Andrew Saintsing: Hi, you're tuned in to 90.7 FM KALX Berkeley. I'm Andrew Saintsing, and this is The Graduates, the interview talk show where we speak to UC Berkeley graduate students about their work here on campus and around the world. Today, I'm joined by, well, I'll just let them introduce themselves. Can you say your name?

Lourenco Martins: Like full name?

Saintsing: Like your first and last name.

Martins: Lourenco Martins.

Asa Conover: Asa Conover, but maybe I should say it so it doesn't sound like a robot. My name is Asa Conover.

Vero Ramananjato: So, my name is Veronarindra Ramananjato, and for short, it's just Vero.

Saintsing: Lourenco, Asa, and Vero are all first years in my program, Integrative Biology. I recorded separate interviews with each of them at the end of this past Fall semester, their first in graduate school. As you can imagine, they haven't had much time to settle in here and really get started on their projects, so you're not going to hear much about results today. Instead, what I want to do is introduce three people at the very start of their PhD with the hope of following up with them at the end of their PhD because I want to see how people change as they go through grad school. As I approach my own graduation, I look back and think I've changed a lot. Grown as a scientist and a person. But it's kind of hard for me to put myself back at the beginning to figure out what all those changes have been. So, I asked Lourenco, Asa, and Vero some questions about their experiences before grad school their motivations for starting it and their ideas of what it might be like for them while they complete it. I hope to revisit these interviews with them in the future, but for now I'm going to go ahead and share some of what they said with you to give you a sense of the different mindsets that people can come into grad school with. And just so you know, these interviews were conducted separately but I've edited them together to make the episode flow a little better. What were you doing before you started this PhD program?

Ramananjato: Where to begin…

Martins: So, before my PhD, I… Well, right before, I…

Conover: I spent the past two years living in Santa Cruz and working at UC Santa Cruz, where I was a lab manager slash lab technician for two professors there. One is Greg Gilbert, who's in the Environmental Science Department. Environmental Studies, sorry. And the other is Ingrid Parker, who's part of the EEB Department. And both of them are plant ecologists in some form. Ingrid specializes in studying invasive plant species, and Greg has a specialty in plant pathology, especially focused on fungal pathogens. They hired

me for a project they're collaborating on studying fungi that live in plant leaves, and these are called endophytes. And I was doing DNA lab work to help identify the fungal taxa present in different plant species throughout Santa Cruz.

Ramananjato: I finished my master's in 2018 Madagascar at the University of Antananarivo, and between that time and this PhD, I've been an adjunct lecturer at the same university. And also, I conducted my own research on the dispersal of mouse lemurs in the rainforests. That was pretty much all of the things I've done in this last two, three years. And I am also the, I co-founded an association in Madagascar. It's called Ary Saina, so it's an association of Malagasy conservation biologists. We are seven or eight now, and what we do is sharing scientific knowledge and also use this scientific knowledge to promote conservation. So far, we are more on the outreach side of our mission, like sharing general knowledge to the general public through social media, some activities with kids, and also we focus on the capacity building of Malagasy students. So, we organized like workshop for statistics, or workshop for writing or something that most university students would need for their master's, doctorate, or post-doctorate positions. And I coordinated most of the outreach program, the capacity building program of the association.

Martins: I was living in a beach house with some of my best friends finishing up my senior year of undergrad. We decided that we didn't want to go back to campus because of all the COVID restrictions, and college students were wild. But we were sick of being home and so we were like, you know, let's Airbnb some beach house and live it up.

Saintsing: Did you do research as an undergrad?

Martins: I did. I started the spring of my sophomore year because I was sort of hitting a point where I was like, "I think I should be doing an internship or doing something over the summer." So, I reached out to Sarah Lower at Bucknell because she does some really cool research on fireflies: predatory behavior, the evolution of bioluminescence. My specific project was looking at how fireflies, there are some species that have evolutionarily lost the ability to produce light, and so, how are males attracting mates. A lot of computational stuff.

Saintsing: Were you doing research after COVID hit?

Martins: COVID is really interesting for me because I was actually abroad when COVID hit. I was living it up in New Zealand. I got sent home, and so, I sort of finished my semester abroad from my childhood bedroom. And then, come the fall, because most of my research was computational, I was still doing research that fall semester. I was actually working on writing up a manuscript, and then, this spring I was mentoring some students. And I'm trying to finalize some methods and stuff for the lab.

Saintsing: And then, so you finished your master's, and you decided to work as an adjunct professor for a while. Why did you decide to do that and not, you know, start a PhD immediately?

Ramananjato: It went at the same time. So, I started prospecting for PhD positions right after my master's, but I had like many things to prepare, especially to study in the US, like getting the TOEFL, preparing for it if the university asked for it, something like that. So, it took me more than the time I expected to apply for a PhD. So, meantime, just like I need the money. I need experience. So it was just like, "Okay, let's let's be an adjunct." And it was available at the university.

Saintsing: And so, why did you start working as a lab manager and a lab tech after undergrad?

Conover: I had had research experience as an undergrad but hadn't experienced anything that I felt I was ready to commit myself to in a long-term PhD sort of way. And A, felt like I could use more experience that would help guide me towards what sort of study I'd be most interested in and make me a better candidate. And B, I was ready to take a little break from school and live the technician dream for a little bit.

Saintsing: Yeah, for sure.

Conover: The sweet life.

Saintsing: Is it really?

Conover: Yeah, because for the most part, you leave work when you leave the lab. There are just fewer balls being juggled than when you're a student, either undergrad or grad. And also you get paid better than when you're a graduate student. So, life as a technician can be pretty cush.

Saintsing: What made you want to stop being a technician?

Conover: I think I was ready for a bigger seat at the table. I really enjoyed learning through each of the projects I got to work on and wanted to have a bigger role in the creative process and have a project that felt like it was my own rather than something that had been prescribed and pre-planned for me to work on.

Saintsing: What are you planning on studying while you're here?

Conover: Right now, I've figured out very little. So, I just start by saying that, broadly, I'm really interested in ways that microbes shape the ecologies of macro host organisms that they live with. So, like how interactions with microbes might shape the distribution of larger organisms or their life cycles and particularly that of plants and their symbioses with bacteria and fungi. I've come to find these relationships really cool and also really

important for structuring ecosystems and agriculture and a bunch of things we care about in the world. And beyond that I have not quite figured out my direction yet.

Martins: So, I'm still figuring that out, but I'm really interested in looking at the evolution of cold tolerance, and also thinking about genomic divergence. There's this idea of local adaptation and how your ecological niche sort of drives evolution of sorts. My model species are these beetles, Sierra willow leaf beetles. My lab's done a lot of research looking at the physiology of populations in the Sierra Nevadas. But there are actually coastal populations of these beetles and population these beetles in the Rocky Mountains and even up as far north as Canada. And I'm… I kind of want to figure out like: How do they compare to each other? What is going on at the population level? What's happening there at that organism, genome, genetic level?

Ramananjato: For now, my project is mainly focused on the seed dispersal of mouse lemurs, which is the smallest primate. They could be good seed dispersers, but few researchers really looked into how effective they are. And so, I like to add more information and data about that. This is how my master's starts, so I just like build up from my results then for my PhD now. And also, I'd like to expand it like on the effect of how human activities would impact such process in tropical forests, like if these animals disappear from one side, what would happen to the plant species? Because when they eat the fruits of plant species, they will defecate the seeds, and the seeds will grow faster than just like seeds falling down on the ground. And so, the way that they eat and then disperse it would help the forest to regenerate faster. So, what would happen to this regeneration if these animals disappear from the forest? Or what would happen to the forest if these animals just like have a very small population or just like are present in one side of the first but not the other? Not really clear yet, but something like that.

Saintsing: If you had to say like one scientific concept that's gonna be central to what you're studying, what would you pick?

Ramananjato: What kind of concept do you like expect to be the answer of that question usually?

Conover: Symbiosis. A symbiosis is a relationship in which two organisms live in close association like on or in one another. So, in my case, it involves bacteria and fungi that will live in association with plants. And there are distinct communities that will associate with above ground and below ground tissue, and a variety of degrees in which things will associate with external tissues or actually grow inside of a plant. And both those communities are shown to be really important for the functioning of that plant.

Martins: Evolutionary genomics. When I think of evolutionary genomics, I think of looking at the entire genetic material of an organism and how that genetic material is changing through time and how it's being impacted by external factors like predation or the environment, to even think about things like global climate change and how that could

be like quickening that process or leading like a particular population in a different direction than it was originally heading in because of all the things that humans are doing. It's a very holistic approach.

Ramananjato: Yeah, so I would say fieldwork. I can't do, I can't answer my research questions without going to the field, without doing some experiments with the seeds, with the animals. So, I would say fieldwork is really central of my research. We really, really need like new observations from one species to another, from one side to another. We need more observations like how things work, and then try to draw some conclusions from what we observe. Instead of just like having: This is the things I want to test in the field. It's more like the field would tell you what's going on in the real world.

Saintsing: Okay, what is a method that you think will be very important to your PhD?

Ramananjato: So, it's a joke between my family and my friends, but I earn my living by playing with poop. So, yeah. So, mostly all of the experience we do in the field is like collecting the seeds in the fecal materials of mouse lemurs. Identify them, measure and then put them in the forest ground to see if it germinates or not. So, everything related to my research will just like turn around this. What's inside the poop? Where it goes in the forest. If they eat at some place, to which distance are they going to let it down, something like that.

Conover: There are certain things that I would like from a project, and one is that I hope that it will be grounded in some sort of field-based methods. I think for me, I derive both a lot of motivation and inspiration from being outside and thinking of research questions in the context of the world I see. And I would like to gain skills with field research, but there are also a lot of really powerful DNA-based tools in the lab and on the computer that are useful for studying these relationships in these microbial communities that I think would benefit me as a scientist to learn. And right now I'm thinking specifically of like metagenomic sequence studies and analysis.

Martins: I never saw myself as a comp sci person. I was like, “I hate computers. All I need to do is type and like write these papers.” But once you actually like start like coding, now that we have like sequencing and sequence… So, sequencing is so cheap, and so much easier than it was like 20 years ago. There's so much that you can like find out, and sort of like bridging that gap of like learning a new language or learning this like relatively new method. And what I like about it is, it's less about getting answers, and it's more about creating more questions. If more questions pop up, that's kind of what you want. It's like, you don't want to like just like… You don't want to just stop. You want to be like, “I've gotten this far, but now I figured out how this works, I can go in this direction and be like how does this compare to this or link with this?” Like, how can we use what I figured out in this specific model? Like apply it to other models?

Saintsing: Well, if you are raising more questions, do you think you'll have to expand the methods or anything that you'll be doing in your PhD?

Martins: Probably. I like pulling in methods that are like being used. Like, I like a lot of the computational methods that I'm using. Like, they were being developed for like cancer research or like… So, like this one method is like, "Oh, they built it because they were looking at like cancer cells or like bacterial cells." Like a very applied approach, and I kind of like the fact that I'm bringing it back to more of this like basic fundamental research aspect.

Saintsing: What are some challenges you anticipate?

Martins: How much time do we have? Time management, imposter syndrome. It's also like this is like the first time… I like, I literally moved across the country. Like my family is all in like the Boston area, and I'm like, I'm now in like the Bay Area in California. So, like there's that.

Ramananjato: One of the biggest challenges I expected when I left Madagascar was the language. You only speak English in Madagascar if you are talking to a foreigner or when you write your manuscript or (and that is if you submit it to a journal). So, it's not really common that you practice English in Madagascar. I was like, "Oh, my god. How am I going to do this? Like, am I going to follow what everyone is going to say?" And whenever… it's like, yeah, I think sorry is the word I use the most since I arrived, just to make sure I understand properly.

Martins: I'm right out of undergrad, and so, like I have research experience, but like, I obviously don't have a master's. So, I like… I haven't published. So, that's something that's like kind of getting to me a little bit.

Ramananjato: Another challenge was: I haven't studied for two years, so just coming back to school, it's just like, "Am I still good at this?" On top of this, it was also like a very different system. Like, we have our own in Madagascar, and then, here it's really different.

Saintsing: In what way?

Ramananjato: You know that like we discuss more everything. You just, you say something, you're going to have an opinion on this. Another person who's going to have an opinion on this, and there's no right or wrong. You just like exchange ideas. You just discuss things. See the bad side and the good side of everything. And we don't do that in Madagascar. I mean we like for example take a paper, discuss about it like, "How I can use it in my research. Or how it contradicts my research." Something like that, but not like discussing in details and confronting different opinions.

Conover: It's really hard to see how it all comes together. I think that's not a surprising statement. I'm sure when you look back on how everything has developed it would be really hard to have predicted that from day one. I find myself there now and finding it hard to understand how the path will unfold and that feels like a challenge.

Saintsing: So, is this separate from the idea of: you are doing science, and you don't know what you're going to find when you're doing science?

Conover: Yeah, I think that I've now had a few years of experience getting to work on research projects and very little experience getting to see research projects being born and figuring out the logistics of what's possible, what is strategic or good to be pursued as a PhD student.

Martins: Honestly, I think the hard part about my PhD is going to be less about the science (like obviously the science is going to be hard and the research, which is like going, like it's going to require a lot of critical thinking), but I think the hardest part is going to be the adulting aspect for me. Because I like, I'm doing both of those things at the same time.

Saintsing: Why did you start the PhD?

Ramananjato: Usually in science in Madagascar, you must have a doctorate degree. So, it opens a door for you for like a position at the university or in an organization. It's like the lowest degree to go in the job market. So, it was kind of automatic for me to go from master's to PhD.

Conover: I have really enjoyed getting to work in biology-related research. It's taken me to really cool places and taught me lots of things that have made it more fun to exist in our world. Through the process of working in research, I've come to admire a lot of the people I work with and their careers. I think the people I admire most and the jobs that appeal to me most often come with a PhD credential. And so, there's partly that pragmatic approach that I think a PhD will help me from that perspective. But also, I just really enjoy the research process and think that a PhD is a tremendous opportunity to get to pursue whatever it is I'm interested in and get five years to think about whatever questions I want and have a lot of freedom. And that really appeals to me.

Martins: What I like about research is having the flexibility to like ask your own questions, like think about things that someone else isn't necessarily telling you to think about. I'm… so I like learning all the time and sort of having the next five to six years dedicated to like this very like focused training was really like what I was looking for when I applied.

Ramananjato: And as I'm searching the right thing to do or something like that, I was just like become aware that, if I'd like to be a researcher someday, which I really want to be, I need this like a training that makes me think on my feet without losing my objective, and also like being more familiar with the process of research all over the world, even

though it's kind of universal. So, just like, I need more knowledge and training. This is why I started a PhD.

Saintsing: What do you plan to do afterwards?

Martins: I don't know if I see myself as like an academic or like a like a full-time researcher in the future, you know? I am really passionate about like science communication and increasing diversity equity inclusion within the science community.

Conover: I really like research and find the life of researchers at universities like Berkeley to be really appealing, but also it feels really cookie-cutter to suggest that that's what I'm aiming for. I think for me it's important to have some sense of creativity in my path. I don't want to just prescribe to a direct path in which one linearly goes from undergrad to PhD to postdoc to professor. And it's also important to me to make things that people interact with. This past year I published one of my first first-author papers, and it felt like an amazing accomplishment to me, but also so limited in the extent to which I could share it with everyone else in my life that I care about. And I wouldn't dare ask them to read it. And I would like to work on things that feel like I could share with friends and family in a way that it was self-explanatory what its worth was and why it's cool.

Martins: In an ideal world, I have this like picture of me of being like a cooler David Attenborough of sorts. Because I don't take myself seriously, like I'm having fun, and I like this idea of like being like a freelance like science writer who like travels the world and is meeting with all these researchers and all these people and learning about all this amazing science and like writing it in a way that like is able to capture a super broad audience that would make anyone excited. Like I go home sometimes, my family will ask me like, “Oh, like what are you doing?” I used to like drone on and on about like all the specifics, and like they would just turn away like 30 seconds in and be like, “What's the point?” It's not like thinking about like, “Why is this cool? Why does it matter?”

Conover: I think outreach is one concrete way in which academic science can interface with the rest of society, but I also just think application of science, instances in which neat things that are learned through traditional science then have applications to people's lives, whether that be in making a tool or a business or a health intervention or something like that, a way in which science then gets used that can be appreciated by people broadly.

Ramananjato: We've been like, we've talked with many people from industry lately, so it's kind of appealing to, or I still wonder which one has more impact on like the younger generation of students, which one would engage more people in science, more girls in science. Something like that. So, I think academia is more indicated or industry is also like very good arguments. So, I don't know yet.

Martins: I do science because I want to combat the stereotype of like scientists being these super old white guys with lab coats and like the Albert Einstein and the Nikola Tesla and

everything and that some 22 year-old who like moved to the US at the age of two could be a scientist. Someone who was working in like industry or like as like an accountant or something could be like, “I don't want to do this anymore. I want to do science.” Combating that status quo is sort of like what I stand for.

Saintsing: Yeah, do you think if you didn't feel that that stereotype existed and it seemed less important for you to show that that stereotype is invalid, you would be as invested in doing science?

Martins: I don't know. I feel like it's like personal because of that stereotype. I've made it personal. And that's sort of like, is what gets me through. I need to do this, and I also happen to like doing it.

Ramananjato: This is something I love, so no one's going to stop me from doing it. And the fact that I did it is like… You start with like a very small step, and then, “Oh, I didn't even think about like going this, like set this level.” Not everyone could afford a PhD in Madagascar, so if you are doing your research, you have to find your own research fund. And also, like being a girl in science in a family context is a very bad. Because it's a sacrifice. It's like you're not going to have a family. We need a girl that can like compromise family life and work. So, science is not an option usually. So, it's also like a challenge to show these people that it works and it can be done. Just like, “You see now where I am?” It's not bragging, but just like, “You told me I couldn't do this when I started.” And just like with all of the things I've done so far, we can say that it's not easy, but I did it. I can do more. More than that.

Saintsing: That's about all the time we have for this half hour, but I hope you've enjoyed getting to know Lourenco, Asa and Vero. I had fun talking to them, and I also think they were great for this episode because even though there was overlap in their answers, which makes sense given that they all just started PhDs in the same program, they all had unique perspectives, experiences, and motivations. Together they showed that there's not one right way to start grad school. And when we do that follow-up I mentioned at the beginning, I feel pretty confident that they'll show us that there's not one right way to do grad school either. I mean you have to fulfill the basic requirements for your program to get a degree, but everyone has to figure out how to use those requirements to complete their own individual goals. The one thing that does worry me is that my three guests all had really good answers for the questions I asked, and I feel like there's not a lot of suspense here. We're just headed towards a follow-up called something like “Competent students achieve goals, complete degrees.” I guess I thought I would talk to at least one person who is a little more like I was when I started grad school and didn't really have a plan and thought I was just going to be doing more undergrad or something. I feel like if someone had asked me these questions then, I would have said something like, “I don't know. I just started. Nobody's told me the answers to that yet.” So, kudos to Lourenco, Asa, and Vero for already having a good sense of what they want and why and ideas about what they'll need so they can figure out what they'll have to

work on themselves and what they'll need to ask for help with. I'm looking forward to seeing what they accomplish in the next five years. I'm Andrew Saintsing, and I've been speaking with:

Martins: Lourenco Martins,

Conover: Asa Conover,

Saintsing: And…

Ramananjato: Veronarindra Ramananjato…

Saintsing: Who all just started PhDs in Integrative Biology. Thanks for listening. Tune in in two weeks for the next episode of The Graduates.