This is <redacted> at <redacted>.

00:03 Hey, how's it going?

Good, how are you?

Good. It's a little late.

I had the number down wrong, so then I couldn't call. It was weird. Sorry.

That's OK. I just got back from lunch. So good timing.

OK, great. So I'm going to start off with some kind of getting to know you questions, OK?

00:28 **I'm going to ask you about a bit about collaboration and then focus on the technology that you use for collaborating.**

OK.

OK, great. So what kind of research do you do?

I study hormone signaling and Arabidopsis.

OK, so what is the goal of your work?

So my goal is to figure out the molecular mechanisms underlying hormone perception which control plant development.

00:59 **OK, so then what's the potential impact of your work?**

So the hormone that I study is called Aukland and it's a really potent growth regulator and currently oxidative on the market and a couple different forms as a very strong herbicide. So it's used commonly in agricultural settings to control usually weeds.

01:27 So by understanding how this chemical, which is produced normally by plants, affects different aspects of plant growth and development, it can be important for agricultural uses that would be further downstream. OK, so basically ways to tweak either hormone action or production to change plant growth.

01:57 **OK, so on your current research project, how many researchers or collaborators are you working with?**

Let's see. Currently I have one person here in <redacted> we've got.

02:26 Two collaborators, let's say three total.

OK, does that number include like graduate students or those are all PIs? Do you have a rough estimate on including everyone?

That would be everybody, because there aren't any grad students or postdocs involved in this is actually it's all just PI driven.

02:52 **OK, I was just checking on. So what is your role on that project?**

I guess I would be the lead investigator, so I'm the one designing the experiments and actually, for the most part, doing them and then for these collaborators and one instance, it's my former postdoc advisor. So he's kind of a collaborator because the project was started and his lab.

03:20 And then for the other researchers, I'm utilizing a technique that they are kind of experts on.

So on average, how many researchers are on the projects that you've worked on?

Let's see, it depends on the project.

03:48 So for I would I guess probably on average, two.

OK, what about the largest and the smallest? And this is for my current research historically as well.

So I would say the smallest is probably one and the largest would be a group of probably four.

04:21 **OK. In general, what is your role on these type of projects?**

Usually I'm the lead investigator for these projects, so I'm in charge of designing the experiments and doing the experiments, and then usually the other collaborators have a particular technique or particular experiment that's part of the entire project, but they're not kind of overseeing it.

04:51 **So. OK, so what percentage of your projects have involved at least one collaborator at another institution?**

You know, lately, I would say pretty much all of my projects have involved a collaborator in another place or within the same institution, so I would say 100 percent for the last five years.

But have you ever worked on a project where everybody was at the same institution as you?

05:23 Yes. Yeah.

So if on this project where you're working with collaborators who are at other institutions, why did you choose to work with those collaborators?

Usually because they have a particular expertise that is required for the project. And I also usually knew them in some other capacity.

05:52 So they were like a colleague at a former institute or I had met them at a meeting or I knew them through other science people or friends. So sort of a combination of being familiar with them and then also that they had, you know, an area of expertise that was perfect for the project.

Have you ever worked like that? Who needed expertise and didn't already know somebody who could do it?

06:20 Yes, the situation I usually just talk around to colleagues or read papers, send emails out to people, just try to get in touch one way or another.

OK. Have you noticed any differences in your collaborations with people that were basically strangers versus people you'd worked with before?

06:50 Yes, I think people that you don't know in some other capacity or you don't have a really you haven't had an established relationship with it can be more difficult to keep in touch with those people.

OK, so can you elaborate on what you mean by keeping in touch?

07:11 So, usually during collaborative projects that I've been involved with, you know, they can stretch over, you know, six months or a year or a couple of years in some cases. And I've had a couple of collaborations where initially the contact was really good, either via email or in person meetings or doing experiments together. And then the collaboration just kind of lost communication, I guess, mostly because it was via email.

07:41 And so you just don't talk to those people much anymore. And that kind of stalled the collaboration where I've had other collaborations where I have a more established relationship with the people before the collaboration starts. And so communication tends to continue throughout and seems to be better. And I don't know if that's the nature of the project or those particular people who are involved. It's hard to say.

08:11 **OK. Have you ever had a project fail because of collaboration issues?**

No.

That's nice.

Well, I think that's mostly just because I've been persistent to try to make things work one way or another or. Well, actually, I should say, yes, I have had one which partially failed, but there still was another component to it.

08:45 So hopefully the whole thing won't be a total wipeout. But what happened, basically, the quality of the data that was generated by the collaborator was really poor and it's not going to be able to be

published. So because they specialize in a particular technique to generate that data, I'm not going to be able to go back and redo it or find somebody else to do it.

09:17 So I think that happens sometimes. We're just you're relying on somebody else to do something. And for whatever reason, it just doesn't have the same quality that you need.

It sounds like you're not really sure what the ultimate outcome is going to be of this project, correct?

That's going to have to take a new turn right now.

09:42 **OK, so are there any disadvantages or challenges associated with working with people who are not co-located, not located with you?**

Yes, I would say communication is the number one disadvantage or a challenge. I feel like it's always easier to, you know, discuss results, to present material, to troubleshoot if it's done in person.

Mm hmm.

10:12 Um, and if there's multiple people involved in the project getting everybody, you know, all in the same. Meeting and everything can be difficult or on a phone call might not be that great. So I would say communication is the one thing you just can't replace face time in that instance.

10:36 You know, when you see people all the time, you're more apt to be sort of thinking about the project and working on it more actively versus if they're not physically in the same space. I think they're just not necessarily on your radar in the same way. Otherwise, yeah, I don't I mean, I think I think communication is the biggest disadvantage or challenge.

11:08 **OK, what about benefits?**

So the benefits of collaboration are pretty extensive, I mean, most life sciences, especially in biology, is very collaborative these days. It's a very interdisciplinary type of approach, which is kind of going on across the board.

11:31 And so collaborations are pretty much necessary because you got to have people who have different training and expertise and also different opinions and just thought patterns because people from different disciplines or even subdisciplines will have different ideas that can really help bring a new kind of, you know, level to a project.

12:08 So usually as a side shoot of that, you know, I've expanded my network considerably. So you just know more people in different areas of science and you can really enhance the kind of work you're doing because you're not just doing the same thing all the time that you know how to do.

OK.

So I would say new learning is the other thing. You also continue to learn.

12:36 Ideally, if you have good collaborators and any benefits that are specific to working with people who are at a different institution, I would say mostly networking, usually because it provides you a connection to another university which might have different resources or different focus, things like that, from what your institution has. So.

13:03 That can be good and also for if collaborations continue for grant proposals, it can be very beneficial to have more than one pie at a different institution, sometimes give more credit to the whole collaborative type goal, which is pretty important first. I mean, for some grant proposals, it's actually required that you have people at different places.

13:29 **So, OK, are there any benefits to working on projects where everybody's at the same location?**

Yes, I would say that projects move a lot faster and you have more face time with people.

13:49 It's easier to troubleshoot and everybody gets to have, I would say, easier communication because you can get together in meetings and you can talk about ideas and there's just more opportunities

to meet and discuss and to keep things moving. And a lot of that sometimes is just spontaneous and it's just easier to schedule because you're in the same place at the same time.

14:19 **OK, are there any challenges to working on groups where everybody is in the same location?**

Challenges are always, I would say, mostly a result of just everybody's priorities, maybe not being the same for a particular project. So one collaborator may really want a particular bit of data compared to another collaborator maybe wanting something else for a project.

14:50 So it's, you know. Which I think is just the nature of any project that has, you know, different people working on it with different opinions. So not everybody can see eye to eye all the same time.

Right. Right. For sure. So about what percentage of your projects involve collaborators in other fields?

15:19 I would say about maybe 50 percent of my collaborations involve people and not implant biology.

So you've mentioned some benefits of working with collaborators who are in different fields. Any additional benefits?

15:51 Not that I can think of offhand, I mean, I think, you know, new learning, networking, bringing expertise to a project, those things are all kind of the main benefit.

16:10 I mean, it's personally rewarding to usually I mean, it's intellectually stimulating, I guess I should say, to work with people who have totally different training and come and approach a problem totally different from how I might.

OK, are there any challenges to working with collaborators who are not in the same field as you?

16:37 Yes, I think it can be difficult to explain ideas, and it can also be difficult to explain technical details just because, you know, either side doesn't have the complete expertise of what the other person is more familiar with. But usually, you know, it gets hashed out through enough communicating.

17:09 **OK, so you kind of touched on this a little bit earlier, but how frequently do you meet with your collaborators when you're working on a project?**

Well, when I'm actually working on a project, I like to touch base with collaborators, at least weekly. There have been projects where the communication has been like, you know, maybe once a month.

17:37 There has been times where the communication is like daily, just depending on the what stage the project is in. But ideally for an ongoing collaboration, at least a weekly touch base is what I prefer you most comfortable.

OK. You mentioned that this this frequency can change when you're not familiar or previously worked with your collaborator.

18:10 **But can it change due to the location of your collaborators or the size of your group or the collaborators backgrounds?**

Yeah, I would say, you know, if somebody is further away or maybe not that either involved or understanding in the project, then I would say the communication can drop considerably and go months before you hear anything back from people.

18:43 OK.

Which do you think has the biggest impact on the outcome of a project: the size of the group, the location of your collaborators, or their backgrounds?

19:11 I would say probably backgrounds because backgrounds probably relates to how well aligned everybody is, goals are with the project because there are I mean, for me that seems to be where the kind of investment comes in, like how invested somebody is in the collaboration and seeing it all the way through.

19:37 I've only really ever worked on small collaboration, so I can't really speak for large ones, but I would say background is probably most important that people have at least somewhere aligned similar interests. In order to make the whole collaboration come together.

20:02 **OK, so we've been talking you've mentioned communicating your meeting with collaborators throughout your research. Are there any additional tasks or activities that you do that involve another collaborator?**

20:29 Besides communication and doing experiments, I mean, usually there will be like a publication aspect, so that can involve, you know, poster presentations at meetings or people speaking at meetings about the project or writing papers together.

20:51 So other than that and besides doing experiments, I can't really think of anything.

OK, so when you when you do experiments, you're working with a collaborator.

Yes.

21:09 **Can you describe that to me? I don't have any kind of biology background.**

21:37 So sometimes it can mean that so you might send samples to somebody else to process and a particular technique that they're really good at doing, or you might take samples to the co-operator and then learn how to do the technique. So there's some sort of like sharing of samples and biological materials and then, you know, performing various experiments to. Look at all kinds of things from the cellular level up to the organismal level.

22:08 **OK, so you mentioned you're mentioning sharing samples, are you ever sharing data?**

Yes.

What do you use to share data?

Um, usually access to a server or in some cases I've actually either sent a hard drive to someone or they've given me a drive with data on it already.

22:42 So I'm trying to think, oh, and Dropbox a lot?

Anything else that you can think of? What about email?

Yes, sometimes email.

23:10 Usually not why I'm more prone to put stuff on Dropbox just because of the size of the files and sometimes for security reasons, emails, not really a great idea.

Have you ever had any problems using Dropbox to share data?

23:32 I'm not really. I mean, sometimes people aren't familiar with it, and so they, you know, just might have some technical things, they need to figure out how to use it. But I personally have never had any issues usually been able to get enough storage and get everybody access and edit it and all of that just fine.

24:02 **Are there any collaborators that you don't use Dropbox with?**

Currently, no.

OK, well, would you use Dropbox over, say, putting something on the server?

So right now, we tend to use it pretty heavily because they don't actually have access to a server currently, and I assume, although that probably will change soon.

24:37 And I also find that for some collaborators, they're just not familiar with accessing servers, especially from a different location. So they're just it's a lot easier for them to just, you know, open their email or get online really quick and go to their Dropbox page.

So have you ever met my postdoc advisor, for instance?

25:04 There's no way I would ask him to try to access something by some other method.

Yeah. So you use Dropbox with him.

Yeah.

OK. Have you ever had an issue arise when using the server to share data?

25:36 Not currently, no. I don't think I think it's always been OK. I mean, besides sometimes servers just being not accessible or something like that, but usually that gets worked out within a few hours or a couple of days at the wall, you know, so at least so.

OK, and when would you send data on a hard drive as opposed to putting it on the server or Dropbox?

26:06 Sometimes at the initiation of a project, so there's always a separate hardcopy or in the case where everybody involved or the key people involved didn't have access to a server. Usually everybody's got Dropbox.

26:24 I could imagine, I guess, needing to send stuff that would be much bigger than my capacity on Dropbox, in which case the hard drive might be good.

You mentioned that you don't really use email for sharing data that often, but you have you have used it.

Yeah.

So when did you choose to use email over putting something on, say, Dropbox or the server?

26:57 Um, I guess if it's so often times it's like if it's just like a quick result or a snapshot of something or a quick update, like a small piece of data that's kind of taken out of context of the big project. And you just want quick feedback on it or people need to you know, if you're working on it, if you're optimizing something, let's say you might find an email with a couple of quick pictures or files of data, depending on what it is.

27:32 So usually when you need quick feedback or it's a new update or a new finding, but usually a small planner focused result.

28:03 **OK, so all right. So just with, like, general communication with your collaborators, you mentioned a lot of in person and email use.**

Mm hmm.

Is there anything else that you use?

I talk on the telephone on Skype. If we're going to be like at a meeting or some other social event or something like that, I usually try to get together to talk about things in person. That's pretty much it.

28:41 **OK, so what are the benefits of talking in person?**

Well, it's just always so much easier to explain things you can, you know, scratch on pieces of paper and draw things out, you can read emotions better. You have a more focused conversation. Usually, you can see if you know it's just you talking to the person rather than maybe other stuff going on in the background.

29:15 And also, I mean, like there's really nothing better than just one on one, you know, communication with people when you're working on a project together.

Are there any disadvantages?

It can be hard to find that face time to schedule.

OK, so what do you do when you can't? What is the first thing that you do when you can't find that face time and you need to talk to somebody?

29:38 Email and then fire up a time to Skype.

Have you ever had any issues using email to communicate?

30:06 Yes, it can be difficult sometimes because email can come off as being really impersonal or it's sometimes hard to dictate tone via email and, you know, and there's audio corrections or not corrections, you know. Also, there's like oftentimes for me, like a sense of urgency with email.

30:27 Like if people come to expect that you check your email all the time and you respond immediately, if that pattern changes and it can be hard to know like what's going on, like why is one person getting back to me or, you know, whatever. So I think email, for lots of reasons can be challenging.

What is the advantage of using email over something like Skype or really anything else?

30:58 It's easy to compose more. I mean, I, I tend to go to email more than Skype just because I think it's a lot easier to just, you know, write my thoughts down and keep it organized. Also, usually with email, you can keep a train of thought going so you can see if you have a whole history of written out information. So if anything's confusing or you lose something, you can always go back and be like, oh, yeah, I did see what you were saying here.

31:28 Oh, yeah, I, I didn't get that or something like that. So having that written history is a great reference point. It's easy to search. You can find it any time. Doesn't matter what. The other person is doing or where they are. Yeah, usually it's easy to find small attachments and it's a quick way to update or you can also write a more long and detailed thing.

31:57 So it's pretty flexible.

OK, um, when would you choose to use Skype or email?

I would prefer to use Skype for just weekly check-up meetings. I wouldn't want to Skype with somebody every day unless I was super necessary for some reason, because it seems to be a bit more time consuming to have to set up, you know, appointments.

32:34 But if it's a group of, I would say larger than three or four people, emails are probably a more effective way to make sure that everybody gets all the information because it can be hard to set up a Skype conference when there are so many people involved.

33:00 **Have you ever had any issues when using phone calls for communicating with your collaborators?**

No, I mean, sometimes if you've got a group phone call with speaker phone, it can be hard to make sure everybody gets heard.

33:28 But, you know, it's the same way. If you're just talking to your mom on the phone, too, sometimes you're just not listening. OK, so some people are more comfortable than others talking on the phone, actually. So I don't know. Just depends.

OK, what are the benefits to having a phone call over, say, email or Skype or whatever?

34:04 It's just easier to hash out ideas and have a quick back and forth and, you know, email. It's like you got to write and wait for a response on a phone conversation. You know, things can just flow more rapidly and you can kind of get on the same page a lot faster or work through a technical issue a lot easier.

34:33 Um, there was less chance of misunderstanding, I would say, because you can gauge tone and, you know, think things through that better, I would say Skype is great if people I mean, I kind of consider Skype and phone to be about the same. Just some people do Skype and some people don't sound OK or sometimes for technical reasons, like if their computer is down or something, they don't they can't do Skype, so.

35:02 **Have you often had issues like with using Skype?**

Sometimes it's hard to schedule for somebody who's in a different part of the world, so. Other than that, not really. I mean, usually it works pretty good.

35:24 **OK, so and then when you're preparing for publication, things like presentations or papers, what tools do you use?**

Usually, Dropbox– OK, so put figures there, put draft manuscripts there.

35:50 I usually do online documents and Microsoft Word and then figures are made in various programs, depending on, you know, who's making what figures. So anything from, like Photoshop to PowerPoint illustrator are the usual things. And then like times I'll share a PDF.

36:18 That's pretty much it. I haven't really used anything else besides Dropbox for getting manuscripts together where multiple people are involved in different places.

Can you kind of describe the workflow with working with other people on manuscripts?

Yeah. So usually I like to think about authorship from the beginning, so and usually kind of detail responsibilities from the beginning of the project.

36:45 Obviously that may change over time, but I think that's a good way to set things up then everybody knows clearly what they're contributing and what they're going to be responsible for. And then usually it's just kind of like you work on the to do list what the what the things are that need to be accomplished.

37:10 And then as different people generate either data that's going to be part of a figure or an entire figure is worth of data, then that usually gets put on to Dropbox. And then whoever the first author is responsible for kind of collating all of that and writing the manuscript. And then usually that gets shared with the other people involved and they can edit portions of it. OK.

37:37 **Have you ever had issues using Dropbox or had an issue arise from using Dropbox while collaborating on it on a manuscript?**

Yes, there was one manuscript that we published recently that a couple of people who are using Dropbox weren't super familiar with it, and they ended up kind of taking files off and then not putting them back or trying to edit while somebody else was trying to add it.

38:06 But we got all that worked out OK.

I just realized that I had kind of forgotten to ask you a question from earlier. So I asked you about working on projects where your look collaborators are located at different institutions year about, you know, benefits and challenges. And I was wondering if there are any additional challenges or benefits when you have collaborators who are working at multiple different institutions?

38:38 So there's like three institutions involved, including your own. I guess just I mean. The benefits are that hopefully you've got people who are experts on their field, you know, who are bringing something to the table in that respect and then challenges are just, you know, the more people, the more places, the harder it is to get people to keep in touch.

39:16 **OK. Do you feel that having people at, like, multiple institute different institutions has an effect on the outcome of a project?**

I mean, if it goes well, then usually it's considered to be even more successful because, you know, you were able to kind of obviously overcome that challenge of having people in different places and still get everything done.

39:45 Sometimes it can actually put an extra expense on the project. So if you need to ship samples, let's say to another university that can get quite expensive or if you need to buy reagents or particular something like that to send to somebody else or order it for somebody else to go, or you're waiting for something from somebody, you know, that can cause kind of an added time and expense on the project as well.

40:21 **OK, so I have a couple of questions for you. And if you could create a hypothetical future technology, which doesn't need to be limited to what you feel we can or can't do, that would**

make collaborating easier for research. What would it be? What would it do or what features would it have?

40:46 Hmmm, I guess, um, ideally, it would need to be accessible from, like your phone or your laptop since, I mean, those are the devices I commonly have with me all the time. Secure a lot of time is when a project and early phase are even right up until publication.

41:16 The security of the data is a really big issue, especially for biological sciences. Usually when you share data, you know, a lot of it's very confidential, even with collaborators. And I'm trying to think what else? I mean, something that just allows a really interactive you would have, I guess, somehow to have data storage and visualization and then also be able to, you know, communicate really easily.

41:51 But I can't imagine what it would be. Besides, you know, I guess right now I'm just used to using all these different things to kind of share information and. I guess if it was tied to some kind of electronic lab notebook, that might be easy to where people had access to it.

OK, can you elaborate on the security issue with your data?

42:25 Yeah, you basically just don't want people getting access to your data before it's been published. There have been instances. So in the field of biology I work in and plant biology, genetics and breeding is a big area of research. And for some crop species, for instance, there has been a concern recently about data being stolen.

42:54 **Oh, wow.**

You never quite know what's going to happen from that or what it leads to or whatever, but I mean, usually people are fairly guarded about sharing their information until it's been published.

Do you have you ever had concerns when working with collaborators about sharing your data?

43:26 No, I usually work with very trustworthy people.

OK, that's great. OK, so my last question, my last couple of questions– what is your current position?

My current position is adjunct assistant professor.