01:11:01.650

Olivia Carril: I don't know ah, do you Denise Have you ever tried to do this.

459

01:11:03.930 --> 01:11:12.810

Denise Ellsworth: you're muted sorry I was muted yeah only kind of by accident i've never been able to so you men, maybe mentioned Tom seeley and some of his work to.

460

01:11:14.550 --> 01:11:24.090

Olivia Carril: yeah so Tom seeley he specializes in honey bees, but he does this really he has a whole book about it called what is it following the lie I have it on my shelf there somewhere.

461

01:11:24.960 --> 01:11:35.910

Olivia Carril: um I don't think i'm getting the name right but anyway in this book he he outlines how people have found honey bee hives for the last 300 years, especially in North America, and it involves.

462

01:11:36.600 --> 01:11:44.460

Olivia Carril: Setting up a sweet place some sort of nectar source for the bees, the honey bees and once one female one sister.

463

01:11:45.000 --> 01:11:50.220

Olivia Carril: finds that she'll go back and report to her siblings that she found a really awesome source.

464

01:11:50.460 --> 01:11:56.790

Olivia Carril: And the the bees will start following her to that place and pretty soon there will be a line of bs going back and forth.

465

01:11:57.060 --> 01:12:05.850

Olivia Carril: From this wonderful resource to the nest and you can literally follow that line to find the nest I don't know how they do this with bumblebees though i'm not sure.

466

01:12:06.720 --> 01:12:19.050

Olivia Carril: There are many other Bumblebee experts that could probably help with that Daniel says, what do you think about dandy lions and no mommy's no mommy's i've never heard that but that's fun to say.

467

01:12:19.410 --> 01:12:21.330

Denise Ellsworth: I think it's a new user sees and.

468

01:12:22.500 --> 01:12:24.090

Denise Ellsworth: encourage people to not know to.

469

01:12:24.210 --> 01:12:25.980

Denise Ellsworth: To you know allow that for that's a.

470

01:12:26.850 --> 01:12:32.040

Olivia Carril: great idea I, yes, if you can I mean, why not.

471

01:12:33.150 --> 01:12:44.460

Olivia Carril: That seems like a fine idea I don't have a problem with dandy lines, when you find them in cities, I haven't seen anything that suggests that they outcompete other stuff, especially in urban areas there so naturalized in such a part of it.

472

01:12:44.730 --> 01:12:48.570

Olivia Carril: They do provide provide a floral resource when you get into.

473

01:12:49.740 --> 01:13:00.990

Olivia Carril: You know more native natural habitats meadows and things like that it can be a little trickier to justify their presence, just because they're probably pulling from whatever native plants are in the area that that.

474

01:13:02.940 --> 01:13:05.400

Olivia Carril: Would would benefit from those bees being there.

475

01:13:06.480 --> 01:13:22.350

Olivia Carril: Julia says research is so hard and bees and ecosystems are so many yes it's true do you think there's significant progress being made that can benefit bees fairly broadly across ecosystems, as the climate shifts do you have thoughts on the riches topic to mind right now.

476

01:13:22.740 --> 01:13:32.310

Denise Ellsworth: And olivia i'm just going to jump in, and I think that's such a nice meaty question and i'm just in the interest of time let's have this be the final um any other thoughts, you want to add.

477

01:13:32.640 --> 01:13:46.320

Olivia Carril: yeah and i'll see any of the rest of you here that would like to your question is burning to you feel free to reach out to me i've left my information up there and i'd be happy to look through your and talk to you about your question so um.

478

01:13:47.190 --> 01:13:54.300

Olivia Carril: Do you think there's significant yes, I would say there is significant progress being made and it's weird because, in my mind it feels very.

479

01:13:55.170 --> 01:14:06.990

Olivia Carril: vague and almost like a change in sentiment, you can feel the shift in culture over time about the things that we know things that are common knowledge, seem to just subtly shift with time.

480

01:14:07.350 --> 01:14:13.260

Olivia Carril: and become suddenly something that everyone knows where they were once not so commonly known.

481

01:14:14.040 --> 01:14:22.560

Olivia Carril: So yes, I think it doesn't always feel like instant progress it's definitely this very slow build towards something but.

482

01:14:22.980 --> 01:14:29.310

Olivia Carril: Compared to where we were 10 or 20 years ago I feel pretty hopeful i'm pretty positive about what we're learning.

483

01:14:29.790 --> 01:14:44.250

Olivia Carril: Do you have thoughts on their riches topics to mind right now um I think it depends on what aspect of bees most interests you, for example, people that are interested in agriculture there's a lot of work right now about.

484

01:14:45.630 --> 01:14:56.550

Olivia Carril: sort of what what benefits, there are from the surrounding habitat and sort of how we could change our agricultural practices to encourage and support the native bees that are already there.

485

01:14:56.970 --> 01:15:07.140

Olivia Carril: If you're like me and interested in the sort of the statistics and the methodology behind figuring out how to document be declines, unlike insanely vast landscapes, that are the Western us.

486

01:15:07.680 --> 01:15:12.360

Olivia Carril: You probably will take a different tack and maybe the agricultural thing isn't so important.

487

01:15:12.660 --> 01:15:27.180

Olivia Carril: Pesticides are really big deal there's I think there's a lot of hot topics I don't think I could really pick, one that is the richest to mind, right now, because I think a lot of it has to do with individual passions of scientists.