

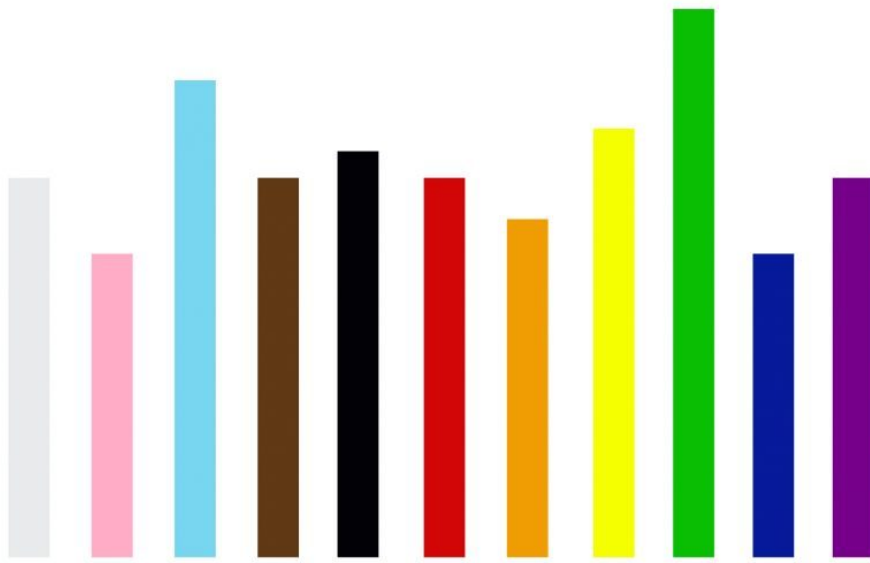
THE QUEER VARIABLE

**INTERVIEWS WITH INSIGHTFUL
LGBTQ+ PEOPLE IN STEM**

CURATED BY

**DR ALFREDO
CARPINETI**

**DR SHAUN
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*DR ALFREDO CARPINETI AND DR SHAUN
O'BOYLE*

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Acknowledgements

Alfredo's Introduction

We decided to put together this book because we wanted to gather the experiences, challenges, goals, and hopes of LGBTQ+ people working in STEM. Shaun and I represent only a tiny fraction of the many identities in the LGBTQ+ community, so from the outset of this book project, we continuously discussed how to best showcase the prism of diversity that exists in the world. We both agreed that the voices of the people we interviewed—who are living these experiences—should not come filtered through us.

This collection of interviews brings forth many important themes—yet we do not claim that this is in any way a complete representation of the myriad of experiences of people in STEM, or even an exhaustive catalogue of intersectional identities in the community.

Our hope is that these interviews that we curated will give a glimpse into the lives and roles of LGBTQ+ people in STEM. The philosopher ミユウツ (known in the West as Mewtwo) once said ‘I see now that the circumstances of one’s birth are irrelevant. It is what you do with the gift of life that determines who you are.’ We wish with all our hearts that the circumstances of birth were truly irrelevant and that people could do what they desire without facing hurdles due to their identity.

Maybe naively, we believe that such a world is possible—but it

won't be handed to us. It needs to be built from the ground up, and it won't be an easy undertaking. By the end of this book, the hurdles many of us faced, and are facing, will become obvious. We hope you'll join us in trying to dismantle those barriers; creating a healthier work environment, and elevating the voices of the many underrepresented identities from inside and outside the LGBTQ+ community in STEM.

Shaun's Introduction

When I was learning how to be a scientist—doing my undergrad and PhD in Ireland—I wasn't learning from anyone I could really relate to. I never knew any of my professors, lecturers, tutors, or lab demonstrators to be part of the LGBTQ+ community. I'm sure some of them were, but they never talked about it. I had never known a scientist to combine their love of science with their love of queer culture or LGBTQ+ history. In fact, the only time I heard my community mentioned in a science class was when we were being 'explained' (in the context of evolution) or blamed (in the context of epidemiology).

I didn't realise the impact this absence of LGBTQ+ role models had on me until I started making friends with other LGBTQ+ people in STEM (largely thanks to Alfredo and Pride in STEM). For me, having LGBTQ+ peers and friends in STEM for the first time was like watching Star Trek Discovery for the first time: all my life I've loved this universe, but finally, I know I belong in it.

Curating and editing this book was a gift. I have learned so much from the people we interviewed; each of them offering their unique perspectives on science and our community's place in it. We are grateful to everyone who shared their experiences, advice, and insights into how STEM can be better. I hope reading these stories will offer a sense of community and belonging to scientists who still might not have LGBTQ+ role models.

Editors' Note

These interviews were recorded in 2020 and 2021. They were transcribed and edited for this book. Some of the people we interviewed might now be doing different things, in new places. We received financial support from Science Foundation Ireland and The Physiological Society, which helped cover the costs of transcription, editing, and design.

Peter Coles

Professor Peter Coles (he/him) is a professor of cosmology at Maynooth University (IE). He was born in Newcastle upon Tyne (UK) in 1963. He is a gay man, a keen blogger, and an avid crossword puzzle solver.

Tell us about your journey into science

It was a strange journey for me because I'm not from a family where people went to university. I'm the first person in my family to go to university. I took an exam when I was eight so I could go to the Royal Grammar School in Newcastle. I struggled a bit when I first got there because it was completely unlike the infant school that I went to. I gradually got used to it and I started to do quite well. I had a very good chemistry teacher so, during my O levels, I decided that I would specialise in science subjects for my A levels. I got A levels in maths, physics, chemistry and further maths, and I took the entrance exam to Cambridge. I was the first person in my family to go to university and I got into Cambridge. They were all shocked about that, and they wondered how I'd managed it.

My chemistry teacher inspired me to study science. I went to Cambridge to do the natural sciences degree, so I studied physics, chemistry, and maths in my first year. I thought I was going to continue with chemistry, but I started to find physics more interesting. The joy of that degree is that you don't have to

choose your focus early on, so at the end of my second year I switched to studying physics and maths. I then did theoretical physics for my third year and final year.

I didn't really know what you were supposed to do afterwards. I was doing reasonably well academically, so in April of my final year, I thought about doing a PhD. In those days there was no internet, so I sent letters to a few universities that I chose totally at random with no information to go on.

Some of the places I wrote to were astronomy departments. I got interviews at Manchester, University College London, and the University of Sussex in Brighton. I went for the interviews with no real background knowledge of astronomy, and with no real clue about what I wanted to do. Today, it's different. Now, you're expected to know what you're talking about.

I went to the interview at Sussex, but they didn't offer me a place straight away. A few days later, I went to the interview in Manchester, and they offered me a place on the spot. I wanted the Sussex PhD, so I was a complete tart and I told them that Manchester had given me an offer, and I asked what they were going to do. They gave me an offer but, looking back, it was an outrageous thing to do. I started my PhD in cosmology.

I didn't have a big plan. I drifted into the field that I spent 30 years in. People talk about the lunar landings inspiring them, but I don't think they really affected me. They didn't push me into doing astronomy. Basically, I had one teacher in school, Jeff

Swindon, who taught me that science is something not just to learn about in books but actually to do and enjoy. That got me interested in science, and it is what made me go and do it.

Tell us how being LGBTQ+ and any other aspects of your identity have influenced your experience in science

I went to an all-boys grammar school, and there was quite a lot of experimentation going on. Secret from many people but not from everyone. When I went to Cambridge, I was quite overawed by the place. I went into a shell, but in my second year I came out to a few friends. That wasn't necessarily a successful experience but most of my friends were fine.

I worked very hard as an undergraduate, and when it came to the end of my degree, I knew that I wanted to have a full life, not just to be an academic. Even 30 years ago, Brighton had a reputation for being one of the few places in the country that was quite gay friendly, and that definitely played a role in my choice to do a PhD at the University of Sussex. I remember when I turned up there in Freshers Week. The first thing I did was go to sign up for Gay Soc. I made quite a few friends there, and they were some of the happiest days of my life. I did have some tough times, but I came alive in many ways, both as a scientist and as a gay man. I felt more at home there than I'd ever felt anywhere else before, certainly more than Cambridge. So I stayed there.

I was fortunate that my supervisor offered me a postdoc at Sussex immediately after I'd finished my PhD. I stayed there for

two years. Halfway through, I met a guy who was living in London. We ended up in a relationship, and we bought a flat together in London. I got a job at Queen Mary, but I was working in a maths department, which was quite a different experience. Had I not been gay, and not had a partner, I wouldn't have done that probably.

Those are the two main times where my sexuality had an impact on my academic life choices.

You have been involved with LGBTQ+ networks, both at the student and staff levels. You were instrumental in starting the LGBTQ+ staff network at the University of Sussex. How did you find that experience?

I went back to Sussex as a head of school and was appointed chair of the university human resources committee. There was only a small agenda when we met, and we didn't meet very often. Then I realised that I had the power to write the agenda. I started tackling some of the omissions that I could see, especially when it came to LGBT+ stuff.

I got a lady from Stonewall to talk about what we could do. I talked about setting up an LGBTQ+ staff network, and the other members of the committee were quite responsive. 120 people turned up for our first network meeting, and that persuaded us to get it going.

I was careful to make sure that it wasn't seen as a management

thing. The idea was for the human resources committee to enable and facilitate the LGBTQ+ staff network. We would give resources, but there would be no agenda other than what the members want to do. The people in the network would decide what it does, what it doesn't do, whether it becomes very political, whether it does not become very political, or whether it's a social club. It took a long time to get it going, but it's still going alright. That happened because I ended up in a job where I could pull strings. What's the point of having power if you can't use it to do a good thing?

You have spent decades in science and, in particular, in the academic world. What kind of changes would you like to see?

I've thought a lot about how university management works. I've concluded that at the core of many of the problems is the fact that universities are organised in a way which is too hierarchical. I will always think of the parallels with the Catholic Church, or churches generally. If you think about university offices and roles, they're just a mapping from the old church hierarchy onto educational institutes. Deans, rectors, and those roles are like religious positions in monasteries.

I think this hierarchy is unhealthy. In science, it often manifests as 'the great professor', and in physics, it's usually an ageing white male professor who has all the power.

If universities want to improve the workplace, do the best for their staff, and get the best from their staff, then they have to

abandon these antiquated hierarchical ways of running departments and institutions. They have to allow everything to be much more egalitarian. Give everyone a voice. Obviously, some people have to make decisions, but by empowering people to feel valued, they will feel that they matter rather than feeling only belonging as a servant of the person upstairs.

Think of the career progression for early career academics. You're basically at the mercy of your supervisor or your advisor. If there's a negative power structure there, this can be very debilitating. I think it can be very unhealthy.

If I could do something to make the most positive difference to as many people as possible, it would be to scrap it all. In my ideal dream, there would be a university somewhere where we could redesign the whole management structure in a totally different way.

What advice would you give to someone with a similar background as you?

Well, that's rather difficult because they'd have to be a 56-year-old gay man.

I'll tell you a few different things. If you do a PhD, develop a network of friends, and don't be frightened to go to them. If you're struggling, go to anyone qualified to help you deal with it. Don't be ashamed.

The other thing I would say is that it's hard work being a scientist.

You have to work strange hours sometimes, and you have to be a little bit obsessed with things. You can't always just put it away at five o'clock. But my main advice would be that nobody gets on in science by being some kind of robot. You've got to have your own life as well, and you've got to be able to take time out and do something different. Otherwise, it will swallow you up and you'll end up a wreck.

I would also say, on the personal side, that when I went to Sussex, I came out. I made a conscious decision not to conceal my sexual orientation at that time. Throughout my career, I've had very few negative reactions from other academics. So my other advice would be, don't be afraid to come out. Don't force yourself to be something that you're not.

Of all the stories that I've heard of people coming out at work, they've felt an awful lot better after doing that. Of course, you may find a few people who don't want to talk to you anymore because they're hostile to you, but who the **fuck** wants to talk to them anyway?

Shubhangi Karmakar

At the time of this interview, Dr Shubhangi Karmakar (they/them) was finishing up their final year in medicine after a postgraduate degree in molecular medicine, with a focus on neurodevelopmental and neuropsychiatric genetics.

Tell us about your journey into science

During my medical degree, I worked in the Evelina Children's Hospital in London, looking at how a molecular and clinical diagnosis of Rett syndrome impacts care, behavioural, and wellness outcomes in patients and families. I liked that translational approach to medicine, and I wanted to learn more about the science of it, so I decided to do a master's in molecular medicine.

Tell us about your experiences of being LGBTQ+ in science

Having a sense of queer community is very useful, and it's something that I find solace in when things get difficult. As queer people, we're socially inhibited from entering science, and by forming a community we can help get rid of those hurdles. We can also get rid of the misrepresentations of the queer community in science.

Where do you find your queer community in science?

I've made personal connections through Pride in STEM, and the

International Day of LGBTQIA+ People in STEM. I've also had the good fortune of becoming friends with queer people from all parts of science, and from all sorts of lives. Our shared experiences unite us as people and enable us to advocate better for ourselves and for those who come after us.

How have other aspects of your identity influenced your experiences in science?

I talk a lot about the importance of gender and minority ethnicity representation in science. There is a stark disparity, for example, between the number of women entering the scientific workforce and the number who ascend to senior positions. That has affected the scope I have allowed myself for where I can reach with my job and how much I can earn. Things are further complicated by my ethnicity: I am a person of colour and a migrant in Ireland. I also have a mental illness. In medicine, the value of lived experience is something that has only very recently come to the fore. As someone who would like to work in neurodevelopment or psychiatry, it's something that I found quite difficult. Those are things that have placed more tangible barriers in my day to day life, starting out in science and research.

Are there any specific experiences that you've had in science and medicine, that you want to share?

In medicine, you're often told 'you're a woman, you'll want to be a GP'. Also, being on my particular degree course, with a personal

history of mental illness, had been a huge barrier. It's difficult to say to my team 'this is what I'm capable of doing right now', or 'this is what I'm not capable of doing right now'.

I strongly believe in advocacy, but I know not everyone has the energy or resources to do that.

How do you take care of yourself physically and emotionally—but also your career—while doing that advocacy work?

I love working, and I'm fortunate that my mental health is helped by doing as much work as I can. I take on multiple projects so that, should I experience knockbacks in one, I find satisfaction through the others. I think it's helpful to find things you can fail successfully at. For example, I take on creative endeavours or even simple things like taking care of my health or working out. Anything, where I can build resilience by safely taking knockbacks, has helped me. When I am having a bad day, I remember the saying 'if something is worth doing, then it's worth doing poorly'. My supervisor also has 'done is better than perfect' written on her board.

What do you think needs to happen to improve the experiences of LGBTQ+ people in STEM?

Visibility and representation are important. We must recognise that people in the LGBTQ+ community come from all the intersections. If people say 'I can't pay attention to all things all the time', it shows they are aware of other communities but

they've made a deliberate decision to leave them out. It's also important to talk about recruitment, retention, and raises. It's not good enough for anyone to implement procedures for diverse hiring or entry to education, without also giving people a viable shot at excelling. If you get into science, you're doing so because you have a niche interest in enhancing a field and contributing to social and scientific consciousness on a particular topic. There should be active processes to make sure that people from multiple marginalisations get to do that. There should be processes for retention by providing opportunities for progress, giving people raises, and raising their profile.

If someone is reading through this book and identifies with your story, what advice would you give to them?

Hopefully, they will know that they deserve better. Being marginalised is abnormal. I want the scientific community to acknowledge that treating people as marginalised is abnormal. I also want to say that every voice, if repeated enough, has power. If you can raise your voice to address an injustice, contribute something positive to it. It's all well and good saying 'this is somewhere I don't find myself represented'—but if you can represent yourself, and it is safe to do so, then do it. If you know someone who would be a good representative, put them forward for things. That's one of the most meaningful ways you can change science. Another way is through citation. Citation is validation, so cite the work of people you would like to see

represent your field, and don't cite the work of people who are actively harmful.

Who inspires you at the moment?

I wouldn't be exploring my place in science if it wasn't for the International Day of LGBTQIA+ People in STEM, House of STEM, and Pride in STEM.

My aunt, who raised me, and has since passed away, instilled in me the value of approaching people—from any walk of life—with openness. My mother is an epileptologist, and all my life I've seen her work crazy hours as a clinician in India and then around the world. I am inspired by her commitment, her unbiased patient care, and the way she works with such sensitivity.

Finally, I'm also inspired by activists and educators like Sinéad Burke. With my writing, I try to include a good diversity of people from the queer community, the disabled community, and people of colour. Sinéad inspired me to do that at an early point in my life. I take a great deal of inspiration from the women in my life.

What advice would you give your younger self?

Find a way to do what you want to do, and approach people who will help you do it. I saw people across a variety of intersections. I spoke to them and I learned from them.

What advice would you give allies, particularly allies within STEM?

Allies can help by listening, first and foremost. They can help by not citing problematic sources in research papers. I edit a university student review journal, and I have to check every citation to make sure it isn't someone who is disenfranchising the communities they claim to speak for.

How do you think the LGBTQ+ in STEM community can do better?

We can advocate for people across different sets of marginalisations. Not everyone in the LGBTQ+ community in science has the same platform or level of agency, but those of us who do can invite them to talk about their experiences. We need to collectivise and show solidarity.

Clara Barker

Dr Clara Barker (she/her) is a material scientist (a thin film synthesis material scientist). She currently works at the University of Oxford, in the materials department, as the lab manager for the Centre for Applied Superconductivity. Clara is the chair of the LGBTQ+ advisory group for Oxford University, she runs the LGBTQ+ youth group, and is about to join the Royal Society's Diversity Committee.

Tell us about your journey into science

I loved science and maths when I was at school and excelled in those subjects, but I was also good at a lot of other subjects—so I could have gone either way. I'd wonder if I should be writing, or making music, but I really enjoyed science, so I just assumed that I was always going to go into science from an early age.

But then, in my teenage years, I started getting depressed. In hindsight, a lot of that was to do with my gender identity, because when your body's changing as a trans person, it's horrible. This was in the 90s—Section 28^[1] was a law at the time, so there was no visibility in schools. We had four TV channels and no internet, so I certainly didn't see LGBTQ+ role models. I knew I was trans, but I didn't even have that word to describe my identity or my experience; 'transgender' just wasn't a word that you knew. I had no one to look to, so I just assumed I was broken.

I dropped out of school during my A levels, and never finished them. I started working; I was DJing and managing a bar, and I was a lifeguard and swimming teacher.

In my early 20s, I managed to get on to a foundation course for mechanical electrical engineering. I thought I was going to design electrical gadgets, so that's what I wanted to do. I did a degree; I was hoping to do robotics, but that just never panned out because all the universities that I applied to shut down their robotics courses the year I applied—so I ended up doing electrical engineering as my degree.

I was still struggling with myself, but I took a year out to work in industry. I worked designing power electrical circuits for large vacuum deposition machines for the food industry (like the machines that put the metal inside of crisp packets). But it turns out that I'm really bad at just sitting at a desk and designing circuits, so I asked to go on the shop floor, to get some practical experience. They let me do that, and I ended up helping to test their largest machine. By the time the machine left England, I was one of two people that knew how to run and test that machine. I ended up working in Japan for three months and installing it on-site, which gave me renewed optimism—I finished undergraduate studies, and managed to get a first-class degree; even though I was struggling with my gender identity.

At this point, I started to realise that there was this thing called

gender identity—but I was doing well at work and was afraid it could ruin my career if I ‘came out’—so I kept schtum.

I finished my degree, and then I started back working again at that company. Someone there recommended me for a PhD in material engineering. They said, ‘Look, you’re really good at this, you could do this’. I just wanted to earn some money for a while, but it seemed like too good an opportunity to pass up.

So I joined a really amazing group at Manchester Metropolitan University, with Professor Peter Kelly, who managed to put up with my mood swings and everything else. He was a fantastic scientist, but also a really good manager, and so I got through my PhD. I was just in love with material science by that point, so he gave me the opportunity to work in labs around the country, and around the world—I went to a lot of international conferences, and did a visiting post in Finland in a material science group.

I was offered a postdoc in Switzerland (at Empa); my manager was really nice, but he wasn’t as good at managing me. It was difficult because by this point I was more aware of who I was—I started to email a psychologist who worked with trans patients in Switzerland.

The good thing about Switzerland is you pay your health insurance, it’s expensive, but you get an appointment quickly. I met a really good psychologist, and he was the first person I opened up to about my gender identity. Over 13 years, I’d met two ‘out’ Queer people, but not one trans person. So I assumed

that if I came out, that would be it: career over. But through speaking to the psychologist I realised that I didn't have a choice, that I had to transition. I assumed that I would have to choose between transitioning or science, so I started wrapping up my career; I stopped writing papers and stopped publishing.

So I was transitioning in secret at work. I told a couple of people. Then I left Switzerland and came back to the UK. My plan was to just chill out and figure out what to do next. Then, this job opportunity came up at Oxford. I went to the interview just to prove that everyone was going to be a jerk to me when I transition. So I came to the job interview ready to fight—and during the interview, they asked me 'What can you do?'; 'What are your skills?'; 'What are your abilities?' etc. Proper job interview questions. They didn't seem to care that I was trans, so I was on the train home thinking if they offered me the job I was going to say yes.

I was offered the job, came to Oxford, and I was just allowed to be myself. I started coming to work by myself. I started getting in touch with people I used to work with, and they didn't seem to care about me being trans. I have lost a few contacts, and I've seen some discrimination—but in the last five years, people have been more interested in what I can actually do.

I had always been treated pretty well because I had that mix of industrial and academic training, and I always had job offers—but don't get me wrong, there were a lot of places that had said,

‘we’ve always got a job for you because your skills!’—but then, all of a sudden, they were ‘busy’. By contrast, in Oxford, everyone was fine.

I think things have changed because we are starting to talk about LGBTQ+ visibility; we’re starting to see people; we’re starting to see groups like Pride in STEM, 500 Queer Scientists, House of STEM, and LGBTQ+STEMDay. I had just assumed there were no LGBTQ+ scientists because I didn’t see them—but now, the visibility has increased so much that I no longer feel alone. And I think that would have made such a difference to me personally if things had been like that during my undergraduate years.

How would things have been different for you, if you had the support that exists now?

I just assumed I couldn’t transition. It wasn’t even an option; but I think if I’d been able to see people like me, I would have done it sooner. I think I would have experienced less depression. The depression isn’t 100% solved by transitioning, but wow, it dealt with about 95% of it. But...having said that, I have had my own life experiences, and I don’t want to lose those memories. I’ve had friends who I wouldn’t have met; went to places that I wouldn’t have gone—so, even though my career and my life might have been easier, and I might be in a better position now academically, I’ve had a nice life—despite the depression.

For younger people—seeing that there are other trans people out there—well I hope that it means they can just get on with their

life; that they can just get on with the good stuff, get on with living and being themselves. I do think there's more awareness, and I think there's more support, and I have seen the changes over the last five years in Oxford. They come to me to do stuff, they want to promote LGBTQ+ scientists—and that's amazing. I'm working with lots of different colleges and groups, giving whatever support I can, and I see improvements. I also visit many secondary schools, and I see how things are improving. The main thing I tell young people is that it's possible to be yourself and succeed—but I don't lie to them: being LGBTQ+; being a woman; being Black—you're going to face barriers, but it is possible to succeed. There are groups that can support you, there are people that will give you advice.

There are great research groups out there, but if you're a PhD student or an undergrad in a bad group, get online and chat with people.

The thing I hate at the moment is this whole concept that, if you're a scientist or an academic, you're supposed to work 60 hours, 70 hours a week. It's disgusting. So whenever I do talks, I have a slide of my nerdy hobbies to illustrate that you've got to take time for yourself. My mental health wasn't always great, and another part of my story that I don't talk about often is that I was diagnosed with chronic fatigue when I was a teenager. So, the truth is that if I overdo it work-wise I'm going to burn out. So now I can plan for that, and manage my life accordingly.

Are there people who come to you for advice now?

I'm the chair of the LGBTQ+ advisory group at Oxford University (I haven't been able to get the 'I' in yet, but I've been working on it), and so a lot of people get in touch with me because of that, and because I'm quite visible in the university. Last week a professor asked me for advice on how to support a trans student, which is great. I think that most people are really worried about getting it wrong, so don't talk about it. I make it clear that I *am* that person you can talk to—and you can get it wrong. I'm here to support you.

In the UK there are academics, teachers, parents, and guardians who came of age during Section 28, and so are behind the times in a sense. Because when they were growing up, the government made it illegal to 'promote' homosexuality—which means that nobody could talk about anything non-heteronormative in schools, etc. So it's no wonder we're struggling.

How can the LGBTQ+ in STEM community do better?

I've become aware of the wider LGBTQ+ in STEM community, thanks to the LGBTSTEMinar conference—which demonstrates a lot of sensitivity by asking questions like How do we deal with this stuff? How do we deal with race? How do we deal with religion?—and I feel it's very trans-inclusive. I think the people there are willing to say, 'I'm not the expert in this, it would be great to get help understanding this'. And so I've seen a lot of collaborations that aren't just 'LGBTQ+ in STEM' but also

‘Diversity in STEM’—and I like that. It has been an inclusive group from the start, so I think we’re getting a lot of things right. If there’s criticism, we’re willing to listen; we want the best, and the only way we can achieve that is by working with other people. I also think we’re quite mobilised as a community on Twitter, so I think we’re doing well.

In your work, you must have a lot of conversations with people who want to support their LGBTQ+ colleagues. How do you help them become better allies?

I don’t want to just call people out when they are doing things wrong. We do need to do that, but for me, I find it more encouraging if we say, ‘this isn’t great, but you’re doing this well. So why can’t you improve this, it’d be really helpful. This is how you do it’. I think people respond to that. If you just criticize people, they’re more likely to shut down.

I’m not saying we shouldn’t call people out, but we need to think about how we do it. If people have used the wrong word, but seem to genuinely mean well, I see that as an opportunity for education, not criticism. Otherwise, it takes away the power when we go after the people who are being transphobic and homophobic.

Who inspires you at the moment?

Dr Jess Wade does so much for improving equality for women in

STEM fields and is so inclusive with her approach, and she's just awesome and inspiring.

Also going to the LGBTSTEMinar for the first time set me off; that's how I've ended up doing so much, because of the power I got from that.

I'm part of Tigers in STEM as well, and we've been looking at things from an intersectional point of view. I've learned so much about race and disabilities and religion from that group, and I've met amazing activists: Izzy Jayasinghe, Ben Britton, and Avery Cunningham.

Alfredo Carpineti's energy inspires me. Also, Gabi Fleury is doing these cool YouTube videos at the moment. Lots of people inspire me!

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1. Section 28 or Clause 28, enacted in the UK in 1988, stated that a local authority 'shall not intentionally promote homosexuality or publish material with the intention of promoting homosexuality' or 'promote the teaching in any maintained school of the acceptability of homosexuality as a pretended family relationship'. The law's existence caused many groups to close or limit their activities or self-censor. For example, a number of lesbian, gay and bisexual

student support groups in schools and universities across Britain were closed owing to fears staff that they could breach the act. It was not repealed fully in the UK until 2003. ↩

Colin Kasl

Colin Kasl (they/them) is a PhD student at the University of Washington, Seattle (US). They are a paleoanthropologist—studying human origins and evolution, by way of fossils and anatomy, and how humans and human ancestors moved.

Tell us about your journey into STEM fields

My journey into my field was a little rough. (I'm only just starting my PhD and I'll be 32 this year; many of the people I know were 22 when they started). As a kid I always loved science—I loved biology, I loved palaeontology—but I had really rough junior high school experiences: I was 'visibly queer' and bullied because of it; I had mental health problems; some other health problems in general; and then I lost my mother. So everything kind of got delayed—but I had some really great science teachers in high school that really helped me find what I loved.

And then, after taking some time off to figure out what I wanted to do, I went back and finished my Associate Degree. As I was doing my associate's, I took 'Introduction to Biological Anthropology', and I loved it. I often met with the professor who taught it after class, and we talked about other papers I would like or books I could borrow. He ended up making me his TA (teaching assistant), and a tutor for the department, and that definitely pushed me into this field.

And when I was doing my bachelor's, I felt I wanted to study human evolution—but my academic advisors didn't really do that (they did archaeology)—but they were still really supportive. They taught me a bunch of science techniques that I still use now. I got to work in a stable isotope lab, and the zooarchaeology lab at my university, but I didn't get to do a formal anatomy class. But one of the things that made me realize this is what I wanted to do for the rest of my life was when I took my first osteology class, and they were like: 'Here's a bunch of bones—look at them, tell me what they are, etc', and I could just look for hours and hours. It felt natural. I was like, 'Okay, this is what I'm doing now!'. They helped me get into my master's, and my master's advisors helped me get into my PhD—and here I am.

How has being part of the LGBTQ+ community (or any other aspect of your identity) affected your experiences in STEM?

I think there have been there definitely been some positives and negatives to being a Queer person in STEM. As a Queer person in the United States, you're being really observant of the world around you, to make sure you're safe or not. I feel like that kind of awareness of the world around me predisposed me to go into science in general, especially anthropology.

Historically, science and STEM (especially academic STEM) isn't very friendly to minorities. So when you are Queer, Latinx, have health problems (like chronic pain), are HIV positive—these are all boundaries that you have to deal with, and not everybody

handles them very well. I've definitely come up against people who didn't think I should be in academia, or shouldn't be a scientist because of those aspects of my identity. And some of those people didn't even know I was non-binary because I wasn't out at the time— so I think that would have made it even harder.

In my opinion, academia itself is such an old boys club. Breaking into that world is hard for people of colour, for women, for Queer people; and it is so difficult to just get a level of respect or acceptance, or even acknowledgement, in the first place. I've had multiple people tell me flat out that I shouldn't be in science because of who I am.

During my master's, a professor asked about my plans for my PhD career. When I told him, you know, I'm not looking at that program or this program for my PhD because I wouldn't feel safe there, he was like 'Well, if you're not willing to go there, if you're not willing to live anywhere including somewhere where you feel unsafe then you shouldn't be in science, and you shouldn't be in grad school and you should just quit now.' He said I was a worthless grad student. These attitudes definitely make things harder than it needs to be; and I think doing a PhD, being an academic, being a scientist, is pretty hard already. Most people—even straight white men—struggle with it! But when you have these additional barriers, it just gets harder and harder.

What changes would you like to see in science, in your field in particular, or in academia in general?

I'd like to see more diversity and inclusion in general—but I think we need some radical restructuring. Academia was established by wealthy white men and their friends; researching whatever they wanted to, and then writing about it—and some people do not want to give that up.

I think having more women, people of colour, and more Queer people in positions of power; making them professors, making them advisors, making them department heads—things like that would help a lot.

I think we also need to make a concerted effort as scientists to reach out to young people. I didn't know what a PhD was when I was growing up; I didn't know it was even a possibility until I was already in college.

We need to inspire and support people—and we need to understand the value of good teaching; and the impact of bad teaching. For example, I remember as an undergrad, I had a class where the professor said on the first day of class, 'I'm going to teach you the easiest way to do everything—but I'm going to test you on the hardest way to do things—and it's up to you to figure out the difference, and how you do that is up to you'. I didn't do very well in that first exam. I went to her office later and asked what sort of things should I be doing? How should I be studying differently?' And she just said, 'If you didn't do well on that first test you're too stupid to be here. You should drop the class.' So I dropped it.

One would think a woman in science would understand that science and academia are tough, and try to support people, but sadly I've met many people like that professor; who got through it the hard way, so they refuse to make it better for the people who come after them. So part of the change that needs to happen is stopping the mentality of 'this is flawed, but it's always been this way' and be open and willing to change and fight for change.

What advice would you give to people with a similar story, or identity?

I would say a career in STEM is definitely doable. I'm here, despite the challenges: I grew up in extreme poverty, I'm an orphan, I have health problems, mental health issues, and I'm Queer and non-binary. So I would say: you can definitely get to this point, but it is going to be hard. Obviously, we're trying to make things better.

My advice would also be: try everything you can; and don't be afraid to be yourself—but do not trust everybody. There are lots of people that seem friendly but aren't trustworthy, and there are also people out there who are very trustworthy. You might find that one professor who has the rainbow flag on their office door, or who talks about pronouns in their class, or does something to indicate that they're an ally. You should reach out to them.

I have a network of people I can trust, who helped me get to where I am now. It started by finding one person I felt I could trust, and with whom I felt safe, and having them introduce me to

other 'safe' people—while warning me about certain other people. It helped me navigate. So trying to find a person to help get you through, and open that door, is the biggest thing; and I feel like every year there are more and more people—either queer or allies—that are willing to be that doorway. So there are people out there, It's just a matter of taking the time to find them.

Do you have a network of people with whom you share identity, background, or interests? And if so, how did you connect with them?

I do have a network, but mostly not in my field—though I do have a small network within my field that I found through a professor who was supportive and was like, 'I know people similar to you... similar background...similar interests; I feel like you'll get along'.

I've met some friends within my field that way, but a lot of it was being active online: looking at like science Twitter, especially Queer science Twitter. I got to know many of those people online, and I definitely think it's helped a lot.

Everybody acknowledges that academia and graduate school is hard, but having a network, or at least one or two people that you can relate to—whether it is your gender identity, sexual orientation, or if you have health problems—having people with similar experiences is important. They understand that many things are harder for people with certain identities/backgrounds. But those people...all of us...are proof that we can do it! Together we can support each other.

I don't really have much of a network in my particular field, but it would be nice. My field does have a gay network, and we have our annual meeting for the American Association of Physical Anthropologists. We do also have Queer group meets; we have a lunch every year, we take donations and give the money we raise to a local charity. But I feel like we could be more active, and we're not as much of a network as we could be. But I am happy that we have that within the community of anthropologists and biological anthropologists.

For me, meeting people online—forming a close-knit network in that way—was more beneficial; and it was better because you're not relying on meeting people only once a year at a conference. You can have constant communication and regular outings.

What things could the LGBTQ+ in STEM community do better?

I think we need to be more vocal about what doesn't work. A lot of people are scared to rock the boat because their jobs are on the line, and they might not get tenure if they are too visible. I think those people don't do enough to help junior researchers and such (even though sometimes you can tell they want to help). I know people who say they want to get involved more—but they're just so scared of alienating colleagues, or not getting tenure and so on, so they don't do anything.

What would you tell your younger self?

Things will be hard, but just keep going. Keep trying. There will

be people to help you.

I remember even as an undergrad being scared to be open about myself because I didn't think I would be accepted, that I could even get into grad school, or that I could even be a scientist—because of who I was/am. So, the advice to my younger self, and just people in general, would be: know that you can do it. And that's part of why I'm so open about every aspect of who I am now because I want people to realize that there are others out there like them, and they too can do it if that's what they want.

Who or what inspires you at the moment?

It's kind of a cliché, but I would say my partner and my friends.

My partner has also had a rough life, and has gone through a lot—and he's finished his second master's degree. He's doing really well and has just got a new job. I'm constantly amazed by him.

Also my friends—other queer science friends, and marginalized people in science—and seeing them succeed. The struggles that they—we—go through, and how they fight against difficulties, and persevere, is really inspiring.

I think we can all inspire each other to keep going.

Rob Ulrich

Robert Ulrich (they/he) is a third-year PhD student at the University of California, Los Angeles, studying how living beings grow crystals.

Tell us about your journey into science

My parents are mechanical engineers, so I've grown up around science. It was sort of expected that I would go into STEM because they were always pushing us to be engineers.

I tried doing robotics, but the other kids just made me feel stupid, and I didn't really fit in with any of them. I don't think I was even aware that I was gay, but I knew I was different by that point. I went to Catholic school all the way through eighth grade. This kept me from being able to think about and reflect on those sorts of terms and labels, beyond hearing them used as insults.

Fast forward to college. I started out in chemical engineering, and I just thought about what I was going to do in the future. I knew I didn't want to be a chemical engineer. Those jobs sounded very boring to me. I like the discovery aspect of science, so I decided to pursue pure chemistry instead. Back then I was still in this mindset of needing to appease my parents, so I thought I would go into energy.

I was deliberating on what sorts of things I could do to gear

myself up to go into the energy sector, and one of my friends suggested geosciences. I became very fascinated to learn about the field of geochemistry because it's where you learn how fundamental chemistry shapes our world.

Tell us a bit about how being LGBTQ+ and the other aspects of your identity have influenced your experience in science

I used science as my way to escape from the environment I was in. I didn't like where I grew up, and the place I did my undergraduate degree didn't feel very welcoming to queer and trans people. People from underrepresented groups were not visible there. I always felt I'd have to go out of my way to find these people. I feel that my identities have shaped where I've ended up because my top priority when applying for grad school was to choose a school where I could be myself.

I happened to get into UCLA in Los Angeles, California, which is a very progressive city in the United States. It's not only a centre of culture, it's also a hub of diversity, especially of ethnic culture. This is nice because I feel like I've never been able to really explore my multiple identities, white and Asian because I've just been in predominantly white spaces.

What kind of changes would you love to see in science or in STEM fields in general?

institutions and the people who do have the power to enforce and keep people accountable for their actions must do so.

Whether it's discrimination, sexual assault, or harassment, institutions need to be accountable and keep people working there accountable. It's such a big issue. We see people not being treated as people, but people being treated as their work. Successful work shouldn't excuse people from being held accountable.

What advice would you give people with similar identities or background to you?

You've got to take the time to find people who share those identities or support your identities in whatever way is most relevant to you at the moment. Those people will become your support network, and they will get you through. Especially when you move to a new place where you don't have any friends, invest energy in yourself and plant roots with new friends.

Do you have a network of LGBTQ+ people in STEM, and how did you find it?

I made my own. Queer people are underrepresented in STEM and I got frustrated with having to go beyond campus to try to meet other queer and trans people. So I started Queer & Trans in STEM with the help of some other people, and that's been a source of friends and support for myself and for others.

Now that the age gap between me and the younger students is starting to increase, I've started to put myself out there again. I just force myself to swallow my social anxiety and fear, not be

lazy, and just put myself out there. Even if it feels awkward, the payoff is usually worth it. If you don't have a network then you'll just feel isolated and alone and when you need support and you can't get it.

What can the LGBTQ+ in STEM community do better?

I think the LGBTQ+ in STEM community can be better about recognising that the racial inequities and socio-economic inequities are also common in STEM and within our own community.

When we have meetups at professional conferences, I've noticed that the people there at these LGBTQ+ meetups are predominantly cisgender, white, masculine, predominantly able-bodied. We need to be better at making active efforts towards trying to include all people in our community.

What advice would you give to a younger you?

I would probably tell myself that it's okay to be a little scared. It's okay to be anxious. It's okay to feel all of the scary and sad feelings that you're feeling as you go through the world.

But I would also say to try to not let any of those feelings stop you from doing what you feel like you want to do, or feel like you need to do. We can't control what happens to us, but we can control how we react to the things that happened to us, and how we move forward from them. Also, as cheesy as it sounds, I would say to not be afraid to just be yourself. Love as much as you

want to, whether that's friends, significant others, or family. Love hard and love unapologetically!

Who inspires you at the moment?

A lot of people inspire me. All the people doing activism work in STEM inspire me. The people who inspire me the most are those just getting into undergrad or high school and who are already socially active. Young people are setting up networks at such an early stage. I don't know if that's unique to the university that I'm at right now, where there are a lot of resources for the LGBTQ+ undergraduates, but these kids are very organized and they are very ready to make the changes that they want to see.

Jiwandeep Singh Kohli

Jiwandeep Singh Kohli (he/him) is a PhD student in clinical psychology. His current projects at the [Brain Development Imaging Labs](#) employ multimodal neuroimaging, neuropsychological assessment, and advanced quantitative methods to study Autism Spectrum Disorders.

Tell us about your journey into STEM

I'm happy to say science was always my favourite subject in school, and probably the subject I was best at. It was an approach not just to academic pursuits, but to life in general, so I was always doing experiments at home and causing general havoc around the house with my scientific method.

I thought I would be a medical doctor. I thought I would go to medical school and be a kind of physician-scientist, but more clinically oriented. It wasn't until I got to college that I realised research was available as an actual career, and that you didn't have to just do it on the side of your other job.

I was primarily interested in things like human behaviour and brain development, so I ended up in psychology, where I discovered that it was something that I could do as a career—so I decided to go to graduate school instead of medical school. I chose clinical psychology because I got to focus on both research and clinical work at the same time.

How has being LGBTQ+, or other aspects of your identity, influenced your experience in STEM?

Overall, I have to acknowledge that I've been really lucky. The places that I've lived, and people that I've worked with have all been really inclusive, liberal environments where I didn't overtly feel the burden of being a minority (and a minority in several different ways).

However, there is a second layer to that answer, and it is probably a very ugly one: our identities can influence our experiences in an insidious manner. These are the things that you don't think about, like the cognitive load, the energy, that it takes to hide a part of yourself. And so when it comes to my bisexuality—which was something that I wasn't open about until a few years ago—there was the energy it took to wonder if people knew and to think about whether they were perceiving me in negative ways because of that. Even though it wasn't having an obvious negative effect on my life or my career, I think it's important not to discount the psychological impact that those insidious, less obvious experiences can have. I wonder about opportunities that I might have missed out on because of that.

I'm also Sikh, so it's really funny grappling with these two identities at the same time. I wear a turban, so one part of my whole existence is about being visible and identifiable. But there was also this burden and guilt that went along with not being open about this other aspect of my life.

So I think those were some of the negative ways that I was affected by my identity while being in STEM. But, at the same time, I think my two identities go really well together—now that I've begun to figure things out. They complement each other; and this motivates me to be more visible, and advocate for other people, beyond just my individual identity.

What changes would you like to see in STEM?

It's a long list. I think one of the broad goals is a movement from diversity to inclusion. I think for most of my life people have acknowledged that diversity is important, but it also didn't take me very long to figure out that diversity is not enough. It's not just about counting numbers and having people in the room; it's also about giving people a voice and making sure that people feel included. I think that's where we're still failing.

There's a lot of talk about EDI (equity, diversity, and inclusion) but we're still figuring out how to actually incorporate those into the goals of our institutions, and make sure that they're not just an afterthought. We need to make sure that people with different identities are involved in things from the ground up, and that we don't just try to make them fit in afterwards.

A change I would like to see in psychology and clinical research is making sure that the research serves the people who need it most. I think there's a lot of sample bias in our research, and we make a lot of important decisions based on incomplete data that doesn't reflect the population. I would like to see that same

concept of inclusion applied to the way that we do our research. I think we need to rebuild science to value quality over quantity, collaboration over competition, inclusion over isolation, and equity over ego.

What advice would you give to someone with a similar identity/background to you? What advice would you give to a younger you?

I think it's important to figure out what your values are and to try to live them all while keeping in mind that it's important to stay safe. The two big values that drive what I do in life are to live without fear and to live without hate. For a long time, I wasn't living that first value (to live without fear) because I was afraid of people knowing my whole identity. The advice I would have given myself is to figure that out faster. But I also acknowledge that people come to those types of realisations in their own time, and that's okay too.

Do you have a network/community of people with similar identities/backgrounds? Where did you find them?

Well, that reminds me of another piece of advice I would give to people – to try to find a community. It really helped me figure out my place in the world, and to launch my advocacy efforts.

Again, if you had asked me the same question about five years ago, I would have said 'there aren't any other people like me'—because I think one of the other big issues has been visibility. If

you'd asked me then if there was another bisexual brown man with a turban, I would have probably laughed at you.

I think with my own visibility increasing to a much greater degree than I had ever imagined, I have found that type of community. One thing that was really helpful was social media. When I first got involved in science communication, that was when I realized the importance and value of having a social media presence. That's where I began to see all of these other different communities—scicomm, scientists, queer people—large communities of people who found each other on Twitter and are able to support each other.

Now, almost on a daily basis, I get messages from people with those identities that I never knew existed in STEM, because I am now visible. Having that network and community is a dynamic process, and I'm lucky to be the visible person because I get a different perspective on just how many people do share my identity and background.

What do you think the wider LGBTQ+ in STEM community can do better?

For this question, I have to steal something that I heard at a conference last year. I was at the Communicating Science Conference here in San Diego. Shaun Travers (the director of UC San Diego's LGBT Resource Center) was there, and he said that LGBTQ+ is really a political construct; there's nothing specifically saying that these groups of people have to come together.

Keeping that in mind, it's not really until we hear from someone with each of those identities that we can really achieve change. We need to actually include them, listen to their voices, and try to raise each other up.

I think a lot of times we use this political construct to push forth our specific advocacy effort and leave certain people behind. What our community can do better is to be more inclusive, and do a better job of realising that if you're going to use that label, you need to hear from people from each of those identities.

We need real inclusivity, more raising each other up, and more pushing beyond your specific identity. I think this brings us together as a group of people because we're all minorities, but we need to advocate for each other too.

Who inspires you at the moment?

This is always really a tough question. I just have to open up Twitter and scroll for a little while, and I'll come across somebody who's doing something really inspirational. But as a general answer, I'm really inspired by the people who are able to really integrate advocacy work into their program of research, and really devote solid time towards it.

That's something that I'm still grappling with. I'm a graduate student and that occupies a lot of my time, but I would like to find a way to really integrate the other work that I'm doing, and

not just think of it as a side project or something that I do in my spare time.

One specific person who comes to mind is Ben Britton (who is someone I've come across on Twitter), and I think he does a really good job of integrating LGBTQ advocacy into everything that he's doing.

I participate in oSTEM, here in the US. They have a mentorship program and I participate as both a mentor and a mentee. My mentor is Jennifer Honeycutt, and she is kind of crushing it, so I find that really, really inspirational. She just got a faculty position, she's having a baby with her partner, and she also does a really good job of integrating advocacy into her own research program and research field.

Giugiu Barsuola

Giugiu Barsuola (they/them) is a cognitive neuroscience PhD student working in Cambridge.

Can you tell us about your journey into science?

My Journey into science is probably a little bit unusual, in the sense that I actually started in the humanities. I was studying classics in high school, and then I started philosophy for my undergrad. I was very interested in the philosophy of science, and during the last year of my undergrad, I had the opportunity to go to the States to study psychology and neuroscience, alongside philosophy, science, and a lot of other awesome stuff.

I became fascinated by the brain—how it works, and how our mind and brain interact with one another. I decided to go into cognitive neuroscience for my master's, and that's how I ended up in this field. After my master's, I started my PhD in Cambridge.

How has being LGBTQ+, or any other aspect of your identity, influenced your experience in science?

Being a non-binary, pansexual person in science has, of course, had an impact on what I do. What I do is very important for who I am.

In Italy, at university, it was very difficult to be open about who I am. Things changed when I moved away from Italy, of course. If I

think of my time here in the UK, I would say that it's been really awesome to have the possibility to start engaging in conversations about gender and sexuality in science, especially in my own field. There is this huge debate, for example, about whether there are differences between the female brain and the male brain (spoiler: there's no "female brain", nor "male brain"). Even though this is not my field (I study memory, and we don't look at gender or sexuality), I would say that my experience as a scientist who shares some of these identities, makes me very interested in this. There is a long way to go to debunk these terrible and long-lasting stereotypes, but neuroscientists such as Gina Rippon and Daphna Joel are doing such amazing work in this direction. I have so much gratitude for them!

What changes would you like to see in STEM?

A lot. I would love to see topics such as gender and sexuality being taken more seriously by everybody in the field, not just scientists who belong to these sexual and gender minority groups. A lot of us who are LGBTQ+ are raising awareness about these issues. We're doing events, and organising activities—just to try to get people aware of the fact that we exist and that they should take us seriously. I've met a lot of people in my department, at my university, and everywhere in STEM who are not aware of gender, or what it means to be non-binary. I feel they live in their own science bubble and they don't really engage much with things beyond that—so I'd love to see more people take these topics seriously.

I would also love to see more consistency when it comes to making a department more inclusive. For example, there's no need to ask for gender at most events; if you really need to know, just make sure that you also have gender-neutral options. We need to normalise the practice of sharing our pronouns and asking for pronouns. If, say, an event was being organized, it would be super cool to have a name badge with your name, but you could also put your pronouns on it if you wanted to. If somebody doesn't want their pronouns on there, it would be totally fine, of course.

I would also try to make sure that—at least somewhere in your building—there are gender-neutral toilets. Those are a huge help for many of us.

I would like to see policies related to LGBTQ+ issues. For example, leave of absence for trans people who undergo surgeries or start taking hormones. I've talked with a lot of friends about this, and some of them said how difficult it was to take time off work when they needed it. It was difficult for them because they had to go and talk to each of their supervisors, and HR, but nobody really knew how to deal with it. It would be nice if departments had a clearer idea about what to do in this situation, and how to really take care of everybody's well being.

What advice would you give to someone with a similar background, or identities, as you?

I think it's very important to get a sense of how your identities

are seen and treated in the department lab you're interested in working in. I was lucky that these topics are taken seriously and respected in my department; but I know that there are departments, and people in my field, I wouldn't want to work with because I know they wouldn't respect me and treat me fairly. So I think it's very important that you do a little bit of research about the people you will be working with, especially people in power. In other words, make sure you don't end up working with a homophobe or a transphobe. Sometimes it's very difficult to work that out, but sometimes it's very, very clear who these people are.

Once you start working in a department (which hopefully welcomes you), start looking for other queers. Your journey will be easier, a lot better, and a lot more fun if you know people with similar experiences.

What advice would you give to your younger self?

I would congratulate them on their decision to leave Italy, and go somewhere better. I didn't do a lot of research about the department or the people I was going to work with—in terms of how they treat queer people—so I was lucky to have ended up in a good place by chance. I would tell my younger self to keep a closer eye on these things, and not rely on luck.

Do you have a network of people with similar backgrounds, or identities, as you?

I was very lucky; here in Cambridge, there are many groups for queer people, trans people, and all sorts of identities. In Cambridge, we have lots of colleges within the university, and each college has its own groups—so one can attend any of the events, by any of the groups. Each college also has an LGBTQ+ officer, so it's very easy here to find groups to join, especially if you're a student.

Over the past few years, things have been getting better in the city, not just at the university. For example, I volunteer with an amazing group for young queers called the Kite Trust. There are other groups too—like Queer Women in Cambridge (QWiC), for queer women and non-binary people.

I also found friends on social media, which led me to a network of folks to be with.

What can the LGBTQ+ community in STEM do better?

That's a difficult question because I think we're awesome! I see many of us that are doing a lot for the community.

But there are some things we still need to tackle. The problem is that sometimes it's just very difficult to actually make those changes. For example, it's difficult to intervene if professors are not behaving as they should. It would be awesome if we could intervene—but a lot of times, because of a lack of power, we just can't.

Tell us about your experience of being a non-binary person

having to deal with coming from a country that has an extremely gendered language

When I went to the States during my undergrad, I felt relieved to be in a country where the language is English. English is not a gendered language; it doesn't have grammatical-gender like Italian and other European languages. It was amazing to have the possibility to think, speak, and use a language every day that is not making assumptions about me, or about anyone around me. Using a language that can actually describe who you are, and can mirror your identity is a blast! It's really awesome.

When I speak Italian, or when I go back to see my parents over there, we just don't have the language to express what I mean. It's not just a case of not having terms to describe being non-binary, but also when it comes to describing very simple things. In Italian, you will always be a daughter or a son, and you will always be a sister or a brother. There are no other inclusive terms. For example, there's no "kid", there's no "sibling"—there's nothing that describes things in a non-gendered way. That's very limiting.

My experience with English is very positive—where you have gender-neutral pronouns and titles. I would never want to speak anything other than English, or a non-gendered language, in my everyday life now.

Who inspires you at the moment?

I'm very inspired by, and grateful for, the people at The Kite

Trust. Every time I go there and volunteer for them I feel so grateful. I am so empowered by the youth workers there. They are doing such an amazing job giving these kids a completely different life. They're giving them a place where they can go every week, have a community and have friends who understand them and see them for who they are. It's awesome, and they're making such a difference in terms of these young people's mental health. We are talking about suicide prevention for some of these kids. I feel so grateful to see these youth workers who are so passionate about what they're doing. And I see these young queers just rocking it, and helping each other. Even if they're having a bad week, they are always there for each other, helping each other.

It's so inspiring, and I just feel so happy that they exist.

Javier Armentia

Javier Armentia (he/him) is a Spanish astrophysicist and a science communicator. He's the director of the Planetarium of Pamplona, and he lectures on several courses.

How has being a gay man, and other aspects of your identity, influenced your experience in science?

I have lived quite a comfortable life, thanks to my family and friends. I've been married for 20 years, so it has been quite a stable life in that sense. I've always been accepted, or at least respected, when I was studying and then working at the university, the planetarium, and other places.

For me, the negative impact of being gay happened during my teenage years. We were living in Spain in the 70s. There was a dictatorship, it was a very religious place, and the education was quite terrible in respect of sexuality or gender diversity.

Things changed when I went to study in Madrid in the 80s. Suddenly, I was in a big city, I went to gay bars, and there were gay-friendly people. Spain was changing very quickly and was becoming more accepting of LGBTQ+ people. It was a good time for me. I didn't have a feeling of being disliked and I wasn't harassed in any way, but I was always having to explain myself and that's quite worrying in many respects, especially in the workplace. I felt, and still feel, that all LGBTQ+ people have to put

in all this extra time and extra work, just to feel accepted by society.

What kind of changes would you like to see in science?

I always try to encourage institutions to create inclusive spaces, in terms of gender and sexuality. That has not been very easy. I'm in the science museum field, so we deal with school children and families. We have tried to be mainstream, but I feel that being LGBTQ+ is not exactly "mainstream", and we shouldn't necessarily try to be so. I love being a heterodox, or 'out of the norm' person. I love being myself in science, and I want to have places where people can express themselves in complete freedom. That's not very easy.

In science, we often think that we are driven more by rationality than by prejudices, but that's not true. We have a big gender bias in science, for example. In our planetarium, we have always tried to talk about women in astronomy and to talk about different people from different communities and cultures in astronomy. We talk about Greek myths, but also about Chinese and Inca mythology, to change the Eurocentric view of the world.

Here in Pamplona, we have a growing community coming from Latin America. It has been very useful to include students from these communities at the planetarium, to talk about Inca, Mayan, and Aztec cosmology and myths of the sky, and to talk about their calendars. These students can find several things from their cultures in our shows. For example, when we discuss the Arabic

names of stars, we often have people in the show who speak Arabic, so we can have a conversation and get them involved. We ask them questions about pronunciation and meanings, and we find that this type of inclusion is very interesting for everyone involved.

I plan to do the same kind of thing for LGBTQ+ issues. We have been doing stories about some of the characters represented in the sky—like Pegasus, Perseus, and Andromeda—but we change the stories to modern themes. So it's not just the man who is a hero, who saves the girl, and stuff like that. That has been well accepted, or at least we haven't gotten any complaints [laughs].

When we evaluate workshops and activities, we include a non-binary option when we ask about gender. Nobody has expressed any concern about that, which is good. I know that this is just a little step in the acceptance of these things by society and that it is easier for me to do as one of the bosses of the planetarium.

What kind of advice would you give to somebody that has a similar identity or similar background to you?

I would say that everyone has to think of themselves as a whole person. You don't need to be in any way normative. You can be and feel different, but we are whole people.

I don't have to ask for permission to be myself. If you get worried about my gayness, it's not my problem. We have to encourage people to express themselves as they want. That's very important.

Every day we've got to help people to feel free to be whatever they want to be.

In our workplace, we do not tolerate any kind of hate or anything LGBTQ+ phobic. It's important to be clear that we don't tolerate those things. We have rainbow flags in several places, and I wanted them to be there at the entrance of the planetarium so that anyone coming here can feel confident about being themselves; to make people aware that they are in an LGBTQ+-friendly place. Doing so in public places is important because it allows LGBTQ+ people to express themselves freely. This is important for science places. They have to welcome you to express yourself as you want.

What can the LGBTQ+ community do better?

Here in Spain, we are beginning something with PRISMA (our LGBTQ+ in STEM organisation)[\[1\]](#). We have been dealing with the Science Ministry to write a best practice paper for public research institutions of science and technology in Spain—which was presented in February 2020. All science institutions and universities globally need to prepare these best practice for things such as public engagement, code of conduct, and everything that might need explicit LGBTQ+ inclusion.

We can encourage institutions to work visibility, to create safe and inclusive spaces, and to make public statements on the importance of diversity in science.

We also have to work with the wider LGBTQ+ movement. We are not trying to do anything in science that is different from what we're doing in the rest of society. Another thing we have been trying to do with PRISMA is working with third sector (neither public sector nor private sector) LGBTQ+ groups. Together, we have been working with the Pamplona city council and the regional government to include best practice. It's important that other LGBTQ+ people look to science as an ally. We can be useful in challenging transphobia, so-called "conversion therapy", and ultra-right-wing ideas that are very common in Spain. We have to work together, and we have to fight together because science is not outside the rest of the community.

What advice would you give to your younger self?

The best advice for a younger me is: it will be better. Younger me needed to believe that there would be a future, a better future. Of course, at that time, I didn't know that it was going to be this way. We could have been under a dictatorship forever in Spain—who knew? I needed to believe that a better future was possible: to be a free citizen, to be able to marry, to make a life, to be freely gay. So my advice from the future would be to tell younger me that this better world is possible.

Comparing today with the beginning of the 80s, we have now same-sex marriage and many more rights, but the fight is not over. We have to fight for change, but seeing what has happened

here reassures me about the future. Young people need to know that.

We can make changes, but we have to work for it, and we have to be confident that things can improve. So my last advice for a younger me is: let's go for a better future!

1. Since this interview, PRISMA has grown to several hundred members, and the association is working with science institutions to improve inclusiveness, and with the LGBTQ+ community to elaborate national laws that protect trans people. ↩

Roberto Efraín Díaz

Roberto Efraín Díaz (he/él) is a fourth-year graduate student in biochemistry and molecular biology at the University of California, San Francisco (UCSF).

Tell us a little bit about your journey into science

My journey into science started when I was in high school. I was really interested in psychology because of the books my dad had around the house when I was growing up. I thought that would be my path, my career. In high school I took psychology, and then advanced placement psychology—and in that class, I found myself really interested in neurotransmitters. I really enjoyed learning about how these small molecules, these chemicals, were able to cause large changes in our bodies.

Just thinking about how certain chemicals can lead to you being paralysed, or having a neurodegenerative disease, was really exciting to me. From there, I decided to go to college and study neuroscience. During my time at university, I figured out that I was more interested in protein science, so I decided to focus on that in grad school.

Tell us about how being LGBTQ+, and any other aspects of your identity, have influenced your experience in STEM Fields

At first, I didn't realise it would affect my journey, but as I got

older and further along in my studies—especially when I got to grad school—I started to realise that scientists were also people. That’s something I wasn’t thinking about when I was an undergrad—that scientists also have personal lives, families, and interests outside of science.

When I got to grad school I realised that I wanted to be somewhere that was comfortable for me to be myself. That was really important. It’s hard for me to think about being a scientist without also being able to be open about my Queer identity, and the culture that I bring with me.

What changes would you like to see in STEM generally, and/or research and academia in particular?

I’d like to see mentorship training become a part of higher education in STEM. There are a lot of great scientists who are never formally taught how to mentor someone else, and that can be problematic—especially when training someone from a different background. These scientists may not fully understand how to support someone with different experiences, because they haven’t lived through those experiences. I think that inclusive mentorship is critical because everyone deserves the opportunity to thrive in their pursuit of scientific knowledge, regardless of their identity.

I’d like to see diversity efforts be more self-critical, intentional, and intersectional. Sometimes organizations will praise themselves for initiatives that make small improvements in

representation but virtually no improvement in the lived experience of those marginalized people. It's disconcerting when someone claims to be improving LGBTQ+ representation in STEM, but then you examine their claims and see that all their work is focused on white, cisgender, gay men with very similar experiences. The same can be said for many initiatives focused on gender equity; you can see that the primary beneficiaries of these efforts are white, cisgender women—especially straight women—and I feel like that's leaving out a lot of people who are oppressed by the same systems as white, cisgender women.

Initiatives should not claim to be promoting diversity, equity, and inclusion when they are neglecting Black people, Indigenous people, people of colour, Disabled People, trans and non-binary people, and so many more marginalized identities. We—as an abstract collective of people committed to diversity, equity, and inclusion (DEI)—cannot just support one axis of identity. Support needs to apply to all of the identities that community members bring with them to a shared space. If we're not familiar with the needs of certain identities, then we need to do the work and learn how to support them. Individuals with multiple identities deserve to feel welcomed and supported in all of the communities they belong to.

What advice would you give to people with a similar identity or similar background to you?

I would advise them that it's okay to ask for help, and it's okay to

ask questions. When you don't understand something, when you think it might be a "stupid" question, ask anyway. No one goes into grad school, or any space for that matter, knowing everything. The whole point of grad school is that you're engaging in research, you are there to learn—so if you're not asking questions and asking for advice, what's the point?

Also, don't let other people make you feel like you don't deserve to be there. These past few days, I was recruiting potential students for my graduate program. I was speaking with some undergraduate students, and they remarked 'we're not scientists yet.' I said, 'No! You are. You may not have a PhD, but you're a scientist. So let's cut that out because you have just as much of a right to call yourself a scientist as someone else does. You're here to interview for a graduate program, so clearly, we believe that you have the potential to continue on.'

People can make us feel like we don't belong, that we're not smart enough, or that we're not good enough—but we are—and we have as much of a right to be here as they do.

Do you have a network, or community of people with similar identities? And if so, where did you find them?

I have two networks for connecting with other Queer people. One of them is a group at my institution called the Graduate and Postdoc Queer Alliance ([GPQA](#)) that connects graduate students, postdocs, and anyone else who feels like they want to join. We have faculty and staff members who also come by. I found that

that was a really great way to build community within my institution. I made some pretty good friends that way, and we've done a lot of cool work. We've also had social outings where we relax outside of work, and I feel like that's also been a really nice way to build community.

Another way I've built a community for myself is through Twitter. Even though Twitter can be a bit of a shitshow sometimes, it has introduced me to a lot of great people. Some of the scientists I look up to the most are people I've met through Twitter.

What can the wider LGBTQ+ community in STEM do better?

I think outreach to high schools and colleges is very important, especially to encourage people to pursue advanced degrees. I feel like if I had met someone who was Queer and a scientist when I was in high school, that would have helped a lot. I'm sure other people feel the same way.

Even in college, I don't remember meeting any Queer scientists until the very end of my studies. It is very important to do outreach and be visible, which is why I think projects like 500 Queer Scientists are important for changing the face of STEM. But I think that it also goes beyond just visibility. We need to do engagement and provide resources to help people actually make it to that stage. It can't be a case of, 'I'm here, now you figure out how to get here'—it has to be more like, 'I'm here, let's work on your application together, and let's help you get to this next stage!'

What advice would you give to your younger self?

Not to worry so much. I feel like I worried a lot about where my life was going, what my next step was going to be, and when that was going to happen. Was I on track? Was I on time? I was very stressed out about all those details and, in reality, it's not like that.

I switched labs during my undergrad three times. I worked on three different research projects at the same university. I thought, 'Oh no. I'm supposed to stay in one lab for four years, then go to grad school'—but that wasn't what happened for me. I still went to grad school. I would say to worry less and just enjoy the experiences a little bit more.

Who inspires you at the moment?

One person who inspires me, and who I look to for a lot of support, is Dr D'Anne Duncan. She is the Assistant Dean for Diversity and Learner Success here at UCSF, and she's been instrumental in helping me become a more effective activist. She is also a great advocate for meaningful changes within academia.

Another person is Dr Iris Young. He's a postdoc in my thesis lab who has taught me how to keep fighting, even when it seems like there might not be any way to win. He doesn't give up on what he believes in, and I really admire that.

I'm also inspired by the work of Pride in STEM; and the work that Dr Lauren Esposito and Sean Vidal Edgerton do with 500 Queer

Scientists. There are also a lot of other people that are trying to make a difference in one way or another.

Yan Tsou

Yan Tsou (she/her) is a cancer research scientist for CRUK at the Crick Institute in London.

Tell us about your journey into science, especially in your field

At university I studied medicinal chemistry, but, as it turned out, there were not that many jobs—unless you went into research for pharma companies. There were loads of graduates going into that field, and I didn't feel that was something I wanted to pursue. So I did a short stint at Charing Cross Hospital, in a tiny Melanoma Unit that was run by a friend (who has since passed on). I learned about growing cells and cell culture, sterility testing, and all the rest—which was invaluable.

Then I found a job at the original Imperial Cancer Research, and that was my first proper full-time job. There I learned a bit more about cell culture, and I was there for a little more than two years. From there I went on to work for Bio Products Laboratories, because I wanted to learn PCR (Polymerase Chain Reaction) and molecular biology.

The bulk of my work over the last 20 years has been on molecular PCR. Byproducts Laboratories was testing blood donations—which was relatively new at that point—and we were doing PCR testing for hepatitis C. The project was rolled out nationally across the UK, so we were testing the NHS (National Health

Service) blood donations for hepatitis C. I transferred from Byproducts Laboratories to the NHS Blood Transfusion Service and worked there for about 15 or 16 years. Then there was a reshuffle of staff, and I got made redundant.

Within about a month of being made redundant I found a job at Public Health England during the swine flu epidemic (we were testing for swine flu with PCR). After that, I found a permanent job at the mycobacterium tuberculosis Unit (the TB unit), and I was there for six years. So I've moved around quite a lot.

In 2017 I bumped into my old boss (from Imperial Cancer Research) on the train platform at Finsbury Park, and I told her that I was leaving my role at the TB unit. She wondered if I would like to join her team again—and so I've been there ever since. I think I've probably found my forever job now...as long as they don't kick me out!

Has being LGBTQ+, or any other aspect of your identity, influenced your experiences in STEM?

At the beginning of my career, I wasn't out—but that wasn't because I was afraid to come out at work, but because I didn't think anyone at work would have cared. I chose not to come out.

It wasn't until I was working for the Blood Service, and I was with a partner that I wanted to spend the rest of my life with, that I told people about my partner.

I've been lucky because I haven't felt held back at work because of

my sexuality, or any other aspects of my life. The NHS is very welcoming in that sense; if you're not married, you can nominate someone for your pension, because the NHS pension is pretty good. I was able to nominate my partner (even though we didn't have civil partnerships yet) in case anything happened to me. They were quite happy for me to nominate a woman, and to state that she's my partner. If anything should happen to me, she can get my pension. So I think in that respect, it was quite eye-opening to know that we were allowed to nominate a same-sex partner.

I subsequently married her, and we've been together for 19 years.

What changes would you like to see in science?

Our department has a great open-door policy, and also a no-blame policy. When you work in research, mistakes happen. Policies like these allow you to just be more open about mistakes. I've been in really good labs where you're not afraid to report something. I found that way is more productive because you can nip a mistake in the bud. I've been lucky enough to work in a lot of different labs, but I've stayed longer at those that have a no-blame culture because I've been happy working in a completely honest environment. I'd like to see the no-blame policy become more commonplace.

What advice would you give to your younger self?

I don't think I would change a thing. What I've been through has

sculpted who I am, and I look in the mirror today and I like who I see. You have to go through all that crap to get to this point. I will never tell them spoilers because they have to find out for themselves.

I don't think it's ever been that hard for me in terms of being LGBTQ+, being a woman, or being from an ethnic minority. Again, I've been very lucky. The environments I've worked in have all had a zero-tolerance policy on discrimination.

When I was young, I experienced things in public that I wouldn't tolerate in my workplace —especially if I'm in charge. I'm not in charge at my current job, but my boss is hot on that as well. This is why I don't feel like I've been discriminated against in any way —because they're so hot on it. They are so good at nipping in the bud before it happens. So my younger self is going to look forward to working in such a supportive environment!

What do you think the LGBTQ+ community in STEM can do better?

The last time we had an LGBTQ+ in STEM event at the Crick we had talks aimed at the public. Marian, my wife, came along. She's not a scientist, and she said it was such a great event. It was truly a safe space for science and for LGBTQ+ stuff. I know I feel completely safe and confident in my own skin, but there are people out there who don't necessarily feel the same way. So to provide that environment, where it could be the first time they've even approached any sort of LGBTQ+ group is important. It's also

great that the focus is mostly on science. Usually, we only have clubs and bars designed for our specific needs, and it's quite daunting.

I spoke to one guy that had come from San Francisco. He was just visiting the city and saw the event advertised. He just turned up, he sat with me, and we talked. He just turned up on his own! I think those kinds of things can only help to promote our cause.

I also knew a lot of straight people who just turned up and listened to the talks, and were thoroughly entertained.

Who inspires you at the moment?

My colleague Mali, who I've known since college (since we were 16). We went our separate ways for a while, but now we are back working together. We work together every day—and we inspire each other, we bounce off each other, and we make ourselves better versions of ourselves. Another obvious person is Marian (my wife) because you should always be with someone that makes you the best version of yourself.

Sebastian Groh

Dr Sebastian Groh (they/he) is a vertebrate palaeontologist, working as a research associate at University College London (UCL).

Tell us a little bit about your journey into science

I'm one of those people who always knew they wanted to be a scientist, even as a little kid. When I started school, I wanted to be an astrophysicist. When I learned that astrophysics was more about modelling and less about going into space to look at stars, I realised it wasn't what I wanted to do.

I also liked biology. I've always really liked fossils. I used to go fossil hunting when I was little because I lived in an area that had lots and lots of different fossils, so I did my undergrad in biology and I did a master's in evolutionary biology. I was lucky enough to find a really awesome palaeontology PhD, so I did that and I stayed on as a postdoc and lecturer in the same department.

How has being LGBTQ+, or any other aspect of your identity, influenced your experience in STEM?

I organise and teach three different modules in my department. The hardest part of this is that every time a new year starts, I write a welcome email to introduce myself to my students. I write in the email: 'By the way, I'm trans and my pronouns are he/they,

so please respect these pronouns. If you have any pronouns you'd like me to refer to you with, or anything you would like me to be aware of, please let me know as well.' So before those students have even met me in person, they already know I'm trans. I just want to get that out there, and to get any questions out of the way.

This means every time I walk into the lecture theatre, I feel there is going to be a lot of scrutiny. My body is going to be scrutinised, and the way that I behave is going to be scrutinised. I imagine quite a few students have never met an out trans person, and it's always terrifying every single time. Although, I have to say that none of the students has ever actually misgendered me (to my face), and I haven't gotten any harassment over the three years I've been doing it—so that's been good.

Another difficulty is the culture of the department. For me, being trans and being a scientist are intertwined. A lot of people ask: 'Why should we care about who the scientist is, and what they do? Why don't we just look at their science?'. In today's climate where trans people aren't always accepted, a trans person doing science is in itself a political act. I've had people tell me on Twitter, for example, that they can't take me seriously anymore because I'm a trans scientist. That somehow invalidates the entirety of my work. On the other hand, I gave a lecture a few weeks ago and someone came up to me afterwards to say 'hey, I'm also non-binary and I've never seen or known of non-binary people past PhD level staying in academia – and it's really cool to

see, thank you so much'. It's quite interesting to have people say 'Hey, you exist? That's pretty cool!'.

There are a lot of barriers to trans people in science. You are always aware that people will look at you differently because you're trans. I am also on the autism spectrum, so social interactions are already really difficult for me. If people are weird about me being trans, it all adds up and it's exhausting. I work from home at least two days a week because otherwise I just can't do it.

What changes would you like to see in science?

It's important to change the opinion that the scientist behind the science doesn't matter – not just for LGBTQ+ issues, but also for race issues, disabilities, and so on.

I think organisations should raise awareness that trans people do actually exist, and let people know what they can do to make our lives easier. There are tangible things people can do. At conferences, for example, I'm always very happy to see badges with pronouns, for cisgender and transgender people alike. We can also put our pronouns into our email signatures. We can offer gender-neutral toilets. Thankfully, my department has one gender-neutral toilet up on the third floor, but it's used by 30 people so sometimes it's quite hard to go to the toilet because there's a queue.

I've been at conferences wearing my pronoun badge and people

have still very pointedly referred to me as 'she'. If people were aware of how harmful stuff like that is, I believe they might be more willing to put some effort into being more respectful. We need to teach people that if they see a trans person getting misgendered, they should maybe step in, rather than let them do all the work. I feel like these tiny things can make quite a difference.

I'm involved with the LGBTQ+ group here at UCL, and we are currently looking at the process of changing titles on emails. The UCL system automatically stores titles, so if you don't have a PhD it's not easy to change to a gender-neutral title like Dr. We want to correct that.

What advice would you give to people with similar identities, or background, as you?

Science and academia are hard, so try to find like-minded people. I'm part of a network in the US (that I co-founded with a lovely trans woman) called Trans in STEM, and we have a closed Facebook group so we can talk about our experiences.

Surround yourself with transgender friends. It makes it a lot easier when we get together to talk about all the shit that goes on. I'm convinced that it's never going to be super easy, at least in my lifetime. I would be glad to see more change in my lifetime, but I don't think I will ever be super accepted. So try and find a group of friends that you can be yourself with.

See the small victories. Don't just think of every time that you get misgendered, but focus on every time someone gets it right. I try to see the positives. I hold on to that time a person told me how great it was to see a trans academic.

Finally, be spiteful! Every person who gives me shit for being a trans scientist makes me want to stay in academia, just to piss them off.

Tell us about how you set up Trans in STEM

It came about on Twitter. I took over the Real Scientists account (@RealScientists) for a week, and I was talking about being trans in STEM. Somebody else was like, 'Wait, you're trans and in STEM? That's really cool! I'm a trans scientist too! I didn't even know there were so many. There should be some kind of network for us to connect'. And I said, 'There should be! Do you want to make one?'. That's basically how it happened.

We have a Twitter account ([@StemTrans](#)), and a closed Facebook group with over 100 members—all transgender people in STEM. We have students, staff, and even people who are interested in going into science, from every walk of life. We even have professors! With everyone in there, you get that feeling of community, and it's amazing. We've done a few Twitter campaigns, including one for Trans Day of Visibility which had an amazing response. We are facilitating connections between people, which is important.

Offline, I am in the cosplay community. There are a lot of people in the cosplay community who are trans. We really do find each other. It's often quite easy to find people who are into the same hobbies as you. Even if they're not working in the same area as you, it's just as important.

What can the wider LGBTQ+ community in STEM do better?

Kick out the TERFs (trans-exclusionary radical feminists).

Normalise things like asking for pronouns and supporting your trans colleagues. If you see someone getting misgendered—whether it's online or in the real world—step in and say something. Help take some of that burden off our shoulders. Instead of us trans people having to educate others about our identity all the time, step in and lend a hand.

We need more solidarity. In my opinion, one of the biggest things that makes it harder online is seeing so many LGBTQ+ people remaining quiet after seeing hateful tweets against trans people. It's like they are saying 'this doesn't touch us, we're not trans'. We need everyone to help push back against the hate and to keep pushing for changes to make STEM more inclusive.

What advice would you give to your younger self?

Get into therapy. Don't wait until you're 24 to go to therapy [laughs]. Don't feel upset because you are trans. You are not a bad person, you are just trans (and autistic, by the way)! Keep going,

stop working so much, please take more time off, and your parents do mean you well.

Who inspires you at the moment?

There are a couple of senior trans scientists that I look up to: Clara Barker from Oxford is a chemist, and she's fantastic; Izzy Jayasinghe is also really great. I do sword fighting on the side, and one of my instructors is a trans woman. She's just so kick-ass and so awesome. I would love to be more like her.

I'm inspired by people who keep on going despite all the odds being stacked against them—especially in today's world, where there's so much stupid shit going on.

Jeremy Yoder

Dr Jeremy Yoder (he/him) is an assistant professor of biology at California State University Northridge, which is in greater Los Angeles. He studies species interactions—particularly mutualisms (the coevolution of species that interact with each other in mutually beneficial ways). He has studied specialised pollination interactions between yuccas and yucca moths, and he has worked with a model legume which is widely used to study legume-rhizobium nitrogen fixation symbiosis.

Tell me about your journey into STEM

I don't think I had a particularly unusual path. I was a bookish middle-class white kid, and science was always an easy and interesting subject for me in high school. I then went on to do my undergrad in biology, thinking I was going to do pre-med. (which was the family trajectory). After my first year, I switched over to environmental science—It was still biology, but it was a biology track with an ecology focus, so I didn't have to take human anatomy and physiology.

I went to a fairly small, out of the way undergrad institution; I had a little bit of research lab experience there, but there wasn't a great deal of opportunity that way, so I graduated without a strong sense of how one got into doing science.

I thought graduate school sounded interesting, so I spent a year

working with the field ecology department in a land conservancy in Pittsburgh. I finally had the experience of meeting folks who had recently been in graduate school or were somewhere in that process. I did the thing that you're supposed to do: I read papers I was interested in, and I started contacting professors who were publishing things that looked like what I wanted to spend five years studying. One of those professors became my PhD advisor on the work with the yucca—yucca moth pollination mutualism. Specifically, I worked on population genetic and morphological differences of a yucca species that is pollinated by two different pollinator species, the degree to which that sets up meaningful reproductive isolation, and how that happens.

Can you tell me about your experience of being LGBTQ+ in STEM, especially early in your career?

I was raised fairly conservatively. I didn't have any meaningful exposure to the existence of queer people, much less have that all figured out. I didn't make my first proper gay friends until graduate school—and then I came out. In general, science has been a very friendly place for me in that regard.

I knew queer folks in the field in quite senior positions well before I was ready to articulate that for myself. Evolutionary biology has Doug Futuyma, who has been openly gay since the early '80s. He has done a lot of different things, but he also works in species interactions and some of his work is foundational to my research. He also wrote one of the widely used textbooks in

the field. We also have Joan Roughgarden, who worked in foundational evolutionary ecology, and came out as trans in the late '90s. She wrote one of the go-to books for an overview of the diversity of sexual behaviour in the animal kingdom, *Evolution's Rainbow*.

You then began to use the tools of science to support other queer scientists. How did the Queer in STEM work come about, and can you tell me a bit about that process?

In 2013, people were starting to think quantitatively about the value of diversity in scientific careers. There was essentially no data on LGBTQ+ folks, and this is still the case in many respects.

A lot of the mechanisms that we have in place for understanding minority representation in scientific fields just don't include sexual orientation and gender identity. In the US, the Science and Engineering Indicators report—which is a National Science Foundation (NSF) sponsored survey of different features of the US scientific workforce—looks at things like the representation of women and racial and ethnic minorities, but they don't ask about LGBTQ+ identity. I knew a lot of gay men in evolutionary biology, but that's a highly non-random sample for obvious reasons. I was thinking a lot about this quantification issue— that we didn't even know what LGBTQ+ representation looked like in science.

One night I was spending another fruitless round of Google Scholar searching, not coming up with any comprehensive information. It occurred to me that an online survey could help

answer even some of the basic questions. I thought about it a little bit more and realized I knew someone who did that kind of work—Allison Mattheis, a social scientist who looked at queer things. She was right at that magical stage of PhD preparation where you are kind of sick of your doctoral project and want something else to do, so I contacted her because I wanted her to consult on this idea.

She said this would be publishable, and she was happy to walk me through the institutional review board (IRB) paperwork—that’s the formal ethical approval for research involving humans. She worked with me to design a survey instrument that was appropriate, used current terminology, and handled tricky questions as well as possible. We set up the survey online, put up a quick website, and spread the word over social media. We had a really good response, and the rest is in those publications.

After we published that first paper, we were approached by Joey Nelson, who was finishing up his PhD in geophysics at Stanford at the time. He took the lead in designing and conducting a second survey where, among other things, we explicitly recruited straight folks to answer some of the same questions that the LGBTQ+ respondents did. That would give us a sort of control group comparison with that data set. The results have been perpetually “six months away from publication” for a while! There’s some interesting analysis, but nothing that’s quite at the final phase yet.

From that first analysis, did any of the results surprise you?

I think it was a little surprising, based on my personal experience. The sampling design didn't let us get at what you might call the key question: how many LGBTQ+ folks are there out there. What we did do was establish that queer folks are out there—and the range of STEM fields that folks are working in looks pretty much like what you'd expect to get from a random sample of the scientific workforce. The headline result was that a lot of people were effectively in the closet at work. (We asked people to rate their openness about their LGBTQ+ identities in personal, professional, and classroom contexts. The overwhelming majority of folks who responded were out in their personal lives, but about 40% were not out in professional contexts). That was contrary to my personal experience, but it is pretty consistent with what's been seen in broader surveys of the US workforce.

About a year after ours, the Human Rights Campaign did a US-wide survey that got a fairly similar result.

Did you learn anything that could help us improve STEM for LGBTQ+ folks?

In the initial survey, we asked about some very broad features of workplace climate: Do you feel safe? Do you feel like LGBTQ+ folks are treated the same? We found positive associations between that openness rating and workplace safety and climate descriptions. That's maybe not surprising, but a good thing to have the numbers on. We found a pattern in the first survey—

and I always try to caveat this by stressing that the strength of it is dependent on exactly how you do the analysis—but there does seem to be a positive association between the representation of women in a given scientific field and the degree to which folks in our survey said they were ‘out’ in a professional context in those fields. (This has recently been shown in a much larger study of US Census Bureau data: [Turing’s children: Representation of sexual minorities in STEM](#)). The takeaway we got from that is that it seems if you’re working in a more diverse context, along any dimension, then it makes it easier to be yourself—at least in principle. It is a nice idea; that maybe diversity is non-additive.

Since then, there is a team (Erin Cech and Tom Waidzunas) who have been working with institutional partners through NSF, and they now use another kind of survey design. They have been able to work with organizations like US government national labs to send surveys to everybody in the organization. These surveys ask about identity and workplace climate. Among other things, they can come up with something approaching a good estimate of LGBTQ+ representation in these big organisations, because they’re taking a population-wide sample. And they do see numbers that suggest under-representation; and of course, that will vary with which aspect of the LGBTQ+ umbrella you’re talking about. They also find a lot of folks who are not open in the workplace.

There was a really good longitudinal study released by Bryce Hughes—tracking student retention in science majors and

undergrad settings—that found reduced retention for LGBTQ+ students. That’s probably the nicest direct study we’ve seen in the field yet. That study is also super interesting because they found different results for gay and bi men, versus gay and bi women: Queer women were somewhat more likely than straight women to retain in STEM fields, but queer men were driving the overall effects for the LGB group. This suggests that what we’re looking at is some sort of gendered association with STEM: if you’re a Masculine of Centre woman, you’re conforming somewhat better than if you’re a Feminine of Centre man.

You’ve done some very important work. What would you like to see other people do with it?

I think it continues to be valuable just to establish that LGBTQ+ people are out there. In the past, one of the challenges when advocating diversity initiatives was that you would frequently have some people say: Well, how do we know these folks are even out there, or that we need to do anything about this?. So it’s always useful to establish that there is a real population of people who are being impacted or helped by particular policies.

One of the next-generation things that the Queer in STEM project has been working on is a release version of our own question sets (the basis for the survey that we’ve collected data on). The goal is that folks can take that as a starting point and modify it to their own ends; but also collect data in a way that would let them make fairly direct comparisons with our large-

scale studies. That way you can see how, for example, the experiences of LGBTQ+ people at your university campus compare to the US overall, or to the somewhat international perspective you get from the original Queer in STEM study.

What advice would you give to somebody who wants to use their scientific skills to support LGBTQ+ people in STEM?

I would say a couple of things. Firstly, partnering with social scientists is really valuable. I could not have produced work that stood up to peer review if Allison Mattheis hadn't said yes and been super excited about the project.

Also, there seems to be short term memory failure sometimes in queer activist contexts. Activists should bear in mind that it is worth using what other people before you have already done as a foundation, instead of starting from scratch. Generally, folks are always excited to extend the reach of existing projects and build broader coalitions.

In the context of folks who are working in the sciences and who are thinking about these issues, it's great to add this kind of stuff to your portfolio. I do think it's helpful for personal mental health, but you do also want to think about where this fits in the context of what you want to do more broadly in the field. Projects like Queer in STEM are time-consuming, and how you balance that stuff is worth thinking about—especially if you're at a career stage where your CV is getting reviewed a lot by senior folks who have

come up in an era when it was not usual to have side projects like this.

Indeed. At PhD level, that time is needed to develop research skills, and become an excellent scientist.

Early career is a great time to figure out the mix of stuff that you want to do as a scientist—but it's also the time when you want to be really clear about why you're contributing, and how it fits into what's already out there.

Mario Pizarro Rojas

Mario Pizarro Rojas (they/them) is currently a graduate student in biochemistry, and slowly transitioning into education, and science and technology studies. They are also a science educator.

How did you get into STEM?

I'm surprised I didn't become an entomologist, because as a kid I loved playing with bugs (the ones that wouldn't bite or sting me). I was always interested in how they work, and just how life existed.

As I went through high school, I learned about molecular biology and genetics. For me, genetics made sense. My whole life, I'd been asking how life works, and I knew this is what I wanted to study. I went into undergrad as a pre-med, like a lot of biology students in the United States. I loved biology and, growing up in the United States, I feel like you have three options: you become a successful business person, a lawyer, or a doctor. I thought doctors were closest to science, so I would do that. Then I went into undergrad in 2010, learned about research, and said goodbye to the idea of being a doctor.

I got involved in research in the third year of my undergrad. I joined a lab in the dental school, where we worked on the oral microbiome and on the different species that live in your mouth

and cause disease. I decided that I liked research and was going to stick with it.

What made you interested in science and technology studies?

In high school and during my undergrad, I was very involved in social justice issues. As an undocumented immigrant in the United States, I had to understand my place in this country, how systems of government dictate the way my life is going to be, and how I navigate these different systems of oppression.

During my undergrad, I always felt like I was part of two spaces: I was either in my STEM bubble or in my “radical students” bubble with other undocumented students or students involved in other social issues such as racial injustice or gentrification. I was navigating between those two spaces. If I was with my STEM peers, I would be “the radical kid”; and if I was with my “radical” student peers, I would be “the STEM kid”. I never found a place where I could combine the two identities. I hoped there was some way I could have a love for science, but at the same time be critical of it. A couple of friends told me about this field called science and technology studies, and I started looking into it. I could see my background in social justice work in science, and I wish I knew about it when I was an undergrad.

How has being LGBTQ+ and being undocumented influenced your experience of studying and working in STEM?

In the United States, there are programmes to help folks who are

low income or from marginalised communities. My immigrant status prevented me from being a part of these programmes. Unfortunately, they are only for US citizens and permanent residents because they come from federal money. Because I'm undocumented, I'm not allowed access to that support, and so I always felt that I was ten steps behind the rest of my peers. It wasn't because I didn't put the same effort in, it was that these barriers were preventing me from getting further. My peers had these other opportunities—and I'm so happy that they had them—but it put them way ahead, and so I had to try and catch up as much as I could. That's definitely one of the first things I associate with my experience in STEM and being undocumented.

As for being queer, I wasn't "out" until after my undergrad, at least within STEM spaces. This was mostly because I wasn't sure how I was going to be received. I didn't know if I was going to be othered, or if I would be tokenised. I think that's another thing that I got so tired of. When I would express being undocumented, people would say 'we understand' (they didn't), 'we're here for you', and 'we would like you to be the face of a campaign'. But those were just words. Even though my lab supervisor was an out gay man, I still was not ready to be out within these spaces because I thought I would be viewed differently and treated differently, due to how the rest of society others us.

What changes would you like to see within STEM workplaces and educational spaces?

I've been really thinking about this whole idea of what a safe space would be. I would hope that any workspace, whichever STEM field you are in, could be a safe space for queer folks to be themselves. I don't know what that would look like. For me, it would be a place where I could share that my pronouns are they/them/theirs, and where people would get used to those pronouns and not use he/him/his. Something as simple as that would go a long way.

To create safe spaces within STEM, we need to have conversations in the right way, with all of the people who should be at the table and to question the state of STEM. It should go beyond the idea of encouraging LGBTQ+ folks (or people of different minorities) to be part of STEM, and ask how we can restructure STEM to make it a better space for LGBTQ+ folks.

How do you think that the community of LGBTQ+ people in STEM can do better?

I feel so happy that in the past few years we've had this huge movement of LGBTQ+ folks in STEM. At least on Twitter, my timeline is dominated by 'Queer in STEM' folks, and I love it. But I think that if we're going to come together as a group, we need to uplift the most marginalised within that group. This goes to any other movement, and not just ours.

We need to uplift the narratives of trans folks and trans scientists. I feel like we don't have enough of that within the movement. Our community is made up of multitudes. We're not a

monolith. We need to take a step back and ask: whose stories do we need to uplift the most? Whose stories need to be told? That's what you are doing with this project, and I think it's great.

Who inspires you at the moment?

Honestly, my community inspires me every day. I grew up in the greater Los Angeles area here in the US. I love Los Angeles, and I love the people. There's a huge movement right now fighting against the gentrification of Los Angeles, of the low-income Black and Brown areas. Seeing that inspires me.

If someone is reading this book, and they identify with your story, what advice would you offer them?

I would say, trust your heart. It took me a while to be where I am right now; to be comfortable with my identity, and to be comfortable with the choices that I make—which was mostly because I didn't trust myself. I always chose the idea that fulfills The American Dream, which is a myth. I tried to please others, or to give answers that I thought the other person wanted to hear. I hope that whoever reads my story takes this concept of trusting your heart and doing what aligns with what you want to do in life. That has allowed me to navigate the world so much better—still with a lot of stress (because this world is a mess) but feeling more comfortable with myself and with the decisions I make. It has lifted a huge burden that I carried for so many years.

Beck Strauss

Dr Beck Strauss (they/them) is a non-binary and transgender planetary geophysicist—who studies the magnetic fields of the Earth and other planets, and how they are recorded in rocks and minerals.

Your work sounds incredible. Tell us a little more about your research

The field that I work in (planetary magnetism) is essentially about understanding the magnetic fields of the Moon, Mars, and other bodies—not just in our solar system, but outside of it.

I specifically focus on the inner solar system terrestrial planets: Mercury, the Moon, Mars, Venus (teach the controversy!), and the Earth. What people with my specialisation do is look for records of past magnetic fields on these bodies. We are interested in the ways that magnetic fields have changed over time—over millions and billions of years—and we can often find records of those changes in rocks that we either collect from another planet or find on Earth as meteorites. By way of example, I did some previous work during a postdoc where I had access to samples (three basalts that were brought back from the moon) from the Apollo 12 mission. I got to hold them in my hands and prepare these samples to pass through a variety of magnetic sensing devices in order to figure out if they held records of an ancient magnetic field on the moon (that would have been recorded

about 3 billion years ago). This manuscript has just been published in JGR: Planets.

That's just one example of the kind of things that we do; we use the records in physical objects to tell us about billions of years of history on other planets.

Would you mind telling me a little bit about your journey into science?

I had never really intended to be a scientist when I grew up because I was artistic as a kid. I was into music, drawing and sketching—and I went to college thinking I was going to be an English major because I liked reading. I went to Oberlin College in Ohio (US), and I took a couple of English classes and I didn't like it at all. Then I got a letter from the Dean of the College telling me I needed to declare a major—now!—and the only class that I had taken at the time that I didn't loathe was a geology class called Coral Reefs: Biology, Geology and Politics. I took it because I needed to fulfil a credit requirement, and the only part of that class that I didn't zone out during was when the professor was talking to us about why coral reefs are located where they are around the Earth. He was talking about ocean currents and temperature, and the way that water moves around the continents, and then this led to the subject of plate tectonics. He was describing how the subcontinent of India slammed into Asia, and how the Himalayas are still growing today. I thought that was the coolest thing I had ever heard, so I declared a geology major,

and then took the formal introductory geology class. I got really lucky to take that intro course with a professor who, if science hadn't worked out, could have been a stand up comic!

From there, I started taking more geology classes, and I got interested in doing research. I was able to get my degree, and also do a research project that brought me to the University of Minnesota. I did a summer internship there as an undergrad, in a research lab focused entirely on rock magnetism, called the Institute for Rock Magnetism. It's funded by the National Science Foundation (NSF) and has visiting fellows, student scholarships, and essentially a giant suite of instrumentation that makes it a centralised hub for a lot of people from other places to come do their research projects. I had a really fun time working there over the summer, so I decided that I wanted to apply for grad school there and try to continue doing work in that program. One thing that I like to note when I tell these stories is that I, as an undergrad, didn't know that I could go to grad school—because I thought that grad school in the US was something you have to pay for, and I didn't have money to go. But I was at a party, and someone overheard me saying, 'I don't think I can afford to go to grad school', and they leaned over and said, 'you know, in the States, if you're in STEM fields, they'll usually pay you to go to school'. That was totally life-changing for me because I had never heard that before. My parents are not scientists, and professors don't necessarily know that their students don't have this information, so now I try to make sure that I tell undergrads: If

you want to go to grad school to do science in the States, they will usually pay you to do it.

I was at the University of Minnesota for five years, doing my PhD thesis on the characterization and modelling of materials responsible for rock magnetism. I did half of my thesis on terrestrial magnetism (rocks from Earth), and half on planetary magnetism (rocks from Mercury). Now, we don't have any rocks from Mercury—there are no samples of Mercury on Earth, so all of the research that I did for that project was based on looking at orbital data from the Messenger mission, and trying to figure out what kinds of magnetic minerals could be present at the crust of Mercury in order to hold the records of magnetic fields that we could observe from orbit.

I defended my PhD in 2016, and I did my first postdoc at Rutgers University, which is where I got to work with the Apollo samples. Then I did a second postdoc at the National Institute of Standards and Technology (NIST), which is a federal government research lab. In the US, NIST is the agency that determines standards for measurements—things like how long a metre is, and how heavy a kilogram is—and they coordinate with agencies around the world in order to make sure that scientists everywhere have access to the same fundamental units of measurement, and that we're all on the same page when we do our research.

I recently started working at NASA Goddard Space Flight Center,

where I am part of an interagency agreement with NIST, to do some related research for a couple of groups that have more space science applications.

You must work with lots of different types of researchers. What are the main disciplines that you work with?

I tend to describe myself as someone who sits at the interface of science and engineering. I'm interested in fundamental technical questions, and methodology, as the groundwork that underpins a lot of exciting scientific research.

I do very basic stuff, which means I work with a lot of material scientists, chemical engineers, and mechanical engineers. When I do work in the lab, I love having electrical engineers around because I'm not an electrical engineer, and I love not getting electrocuted! I do a lot of work with a variety of geoscientists—from Earth scientists to planetary scientists. Anybody who's ever cared about a rock is definitely somewhere in my collaborative network. I'm currently working in an isotope geochemistry lab half-time, so I work with a lot of argon-argon and potassium-argon dating people (and they're very valuable for magnetics research because they're the ones who tell us how old the records that we found are). I also work with some planetary magnetospheres people—folks who study magnetic fields but are not geologists. I also work with people who are into communications and policy, because the research that I do—while it doesn't necessarily have major implications for people's

everyday lives—is cool, exciting, and fun, and that’s sometimes a challenge to communicate effectively. I like working with researchers who are outside of my sub-discipline, because, number one: that’s where all the best ideas come from—from people who haven’t been thinking about the same thing as me for a decade—and, number two: being able to get people excited about something that, for a lot of folks, is terrifying, is very powerful. (When I say terrifying, I mean magnetism is notorious for being a challenging thing to understand and effectively apply, but if I can get people who have never thought about physics before to get psyched about magnets, that’s the best day of my week.)

How has being part of the LGBTQ+ community—or any other aspects of your identity, your experience, your background—influenced your journey through STEM?

I think that being part of the LGBTQ community, or just being queer myself, played a pretty big role in determining what kind of research I wanted to end up doing. When I was in grad school I was in an Earth Science department that was totally fine, people were very nice, it was a very collaborative department with a lot of social events—but I always felt out of place there. One day I had a meeting in the chemistry department, and as I was walking down the hall of their department, I noticed that every single professor’s door had a little rainbow flag sticker on it stating that they were an LGBTQ+ ally. That was very strange to me; I just assumed that this was something that wasn’t done at my

university because I hadn't seen that in my department. I got to talking with a chemistry professor who was very encouraging with my research; they asked all these really good questions, and I felt so comfortable being in their department and in their office just chatting about the way my work was going. From this, I got excited about collaborating with the chemistry department, and I got two or three papers out of the relationship that I was able to strike up with that professor and with their students.

This made me start thinking about the way that I choose what I want to research. Part of it is what I'm interested in objectively as a scientist—but the other part of it is where do I feel comfortable, welcome, and able to be the best version of myself?

The other place that this started showing up was when I was thinking about what parts of geology I was interested in. I would go to conferences, I would go to various American geoscience societies and present work, and meet with collaborators, and again, it was totally fine. Everybody was always very nice, it was a very collegial environment. But then I went to a planetary science conference—and all of a sudden there were people with rainbow pins on; people had pronouns on their name tags; there were a lot of younger people; there were more diverse people; and there were a lot of cool-looking people with fun haircuts, and people were wearing clothing with space prints. I looked at all of this and thought, wait a second...people can be actively excited about the work that they do, in a way that makes me feel like I'm not totally out of place?! That's cool! Maybe I want to be a planetary

scientist. I've always been excited about space, but this made it easier for me to choose when presented with options between research topics, the ones that would bring me closer to this community where I already felt welcome—because the infrastructure was in place before I got there. That's been a really big deal for me. I've found that I'm a happier, more productive researcher—but also a happier, more functional person—when I'm able to focus on the science that I'm here to do, and not have to worry about perceptions and being taken seriously, just because my identity is perhaps a little unexpected to some people.

You've done a lot of queer activism within science as well. What motivated that?

When I did my postdoc at NIST, I had never worked for the government before, I'd only worked in academic places. I assumed, when I was starting, that it would be like working at a university, where you show up the first day and they tell you where your lab is, and they tell you where your desk is, and then they say we have this, that, and the other employee groups and clubs that you can join and make some friends with a shared interest. And I thought to myself, okay, they'll have an LGBTQ+ employee group of some kind, and I'll just roll into that the first time they have a coffee meetup, and then I won't have to think about this again. It turned out that, in reality, they had one of these groups about 20 years ago—and then it went under for unknown reasons, and there was no group or organisation at all

when I got there. So I started asking around about this and was encouraged to hold a meeting to see if anybody else was interested in having an LGBTQ+ employee group. I think 35 people showed up, including over video teleconferencing to another campus. From there, it just sort of spiralled out of my control. The group was called NIST & NOAA Pride, and I think our membership topped out at about 55 or 60 people. This is an LGBTQ+ employee resource group for the employees of NIST, NOAA, and other Department of Commerce agencies sharing our campuses and facilities. The work that I did with that is something that I'm hesitant to call activism because, in my perception and understanding, activists are people who are going out of their way to change something about a system, to change the world, and to create the environments that they want to see—and I felt like all I did was run a little club for federal employees. I did things like organizing social events so that people could meet each other, and find other queer folks on campus just to hang out and network with. But I also led the effort to get gender-neutral bathrooms on our campus, which was a pretty big deal. (In the US the rules and regulations about gender-neutral bathrooms vary by state. In some states, if you have a public facility with a single user restroom, it's required to be gender-neutral, so anybody can use it. But in other states that policy is different.) Our campus was not only located in a state that didn't have one of these laws, but technically it's a private campus because it's a government research facility where you need some amount of clearance to gain entry. So the arguments that we have to make for getting

access to resources in places like this are a little more complex than just following whatever laws are on the books. I was proud of what we were able to do, which was to get six gender-neutral bathrooms at both campuses that NIST operates. In these bathrooms there are also baby changing tables, which had never been available on campus before; we added sharps disposal containers; and essentially we were able to get resources not just for people who would feel most comfortable going to the bathroom in a gender-neutral space, but also for people to just do the things that they need to do while they're at work. It cost us nothing to make these extra little changes, but for other people, it could make a really big difference in their day-to-day work lives.

That kind of change is fundamental to people having dignity at work. Did you get any feedback, or did you see what sort of impact it had?

I wasn't out as nonbinary while I was at NIST, but as we were getting these bathrooms set up, we had summer interns. They were undergrads, and at least two of them that I was aware of were non-binary and using they/them pronouns. That meant that these interns got to show up on campus, and have a gender-neutral bathroom pointed out to them the very first day—and not have to worry about it. This was exactly what I wanted—because when I walk into a new situation, I hope that I will be able to just do what I came there to do and not stress about access to resources or accommodation. To know that this next generation

of researchers is going to have that kind of access, because of a little bit of work that I did in my spare time, is incredibly important to me.

I am so thrilled that somebody else gets to go to this campus and not have to worry about where they're going to pee during their lunch break.

Are there any other things within STEM that you think need to change?

I've had a lot of difficulties doing this kind of activism-related work because, as an early career scientist, there are other things I'm supposed to be doing—like my actual research. There is also a lot of job precarity, and that's something that I hear a lot from other people too.

When you aren't sure if you're going to have a job in two or three years, or even a few months, it's very difficult—if not dangerous—to attach yourselves to these kinds of projects because of the possible perception of future employers. You never know whether someone is going to value that kind of work. I think that one of the most powerful changes that could happen in STEM would be for professors who have tenure, researchers who have job stability, and people who have more power than the undergrads, grad students, and postdocs, to be willing to spend a couple of minutes a day working on these changes. Not only are those more secure people the ones who can get involved with this work without major career repercussions, but they also are

the ones who have access to the levers of power. So my continued involvement in LGBTQ+ organising comes largely from my interactions with grad students because I remember how hard a time I had as a grad student, and how much I wished somebody with a little bit more power had been fighting for me. If I could go out of my way as a postdoc to make the grad students' life easier, then that was something that I felt a civic responsibility to do. Now, as a research scientist, if I see a postdoc having a hard time, going out of my way to spend five minutes helping them is something I feel that I have a responsibility to do.

I want to see that kind of public service, and civic-mindedness, coming from more people in the scientific research community. We have a responsibility to each other and must act accordingly if we want to continue bringing new people into science, and if we want to ensure that our fields get more diverse and attract new people with cool ideas. This is the hill I'm going to die on.

Do you think there's anything this growing community of LGBTQ+ people in STEM can do better, or more effectively?

One of the major problems in geoscience right now is that it is not diverse; it is not doing a great job of highlighting the work of folks from other backgrounds, or of making sure that what's done in this research area is accessible to everyone. I think the LGBTQ+ science community must be made aware that there are many forms of diversity, and many identities that are not

necessarily being represented. More privileged people should leverage that to help and enable other people.

In the sort of activism that I do—which you could call ‘workplace organizing’—there is a tendency for LGBTQ+ organizing to be led by and to centre the experiences of, cisgender white middle-class gay men. I see it in a lot of white-collar jobs, I see it all over academia, and I particularly see it in things like federal government research labs, or any kind of industry. It is incumbent on the people who are running organisations to go out of their way to ensure that they are not dominating the conversation with a single kind of viewpoint.

If someone reading this book identifies with your story, what advice would you offer them?

I would give them two pieces of advice: First, run toward the places where you feel welcome; and make choices based on where you think you are going to do your best work. Seek out those collaborations, networks, environments, and communities where you know that you are going to be able to be the best version of yourself.

Secondly, look into unions, and the history of solidarity movements. Read about solidarity and intersectionality, as well as the history of how these concepts have played out in our societies, and the ways that they’re currently manifesting in research.

Who inspires you at the moment?

One person is Frank Kameny, and the other is Harvey Milk. Both were involved in the LGBTQ+ rights movement. Harvey Milk was a gay politician who was assassinated. Frank Kameny was a scientist who lost his job due to his sexual orientation, and, in a landmark case, challenged his employer at the Supreme Court. I have been inspired by the stories of these two people because, not only were they part of the LGBTQ+ community and our history, but both of them were passionately committed to public service and civic responsibility. These concepts are really important to me, both as a federal employee and generally as a person who cares about how we make our society better for everybody. For me, looking at those two historical figures—who committed so much of their lives to trying to improve the world around them—has been inspiring.

Izzy Jayasinghe

Dr Izzy Jayasinghe (she/her) is a senior research fellow in super-resolution microscopy working at the University of Sheffield

Please introduce yourself

My name is Izzy Jayasinghe. I'm currently a senior research fellow at the University of Sheffield, and my area of research is microscopy. I work on single molecule microscopy, to understand how things are organized (especially in living structures) at the nanometer scale. So my work ranges from chemistry to biology to physics—in terms of the equipment and chemical processes that we exploit for imaging.

In terms of my background, I'm a trans woman, and partner to a lesbian academic. I was born in Sri Lanka during the civil war, and when I was a teenager I moved to New Zealand—so I've got these multiple different parts to my identity.

New Zealand was where I began my scientific journey: finishing high school, then going to university, and getting a PhD. Since then I've worked in four different universities: the University of Auckland; and the University of Queensland in Australia; I then moved to the UK to do a postdoctoral fellowship in Exeter, then in Leeds, and recently to Sheffield.

That's a lot of movement. But it's typical for a scientific career

isn't it—moving from city to city?

Yes. It's a bit unfortunate that it has to be that way because there are downsides to it. It means that you can never really put down roots in the same way that other people can. But I think the upside is that you grow as a person because you've lived within different cultures and different political climates.

I went from New Zealand—which was a very liberal, progressive, and LGBTQ+ friendly place—to Australia, which was quite conservative. Queensland, in particular, is one of the more conservative states. Then I came to the UK—which is sort of the epicentre of LGBTQ+ rights, and also, it's fair to say, one of the centres of scientific advancement in the world. So I think the cultural and the academic experience of doing that has been really rich.

Having said that, I appreciate that this level of mobility is not a luxury that many of my colleagues in STEM have. I don't think this is, or should be, a preferred method to go about a scientific career. It's also not the only way to engage with different cultures and ways of life. It is simply how my journey has turned out.

Can you tell me a little bit about your journey into science?

I was inspired by several people. Firstly, from a young age, it was my parents because they were both in STEM disciplines. My dad was an engineer, and my mom was a medical doctor. I guess I had an affinity with science because I wasn't very good at many other

subjects in school. But the real beginning came in my final year of school in New Zealand. My physics teacher, Dr Michael Hart, just happened to be the first openly LGBTQ+ person that I had ever met. He was also one of the most resourceful and engaging teachers that I've ever learned from, and he sort of got me into experimental science from that age. I built a prototype of a viscoelastic damper which allowed me to study different material and design parameters that affect how they absorb shocks. So I got into the idea of building things, and that continued on. I also think observing him as an academic was quite life-changing because he encountered a lot of homophobic remarks from students—and how he coped in that situation stuck in my mind. I've played it back over and over again in the years since.

How has being part of the LGBTQ+ community influenced your journey through science?

My scientific journey and my personal journey of coming out, and being visible, have gone hand in hand. It hasn't been a linear process, and I think that's true for most people. I first came out as trans to my two best friends. All three of us were PhD students, and it was a relief to no longer pretend and hide. It was during that latter part of a PhD when the pressure is on, and that was quite a liberating process mentally. It meant that I wasn't lying to my closest friends. Once I finished my PhD, I wanted to reinvent myself and start from scratch. I wanted to be open and more authentic as a person, but when I got my first postdoc job in

Australia, I didn't take that opportunity. I went back into the closet.

It was such an environment where I felt like I had to be anonymous, and just get on with my work in order to not be targeted. That carried on for another number of years. It was at a pinch point where I decided that I needed to be more open, and that was when I moved to Leeds and started to set up my lab. The pressure there was to start securing funding to make my research take off. This time I had my partner with me, and my partner has known about my gender identity and gender struggles the whole way. But I had actively suppressed it. I had just focused on work—and it came to a breaking point. I wasn't making much progress at work, and the frustration was becoming physiological. It was actually meeting a scientist who was trans that opened the floodgates for me. They introduced me to more trans academics, and suddenly there was a realisation that I did not have to choose between being my authentic self and pursuing a career that I could be proud of.

How have other aspects of your background or identity shaped your experience in STEM?

I don't consider myself Sri Lankan in the same way Sri Lankans do these days because I haven't been there for a long time, and I have very few family or friends left there. But I think my formative years growing up in that environment made a huge difference because I learned about what privilege was. By

ethnicity, I was Sinhalese, which is the majority of the country (75%). Then you have about 15% Tamils, and again about 10% Muslims. I had close friends who were Tamils or Muslims, and I observed the types of harassment that they went through. I was really aware that I didn't have to go through that because I spoke the language that was the "right language" and so on.

Having moved from Sri Lanka to Western countries, I now find myself in the minority—and I am very aware of that happening. I think becoming mindful of that has been the first step in dealing with it. Sometimes dealing with it is not about making noise, it's about finding the support systems that you need. New Zealand was a very different cultural experience. Auckland (where I lived for some years) is a very diverse place. A lot of the population are Asian, Māori, Pacific Islanders... and white Europeans are not a clear majority. It means that there are no dominant races, and it was liberating to live in a truly multicultural place. It is also bilingual, so Te Reo—which is the language of the Māori people—was embraced by everyone. It was nice to learn how a shared multicultural environment could work. I think that works not just for race, but for gender identities too because, as you may know, in Polynesian culture it's not just the two genders. I think there are something like five gender descriptions. For me to see these people in the flesh, and to have lived in a progressive society was life-changing. I often talk about how, in the '90s, New Zealand had the first openly transgender Member of Parliament, Georgina Beyer. In the UK this still hasn't happened. So I think it was a very different society to grow up in. There were children's TV shows

about LGBTQ+ role models in the early 2000s. There were lots of Māori cultural references that were being reclaimed after the colonial times that related directly to the queer community. So I guess I now have a reference point as to how good it could be.

What kind of changes would you like to see in STEM?

I think in STEM—and in academia in general—the UK and Ireland are centres of innovation and discovery. So I think we need to get it right, whatever we do. This also applies to equality, diversity, and inclusion in general—not just for LGBTQ+ rights. We might not be as liberal as New Zealand, but we are definitely good at having a conversation and working through difficult times. The UK has had a lot more difficult times than other countries. I think the main change that I would like to see is that we need to move beyond this state of debate. Everyone wants a debate on trans rights or a debate on whether non-binary people should exist. Black Lives Matter is subjective in many people's eyes because they feel it should be a case of "All Lives Matter". I think these are primitive questions, and we need to progress beyond them. I think the difficulty in STEM is that we don't have enough leadership on this.

If you look at universities and think about senior LGBTQ+ role models who are prepared to speak openly about their experiences, only a handful come to mind. This means that when decisions are made, they may not necessarily be made with

consideration for LGBTQ+ colleagues, or colleagues from ethnic minorities.

So I think definitely we need role models in positions of leadership to give us a voice and then progress us beyond these debates. It would mean that our institutions and workplaces recognise what true equality and inclusion look like.

What advice would you give to someone who identifies with your story?

It depends on where they are on their journey. There are still a lot of people who are not out. I say this because I've been looking at the 2011 UK census numbers—and they estimated about 1% of the population to be LGBTQ+. Some of the revised numbers from last year suggested that it's more than 2.2%. I think what we're seeing is a tipping point where people are valuing authenticity. So my advice to people is that when you're ready you should come out, because life will get easier, and there are more of us now. Now is a better time to be out than it has ever been before.

For those who are out, it's really important to spend some time reading and understanding the history of how we've come to this point, what the setbacks have been, and the fact that we've only been able to do this because we worked together. Be careful, and critical, about what you read—because there are forces and people who like to divide and conquer. So, verify what you read.

Coming out as trans in 2021 can be a scary decision—especially if

you are aware of the amount of transphobic content on both social and traditional media. It is really important to remember that more people support trans rights than the few who want to actively erode them. Reading the history of the struggle for LGBTQ+ rights will show you that 'L', 'G', 'B' and 'T' have always been together—and should always be together.

Do you have a support network or community of people with similar identities? And if so, where did you find them?

I think it has been a snowball effect. I started being out as myself in the STEM community in early 2018—so that's just three years ago. Being out, and being visible, has given me more opportunities and doors have opened. At this point, the biggest network that I have, that I can bounce ideas back and forth with, is TIGERinSTEMM. That opened up because of another LGBTQ+ colleague who was already a part of it and invited me in. But TIGERinSTEMM has now become a more open group, so people are welcome to join. I think engaging with projects like that has aligned me with a number of people that I can be honest with, be myself with, not feel inhibited around, and people I can bounce ideas around with. Recently, I have joined forces with Alex Bond in running LGBTQ+ STEM—an organisation built around the value of giving a platform to underrepresented LGBTQ+ minorities (through the LGBTQ+ STEMinar)—and it is a positive force in my life at the moment.

Other than that, my other small network consists of personal

friends, my partner Jess, and also a group of women who I met five years ago locally. A number of them are either current or former scientists. It's a friendly group, and we talk about the social aspect of being LGBTQ+. Those support networks are really important, not just for work, but also when life gets a bit difficult.

Who inspires you at the moment?

When I was becoming independent as a researcher, I looked around and there weren't many trans people, or people of colour, who were LGBTQ+ to look up to. There are a few I could name whom I think about when I need inspiration: One is Dr Jan Eldridge, an enby trans woman and a prominent astrophysicist working at the University of Auckland (my alma mater)—so I've watched their journey closely. There were times when she had trouble getting funded, or had anxieties around being considered for promotions, but they've really come through. She has now won funding from some of the most prestigious funders in New Zealand, been promoted to Associate Professor and is now the Head of the Physics Department. She is a shining beacon.

But if I had to pick just one person who inspires me, I would pick my partner Jess. As a pansexual cis woman, who has a disability—she has been navigating academia as a member of often-invisible minorities. Over the past year as her office mate (whilst working from home), I've observed her fulfil her role as a lecturer above and beyond the expectations of her employer. Whilst students

were being put through tough circumstances during the academic year, I have watched Jess devote her days to offering her students empathy, and go out of her way to support them. I also get to see the emotional cost to her, close up—but her desire to help her students is remarkable. Jess inspires me every day.

David McNamara

Dr David McNamara (he/him) is a lecturer at the University of Liverpool (UK), and works in the geosciences. He is interested in how fluids move around in cracks in the Earth's crust, and what that means for natural resources and geological hazards like earthquakes.

Tell us more about your research

I'm a geomechanicist and mineralogist. I study the mechanics of rocks (why and how they break). When rocks break, they can let fluids move through them. Depending on what those fluids are, this can create things like geothermal, petroleum, or water resources. If the fluids stick around in the cracks for long enough, they can create mineral resources like ore and metal deposits. Fluids moving around these cracks (called fractures and faults) in the crust can weaken them, making it easier for earthquakes to occur. It's a great field to be working in because it lets me work on resources, which is important right now for things like the energy transition. And it also lets me work on hazards, which is important for specific regions at risk from things like earthquakes.

How did you get into science?

I'm from Northern Ireland, and I grew up on the family farm in County Down. If you're a farmer, you're a scientist – that's the

way I look at it. They know so much about the way the natural world works, and that rubs off on you.

I was also obsessed with a movie called *The Land Before Time* when I was a kid, and I used to replicate the opening earthquake scene with my toys and books. I did geography for A Levels and I loved physical geography, so I decided to do geology at university. As the oldest son in a family of five, from a rural farming community, who has never had anyone go to university before—I guess this was a big deal.

My dad had a good friend who was an engineer in Navan mines, so he arranged for me to have a tour of the mine and to meet the geologists there. I joke that he secretly thought the trip underground might put me off, but I thought it was so cool.

I went to Trinity College Dublin and studied geology for my undergraduate. I loved it. Then I did my PhD at the University of Liverpool, where I studied eclogite, a rock that only forms in a few places around the world. It was interesting, but only from a very academic perspective, so it had no immediate application—at least that I could see back then. That's why, after my PhD, I needed a break from academia. I wanted to travel so I applied for all sorts of jobs. I ended up in New Zealand, working as a geothermal geologist. Basically, I took the skills that I developed in my undergrad and PhD and just applied them to something different. The company did consultancy work with geothermal energy companies. They trained me in some new techniques, and

my post-PhD research interests started building out from that. After nearly eight years in New Zealand, I moved back into academia. I was in NUI Galway for a couple of years, and now I've moved back to Liverpool.

You have experience across lots of different aspects of your area of science

I do, and I'm grateful to have had that varied experience as it gave me the perspective of my field I have now. I'm glad I left academia for a while because, by the end of my PhD, I was a little disillusioned with it. I didn't think there was a future for me there. Going away and getting some industry experience reinvigorated my interest in research. I could see the problems, and I could think of ways to figure them out. That's what led me back to academia.

How has being LGBTQ+, or any other aspects of your identity or experiences, impacted your journey through STEM?

I am a "later-in-life" gay man. I didn't come out until the very end of my PhD. For all intents and purposes, I was "straight" during my undergrad and PhD. Even though I grew up rural, I did go to school in Belfast City. I knew maybe one person who was openly gay back then, but certainly nobody from home. I think Will & Grace was one of the only exposures to gay people, culture, and life that I had back in my teens.

When I was in university, I started to meet more people from

different backgrounds. That's when I started to realise that I was feeling some sort of resonance with being gay. It frightened the hell out of me. I was very "in the closet", even to myself, and so I didn't think about it properly until late into my PhD. I think I had this idea of what my life was expected to look like (with a wife and kids) and that was what my family, friends, and community expected of me. Any gay inclinations or thoughts I had were quickly squashed in my mind.

Being a white, cis, closeted man throughout my undergrad and PhD, I didn't have the issues that a lot of other people have to face when they're out and proud at those stages of their careers. When I came out, I moved to New Zealand straight away. It happened very quickly, and it was weirdly liberating to have a blank slate. I could start my life and be whoever I wanted to be without worrying about people's reactions to my 'change'. I kept thinking of it as a 'new life in a country where no one knew me, where I could be more honest—especially with myself.

I've never had anything very horrible happen to me at work, but there are still small things that you notice, and usually brush off. A throwaway comment here and there, little things that maybe aren't intended as offensive but can make you stop in your tracks, or things that make you smile uncomfortably even though they are upsetting. I've never faced open, hostile, direct hatred, which I'm very thankful for because I know a lot of people have, unfortunately.

Those early days in New Zealand were a little difficult. I was navigating a completely new professional space, without the support or structure of academia, and on the other side of the world away from family, friends, and my emotional support network. I asked myself if I could tell my colleagues, and if I would still be able to have a comfortable and professional life with them if they reacted poorly.

During my first couple of years in New Zealand, I was doing geological consulting for geothermal drilling companies. I was going out to drill sites, collecting samples, talking with the drillers, talking with the company people, and giving them insights into what they were drilling through. The work was cool and it was exciting to see this type of drilling work firsthand, but these spaces are not very diverse. Rig sites are male-dominated and often feel hyper-masculine. The people at these sites are already good friends and quite comfortable with each other. As the consultant, you're the outsider. During downtime, conversations turn to our personal lives. That's when I became keenly aware that by disclosing personal information about myself, as everyone else was doing, the environment might become unsafe for me. These riggers are all big, tough guys. They're in their overalls and hard hats, and they look like everything you'd expect from movies about oil rigs. When you're in that space, you're emulating some of that to an extent, because you automatically go into preservation mode. You want to make sure you fit in.

Knowing that I'm not from New Zealand, they would ask me things like 'what do you think of Kiwi women?'. I thought that if they find out I'm not similar to them, this could be a problem. You're in a remote area, you're surrounded by all these people you don't really know, and they're asking you to share information with them that you're not sure is safe to share. That's quite intimidating as an LGBTQ+ person, and for a long time I didn't share a lot. I was very closed off, which then gives the impression that you're just a stuck up consultant, and that you're not approachable.

It took me a while, but I remember the time I dropped into the conversation that it was Pride weekend. I watched for the ripples to spread through the room. Some didn't care, some wanted to know more, but nobody was angry, disgusted, or reacted negatively. I think that's partly because New Zealand is such a diverse and progressive country. It was a huge relief, but it was also a long period of stress and anxiety build-up. That happens every time you are in a new professional space or situation, the constant coming out is emotionally exhausting, and you have to go through a fear-relief cycle far too often.

With field-based disciplines like mine, you often go to remote places where you're very removed from all of your networks. There are already a million and one things to think about on your fieldwork risk assessment. When you're LGBTQ+ in geothermal, your opportunities are often in the quickly advancing regions for geothermal science. That currently includes countries in the East

African Rift System, and some of those countries have active policies that target, harass, imprison, or do worse to LGBTQ+ people. I've never worked in those regions because the risk feels too high. It's a shame because that is one of the most exciting places for geothermal and I feel opportunities are closed to me that are open to others.

As somebody who is now in a more senior role leading research in a university, what sort of changes would you like to see, especially with fieldwork?

There should be no expectations from any institution that LGBTQ+ staff should go to places where it is not safe for them. There should be no pressure on staff to take that extra level of risk. If you do make the choice to go, and you are outed while you are there, I would like to think the university would assist with legal work or costs associated with getting you out of prison or out of the country. I'd like to think that they would do everything in their power to make sure that their staff member comes back home. But I don't know what sort of precautions universities take regarding this. I don't know if universities even consider a lot of this, to be honest.

It's something that should be built into Equity, Diversity, and Inclusion (EDI) policies, and insurance policies.

What advice would you give to your younger self?

I'd pass on this advice I heard on *Drag Race*: 'Opinions are like

assholes, everybody has one'. I wish I could tell myself not to be so preoccupied with what other people might be thinking about me because I reckon ultimately that people don't think about you as much as you think they do—and if they are, it is not worth worrying about. I would tell myself to drop a lot of that concern and just worry about what I think of myself. I think the reason it took me so long to come out was that I was so overly preoccupied with what it would mean to everyone around me, and not what it would have meant to me.

What do you think the LGBTQ+ in STEM community can do better?

More of the same, I think. I've been blown away by the work of groups like LGBTQ+STEM, House of STEM, and LGBTQ CERN. Just seeing these communities shine a light on LGBTQ+ people doing science, technology, engineering, and math is awesome. I knew very few people like that doing STEM when I was at university. One of my fellow PhD students was a gay man, and he was the only person I knew that was out in any of my networks. The first LGBTQ+STEMinar I went to was amazing. I was in a room filled with people doing STEM, who were all part of the LGBTQ+ community. It was awesome just to see that there were so many of us. I think that's so important. I think visibility helps show people they can have careers in these spaces, that there is room for them, and that they can make a life there.

Who inspires you at the moment?

People like you guys (Shaun and Alfredo), because you're crafting community. You and many others have crafted these communities for LGBTQ+ people in STEM spaces. That's a huge achievement and very inspiring. I'm inspired by anyone out there, talking about what it's like to be in the LGBTQ+ community and work in these sectors. All these people are fantastic examples of what it means to be completely honest about who you are, and they inspire me to do the same. We have specific experiences in these sectors that are unique to us, or unique to our community. That needs to be discussed, it needs to be known, and problems that may arise from that need to be addressed. People who are doing that inspire me.

Emma Bell

Dr Emma Bell (they/them) is a cancer genomic researcher at the Princess Margaret Cancer Centre in Toronto, Canada. They are a bioinformatician, which means they use computer programming to analyse big data. Emma works on DNA sequencing data, and has been in Canada for just over a year. Before that, they were in London, UK for 10 years.

Tell us about your research

Generally, I take DNA sequencing datasets and I mine them. Right now, I'm working on a project with Dr Helen Loo, who is interested in the biology of T cells (the white blood cells that identify foreign stuff that needs to be handled by the immune system). Helen is interested in the effects of epigenetic drugs on these cells. She's particularly interested in deoxycytidine (a drug used in a lot of leukaemias to remove DNA methylation) and what it is doing to normal, healthy T cells. There's some interesting literature on how it might increase their capacity to kill cancers, so she has taken those T cells from donors and she has treated them with two doses of the drug—a low dose and a high dose. We've sent those cells for RNA sequencing so that I can look at what happens to their transcriptomes when the drug is applied. We know that they have a better killing capacity, but I'm trying to get at why they have a better killing capacity.

Tell us about your journey into STEM

I am this horrible cliché: when I was 13–14 years old, I watched a lot of CSI. I know it's not very good science (they don't even balance the centrifuges!) but it was the first example I saw of how the stuff I was doing in the science classroom could be practically applied. It wasn't just fancy theoretical intellectualising (which I love), it was work that had a purpose and an endpoint. There were other stages during my GCSEs, my A levels, and my undergraduate degree where I learned more about genetics and research, and it continued to appeal to me.

I got a B in A level biology, and that B was enough to get me to King's College London to do biomedical science. The biomedical science programme there is great because you do this cool first year, then pick whatever modules you want. I got to study everything that made me want to get up in the morning: regenerative medicine, neurodegenerative disease, developmental biology, cell biology, and genetics. Epigenetics started appearing as a theme through all of those subjects.

I finished my undergraduate degree. I got a first and came top of my year, but I couldn't get on to any PhD programmes because I was appalling at interviews. I had absolutely no confidence in myself, and that was all you could tell about me in an interview. I ended up working in academic publishing at BioMed Central for a year whilst I got my act together (it was open access publishing, which is really important to me now). I'm glad that I had that experience because it taught me about the philosophy of science,

the communication and sharing of science, and the underlying principles of open data.

I did eventually get onto a PhD programme at Imperial College London, in the Faculty of Medicine. I got to do a master's and a PhD as part of the programme. During my master's, I discovered bioinformatics. It seemed like something useful that I should invest in. I had no coding experience, but I took a project with Dr Ed Curry, head of the bioinformatics hub in the cancer centre at Imperial. I learned how to code, and it was painful! It was an uphill struggle but it was worth it, and it has completely changed not just my professional life, but my personal life. I found something that I was good at, and that I enjoy, and that has opened doors for me.

How has being part of the LGBTQ+ community, or any other aspect of your identity or your experience, influenced your work in STEM?

I don't feel comfortable being visibly queer at work. The queer side of me makes me feel like I have a secret alter ego. For example, at the weekend I am a drag queen. I dabble, I have fun, and I like being part of that world. My drag name is Desi Mondaine. At work, I've got a pride flag at my desk because I realised how 'in the closet' I am there. But I'll go on stage in an entire outfit and belt out Girls & Boys by Blur in an obnoxiously over the top English accent (my drag persona is that I'm very

British because I miss the UK). It's strange how those two people exist and never seem to meet.

Does performing impact your relationship with your work in any way?

It probably does. I'm a lot less self-conscious than I used to be—which I think coincided with me attending queer events and trying to become more visible, both in my little online circle, and maybe occasionally on a stage.

I think a lot of my desire to be more visible is motivated by mental health awareness. During my PhD, I experienced depression and anxiety. It was very isolating. I'm a lot better than I used to be—I have a therapist and medication. I try to be visible in a mental-health sense. I have had the occasion when a PhD student contacted me on Twitter asking for advice on local mental health support. Even in the last couple of weeks, I've been talking to a student about how to approach their boss about mental health issues. It can be so isolating, I think to see somebody talking openly about how they have mental health issues means that you know there's someone you can talk to.

I feel like the same thing applies to LGBTQ+ identities: If everybody feels alone because nobody is talking about it, then you don't get to meet these other people who are in your vicinity, and you can't support one another. There are lots of queer people in STEM, even in my local area, I just don't know who they are because we're not visible. I took part in a wonderful event a

couple of months ago called Science is a Drag, which was organised by Science Sam. She lives in Toronto, she's brilliant at drag, and she's also a science communicator. She organised an event where a bunch of queer people (predominantly drag queens) did some sort of performance and then explained their research—in full drag. It was wonderful. There was somebody whose PI flew them out from the US to take part in this, which was fantastic and so supportive.

LGBTQ+ folks in STEM are starting to gather a bit more as a community. Is there anything that you think that this newly forming community could do better to support each other?

I want to see more events like Science is a Drag. There was a conference in Ontario last year highlighting LGBTQ+ people in STEM—I want to see more of that. I want to see more visibility, and I feel like that's something that we need to do individually. I want to see more people do small things like putting their pronouns in their email signatures. That's not something I do yet because I'm not entirely comfortable with the idea of being a non-binary person at work when I'm a feminine presenting person. I don't want to have uncomfortable conversations about gender with people I feel won't understand.

In what ways do you think STEM environments could be more inclusive for non-binary people?

There are plenty of trans and non-binary people around, they just don't feel comfortable. I'm much more comfortable being visible

as a pansexual person and a queer person, than as a non-binary person. So I would suggest mandatory inclusivity and diversity training, not just at the management stage, but earlier on.

For example, I could be talking about a breast cancer cohort at work with some researchers; I could use inclusive, but accurate, language around gender— and the person I'm talking to might not understand even what I mean. I don't want to have to take the conversation into a whole big explanation of the relationship between sex and gender every time it comes up.

If HR departments provided support for us, so that individuals didn't have to take that upon themselves in every single one of these situations—that would be helpful.

Who inspires you at the moment?

The people who are inspiring me right now are the women around me. We've got this little group at work called Bioinformatics Coven. It's for women and gender minorities or marginalised genders in bioinformatics. It can suck being a woman or marginalised gender in bioinformatics. We have some fabulous misogynistic horror stories.

Bioinformatics Coven provides social, technical, and professional support. We meet for coffee on a Tuesday, and it's a lovely, welcoming space. People share their joys and their frustrations, and it brings people from all levels together. We've got master's students, PhD students, postdocs, people who work in industry,

managers...It takes away the hierarchy, so we're just people who have the same sort of issues and are supporting one another. Bioinformatics Coven is inspiring me at the moment.

Is there any advice that you would give to someone who identifies with your story?

You're not oversharing by being yourself. The analogy for me is this: If it's not weird for me to know that Charles, who sits next to me, is engaged to a woman—then it's not weird for people to know that I'm pansexual.

The other thing I would say is how important Twitter has been in introducing me to people. They're not necessarily people in my field, but they are people in STEM who have similar issues in terms of that feeling of isolation, of leading a double life. It's nice to have a little online community of people who understand what it feels like, even if we don't know how to deal with it. There are these people who I've never met who are somehow providing a small amount of emotional support on Twitter.

Jessica L. Ware

Jessica L. Ware (she/her) is an evolutionary biologist, which means she tries to reconstruct the evolutionary history of organisms. In particular, she works on dragonflies, damselflies, termites, and cockroaches—although her group is interested in evolution across all insects.

Tell us about what your lab works on

There are a lot of insects, so you do have to pick some. My lab has chosen to mostly focus on the Odonata (dragonflies and damselflies), and the Blattodea (termites and cockroaches). We use genetic and genomic information; and we also look at behaviour, morphology, and physiology. We basically look at all aspects of the organism's life history that might inform us about the evolutionary age of the taxon, the biogeographical history of the taxon, why we find things where we do, who's related to whom, and about speciation and diversification events in the past.

Is there a reason you focus on those species in particular?

I would be lying if I said it was all planned. Some people have always known what they wanted to work on, but that wasn't me. I liked dragonflies as a kid but I assumed that, because they were so beautiful and charismatic, everyone would have done all the

work on them already. I thought I would have to pick something else that's maybe not as fun or exciting.

I started in a PhD lab looking at entomopathogenic nematodes, which are these small nematodes that live in the soil. They infect insects and reproduce inside them. The insect explodes dramatically, and then all the baby nematodes can go out into the soil and infect more insects. This research was maybe going to be used for pest management, but my heart wasn't in it. It was a lot of just sitting at the microscope counting nematodes, and how many of these insect bodies had exploded.

I ended up switching to work on dragonflies. There was somebody in my department who worked on dragonflies. I told him all I've ever wanted to do is work on dragonflies, but I'm sure everything's been done already. He said, 'No! What are you talking about? Just because they're pretty, doesn't mean that we've everything done. You should consider them.'

Tell us about your journey into science

I'm not someone who came from a family of scientists or academics, by any means. My parents were not married. They were young university students, and we (my twin and I) were the result of a couple of dates. Some of my peers in graduate school were from families with academic parents, who got married and just spawned a bunch more academics. I really didn't have that background.

When we were eight or nine, my parents met up again and got married—but in the beginning, we were being raised by a single mom, and we largely spent our time at our grandparent's house. My grandfather had completed grade 7 or 8, so he didn't have a lot of book learning, but he really appreciated the natural world. My nan, who was a homemaker, really liked gardening and she took a by-mail course on horticulture. They instilled in us that you have to go to university ('don't be like us'). My mom—because she was an overworked and underpaid single mom—said, 'Don't make the same mistakes that I made—go to university'. So my twin and I always had this drive to go to university, but I didn't know what I would do next.

When I went to university, I didn't know what to do. I worked at Starbucks, at a garage pumping gas, and a used car dealership. Somebody mentioned that if you're on varsity, you should be able to apply for university jobs, so I got a job making labels at an entomology collection. That was my first foray into entomology, and I liked it. From that, I ended up getting a job dissecting the poop of damselfly nymphs. Diane Srivastava (a postdoc at the time, and now a professor who I still collaborate with) had gone to Costa Rica and collected all these damselfly nymphs. I tried to look at what was in their poop. She had a research position going to Costa Rica with her for two and a half months, and she told me I should apply.

I applied, and I got dressed up for the interview. It's so funny to think about that now, as a field biologist. Normally you wouldn't

wear something fancy to interview as a field biologist—you want to prove to them you can do field biology. I ended up going to Costa Rica, and that trip was eye-opening for a couple of reasons: it taught me about experimental design, and it also made me think field biology was something I could do. This postdoc was a Brown person, and she was also queer. I thought, ‘Oh my goodness, this is someone who is out and queer, she talks about being Brown, and she’s so successful’. That was life-changing for me.

After that, a teaching assistant asked if I’d ever thought about grad school. I didn’t know what grad school was, but she said I could get a PhD, and then a job as a professor. That was a revelation to me, and I knew this was what I wanted. I wanted to be able to do field biology, look at insects, and have the type of job where I have job security.

I took a couple of years off before applying to graduate school, and I worked as a renal technician in a hospital. It was very emotionally rewarding, but also very depressing because you lose a lot of patients on dialysis. I knew I didn’t want to do this forever, so I applied to work on pathogenic nematodes. I thought I could preserve crop security and benefit humanity. Within three months, I was working on dragonfly phylogeny, and I never looked back.

You have had such an interesting and broad experience of science. How has being part of the LGBTQ+ community—or any

other aspect of your identity or background—influenced your journey in STEM?

My twin came out as a lesbian when we were 13 years old. My family wasn't great about it at the time, but now they're supportive. My twin is trans (he came out as trans years later, after I finished university). While we were in university, he wasn't living as his true self—he was still living as a lesbian woman. I lived in the dormitory that first year of university, and the dorm leader hired somebody to give a talk to us on how homosexuality was a sin. People did protest and the dorm leader got in trouble for doing that—but it definitely made me think this is something I don't want to disclose to a lot of people. I thought they would focus on that part of my life and not on my science.

When I first started at Rutgers, someone I worked with pulled me aside at the end of the first semester and said, 'I don't think you should work on this project. The problem is, Blacks and women are stealing all the grants, and making it so guys like me can't get a grant. So I'd feel better if you went to website design or something like that.' It was terrible advice for a lot of reasons, including the racism and sexism. I told my advisors and the department chair, and they quietly told him to not say that again, but they didn't really do anything about it. It made me think if this is what this person thinks about me because of what he can see—that I'm a Black woman—what would he think if he knew any of the other aspects of who I am?. And by the way, I would be terrible at website design.

I kept everything very quiet during my PhD, with my colleagues and advisors. Once I started my postdoc, I felt a bit more secure in my science. I had publications, and I felt like people knew me for my work. That nagging feeling—'what if they focus on my personal life and not my work?'—went away, because I knew that there was lots of evidence that I was working hard. I got a job right out of my postdoc at Rutgers, and the first thing I did was put up pride and trans flags, and information on my door.

I really work on being a squeaky wheel in my department. I think the university had a pretty good record because there had been a couple of tragedies, including a student who had killed himself because a roommate live-streamed him with his boyfriend. They created the Tyler Clementi centre and put a lot of money into trans and queer programming for students, faculty, and postdocs. I definitely felt like if I wanted to do LGBTQ+ things every day, I could have. In 2017 or 2018, I decided to start a group on campus. It was informal, mostly grad students, a few undergraduates, and a couple of faculty. I would order pizza, we'd talk about our experiences, and we were supportive of each other through shared commiseration and congratulations.

What was the impact of creating that sense of community?

I heard a lot of feedback from graduate and undergraduate students. Some departments were worse than others. In some, there was blatant sexism and homophobia; in others, people were being encouraged to be robots, and not talk about their feelings

or who they were. There was also a lot of bias and non-inclusive behaviour, so our group developed some strategies.

Because I was trying hard to recruit diverse students, a lot of trans students applied to work with me. On admissions day, the university would usually have students come in for graduate school interviews, and then they would just pair them up: two girls in one room, two boys in one room. Our departmental administrator just lacked the information that she needed to do it better, so I suggested asking people what their preference is.

We were able to do these little things as a group that hopefully changed the culture a bit. When we taught about famous scientists, we made sure to include LGBTQ+ scientists, and we would mention there they were LGBTQ+. We also did structural things, like getting a gender-neutral bathroom.

Were there any things that you didn't get a chance to work on, but would like to see addressed?

We wanted to bring in diverse students, but they were then placed in labs that didn't have the methods, systems, or training for their needs. It was a very toxic environment for students, particularly students of colour and LGBTQ+ students, and that was something we wanted to address. We actually wrote a US Government Education grant to introduce mentor training, but it wasn't funded.

As a field biologist, I'd like to work a lot more on how to do field

biology in a safe way. There are a lot of instances where students, postdocs, and faculty are vulnerable. It amazes me that we don't have more reports of things being bad. We do have data for sexual assault and sexism in the field because people surveyed a bunch of women and they actually collected data. I don't know that anyone's ever done that for LGBTQ+ students, faculty, and postdocs in STEM. We need infrastructural changes at field stations, and at places where the National Science Foundation (NSF) and the National Institutes of Health (NIH) are sending people for exchanges and fellowships. It shouldn't be on the student, faculty member, or postdoc to maintain a safe space for themselves. There should be some structure.

My son is trans. Zack transitioned at the end of grade one. He was miserable. The school actually called me in and said, 'your child is trying to tell you that this is something'. For as long as he could talk, he was asking, 'when am I going to turn into a boy?'. We took him to see somebody, and he has blossomed. He's a happy, plucky sixth-grader who's doing well, on the honour roll, and just having a great time. I go to the Caribbean all the time on fieldwork. I went there when my kids were young, and again when they were older. My colleague there noticed that my tattoo of my kids' names, which I got when they were young, didn't say Zack. I didn't want to disclose my son's trans status in the field, away from the people we knew, at this remote field station that I hadn't been to before. It was really scary and I wished that there were some guidelines, or that I had some help because I was just flying by the seat of my pants and I don't know what to say. At the

end of our time there, everyone was terrific, but you could easily imagine a scenario where it wouldn't be that great. The same is true for going to conferences. They encourage people to take their family to conferences, and then you show up somewhere with your girlfriend and they're like, 'who's this, your roommate?'. Let's have some stuff in place so that can be the least of my worries, and I can just focus on my fieldwork because I should only be worried about snakes and crocodiles and whether there's a scorpion in my shoe.

Who inspires you at the moment?

I get daily inspiration from different people. My daughter is openly bisexual, and she's in grade nine. The fact that she feels comfortable being herself at a stressful time, with hormones and everything, is very inspirational. My son being able to live his life as Zack, that's very inspirational.

My twin is a successful artist, and certainly could have just focused on their visual arts, but they have also devoted a large part of their life to trans advocacy—to try to make sure that 'trans people get to be elders', as he says. Trans people are murdered at a high rate, so they really want to make it so there will be an elder cohort of trans people. That's inspirational.

I'm inspired by my grad students, my postdocs, and anyone I've ever had in my lab. It's not like I was choosing them specifically, but we've had 60 or 70 undergrads in the lab, and no one ever blinked an eye if I said I'm bisexual, or that my kids are queer or

trans. No one ever did anything other than act as a regular human to me and my family. The fact that I've never really had to worry about that in the lab setting, is an inspiration. It makes me think that things are maybe getting better.

Lauren Esposito, who runs the 500 Queer Scientists, has always said, 'I'm going to work to make the system better', and she is. She didn't give up on that dream when she became a successful arachnologist. She puts a ton of time into her diversity initiatives because it's so important, and I think that's very inspiring.

A lot of students have applied to work with me because they felt our lab was going to be a safe space. Many wrote that in their applications—'I'm applying here because I think that, as a queer person, I will be supported'. I never would have had the guts to put that into my application as a university student. The fact that they are willing to push a very stuffy university system to fit them, rather than trying to fit into the university system—and the idea that young people want to change the system—is very inspiring.

Is there any advice you would offer to somebody who identifies with your story or your experience?

In 1999, Diane said, 'Jessica, do you know how many Brown ecologists there are in Canada who are working on food webs?'. She then pointed to herself. I said, 'Just you?'. 'Yeah', she said, 'just me. And I bet by the time you've done your PhD, the world is going to be totally different. Just watch'. She was right.

There are still lots of times I go places where I'm the only Brown person, but the fact that now we're not just pointing to one person, we're pointing to a whole bunch of people—I think it's really exciting. People should feel like there are a lot of us who are together and united in this. We're all behind you. You're gonna do this, you're gonna do great, you're gonna succeed. Each one of us is behind you, supporting you and cheering you on. I feel like the LGBTQ+ in STEM community is so welcoming, and it's not a competitive environment like many science arenas are. I really do feel like everyone's doing whatever they can to make sure each one of us succeeds. So don't be afraid to reach out and to get involved in an LGBTQ+ in STEM things, because all that you'll find is camaraderie.

Liz Bruton

Liz Bruton (she/her) is a science communicator, historian of science, and a former museum curator. As of late 2021, she is a Communications and Engagement Officer at the Earth Institute at University College Dublin (UCD). Before this, Liz was curator of technology and engineering at the Science Museum in London for nearly five years. She has worked in science communication and the history of science at universities, university museums, museums, and other heritage locations for over a decade. She is particularly interested in the history of communications.

What made you interested in science communication and the history of science, and what made you choose the line of study that you did?

I did my undergraduate degree in computer engineering at Trinity College Dublin. It's a four-year degree, and it's an unusually broad engineering degree. In the first couple of years, you do all strands of engineering: civil, mechanical, electrical, electronic, and computing—plus a fair bit of science and maths.

I'd always wanted to be an engineer growing up (I loved playing with Lego!). My parents met through working in early computing, in Ireland in the 1970s. They later went on to do very different things, but they talked very fondly about it, so I knew I wanted to be an engineer. Thanks to the Irish education system, I was able

to keep history and technical subjects at secondary school, right up until 18.

In my engineering degree, we started each topic with a lecture on the history of the subject. In our third and fourth years, we had a module on management for engineering, which included elements of science communication. I found both very interesting and engaging. I was keen to pursue my interests in science communication and the history of engineering, but I wasn't quite sure how to turn that into a career. I looked up some master's courses in the area and I ended up going to the History of Science Museum in Oxford. I did a masters in the history of science and technology in museums, and I just went from there. I did a PhD at the University of Leeds between 2009 and 2013, where I continued my involvement in museums, archives, and science communication.

Do you think there's a gap in knowledge between scientists, historians of science, and science communicators?

I think most scientists are aware of the need for, and importance of, science communication and related public engagement. However, I do think some scientists can be quite oblivious to the history of their discipline, especially early in their careers. Scientific research is about constantly pushing forward and expanding knowledge of a particular scientific discipline or field of study, so I think it can be easy to be caught up in that mindset: you think that it's all about progressing forward, rather than

looking back and learning from past lessons. Even something simple like how some scientific terminology doesn't make a massive amount of sense in terms of how we understand science now, but it makes historical sense because of previous models and theories.

I'm particularly interested in the material culture of science and technology (the artefacts we can put on display) and how these can be used as a tool for public engagement and science communication. Particularly now with COVID-19, there are parallels we can draw with the 1919 influenza epidemic (sometimes referred to as Spanish Flu) at the end of the First World War.

We're also having a lot of conversations now about 5G, smartphones, and other aspects of communication. We can look back to the history of wireless communications at the beginning of the twentieth century, at the history of radio, and learn a lot about the conversations they had then about how it should be managed. We can learn from conversations they had about patent rights and intellectual property, about the relationship between the state and commerce, about emergency situations, and the impacts the technology has physiologically. There are lots of parallels we can draw between where we are now and where we were 100 years ago.

Do you think the scientific community values the role of

museums in helping us understand the role of science in society?

Yes, definitely. In my previous role at the Science Museum, London, we had *Science Museum Lates*—a series of events where the Science Museum is opened up at night on the last Wednesday of every month. Each event had a different theme. For example, there is a ‘Sexuality Late’ around the time of *Pride*, which usually brings young scientists into the museum. Members of the public can have food and drink, and there are talks, stalls, film screenings, and interactive events—there’s even a silent disco! I think members of the scientific community really appreciate these events.

What has been your experience as a member of the LGBTQ+ community? How has that influenced your interaction with people in your field

I think it encourages me to think about welcoming non-traditional, diverse voices in the content that I produce and communicate: in exhibitions, events, research, online communications, and public and community engagement. I like to think that that is something I might have done anyway, but I think being visibly queer and being an active part of the LGBTQ+ community in a world that doesn’t always welcome, include, or even tolerate queer people has encouraged me to think more about other voices that have traditionally been excluded and how

they might be brought back into science communication, history of science, and museums exhibitions and galleries.

I think it gives you a sense of other voices that could be included in the content. I think it's important to be out and proud when we're doing public events. I realise I come from a position of privilege—I am relatively well established in my career, and I have lived and worked in countries where, in most cases, being out and proud is not a problem. In my experience, the higher education and museum sectors are warm, safe, and welcoming places to work as an openly queer person.

Do you think there's anything that the science museum sector could do better in terms of its relationship with the LGBTQ+ community?

The relationship between science and the LGBTQ+ community has not always been a particularly warm or comfortable one. I think that's a fairly uncontroversial thing to acknowledge. Sometimes the artefacts that we collect can lead to some uncomfortable conversations, but I think it's important to explore that relationship. The AIDS crisis in the early 1980s stands as a particularly prominent example of the complex and sometimes difficult relationship between the scientific community and the LGBTQ+ community. For example, I've seen *How to Survive a Plague*—an amazing documentary on the difficult relationship between the scientific and medical communities and the LGBTQ+ community. If a lesson is learned, it's that it's important for us to

advocate, but also to be part of the scientific and medical communities. All communities are improved through diversity—not just LGBTQ+ diversity, but lots of others—and that includes the science communication, heritage, and museum sectors.

What would you like to see science museums do more of to try and address those imbalances?

I've been very involved in projects that deal with women and science, particularly the longer history of women in engineering in Britain. In 2019 and 2020, I was co-investigator for an Arts & Humanities Research Council-funded project called [Electrifying Women](#) (with Professor Graeme Gooday and Dr Emily Rees at the University of Leeds). The public engagement project explored the longer history of women in British engineering and how we can recover these histories and engage people and communities with these inspiring stories. The next stage of the project, which Graeme and Emily are working on, is the more transnational and international aspect of the history of women in engineering.

We need to include diverse voices. That's something we do now, but we can always get better at it. Ultimately, we do have to acknowledge that science in the past hasn't always been particularly diverse. We can't change that—but now we can look beyond the traditional narrative to see what voices were there but may not have been included in the canon history of science and in science more generally.

How can we explore queer history in science?

Queer history in science has the same challenges as queer histories in general. Sometimes you're trying to recover a history that lives in the shadows, that wasn't openly recorded or acknowledged in the language that we use now. It can be easy to look at history and say there was no queer history until... pick a date, any date—because it's not always recorded or preserved, and sometimes it's destroyed, denied, or hidden away. Queer history can also be, by necessity, ambiguous at times. Sometimes you have to read between the lines.

Would you like to see the Queer in STEM community work more with the museum sector?

It's tricky because obviously, not all museums cover STEM subjects; and the museum and heritage and culture sector is much broader than that. There's a strong community of queer people and queer allies working in museums and heritage already, at least in my experience. I suppose it's a case of maybe bringing those communities together. Events like the *Science Museum Lates* are a good way of connecting the communities and having those conversations.

What advice would you give to someone with a similar background or identity, who's interested in getting into this kind of work?

It's the same advice I'd give to anyone: get your foot in the door. Unfortunately, that may involve some volunteer work at the beginning of your career—which isn't always particularly helpful

because that means that we're not necessarily going to get the diverse people we want into the profession.

Follow your passion. Go to events and network. Always remember that your voice matters and should be included.

Natasha T. Miller

Natasha T. Miller (she/her) is the Community Engagement Manager at Science Gallery Detroit.

Please introduce yourself and tell us about what you do

I'm responsible for our community relationships, creating environments and programmes that make the community feel like we're listening to them, receiving their feedback, and reflecting some of that feedback in our future programmes. I establish relationships with young people across the city and across the United States, and I also establish partnerships with artists. Outside of that work, I tour as a performance poet.

What is your relationship with STEM and the culture that surrounds it?

If you asked me this question five or ten years ago I wouldn't have had an answer because I would not have believed that I would have any role in shaping STEM. I think that taking the conversation from STEM to STEAM is where I could have an influence in helping people see how impactful the arts can be on science, but also on helping scientists see how impactful art is in the world. I hope that I have some influence in getting people to take STEAM seriously, but my role is to also help other Black, queer women—people at different intersections—to see themselves in STEAM, and to see themselves as somebody that

can have an impact on the world through STEAM. I think that representation impacts a lot of things.

What was your journey into your work at Science Gallery?

Before I started at Science Gallery, I was working as a spokesperson and brand ambassador with Shinola Detroit, which is a manufacturing company that makes watches and leather goods in the Americas. Their story was that they were a Detroit based brand, and I was pretty happy to promote all things Detroit because I come from Detroit, and I was made in Detroit. I was also working on my own projects, touring and performing poems, as well as doing commercials and all that comes along with the life of a performance poet. I was going to work every day, and not looking for a job in science, but I got an email from Science Gallery Detroit's director at the time. He had heard that I was connected to a lot of people in the city of Detroit, and how important the city and its growth were to me. He was looking to fill a few positions, and we met for tea. We talked about the impact something like Science Gallery could have on Detroit, and he asked if I would want to work there. So I applied for the job and I interviewed several times. I think I got it because of how community-centred I was, and how I wanted to move and navigate through the city in a way that was respectful to the people who call this place home. That conversation changed the trajectory of my life and what I'm hoping will be the lives of so many other people with me being in this position.

How has being LGBTQ+, or other aspects of your identity or background, impacted your work?

I have been part of the LGBTQ+ community for a long time. I have been very open about my identity, and very straightforward about the fact that this is who I am. You take me as I am or you don't take me at all, and I can live with that. Coming into a world of science, there were no moments where I felt that could potentially hold me back. Now, this is just me personally. I can still see LGBTQ+ people in the world of science who haven't had it easy. I'm very fresh in this world, and at Science Gallery Detroit I work with people in science who look like me and feel like me, and they identify with some of the things that I identify with. In all of these years that I have been out and open, one thing I strive to be is the most confident motherfucker in a room. I don't care what you think about my identity. That means I probably don't always see what's really happening with other people. So there's nothing about my identity yet that has made me feel anything less than good in this space. But being a woman in the world—and a Black woman in the world—I do know that it is very present in the lives of other people.

Are there any ways you would like to see the STEM community change or do better?

We're already addressing and acknowledging the need for diversity and inclusivity; we're already having those conversations. They have to stop becoming conversations, and

they have to become a part of our habits, the ways we view each other, work with each other, and listen to each other. It's just conversation after conversation of: 'how do we get more people in STEM?', 'how do we get more Black people in STEM?', 'how do we get more queer people in STEM?'. We need to actively create environments where people of these backgrounds feel safe, feel heard, and feel normal. They need to feel that they deserve to be here, and that they belong here. How do we put STEM in the hands of young Black queer people around the world? Let's start with not talking about it and actually doing it.

We also need to look at mental health. In fields as rigorous as science and technology, there's less focus on humans. We need to remind people these are human beings that are working in these fields. We need to respect each other as humans, and not just as problem solvers. We need to be able to say to a cisgender, heterosexual, white male boss that they don't deal with the same things I do. Because I'm Black, and I'm queer, I live in a world that is, for the most part, not good to me. I deal with some things that maybe he'll never have to deal with, so I need some time off for my mental health. The future of how we work, how we hire, and how we do everything will be reflected in the acceptance of diversity.

You said we need to find ways to put STEM in the hands of young Black queer people. How can the broader LGBTQ+ in STEM community be better at doing that?

We can go into communities and show young Black queer people that science is already present in their world. Science is a very intimidating space, especially for young Black people. When you add another layer of queer, it's even more intimidating. I think one of the things that you can do to make it less intimidating is to show them how science specifically relates to them. An example for me was the show that we started on LGBTQ+ in STEM Day here in Detroit. I thought, 'hey, there is a world full of Black queer and trans people who think that science is intimidating'. Never in their lives would they think that they will be a part of something like LGBTQ+ in STEM Day. I created a space where they can enter science in a way that was comfortable for them. I said, 'you already vogue, you already sing, you already do drag shows, and there is a special science to some of the shit that you're doing'. I started there. I looked at how we can place the resources and tools of science in their hands, then help them shape what science is and can be to them.

The second thing that we do here in Detroit is the STEAM Engine Poetry Slam. We get young kids from the community to write poems about science. We tell them to interpret science however they want to interpret science, and we give \$500 or \$1,000 to the winner. As they're reciting their poems about science, they're also hearing other poems about science, about what you can do with science, what science can be, and what it means to people. They also now have a connection to Science Gallery Detroit, which gives them a connection to all the Science Galleries around the world.

So if you want to get science in their hands, you have to be willing to humble yourself. This is truly not about us. We've got to make them feel like they're already at home, and they're already in a space that feels comfortable.

Create programmes and events that look like them. Before you put something in their hands, you need to ask what they want in their hands. This requires humility and listening because people know what they want.

Who inspires you at the moment?

Since I first started as a young basketball player, my absolute hero was Kobe Bryant. That's the person that I looked up to, rest his soul. I hope when I leave this space, somebody is like, 'God damn, Natasha was the Kobe Bryant of community engagement management at Science Gallery'. I think about my legacy and how I can do work that will mean something to people, how I make it meaningful to me while I'm here, and how I can just do the fucking best job possible. I also think that kindness is one of the best attributes that a person can have. My mom is the kindest person I've ever met, so that's something that I aspire to be while navigating the world.

Imagine somebody is reading through these interviews, and they identify most with you and your story. What advice would you give them?

I'm making a film about the life of my nephew. He's 11 now. He lost

his father, and his mother is serving a prison sentence, so he's been raised by me and his grandmother. We were interviewing him, and this was his first interview on camera. He was just tearing the interview up, and I was so impressed. I asked him what advice he would give other kids that are experiencing a situation similar to his, and he said, 'I would just tell them to keep going, push through, and just don't give up'. As cliché as it seems, it means something. What I would add to that, is, 'when something isn't working for you, readjust and be confident in your readjustments'. Strategy is important, so sit down, make a plan, and create a strategy that works for you. Be kind, and create the environment that you hoped somebody would have created for you. At Science Gallery, I'm creating the pathway to science that I wish somebody would have given to me when I was a young Black queer woman.

Antajuan Scott

Antajuan Scott (he/him) is the head of programming at Science Gallery Detroit, which is connected to Michigan State University and is a new way to experience science and culture.

Tell us about Science Gallery Detroit

We've been operating as a pop-up for the past three years, and a lot of my work has been creating a programming identity that is respectful of the various conditions our communities reflect. That means really understanding that science and technology are difficult topics for a lot of people to grasp and that there is a pathway to make some of these grand ideas tangible.

Learning about the culture of science is also really important to my job. I've been afforded the opportunity to meet great people through this work—and they have helped with our mission to increase people's connection to science and technology, and to make people feel as though they have authority and agency over these things.

How has your life and career led you toward working in and around STEM?

I began producing for a company called Sofar Sounds in New York, and it was really interesting. They organise music performances, but there were more data scientists than cultural

producers in the room. I was like, 'what's going on here?'. It was my first experience in this app-based world; where you can create cultural experiences through technology, and with technology as the connecting point to how people actually get in the room. There's no other way to enter the experience without this technological gate, and this was the most fascinating thing I'd ever been a part of.

Aside from being connected to emerging artists, my job was driven by data and science. I never thought that was a reality for my world. As I began talking to more of my colleagues I began to see that a lot of the processes that we were using in event production, and cultural production, are connected to science. I was interested in learning more about that, so I reached out to various scientists in the New York area. I wanted to hear from them about how science and culture are connected. I was welcomed into this world, and I wanted to be a part of understanding and exploring the relevance of science as a part of culture.

How do you think the scientists responded to that idea?

It was an overwhelmingly positive response, which led to my first job in science programming. Through my connections and readings, I was introduced to the works of natural physicist Janna Levin.

When I met Janna she invited me to be her assistant, and we developed amazing programmes that I think were culturally

relevant. One of them explored scientific controversies and took place at Pioneer Works, an artist-run cultural centre in Brooklyn. I was using some of my production skills in this new world, which involved me seeing scientists as “talent”; and also dealing with the logistics of producing, while learning so much about science. I was doing work that I was familiar with, but it was also an education because I was being exposed to some of the greatest minds in science, through Jana. It revolutionised the way I even think about learning.

Jana is a poet and a writer, and she understands creativity. It made so much sense to me to work under a person that really understood the way that the arts and sciences are connected, and can amplify each other. It felt like that led me to Science Gallery Detroit.

Have any aspects of your background, or your identity, influenced how you’ve interacted with scientists?

To be honest, I’ve never felt as though my intersectionality as a Black gay man in America affected my relationships or the way I connected to folks in science. One of the things that’s beautiful for me is the openness within the science community. Once you’re there, you find community and support.

I feel like the stars of the team are not often LGBTQ+ identified folks, but we’re there; we’re present everywhere. They might be the only one or two in their space, but they want more of us to join them.

I've used who I am as a way to position myself strongly in these spaces. I have to go in with as much conviction as anyone else does in their discipline of study. I'm also conscious of the cultures that I'm being introduced to, so I navigate those spaces carefully.

How can we make sure that science is available to young Black and queer people?

There are pathways for success that are often given to young Black kids—traditional pathways, like sports and entertainment—but those are not necessarily what everyone is good at. I think that we often overlook when young people, especially young Black people, are excelling in the sciences. I was looking back over my own school records, and I was pretty good at science, but no one ever talked to me about it as a possibility. They said 'how about writing? you're good at it'—because that's what they understood.

I think there is a strong connection to the humanities and less amplification of the sciences in African American communities. You do see the sciences amplified in other Black cultures, globally, but I'm thinking about how you make space in science for young queer Black people in Detroit. How can they connect directly to people in science in a way that might influence their career decisions or the types of work that they may want to pursue.

I think this opportunity to bridge gaps is a great professional development opportunity. I wish you could gather a hall of 1,000

young people and say 'you are all now included', but it's so much more difficult than that. That's why I came to Detroit. I was working with LGBTQ+ identified people in New York, but they were highly educated people with good incomes. I don't think they necessarily value these types of cultural connections in the same way. In Detroit, I get to use some of these tools of connecting big ideas to communities that don't necessarily get to explore them in-depth.

What advice would you give the broader LGBTQ+ in STEM community? What can we learn from the kind of work you do across the arts and sciences?

I think about things like this a lot. I was fortunate to have people say yes to me. I also had other fortunes that allowed me to pursue the things I wanted. I didn't need to get a job immediately, so I was able to explore what I wanted to do. I know that's not a reality for a lot of people, and I know it's not a reality for a lot of Black and Brown people globally, who can't just do whatever they want to do.

I look at my experience and notice that there aren't many people of colour who are also investigating science and technology from this perspective. I know there must be another young Black gay guy in Detroit, or some other urban centre, who's interested in similar things, and may not want to take a traditional scientific education pathway. They may want to start from a cultural centre and work their way out into those disciplines. I came to Detroit

to also understand how I can make space for someone like that, and I do struggle sometimes because I don't always know how to.

I also came here to grow, because I don't think this is where I necessarily stop. How do I make this space comfortable for someone else to take? Maybe it's through talking to more scientists, helping them think about their emotional connection to their work, and helping them share that with audiences. I think that's important for people to hear—'As a scientist, I don't just want to study cells; I want to change lives, to heal pain and hurt'.

Those are the conversations that I want to bring to the table more: how do you humanise this experience? How do you welcome people into this world?

If somebody was reading through this book—and identified with your story and your perspective—is there one piece of advice you would give them?

Yes, there is. From Janna Levin to Science Gallery—all the jobs I've ever had—I've always just cold-called and asked. You have to reach out to an individual that you think is interesting. If you are not ready for that opportunity, they can sense it. But if you are, you will more than likely be welcomed with open arms, and your world will change forever. Please don't be afraid to reach out to people that you don't know.

If you are a person from an arts or cultural background, and there's a scientist doing some funky work you want to check out

—then email them, DM them, ask them on Twitter...really. Scientists have told me ‘You’re helping us vocalise these things that we do in our labs that we think are cool, but we don’t know how to share’. This creative way to explore scientific research has been a wonderful part of my job.

Who or what inspires you at the moment?

Natasha T. Miller is my greatest inspiration at the moment. She recognized a lot of this in me and has helped me navigate this space of conflicting identity. I am not a scientist, but this is what I want to do with my life, and I get a lot of confirmation from her. She is a stellar person, she is my community, and I really appreciate her. She’s one of the major reasons why I accepted the job at Science Gallery Detroit because I feel like there are a lot of synergies. I feel propelled by their energy and by their belief in me—and that’s a great cheerleader to have. Professionally, I don’t think I would be as fulfilled without her.

I also have to shout out and acknowledge Janna Levin, who saw the possibilities in my professional track and wanted to do something about it. That really did transform my life. Great women have lifted me up.

Oz Ismail

Dr Oz Ismail (he/him) is a neuroscientist, science communicator, comedian, and podcaster. He is currently based in Portland, Oregon.

Tell us about your journey into science

I always had an interest in biology. Coming from a South Asian family, the expectation was that I would become a doctor. There was a stage where I thought that was what I wanted to do, but as I got further through high school and university I realised that wasn't where my interest was. My interest was in learning more about how things work in the body, rather than trying to fix people.

I started off doing a degree in applied biology at the University of Hertfordshire (UK). It offered the chance to do an industrial placement, and I went to a molecular biology lab at Brunel University where they were studying a neurodegenerative condition called Friedreich ataxia. I think that was my first exposure to doing actual lab work and seeing neuroscience and molecular biology at play in real life. I felt like a real scientist for the first time, and I knew this was what I wanted to do.

I thought maybe the next step was to do a PhD. At the time, however, I was still an international student and there weren't very many funding opportunities so I chose to find work in

science. I was lucky enough to get a job at the Wellcome Trust Sanger Institute, where I was looking at the function of different genes as part of the Mouse Genetics Project. I did that for five years, and then I got an opportunity to become a research tech at University College London, studying dementia.

The project went quite well, and Eli Lilly offered to part-fund a PhD for me when that project ended. I also got a scholarship at University College London, so then I could afford to do a PhD. My trajectory into science had been delayed a little bit, but I still see the years doing research assistantships and research tech work as me being a hands-on scientist. Some people think you need a PhD to call yourself a scientist, but I don't believe that at all.

I did a neuroscience PhD in Alzheimer's. During that time, I got an opportunity to work in a lab in Portland for six months. I had an incredible time working in this lab and working with human brains for the first time. I went back to London to finish my thesis, and now I am back in Portland as a postdoc.

Tell us about how being LGBTQ+, and any other aspects of your identity, have influenced your experiences, and your journey in science

When I was at uni, I wasn't 'out' to anybody. I was 17, and I had just moved to the UK. I was aware of my sexuality by that point, but I was trying to deal with a whole new culture as well. I think maybe because of my background and what I was seeing around me, I just didn't feel like being gay was 'for me'. None of the

portrayals of LGBTQ+ people I'd seen at the time were Asian or Muslim. From my own Asian Muslim background, we were told that being gay was not something for you, so I couldn't really express, talk about, or do anything about it. When I knew that I was staying in the UK for longer, I knew I needed to start living my life.

The other challenge was that my work involved being completely clean. You couldn't go in in your regular clothes. You had to get completely changed and wear scrubs. Because I had to go through a changing room, I would not tell anybody I was gay. I thought the other guys in this changing room are going to assume that I'm looking at them because I'm gay. It was fueled by the fact that I overheard some people in that facility making gay jokes, and I didn't want to become a target of the jokes. My manager was a lesbian. She was my hero at the time because she was a great manager and very supportive. So while I was trying to hide in the work environment, here was a person who had made it in science, who is so respected, and whom nobody made jokes about. I just needed to see that.

Moving to London was another step in my liberation. Literally, no two people look alike. Whether you look insanely well-dressed, or as if you just rolled out of bed—nobody cares. In London, you can just literally walk out in any possible way, and no one bats an eyelid. For me, that was very liberating because suddenly, it didn't matter.

I joined a large team, with other openly gay people. People were talking about their partners in a very normal way. I was in a work environment where I felt like there was no reason for me to hide, and so that made it easy. It was an environment where people were very accepting, and It's the same now in Portland—it's one of the most queer-friendly places I've ever been to. My team here is very diverse and my boss is very supportive. I don't have to 'gay filter' anything.

What changes would you like to see in STEM?

I feel like people in STEM understand that some people are gay and some are lesbian, but they don't want to accept the 'other letters'. Not everybody is accepting of someone who is non-binary or trans. Last summer, there was an outrageous letter about how asking people to use the right pronouns was stifling academic debate. Why should someone's identity be up for academic debate? Why should we debate their existence? Around that time, there was an event that I was meant to be hosting. It was a big event at the university, and I realised that one of the speakers was quite outspoken against trans people. I wanted to make this big public statement at the time, but I also still hadn't finished my PhD. I was going against someone who was a lot more senior and more powerful than me. I felt really helpless.

I spoke to many of my friends about this, and then I wrote to the organisation that was putting this event on. I made them aware that this person had said these things, and that I wasn't sure I

wanted to host an event with this person in the lineup. Sadly, I think they saw me as just another PhD student, and they chose not to address the issue.

What message does it send if we let someone who is transphobic stand in front of all these people and represent an organisation? I think STEM and academia need to take these conversations seriously. They need to bring LGBTQ+ people on board to facilitate these conversations—otherwise, we're going to leave people behind, and we're never going to get to the point where we are treating people fairly.

What advice would you give to your younger self?

If I was to meet a younger me, I would say that it's okay to be conflicted about the different aspects of your identity. I saw gayness in a white perspective, so I couldn't figure out how I was different. If someone had told me there are other gay people who are brown, and who come from backgrounds like mine, I would have struggled less.

My very first time in a gay bar, I was so nervous. Someone turned to me and said, 'Oh, you look very exotic—where are you from?'. I instantly just cringed. It made me feel like I was not supposed to be there.

Another time, when I was exploring the London gay scene, someone at a bar said something racially nasty to me. That was a shock. I thought I was in a space where I would be welcome, but

that 100% wasn't the case. I've stopped being shocked by it now. I naively expected there to be no racism in the gay community. Now that I know there is, I can work with it. I know when to step back, and I know when to fight. I know where to find my place.

I would tell a younger me you will face these things, and that it doesn't mean you don't belong. Your voice and your life are as valid as other people's.

Do you have a network of people with similar identities, background, and interests as you—and if so, how did you find them?

In terms of a network of gay people in science, I've always turned to Pride in STEM. Finding groups of people who have similar identities to you is important. Me and a couple of my friends started another network called Minorities in STEM—which is a place for anyone in STEM who is from an ethnic minority to connect, share resources, and sometimes just talk about the shit that happens to you when you're an ethnic minority.

There are communities of science communicators that I'm part of because maybe I like talking about science more than I like doing it! Sometimes, as scientists, we get so bogged down in the day-to-day, the publishing, and the funding that we never stop to think about what science means to the real world. Science communication and podcasting lets me do that.

What can the LGBTQ+ community in STEM do better?

There are so many letters in the acronym. Think about what those letters mean. Remember that, even within those letters, there are so many subdivisions. It does make us stronger to be united—but think about the people who are in that community, and what their needs are. It is our responsibility to listen to other people, not make assumptions about what their experiences are, and not minimise their experiences.

Who inspires you at the moment?

I don't think there's one person, necessarily. I think the inspiration comes constantly from the people around me—people who have been immensely supportive, like my sister and my friends. Especially as I've gotten older, I've made sure that I strengthen those connections, because I know that those people will form this tight web around me when I need them.

Lee Constable

Lee Constable (she/they) is based in Brisbane, Australia. Lee is a factual TV presenter and science communicator who loves mixing STEM with the arts, social justice, and all kinds of things so that she can talk to different audiences.

Tell us about your journey into that work. How did you get into it?

I'm a farm girl originally; no one else in my family had been to university or had a science background. I think growing up on a farm got me interested in science, especially in the connections between the environment and humans, and between the weather and humans. I got passionate about climate change by the time I finished school, so I did a Bachelor of Arts and Bachelor of Science double degree. (In my arts degree, I majored in drama and sociology).

After my science degree, I found out really what science communication is, and that I could study it as a master's degree. I started thinking more about how that was potentially a route I wanted to go in, instead of going down a research path. I ended up doing a master's in science communication at the Australian National University.

The practical side of the Master of Science Communication was touring remote regional Australia doing live science shows for

schools and putting on science exhibitions in town halls and other places where the whole community could come. We also delivered professional development workshops on science education to teachers in those areas because they were far from the cities and had fewer opportunities. We did four different tours throughout the year, and at the same time we were doing coursework on the theory of science communication, science in the media, exhibition design, science and the web... and all kinds of things. My master's was a crash course in the many things that scicomm is, and also a deep dive into the theory behind it.

During my master's, I became more interested in media, so I started hosting community radio. I came up with the idea for a podcast and radio show called *SoapBox*, where I'd interview people who were working in sustainability and/or social justice. It was just a weekly interview show, but I think that gave me my first taste of that type of presenting and producing—coming up with content, finding people, doing interviews... and all those things.

At the end of my master's, I ended up working in waste and recycling comms and education—giving tours of the landfill and the recycling facilities, as well as doing community communication work on waste and recycling.

I also gave nighttime tours of the Botanic Gardens as a casual job. Lots of things like that all melded together to make me who I ended up being. It meant that when I found myself at the right time and

place, I was the right person for the role of hosting a science show for kids called *Scope*, which is something I did for years (I finished up with the tv show in February 2020).

Is that connection with people outside of cities still important to the work you do?

My parents are still living and working on our family farm, and my only other sibling, my sister, is a teacher in another country town. The connection to the country is really important, especially when you think about the context of what I'm interested in. While I'm a generalist, I'm passionate about climate change and environmental sustainability. We've been going through a horrendous drought for years here in Australia. I grew up in another bad drought that we had in Australia. I feel like most of my childhood and adolescence was drought, and I think that made me interested in climate. There is a city-country divide in Australia when it comes to climate change. There is also a polarisation of climate change as a political issue—an 'us and them' kind of attitude. Being a farm kid is a really important part of my identity. It's really important for me to break down stereotypes in the city and the country—having lived both lives.

I've also carried forward that passion for public education and accessible education. I think that comes from being from a really small rural public school. Entering a prestigious Australian university where I was surrounded by people from Sydney from single-sex private schools, and with rich families, you get to see

big differences based on privilege. I think that's why educational equity is important to me now—especially as someone who talks to a lot of young people, as well as people who work in education, academia, and schools.

I think the rural experience in Australia was really brought to people's minds at the start of 2020 because of the horrendous bushfires here. The drought has been happening for years, but people in the city forget about it. It drifts in and out of their consciousness. Meanwhile, my sister's town is going to run out of water, and my parents are having to give animals feed at times when they should have had enough grass on the ground to feed on. That's been happening for years, and yet people are still surprised when our country turns to kindling and catches fire. I think that's also a reason why, at the start of this year, I really needed to reconnect with who I am as a climate activist.

How has being part of the LGBTQ+ community, or any other aspects of your identity and your experience, influenced your journey in science communication?

I don't even know if I'm part of the community. Maybe I'm becoming part of it. I only came out as bi two or three years ago, when marriage equality finally became a thing. It was probably only a couple of years before that that I really came out to myself and my partner. My partner now was my partner then and is a man. That brings an extra level of privilege, and also invisibility. I am still not far out of the closet as things go, and there are still a

lot of people who wouldn't even realise I'm out of the closet, however much as I think I am.

Not being out, and grappling with that silently, meant that I didn't have community. I was working in children's TV, and was surrounded by a rainbow family—both on-camera and behind the scenes. During the marriage equality plebiscite here in Australia, they were sharing solidarity. I found that hard—being in the closet and seeing them have that connection. I was more of an 'ally' at that moment, as opposed to being one of them. It was horrendous.

I suppose the struggles that I've had have been mostly private and internal—as opposed to facing real discrimination from others because people assumed that I was straight because I had a male partner. I had been hosting *Scope* for at least a year when I came out to him. I was not sure if I had more of an obligation to come out, because I'm a public figure. Or, because I'm a public figure, would coming out seem like an attention grab? When you mix that in with the idea some people have of bisexual women as 'straight women who want attention'... it made the closet an even more confusing place to be. You ask yourself: "Am I queer enough? What is the point of coming out? Why does it matter"—and it obviously mattered because I was so unhappy at so many different points. I was either grappling with figuring out who I was, or figuring out if it mattered. Twitter is probably the space that I'm most out because it's my personal diary. It's also been the place where I found the most community.

What's been your experience of the LGBTQ+ in STEM community?

We just had the second anniversary of #BiInSci. That came about because Isabel Ott wanted to see who else was out there, so she started the hashtag. I think that hashtags like that are a great way for us to be visible to each other, and to find each other. Two years of that hashtag has been awesome for connecting with other people and finding the broader Queer in STEM community. I'm grateful because I can be visible by putting a rainbow in my bio, but also by being outspoken about my identity.

I learnt a lot about the community when I was in the closet, as an ally and friend. The thing that I always grappled with was why I couldn't find a closeted community. If only we could reach out and ask: Is there someone else in here? But since being out as bi, I've had a lot of calls from within the closet in my DMs. These came when I talked about bisexuality, and especially when I made clear that I see the particular struggles of bisexual men. Out of that, I've had a handful of closeted Bi men in science contact me via DM. That's a huge honour, to have someone make themselves visible to me when they're in the closet like that, and it's something I don't take for granted. I think it also demonstrates that within our Queer in STEM community, there are still so many silent and closeted people

What could be done better?

We could focus on the scicomm community to start with: a lot of

outreach and 'diversity in STEM' initiatives often have ingrained issues. As someone from rural Australia and public school, I'll often talk at events for girls in STEM, but then I'll notice that it's all white, inner-city, private school girls (even though it was open to everyone). One of the things we can do in science and in science communication is remind ourselves that diversity does not mean white women (I say that as a white woman). There isn't an awareness of intersectionality. I think my sociology background has made me better able to see these things, but there's a kind of academic arrogance about social science. I think we'd be much more effective scientists and science communicators if we had a better understanding or at least appreciation of the social sciences.

I would also like to see the broader science community take a more prominent stand against the use of science, biology and nature (or people's misconceptions about these things) to discriminate against LGBTQ+ people.

Who inspires you at the moment?

Dr Ronx from *Operation Ouch* is amazing all the time. They have a community-minded attitude to absolutely everything, and that shines through on social media. They are a three-dimensional human being.

Claire Malone

Claire Malone (she/her) is completing a PhD in particle physics, with the High Energy Physics group, at the University of Cambridge. Her research focuses on devising and implementing computational methods to analyse data collected by the Large Hadron Collider at CERN in 2012.

Tell us about your journey into STEM

For as long as I can remember, I was curious about why the universe was the way it was. As soon as I could read, I was particularly fascinated by the science books my parents gave me. The fact that there was a whole vast universe beyond our small planet completely captured my imagination, and I just wanted to understand how we could get from the colossal explosion of the big bang to the world around us. Physics was the only way I could find to quench my curiosity. At school, I was the archetypal geeky kid, wanting to just get the other lessons out the way, so I could get into the science labs. After school, I went to Imperial College (London) and graduated from there with an MSc in physics in 2014.

I have had Cerebral Palsy from birth, which means I use an electric wheelchair to get around. I cannot write with a pencil so I have dictated the majority of my school and University work to an assistant. This means I have had to become good at manipulating equations in my head throughout my studies,

without being able to quickly scribble something down. I conducted laboratory experiments in a similar way, by giving instructions to an assistant about how to use the equipment rather than what to write.

How has being LGBTQ+, or other aspects of your identity, influenced your experience in science?

I have to say that my disability has had a greater impact on my academic life than my LGBTQ+ identity. It hasn't always been straightforward to get the assistance I need. One has to become very good at ignoring the first "no"...and the thirteenth!

My LGBTQ+ identity has given me opportunities to be part of some very supportive social groups. This was particularly the case when I moved to Switzerland to carry out research at CERN, hardly knowing anybody. I faced quite a few difficulties in access to both my research and day to day life because the infrastructure to support a student with a disability is not as developed as at Cambridge or Imperial, so this was quite a lonely and challenging period for me. My best memories of that time are of the friends I made through LGBT CERN.

What changes would you like to see in STEM, or physics in particular? Are there any particular obstacles that you feel are holding people back?

In STEM there is a culture which promotes the idea that aspects of an individual's personality are irrelevant to their ability to

follow the scientific method, therefore guaranteeing that results are objective and reproducible—which is very important in science. Amid this culture, LGBTQ+ individuals may be inclined not to make their sexuality known to their colleagues, having judged it to be irrelevant to their work. I have seen this happen myself—when I asked a friend of mine (who identified as bisexual) why she didn't want to tell any of her tutors about her non-heterosexual identity, she said that it was none of their business, and it had nothing to do with her work. One could also say that we scientists are less likely to really think about the culture within our working environments. You may be thinking, well maybe they are correct—when you are at work, you should leave your personal life at the door, and focus on your job. However, I would ask you how can anyone do their best research when they are constantly censoring what they say or how they react in order to hide a major part of their identity. Always censoring yourself because you are scared of a hostile response takes energy that should be used on conducting good research. So I would say the culture in STEM needs to develop in order to allow people to feel comfortable enough to bring their whole selves to work.

What advice would you give to people with similar identities or similar background to you?

Regardless of whether I was addressing someone from the LGBTQ+ community or someone who also had a physical disability, two proverbs sum up the advice I would give. The first

is 'Proceed as if success is inevitable', and the second is 'Never never never give up'. I found that the majority of success in academic research is the result of sheer stubbornness!

As I've said, I have found networks for LGBTQ+ scientists very supportive, and I have witnessed the work they have done to improve the environment in STEM for themselves and other minorities. Therefore I would encourage someone working in STEM who identifies as LGBTQ+ to join these networks. Unfortunately, the number of people working in STEM with a high level of physical disability is too low at the moment for networks to form. Therefore, as well as a lot of determination, you need to have a very good understanding of what help you are entitled to to ensure that you receive it.

What advice would you give to your younger self?

I would advise her about the difficulties she is going to face in her research so that she could make an informed decision about whether to choose the same path again. People did warn her about the potential obstacles but, like me, she wasn't very good at taking no for an answer. I hope she would choose the same path again—partly so she would also have the wonderful experience that I have had, but also so that she wouldn't create a time paradox!

Do you have a network or community of people with similar identities? Where did you find them?

I was lucky that all the institutions I have studied at (Imperial, Cambridge, and CERN) have had well developed LGBTQ+ networks, and I have enjoyed participating in them. Through them, I have learned about other networks, such as Pride in STEM.

What can the STEM community do better?

I think the culture in STEM needs to change and become more open. This is already starting to happen, with a lot of focus recently on how to improve the involvement of underrepresented groups in STEM, such as women and BME, as well as LGBTQ+. If this continues then people will begin to recognise that there is not a one-size-fits-all method to research, and people will stop recruiting people who are just like them. Through that, we will get greater diversity and be able to attract and retain people who have the best ideas, regardless of their background—which can only lead to better science.

Who inspires you at the moment?

Of course, I was always interested in how Stephen Hawking conducted such amazing research despite his physical disability. However, I would not call him my role model. I have to say I was quite surprised on the day that he passed away at the number of messages I got from people who seemed to think that I'd lost a great mentor and role model. I do think it is truly amazing how he adapted the way he worked to his changing physical condition, and I think he is quite possibly one of the greatest physicists that

ever lived. However, Stephen Hawking is not the reason why I was interested in physics, and I wasn't trying to follow in his footsteps. Of course, I understand why people may liken my situation to Hawking's situation, but I find it quite a simplistic viewpoint.

Alex Ahmed

Alex Ahmed (she/her) recently defended her PhD from Northeastern University, which was in personal health informatics, and focused on digital technologies for transgender health. Before that, Alex did her undergrad in cognitive science at the University of California, San Diego; then she worked in neuroscience research for a couple of years, and in machine learning and computer vision for a year.

Tell us about your journey into science

I majored in cognitive science and neuroscience because I wanted to go to med school. I did apply to med school in 2012, but I didn't get in, so I decided to do something else. I applied around, tried to get a job, and I ended up getting one in a computer vision lab at my old university, UC San Diego. That's how I got into the computer science and tech side of things. Through that work, I met the person who was going to be my PhD advisor. He pitched this new PhD program in health informatics that he helped start at Northeastern University.

I didn't know what that was but it seemed cool. The basic idea was to build personalized health technologies. I was interested because here was an opportunity to do something in the health field to help people, and I also had experience in computational work.

I applied for the PhD program and started in 2014. Originally, I was working on my PhD advisor's research. He's in the assistive technology field, so he works on creating technologies for people on the Autism spectrum. I had worked in that area before, but I didn't feel very personally connected to it. I also found new critical angles that taught me how those kinds of technologies can actually be harmful—and that changed how I felt about creating supposedly assistive technologies that actually end up furthering harmful biases.

Around 2017, a couple of years into my program, I quit. I ended up proposing my research to the National Science Foundation (NSF) here in the US, and I got a fellowship to work on my own project which was to create an app for trans people for voice training, and that's what I've been working on since then.

How has being LGBTQ+, or other aspects of your identity, shaped your experiences in science?

I came out when I started grad school. I had a really negative experience at Northeastern. There are many reasons, all of which made my experience in STEM difficult. One was that the old guard professors weren't willing to listen to what I had to say about how I should be treated.

I was starting a new class and I reached out to a professor to explain my pronouns. He completely ignored that email and proceeded to use the wrong pronouns for me in class. I was so upset, and I was unable to engage in the class from that point, so

I got up and left the room. I emailed him again to remind him, and I was pretty polite about it. He didn't respond to that email either, so the situation was never resolved.

That semester, I was also interviewed by my university's news magazine. It wasn't the student newspaper, it was a magazine operated and published by the university. They heard about the fellowship I got from NSF and they wanted to do a profile on me for the magazine. At first, I thought it would be a great opportunity for me to share my story. They took photos of me on campus, and they interviewed me for two hours. I was a baby, as it were; I had just come out—but they asked me a lot of personal questions about my romantic relationships, and my family. I told them about coming out as trans, about negative experiences I had on campus, and about this incident with the professor. They also asked me what I thought about Caitlyn Jenner and other trans figures. When they followed up after the interview, they told me to let them know if I had any other things I want to say, so I called them and asked them to make sure they include those negative experiences that I mentioned because they were really important to how I feel. They basically said they weren't going to publish any of that stuff because it wasn't the "tone" of the article.

The piece came out and, professionally, I had some exposure. People contacted me and asked me if I wanted to collaborate, so it wasn't all bad. But they were definitely trying to take advantage of my story. They wanted to spotlight an out trans person who is "successful", so that they could suggest that Northeastern has

“allowed this person to succeed”, while not mentioning my negative experiences at the university, or any of the ways they could better support LGBTQ+ students. Uplifting one trans student, once, with a highly subjective article in a magazine doesn’t equate to real support.

I emailed them a couple of years later, asking them to remove the story from their website because, in the later stages of my PhD program, I had become much more disillusioned and resentful of the way they had used my story. The head of Northeastern’s public relations wing flat-out refused to remove the story, and only changed their mind when I asked a faculty member to advocate for me.

There are so many ways Northeastern could improve.

After I had just come out, I was getting more and more involved in that student community. I met another PhD student there who asked me if I wanted to help start an LGBTQ+ grad student organisation. She and I co-founded the group. We wanted it to be a social space and an advocacy space, so we could give queer grad students a voice, and make the changes that we wanted to see in the university. Through that organisation, we met a lot of people who were experiencing a lot of difficulties. We started trying to advocate for better training for faculty around LGBTQ+ issues. We wanted input on things like pronoun usage and things that might be said in class. We went all the way to the Office of Institutional Diversity and Inclusion, which is on par with the

Provost level at Northeastern. We were told that it would be impossible. We explained why this was necessary to improve the experiences of queer and trans students, but we just hit an institutional brick wall. Then in 2017, I was approached by another PhD student named James who told me the graduate students were going to start a union.

In US universities it's pretty rare for PhD students to have a union, unless if they're in a public school. I went to a meeting, and I was interested in the idea that we could mandate things like LGBTQ+ training. I was interested that we could use the union contract to bargain for better institutional processes. I got involved in the campaign, but, because we're a private school, the administration didn't have any legal mandate to talk to us, so we got ignored—again.

That experience transformed how I think about my own identity. I'm in this collective body of workers who are LGBTQ+; but who are also international students, women, Disabled...all of these different facets. The issue that I ended up fighting about most was harassment and discrimination in the lab; and that included discrimination towards sexual orientation and gender identities (an issue that came up in my computer science department), but also gender discrimination, and racial discrimination. I was also involved in the Graduate Women in Science and Engineering group. We collaborated on an event where we shared our experiences of harassment and discrimination. We asked how people have been personally impacted by harassment, and what

mental health resources were available, etc. I heard people tell of how they've had co-workers, and superiors, be shitty and abusive to them. People were crying as they told these stories. It was awful.

We continued to organize in the university. The university even went so far as to send armed police officers out to me and another LGBTQ+ student who were handing out leaflets. Their first response was to send police officers! There was no attempt at communication. They don't care. And the police force at Northeastern is a real police force. They're not Campus Security. They have a whole division that carries weapons, and it's really fucking scary. They use that to intimidate students. This is yet another example, in a long history, of armed responses being employed to suppress LGBTQ+ activism and labour organising. I've been very privileged in my life: I've felt very supported, I grew up in a quiet suburban neighbourhood, and I never had to deal with the police on a daily basis (like a lot of people do). So this was a new experience and it radicalised me.

Since then I've been trying to help people who are in uncomfortable situations. Overall, I feel that my identity as a trans person has led me to the incredible political work done by queer and trans people in the past. I've grown more aware of those histories, and I'm trying to embody those values.

What changes would you like to see in STEM?

My work with the union has shown that there needs to be broad

and transformative change and real and substantive recourse when workers in STEM experience harassment and discrimination. The number of people that I've connected with in my university over the years has shown me how little institutional support there is; it's the grassroots organisers who are providing advocacy and support. For example, we wanted people to have an informal grievance representative that they could choose, as well as strong grievance language, and strong anti-discrimination language. If you have a union, that could be written into your contract. If you don't have a union, you can still form a graduate student association, which would allow you to propose the structures that should exist, and the policies that should exist.

What advice would you give to people that have similar identities or background to you? Or what advice would you give to a younger self?

The rampant overwork that happens in STEM is so incredibly draining—including the Publish or Perish culture, and the grant-funding cycles. The grind to publish is so intense and ingrained; that it trickles down from senior faculty to PhD students, and even undergraduate research assistants. I thought about becoming a professor but, because of the academic job market, it doesn't seem like it's going to happen. But, if I were to be in a position where I could influence future generations of academics, I would say that people need to slow down. I think that the research suffers in this culture of overworking. Also, if you are

overworked but have no workplace protections, there's nothing you can do. LGBTQ+ students may be dealing with overwork, and also with harassment and discrimination on top of that, so it makes it even worse.

I think the culture of academia needs to reckon with itself, especially now in the midst of COVID-19. Universities are shutting down, they're furloughing staff, they're firing staff, and they're going on hiring freezes—these are developments that are going to further casualise university employment. There are going to be more adjuncts and less tenure track.

So, in terms of advice to my younger self, or to a younger student, I would say be careful and don't put your soul into this, because it's not going to reward you. When I was younger, I was excited to do a PhD because I felt I didn't want to work for a corporation or a company—I wanted to do research, help people, and develop ideas. Oh God, how wrong I was! Part of what I have realised is that these universities are actually no different from the union-busting corporations that are doing the same thing: cutting costs, taking austerity measures, etc. So, I would say find an advisor who's not going to overwork you, and who is doing what they can within the system to create a good culture. I think it does exist. I think it's rare, but I think it does exist. Don't accept less than that.

We can't continue to accept mistreatment and bad conditions. All student workers should believe that; if you're an LGBTQ+ person

in STEM, a student worker, or a student, you shouldn't need to compromise. If you find yourself compromising, then you need to demand better. I think that is important, and it's something that I wish I knew earlier.

What can the LGBTQ+ in STEM, or the wider LGBTQ+ plus community do better?

I think that—in the communities and groups that I'm a part of—there's a tendency to have a hyper-focus on one's identities, and not enough focus on the broader power structures that are at play. I think that the queer community needs to think about what we mean by “community”, and who's actually involved in what's going on. We need to think about how this overemphasis on the “group” affects our ability to be in solidarity with other people.

When it comes to STEM, I also think it's important to extend our community to people outside of the university, academia, or your company. There are so many initiatives for increasing diversity in STEM that I think are dangerously limited. Take the simple example of getting more women and queer people to work in the sciences—without understanding some of the awful things those companies and institutions are doing. I was a member of the Graduate Women in Science and Engineering group at my university, and they often do career fairs to get more women involved. One of the companies that were proposed to be involved was Raytheon (the defence contractor), which is a company that is involved in the creation of arms and weapons

that are completely annihilating people in the Middle East, and all over the world. Are we not thinking about women and queer people in those countries? Usually, the answer is that we're not—because the community that is being centred is people in the global north. We can't continue to accept this. We need to protest. We need to say, 'I'm a queer person and I'm not going to be involved in this diversity initiative'. A lot of times it is these kinds of companies (in the military-industrial complex) who are trying to engage us with this diversity crap. We need to reject them and stay aligned with people all around the world who are being harmed by them. That's what I think the LGBTQ+ community needs to be better on.

Who or what inspires you at the moment?

I've been inspired by all of the workers that are going on strike right now, in the midst of this pandemic. Workers that are standing up and saying 'No, we're not going to accept this horrible treatment'—like Amazon delivery drivers, Uber drivers, gig workers, or food delivery people. These workers have been the most relied upon, and also the most mistreated.

The tech industry, which I'm a part of, is fueling this. They are contributing to the "gigification" of jobs, and preventing people from having fair wages and health care.

The workers who are going on strike are fighting for benefits, health care, expenses covered if they are injured on the job, protective gear, sick pay, and hazard pay. My field is trying to

ignore these workers—and only look at what new apps can be developed, how can we innovate, how can we hashtag disrupt, or whatever. All these total buzzwords. They're not thinking about how society is going to be impacted by the creation of these technologies. They're not thinking about the workers. I'm inspired by those workers who are putting themselves at risk to demand better treatment for themselves and their colleagues.

Tell us about your PhD project, and your app

I had this idea near the beginning of my programme, which was to create an app that could help trans people modify their voices to a higher pitch, or a lower pitch—or whatever their personal goal is. I thought the app should be freely available for people who may not be able to access voice training resources (which are pretty expensive). That was the original idea, and over the past four years, I've been trying to create this thing. But it was more challenging than I thought it would be.

To begin with, I interviewed ten trans people to explore this space; to see how they feel about voice and technology; different apps they might have used; different classes they might have taken; and what it means to them to change their voice. From the beginning, this project was centred on what trans people were experiencing and needing.

I did a critique of existing resources that are out there. I was drawing from social and cultural theorists—so I was getting outside of just computer science. I was looking at feminist theory

and queer theory, trying to get at the bigger picture as to why other apps were designed the way they were. They were designed in a very stereotypical way; “find your female voice”, or “be a real woman”. My idea was to critique this, explain why it’s wrong, and why this doesn’t work for everyone. You can imagine their highly gendered colour schemes and the data visualizations that were being offered. They would tell you the percentage of time you were speaking in the “male” range and/or in the “female” range. I presented these visualizations. and I explained their limitations and their social consequences. Generally speaking, they did not allow for much freedom and flexibility. Gender is a very complicated, messy, fluctuating thing—where sometimes you feel one way, and sometimes you feel another way. That’s normal, and it’s not necessarily something that can be measured.

It was a challenge to bring this information into a design. I’m framing it as a community-based design process; where I invited a bunch of people to be part of a new organization—that I helped start with one other person—and our goal was to build this app. We were going to do it collectively as a group, rather than me making all of the choices (which is how it usually happens). In my field, there’s a set of methods called Human-Centred Design, or Participatory Design, which allows some input from a target community to weigh in on the design. In theory, people provide feedback and the designers can alter the design. This method of participatory design lets people influence the process, but not really control or direct it themselves. (I recommend a book called

Chasing Innovation by Lilly Irani, where she interrogates this concept.) These methods don't go far enough in giving people control, and that's on purpose. Control is kept by the university, the professors, and the academics in charge. In a corporate setting, control is kept by the shareholders, management, and the designers themselves. Everyday people are consulted a little bit, but ultimately the outcome is not determined by them. It is something that reinforces the class difference between the institutions and the people outside of them, and it ultimately isn't going to lead to a useful thing. A lot of the apps that are used these days are made through these processes—but we wanted something grassroots.

It took a year and a half, but we came up with a prototype. I worked with a few people; some of them came in for one meeting, and some of them were involved consistently over a while. I didn't want to lock people into anything or make them feel pressured. People have stuff going on, and I'm not going to expect them to put in labour for me. People gave their time, and we made an app that had an emphasis on voice health and voice strengthening—rather than meeting a specific gender goal. We also let people choose their own goals, to allow for more self-determination than some of these other apps allow.

I also critiqued my process: I wrote a paper with the team, where I asked if we achieved what we set out to do, and did my position as an academic impact the process (it did, actually, a lot). I think that this could be useful for people who are interested in doing

this kind of work in the future—to encourage them to be honest, and to realise that their intention may not be the reality. You also need to not just look at the final outcome, you also need to interrogate the process by which you created it. Ultimately, I think this needs to be connected to a rigorous social and cultural understanding of the factors at play.

Arya Karijo

Arya Karijo (she/her) is a user experience researcher and designer based in Nairobi, Kenya.

Tell us what you do

I write a lot on innovation, startups, and technology. Of late, I'm also writing a bit about feminism and life as a transgender person. As a trans woman in Kenya, I feel like I need to keep telling stories so that people can relate to what it means to be transgender.

How has being a trans woman, and any other aspects of your identity, influenced your experience in tech?

With the way our society is set up, there's no point of reference to know if you are transgender or not. You don't get this point of reference in school, you don't get it in church, so you start out from a point of internal conflict—you're trying to find out why you feel different, why you don't fit in.

It can drive you down a scientific path because you start taking yourself apart, you start questioning what you've been taught—'if I'm not this, what am I?' Being transgender made me take the scientific method of analysing things and taking things apart—in order to first find myself. I've heard from at least one other trans person that being trans can point you down the scientific path

because you have to ask questions, you have to take a method of inquiry into things. So I'm beginning to wonder if this is common for a lot of trans people.

It took me a long time to figure out who I was because I was living in what people call sub-Saharan Africa, pre-internet. The young trans people I meet nowadays clearly know who and what they are because everything is online and they can find it. But for me, it was difficult because the online information wasn't there.

I think it took me ten years from the point where I realised I was different to the point where I figured out there's such a thing as transgender (so from 2001 to 2011). It took me that long to figure out what transgender is, and then it took me another five years to figure out it was something that I was, not something I needed to fix. I didn't have that many connections who were also trans. I actually met my first trans community in 2019.

Being transgender also helped me develop a lot of empathy for people. I feel for others in all kinds of human situations, and try to find solutions to help—I guess that impulse comes from my search for solutions for myself.

That's interesting. I love the idea that trans people are naturally getting into science because they need to ask questions. What kind of changes—especially in tech—would you like to see?

Tell other kinds of tech stories. The most visible tech firms are from Silicon Valley, and the stories that are mostly told about

those firms are about how much money they've made. Tech entrepreneurs in a place like Kenya are technologically savvy because people have taught themselves how to code. It's almost on the same level as Silicon Valley because tech is a democratised space where you can learn as much as you need. But we didn't just need the startups that wanted to make money. In Sub Saharan Africa, in Kenya, we also needed technology firms that solved problems, because we have a ton of those! Systems that work normally outside of Africa (in the West, in Europe) normally don't function well here. In basic things like healthcare and education, you find all these loopholes, which technology could help improve. The mindset of tech people here is to solve problems for human beings. That has to be the priority, rather than founding a tech startup to make the next billion or to be the next unicorn. We need to develop our own culture around technology as a way to solve local problems. The contextual practice of tech has to be pointed toward human beings.

Tech is a good place for LGBTQ+ people. One year before I started running my startup, I was working for a bank, and I wasn't happy in that environment as a trans person. In tech, there's room for 'misfits'. You can be a 'misfit' in terms of gender, or sexuality, and tech is a nice place to be. The people who are already there are not working on mainstream things. No one, especially in Kenya, brings up their kid to run a technology start-up. They want them to be a lawyer, a banker, a teacher—all the traditional employment and careers.

So tech offered refuge for me. I could be there as a trans person. But having said that, I worked in one of the community tech hubs and, at the time, I couldn't be openly trans—mostly because I was also still trying to figure myself out. Even in technology, you can't go through the ranks if you're openly a trans person. After I left, I started living openly.

Some people I worked with still needed my skill, which is a bit specialised in this part of the world, so they were forced to reach out to me for consulting work. I have lost a few contracts and a few training opportunities because of my gender identity, but when it comes down to the wire and someone needs my services, they have to get me on the job. I've had some losses by living openly as a trans person, but some people still respect my skills, and they're willing to accommodate my gender identity.

What advice would you give to people with similar identities and background to you?

I think I would tell them to live authentically. I started building my career before I could even identify as trans properly, and there's a part of me that feels like those were wasted years. The activism work I'm doing on the side... it's kind of my guilt trying to make it better for the younger people here. So if someone can come out as being trans, as early as high school or college, then I'd like to make that happen for them. Some people are still willing to hire me and work with me, despite me being trans, and I think by being ourselves we make it easier for the next

generation. We just need to live authentically, tell our stories, and just be there. When mainstream society is faced with LGBTQ+ people, they want you to live your life away from them, out of view. They don't want to see the real you. I think that's counterproductive because, if I keep hiding, then the next transgender person who's in tech or research will also have to hide. We need to come out of the shadows. We need to live as ourselves.

Do you have a network of other trans people in Kenya?

Initially, I knew only one person. This was around 2016. Her name is Audrey, she's a biotechnologist, and she took transgender rights cases to court. She was the only other visible trans person I knew in Kenya. For a long while, I thought there was only a small, countable number of us... like four or five. But last year, I went to a community meetup and I found there are actually groups. There's a group that's called Jinsiangu ('Jinsia' means gender in Swahili, and so 'jinsiangu' translates as 'my gender'). It's a community group that brings together transgender people and gender non-conforming persons. They have community support. If you need counselling, you will get it there. It's taken them a while to build it up but it's easier now for younger people coming out than it was when I was younger.

Back in the day, we tried to find online groups and forums. I have a friend, Ava, who was in a trans in STEM group with other members from the UK, Uruguay, and Brazil. For a while, she

thought she was the only techie trans person in Africa or Kenya because she didn't see any others in these spaces. But it's different now. I'm living my life, online and offline, as myself—so I am visible, and I think things are changing for the better. The laws, the system, the government, and schools are still the same, but at least there's the visibility of other trans people.

What do you think the LGBTQ+ community—especially in STEM—can do better to support each other?

A lot of LGBTQ+ people I know lean towards art and music. This is good because art and music are beautiful. But it's also nice to have a few role models in STEM, and in things like politics—having a trans or LGBTQ+ person running for office would be nice. Every space that we can get someone to occupy or be seen, it's encouraging for the younger people. If they see a trans person in tech, they'll see that they can be in tech too. We need to be visible, and we need to provide mentorship for young people.

I also think we need to do more specific research for our needs here, in Kenya. I can't properly get a prescription—I have to self-medicate. There are new ways of dispensing drugs, self-examination, and telemedicine. We could use things that are already working in the health sector just to help improve the lives of trans people. So if I need a prescription, I could do telemedicine with a doctor that's outside of Africa, or somewhere in Africa where they accept trans people. For trans men it's hard

because they need to do injections, so there are lots of things that scientists could help improve.

I have recently been researching the enzyme Aromatase and synthetic enzyme engineering. A lot of the body of research about it is on inhibition of Aromatase because of its action in breast cancer. However, trans, and cis women with conditions such as Polycystic Ovarian Syndrome, need Aromatase promotion or a synthetic version of it to naturally produce estrogen. There is almost zero research on this.

Who inspires you at the moment?

There is someone I looked up to. She's dead now, but she used to be a councilwoman in Brazil. Her name was Marielle Franco. Mostly, it was the way she spoke up for LGBTQ+ people, and people living in the favelas (a type of low-income informal settlement in Brazil that has experienced historical governmental neglect). She was very inspiring to me. She helped me start being more open because life is short. We can't live it with half measures. We have to live it fully as it is, and not be afraid.

I also admire the work of TransTech—an incubator for LGBTQ+ talent. I recently attended their summit, and I was inspired.

Michael Rivera

Dr Michael Rivera (he/him) is a Filipino-Chinese biological anthropologist and science communicator.

Tell us about your journey into science

I was born in Hong Kong, and when I was growing up I came across this TV show called *Bones*, and I thought it was really cool. For anyone who hasn't watched *Bones*, it's about a forensic anthropologist who looks at the remains of the dead, trying to identify who they were and what happened to them. It's kind of gruesome and a little bit morbid, but I thought the science was fascinating so I went to the UK to study anthropology at the University of Kent.

That was when I was first exposed to the science of studying human diversity—why we come in all kinds of forms, why we have different behaviours, and why we have different cultures. After that, I enrolled in Cambridge to do a master's and a PhD. I did a lot of research on the human skeleton, so I kind of fulfilled my teenage dreams. I was looking at human evolution and development throughout human history, trying to understand why humans have evolved to become so diverse in our biology and culture, and how we've adapted to different environments around the world.

How has being LGBTQ+, and any other aspects of your identity,

influenced your experience in STEM?

I think working in science requires a lot of self-motivation and a lot of self-respect. I was a nerdy kid who was into reading books about dinosaurs, space, and the human body. I also figured out at 12 or 13 years old that I was gay. It always made me feel quite different from others in my school.

This feeling of being a bit different from everybody else only increased once I got to university. I realised that in my field of anthropology and archaeology, at that time, there was almost nobody who looked like me or had a similar background to me: being gay, and Asian. That forces one to really think about if this space was worth pursuing.

Pursuing science can be difficult. Sometimes it is frustrating, depressing, and upsetting how circumstances out of your control can affect your opportunities and whether you feel happy or not. It's not a good thing, but I think that experiences earlier on in my life made me just slightly more resilient and adaptable.

What kind of changes would you like to see in STEM?

I think that many scientists are working in biology, archaeology, and anthropology who hold on to a lot of traditional ideas about human evolution and human diversity. If you were to dig up a skeleton, find a burial, and discover what one might characterise as feminine clothing buried with the skeleton—some archaeologists will not think critically about it. They will presume

that the individual must have been a woman in their society, maybe 800 years ago. I see a lot of the newer generation trying to tackle those sorts of heteronormative and binary assumptions, and I would like to see a little bit more of this reflexivity and critical thought in my field.

I think a lot of it boils down to who gets to do science.

Archaeology and anthropology, maybe 50 or 100 years ago, were dominated by a lot of cis-gendered, heterosexual, able-bodied, white senior men who typically come from socio-economic privilege and were educated at some of the 'top-tier' institutions. All of those different intersections of identity, contributed to them having greater chances of success (and they still do today). That privilege has allowed them to dominate conversations about human identity, human relationships, and how we have evolved. They have dominated how we interpret statistics. STEM would be better if we were able to welcome more inclusive dialogue and practice. It would be better with more diverse groups of people playing significant roles in how we design research, how we carry it out, how we interpret results, and how we present the findings. It also matters who you present that science to, which communities you share it with, and how you measure its impact.

Something that is missing from a lot of science undergraduate courses is a recognition that 'western' science has a history of bad practice. We celebrate and lionise figures in scientific history, but we don't recognise that many of the technologies and approaches they developed and used were discriminatory. In the

past, and even today, many of these techniques are still used to justify the mistreatment or disrespect of people. We need more critical thought about who came up with this science and what it's being used for now. I think it's important to teach the history of science. When we call for this, we are not trying to 'politicise science'. Science is already political, and already biased by whose experiences, thoughts, and accomplishments are marginalised or celebrated.

What advice would you give to people with similar identities or background to you, or your younger self?

If I were to speak to myself when I was 18 I would say "just keep doing what you're doing". I think that even when I was 18, I had a pretty good idea of who I wanted to be. I would probably warn him (and I would also warn a lot of other junior scholars and early-career scientists) that it is very important to take care of yourself.

I remember there were multiple points throughout my PhD where I was burning myself out. I was doing a lot of work (that I wanted to do) like research, teaching, and public talks. The problems started when certain people around me were being a little bit discriminatory—or being a lot discriminatory—in their use of language, in the ways they would offer opportunities to some but not others, and in the ways they just didn't think about what they were doing. That would lead to me and my friends feeling disappointed and being a bit excluded from certain

projects or conversations. It is disheartening to see, for example, that a lot of white scientists in my lab were given a lot of funding. Also, as far as I know, I was the only queer person in my lab—and it hurts when people don't recognise that you belong to an underrepresented group, or that even if you were to work ten times harder, you still might not be respected or valued the way you should be.

My advice to a lot of younger or early-career scientists now is to look out for yourself. You can do that by thinking about your long-term goals. If you envision yourself having a certain career ten years from now, you have to start now, and you have to think about some of the barriers that will be put up in front of you. Even if you're at the start of a PhD or undergraduate programme, you need to think about what the job market will be like for someone like you. If you don't think about that right now, you're going to have to face it one day, and you're going to be caught off-guard.

I think it's also very important to try and find your allies. As a gay man, I think it's been very important for me to have a lot of straight friends and allies who I could trust, who would hear me out, and who would listen to the struggles I face. I'm also an Asian scientist, so I have a lot of white friends and mentors who have taken time out of their schedule to listen to me, read my cover letters, and double-check my results.

During my PhD, I told my head of department off for not hiring

diversely. I could see that most of the hires were of 'western', white scientists educated in UCL, Oxbridge, or one of the 'top-tier' universities. There just wasn't a lot of diversity in that, and I was telling him off. I would never have dared do that if I didn't already have half of the faculty in the department backing me up. I knew that I wasn't going into that office alone. I had already spoken to each of the faculty members before going in, just in case there was some gaslighting, just in case he didn't agree, and just in case he decided to punish me for it afterwards. I was protected. You have to build that collective support all around you. No significant change to improve STEM happens without collective action. You have to start with a collective before anything happens because I think that institutions are very, very good at punishing individuals if they go into it alone.

Do you have a network of people with similar identities? What was your experience of finding a community of people?

It took me a very long time to find people of like mind, similar identity, or background. When I first arrived in the United Kingdom, given that I had travelled from thousands of miles away to come over here, it was so different. I think that I was just in shock for most of my undergraduate because back in Hong Kong I had so many friends. They didn't have to look like me, because Hong Kong is such a multicultural place, and you are so used to the diversity all around you. The very fact that this could set me apart from other people came as a shock because I was so used to another kind of normal.

Halfway through my PhD, when I realised that I was going to enter the job market soon, I needed to think very carefully about who I networked with, and who I could trust to have my back. I think that sometimes when you work in science, half of the reason some people are friends with you is that they want to get to know you. The other half is that there's a work benefit because then you can talk to each other about papers or include each other in a conference session. It isn't really until you are finishing your PhD that you realise who was in it to really take care of you and support you no matter what. I found this very tricky.

I think that working in science or academia trains you to be good at developing this mask that you put on. Friends that I thought I would have for life are not friends anymore, because I've left their immediate workplace. I'm no longer important to keep in touch with, and I'm no longer important to support. But what has been surprising, honestly, is to find that there were people who were there to support you. I've been really surprised, humbled, and excited to know that there were friends who maybe I discounted or took for granted before, and I didn't realise how much they cared about me until afterwards. It is possible to find these people in your lab space or your departments.

Another big part of my life is engaging with a lot of online communities. I have been really proud to connect with the Pride in STEM community and with the Minority in STEM community. I left Hong Kong thinking that nobody on the planet is like me (who comes from Hong Kong and wants to do anthropology and

archaeology). For seven or eight years, I never met any other Hongkonger, or any other Filipino or Chinese archaeologist or anthropologist. It's remarkable to me now that I think back on it, but something has changed. In the last year, I must have found and followed at least 400 or 500 different Filipino and Chinese scholars. They don't do exactly what I do, but they specialise in all kinds of things across academia and STEM, like biology, ecology, cultural studies, or sociology. It's been nice to follow them, because now I get to see all the different sciences through a Filipino lens or a Chinese lens, and place that science and its history in the context of back home.

In the coming years, I'm really excited to start thinking about projects that I could do closer to home, in East and Southeast Asia. I don't know what it is, but something changed recently, and I think people are claiming their identity and know that it's important to be represented. They're creating a Twitter profile, or a podcast, or a blog, and getting active online. I just think it's brilliant to see all this diversity online because now I get to follow them and follow their lives—in addition to the UK-based, privileged, white people that I followed before.

I enjoy everybody's contributions and all I want is for that respect and celebration to be fairly distributed.

What can the LGBTQ+ in STEM community do better?

I think that when it comes to the queer community in STEM, there are two aspects that I think about quite a lot. First of all, I

think about how international a lot of these networks are (or could be), and how we could improve our international representation and inclusion. I came all the way from Hong Kong, but I'm not the only one. There are queer people working in science everywhere around the world. I know that we often have the critical mass in hubs like New York, London, Toronto, Sydney, and Melbourne—but I would love to see a greater network. I would love to see more lines of communication between different countries and different cities—from urban to rural, from 'top-tier' universities to 'lower-tier' universities, and especially to reach more queer scientists in the 'Global South'. From there, there are actually a lot of interesting science opportunities—research collaborations, teaching opportunities, and science communication.

What does the public understand about science? What do they think a scientist looks like? What background do they think you need to do science? Of course, the answer should be anyone. Any background is okay. But that is certainly not recognised enough. I think that representation of minority ethnic groups is really important in all of this network-building. It is quite difficult, but I also think that it is possible. Humans find it easier to connect with people that they have more in common with—but I would argue that we all care passionately about the quality of our science. We all want science to be applicable and relevant to great sectors of our society, and that requires us to have great sectors of our society equally represented in our work and our network.

Who inspires you at the moment?

When I think about this question, I think about our disabled colleagues, our queer community, and all of the ethnic minorities in our fields. I think about all of them. I think about everybody who is trying to fight the good fight, who is blogging, who is tweeting about all of these issues. Even if you don't do it so publicly, I know that there are lots of scientists trying to fight for equity, diversity, and inclusion in their labs, their departments, and in private conversations.

I also think that a lot of younger people inspire me. Some mornings, I look back at a long Twitter thread about racism in our field that I wrote the night before, and I'm like, 'I don't know what got into me last night, I must have been really angry'. But there are undergraduates who are 18 or 19 years old writing even better quality threads, with citations. They're angry, but they're also justifying their arguments for greater inclusion and safety for everybody in our field. I find it so remarkable: their passion, their smarts, their research, and how critically and carefully they've thought about these issues.

I also think about all the trailblazers in my field. There have been people who have been trying to represent the Asian community in anthropology, and to represent the queer community in archaeology, for 30 years. I can't imagine what it must have been like to be in their shoes. I just hope to follow in their footsteps. They inspire me because they were one of the few at the time.

Eduardo Amorim

Trigger warning: Suicide.

Dr Eduardo Amorim (he/him) is a population geneticist and an Assistant Professor in the Department of Biology at California State University, Northridge. At the time of this interview, he was a postdoc at the University of Lausanne in Switzerland.

Tell us a little bit about your journey into science

I was always fascinated with biology. There are no scientists in my family—everyone is a public servant and they work for the government in some way—so it was very strange to be a scientist in my family. They always wanted me to do medicine, but I wanted to do biology. But then when I started to study biology, at 17, I also started to take some dance classes—which resulted in me wanting to change fields. I quit biology and went to Germany to study modern dance. But, at 22, I had a back injury which ended my dance training, so I started biology again.

How did you transition back to biology, from dance?

I returned to Brasilia (the capital city of Brazil), where I was born, and reactivated my course. I graduated, and then I did a master's degree. It's different from Europe, where very few people in my world do a master's after undergrad. After that, I moved to the south of the country to do my PhD.

What did you do after your PhD?

At a certain point, while studying biology, I started to look at evolution and felt strongly that that was what I wanted to research!. I chose genetics because it's a tool to study evolution. I was interested in human evolution, modern humans, and the history of different populations. I went to study with my PhD advisor, and during my PhD, I got a fellowship to study in Switzerland, to get training that we didn't have in Brazil at the time. This was in bioinformatics and computational biology.

When I came back to Brazil, I finished my PhD, and I published some papers, but then I wanted to do something different. I wanted to take a risk and go towards computational biology; it's more like a technique within the field of evolutionary genetics than a field in and of itself, and not a lot of people were doing it in Brazil. I got another fellowship (also from the Brazilian government) to do my first postdoc—and so I went to work with Molly Przeworski at Columbia University. I spent five years at Columbia as a postdoc (from 2014 until the end of 2018).

In 2019 my research stopped for a year for mental health reasons: my best friend, who I grew up with, died by suicide in Brazil. I had been applying for jobs at the time, and I wasn't getting offers, but after he died I just couldn't do anything for almost a whole year. But, at the end of last year, I applied for some jobs—and I got one as an Assistant Professor.

My friend was not an academic or a scientist, but it made me so

sensitive to those issues. Later, a friend of mine was going through some stuff, and I was so worried that he was going to end his life too. I started to fear that anyone I knew, who was sad, was going to die by suicide, but I'm doing better now, emotionally.

This issue is more common than we think—both his story and how his death by suicide affected my mental health.

Thank you for sharing that. Could you also tell us about how being LGBTQ+, or any other aspect of your identity, has influenced your experiences in science?

As a cis gay man, I haven't noticed anything from outside that affected my trajectory or my career. I never felt any pressure from outside.

However, I had a very difficult life as a teenager, because of my parents. I'm very close to them and I love them very much, but when I was a teenager it was difficult for me. I think that probably shaped me a lot. I'm 37 now, and I've realised that my self-esteem is not as good as I would like. I think it has to do with how my family treated me during my development.

But in terms of being a gay man in academia or science—I never felt anything, bad or good. But, internally, I have self-esteem issues. I've been seeing my current psychoanalyst for five years. She showed me how many issues I have with self-worth. They affect my profession, and how I sabotage myself.

I'm not engaged in big things to help LGBTQ+ people or other underrepresented minorities, but I try to help every single person I know—and even people that I don't know. I am very aware when I talk to people—not only LGBTQ+ people but also other minorities, including a lot of Latinos in academia—that there are sometimes a lot of self-doubts and a lot of fear. I connect with that, and I think it has to do with me being gay.

What changes would you like to see in science?

I think we should take mental health more seriously, and talk about it more openly. I think mental health is overlooked in academia. There should be efforts to talk more about mental health issues and acknowledge that there may be people going through struggles related to their mental health. There are ways to help those people.

What advice would you give to somebody that is struggling with their mental health?

I think one of the things that was very helpful to me during my teenage years—but it's also valid for science and academia—is to talk to people. Also, listen to other people. Understanding and talking about your struggle, and being open about what you're going through, will help you. For me, it helped to find people going through the same thing. People might have an insight or an outside perspective, and give you some help. Being open and not hiding, or being ashamed—not only of your sexuality but also if you're struggling with mental health—might help you see that you

are not alone. You're not the only one, and you can get help or find a network.

Do you have a network of people with similar identities? Especially since you have travelled extensively throughout your academic journey. How has it been finding friends as you moved around?

I have a network of support and it's mostly outside academia. I can only think of two very good friends in academia, but I made a lot of friends outside of academia. They are very important to me, and they are my network of support. My friend who died by suicide also had a lot of friends, so it doesn't automatically follow that friends will help you through everything, but they have helped me a lot. They helped me to feel loved when I didn't feel loved by my family. I tend to see academia or science as my job or profession, and not as my entire life. I enjoy it a lot, but it's just my profession—so when I need support I go to my friends, and to my therapist.

What could the LGBTQ+ community do better—in STEM, and in the wider queer community?

There is a lot of animosity in the gay community, in my opinion. I lived for four years in New York, and for two years in LA, and I think those two gay communities are very hostile. It's interesting because I think the LGBTQ+ community in academia is very warm and loving. Even though there is a lot of competition in academia, whenever I meet other LGBTQ+ academics, I feel that

we connect very strongly—so I think they should continue showing the support that they already do. For people who organise things, I would like to see more LGBTQ+ support at conferences. I'm a population geneticist and a biological anthropologist, and in some of the meetings that we have in the United States, we have an LGBTQ+ group—but I don't see that at every conference that I go to. Those are things that should happen every time; just a social thing to let people know we are there.

Who inspires you at the moment?

My first postdoc advisor was Molly Przeworski, and she was my mentor for three years. As a scientist, she is amazing. She is my role model and my inspiration. I learned a lot of what I know now about doing science fairly and openly from her—like admitting what you don't know and being open and clear about the limitations of your study. She's also a great mentor. I never felt any pressure from her, and she respects everyone.

Itumeleng Moroenyane

Itumeleng Moroenyane (he/him) is a biologist based in Canada. Originally from South Africa, he is currently finishing his PhD—which looks at plant-microbe interactions.

Tell us about your journey into STEM

I studied botany, in South Africa. I was an undergraduate in the early 2000s, and it was a very different time. We had same-sex marriage long before most of the world, but I still remember apartheid. That meant I grew up in a country where people were more aware of their rights, especially gay people.

I couldn't say that I had a tough time coming out or expressing myself as being gay, but one of the huge stumbling blocks I found in STEM was that there was an underrepresentation of Black people and queer people. I studied zoology because there was this guy, Mike Picker, and he was the only gay entomologist that was visible in the whole of South Africa. I was fascinated by how he was able to manage both sides, because in my mind they were mutually exclusive—you couldn't be gay and be a scientist, and you couldn't be gay and hold a faculty position at such a prominent university.

I took a very long break between my bachelor's and my master's to reflect on how I saw my career progressing in STEM. I got a job at a herbarium but I didn't enjoy it. I could see that some of the

undergraduates who were interning at the herbarium were struggling with being gay and out. There were no examples of how to be gay and also be a scientist. I felt a bit hopeless, and I left.

I did my master's in Korea. There, it wasn't just my sexuality that was an issue, but also the colour of my skin. I was so obviously the 'other'. I used that as an opportunity to be more visible: everyone is looking at me, I'm the only Black person in this university, and I'm the only queer person that's visibly out. I'm going to use this as an opportunity to talk about my life and to normalise the everyday struggles of a gay man doing science. I still have to do laundry, I still have to pay my rent... we still do those normal things. I joined Twitter, and I started showcasing what life is like for a queer scientist from Africa.

I moved to Canada to do my PhD. It was a much more relaxed environment. There was a sense of community, but it was mainly amongst the students, not the faculty. There were boundaries and hurdles that I hadn't encountered in Asia or Africa. For instance, showing my tattoos was an issue. Being visibly gay and talking about issues that queer scientists face, especially at conferences, was a touchy subject. It's almost taboo to talk about it here. A lot of people still feel that they are not supposed to be visible, and I didn't expect that. I thought Canada would be a breath of fresh air after the conservatism of Asia. Here, it's liberal and the rights are there, but no one is proudly open about who they are. That's one of the reasons that I engaged with a lot of

EDI work here. However, it's mainly women who are taking the charge of EDI here and addressing these issues. I know one other queer male scientist, but I feel like Caucasian gay men—specifically here in North America—don't really want to rock the boat. I also think that things will be very different in a few years.

How have aspects of your identity influenced your experience in science?

During my bachelor's I was either Itumeleng the black gay man, or Itumeleng the scientist. But now, during my PhD, it's much more of a synergy between the two. In recent years, I find that my identity has changed how I'm perceived by my peers. I'm outspoken, and that has ruffled some feathers.

I am in a small research Institute, not a university, so it's a perfect macrocosm to deal with these issues head-on. I haven't personally experienced homophobia at work, but I work with a lot of queer international students. They feel disempowered, because your visa is directly linked to your job, your PhD, and ultimately to your advisor. If your advisor is not satisfied with your work, for whatever reason, they could fire you and you would have to leave the country—so a lot of international students feel they can't speak up.

People were telling me horror stories about how they were being mistreated by their advisors, mainly because of their identity, so I wrote a letter to the director of the centre and explained the issues that some of the students were facing. There should be

some sort of training for professors on, for instance, engaging with trans students and respecting people's gender pronouns. Eventually, we wrote enough letters to the director, and they held mandatory training for all advisors.

A postdoc in my group, and I, organised an open day to talk about being queer in STEM, and three people attended (out of 400 students). A lot of them don't want to be visible because of the perception that speaking out against injustice is time away from science. They feel that they have to focus only on their work, and there is no time for them to show their personality, express themselves, and enjoy themselves during this journey. That's the biggest issue that I've noticed here.

What changes would you like to see in STEM?

I attended a conference last year, and we organised an EDI workshop. No PIs attended. Zero. Surprise, surprise. The people that actually have the capacity and power don't even want to get involved. One of the suggestions that people who did attend the workshop had was that there needs to be transparency—a sort of diversity index for labs. But that's not enough because we can have a very diverse lab and still not have a good mentor. People in the lab can still get bullied and marginalised. Even the idea of creating a safe space isn't enough, because you still have to deal with co-workers, and you still have to deal with systemic barriers.

I think we need radical change. First, we need to show that doing

more EDI work does not make you less of a scientist. It doesn't take away from the time you spend doing your research, because you don't have to work 80 hours a week to be a successful scientist. We need to start here, especially at the individual level. Then we can change a lot of the systemic issues—like rules, regulations, how we do meetings... and so on. We also need to empower people to be visible and feel confident about being queer in STEM. When people see how comfortable you are, that's what they want to emulate—not necessarily the greatness of your science. It's about how comfortable you feel wearing a lab coat.

What advice would you give to your younger self?

I've lived a very colourful and interesting life. There were challenges, in terms of my identity and being in science, but I was never bullied, and I never had issues with internalised homophobia. The only thing is that it took me a long time to be comfortable with being queer and a scientist, but I think that's a struggle most people have when there is no representation.

I would still tell my younger self, 'don't change who you are, and believe in yourself'. It sounds so cliché, but I think a lot of times we look up to others, and we try to follow their path to be successful. But that doesn't work because you don't know what that person had to go through, or what their journey was. Be courageous and steadfast.

What advice would you give to someone with a similar background or identities?

Be more visible! I couldn't shout it out louder. To this day, I know very few queer, Black, South African scientists (or even queer African scientists). I was in Spain last year at a conference; they had a diversity session to showcase the work being done by queer scientists in biology, but there were no Black queer scientists in there. That doesn't feel right. Africa has 3 billion people. If 10% of the population is gay, that's a lot of people! Where are they? I got chatting with one on Scruff. He wasn't at the diversity session because he was from a country in Africa where being gay is a crime. He was afraid of someone taking a photo of him, and I can understand that. But if you're from a place where you don't face those problems, I would say be more visible if you can. Occupy the space.

Do you have a network or community of people with similar identities or background to you?

I would say no. I've met other Black scientists, but none from Africa (so far). In lots of places, including here in Montreal, minorities do come together and form a community. Because of my career trajectory, I haven't had time to settle in one place and form this permanent support system.

People want to feel understood. They want to feel that someone else shares their perspective, their struggles, and their lived experiences. One of the things that came with being an international student was I stopped looking for people like me. I've had interactions with people from different backgrounds

than me, and that's been an interesting journey. To connect as humans, to understand our lived experiences, and how they've shaped who we are today... I think that's the kind of connection that I want to have with people. Everyone has a very interesting story to tell about their journey in STEM, and I love those stories.

What can the LGBTQ+ community in STEM do better?

I think we tend to be focused on our issues, and we sometimes miss other people's needs and concerns in the community. As gay men, we are more privileged in the community than trans women, for example. Sometimes we don't recognise the power that we hold and what we can do for the community. If we have any power, we should use it by being more vocal about issues that don't necessarily affect us personally.

Who inspires you at the moment?

This is going to sound narcissistic, but me. During my master's, there was this one queer scientist—and I was fascinated by his career. You meet your heroes, and then you realise that they're just people doing their best. It's so easy to look at the outcome of someone's career, but you don't know what their struggles were.

In my case, I left my country at a very young age, so there was a lot I had to learn, but it still turned out okay. I have this sense that everything's going to be alright. I couldn't choose anyone else to say I'm inspired by because I don't know what they had to do. I don't know what their journey was. I don't want to idolise

someone who had everything given to them. I really don't want to go down that rabbit hole, so I will be my own hero.

Nora E. Jameson

Nora E. Jameson (they/them) has been in science for almost 20 years and is based in Portland, Oregon.

Let's start by discussing your journey in science

I had the opportunity to do research in my senior year of high school (I was taking a college-level advanced placement biology class in high school). One of the portions was doing an independent project, so I got to intern at a university near where I lived, and I got to do research for the first time. It was really exciting, and that put me on the trajectory of doing research.

I did research for four years in my undergraduate. I helped get a paper published, I taught organic chemistry recitation classes, and I did outreach with the American Chemical Society student affiliates for grade-schoolers and inner-city school kids in Pittsburgh. All of those things were amazing experiences that made me want to continue to do science and research but also to bring science and research to the wider population—to people other than white cis heterosexual men, which was the majority of my class.

My undergraduate was a really good experience. I had mentors and friends that were a good support system. I was really lucky to have that. That made me want to go to grad school, so I went to the University of California, Irvine, to get my PhD in chemistry.

That was pretty sweet. I had two fellowships, I got nominated for a diversity fellowship, and I won a National Science Foundation IGERT (Integrative Graduate Education and Research Traineeship) fellowship—so I was fully funded for four and a half years of my graduate program. Unfortunately, I experienced some pretty severe trauma, and I left my graduate program with a master's.

I moved to Portland and tried to recover from that trauma. Having a life outside of graduate school is hard, and when that life is really bad, it's hard to do graduate school. Graduate school is already really hard. Imposter syndrome is an institutionalised problem. It sounds like such an individualised problem, where you think you have to overcome this feeling within yourself about being worthy, but people wouldn't suffer from imposter syndrome if they had support within their department, telling them they belong there.

In my recovery, I've gained a lot more perspective on my work in the natural sciences. My master's thesis was on nucleic acid biophysics, which is awesome. I love my master's thesis—it's a nice little project, and it's got some old-school chemistry with some flashy new ribozyme stuff going on. It might have something to do with something in the future... I don't know. I may be the only person who ever reads my master's thesis.

Going through a lot of evidence-based behavioural health therapy really changed my life in ways that my master's thesis did

not. I have begun a trajectory towards public health and evidence-based mental health practice. I want to take my basic science background, and I want to make an impact in people's lives by bringing public health and medicine to people who need it. I want to serve people in academia who suffer from severe treatment-resistant depression. Suicide is the number one cause of death for college students and graduate students (aside from accidents). I want to make sure people are able to get their PhDs when they go through trauma. I want to be able to offer solutions to people. That's where I am in my science journey.

I'm in my public health programme right now, and the things that interest me most are violence intervention, mental health, and coping with trauma. I'm on a 'gun violence as a public health issue' committee, where we have a journal club on scientific literature surrounding gun violence. I get to do all of the science that is pertinent to the things that are going on in my world now. I feel like that is so much more powerful than basic science ever was for me. Not to hate on basic science—I love it. I love teaching chemistry because learning about the natural world is empowering—in the same way that learning about feminism, postcolonial critique, and critical queer lenses is empowering. I see the pandemic going on and, especially in America, there are two reactions. One is sheltering in place, and the other is protesting on beaches. This is a failure of the education system. If we're going to move forward, we're going to have to think about ways that we can overcome things like fake news. It needs to involve public schools in rural areas, because that's where the

education systems in America are the least funded and, in a lot of cases, really biased. Science is for everyone. When people don't understand public health measures it's not a personal failing, it's the failing of a system that was never built to help them succeed in the first place.

How has being a part of the LGBTQ+ community, or any other aspect of your identity, influenced your journey and your experience in the field?

I've been pretty lucky. Now I identify as pansexual but identified as bisexual when I was in college. It was really interesting because I experienced a lot of biphobia in college (2005–2009). It was weird because I had really good lesbian friends, and I had really good straight cis friends, but I still experienced biphobia from both of those groups. I still love all of my friends very much, because we were all young, and I had biphobia against myself. I can only blame the things that we grew up with to be such a way to each other. I don't hold it against any of them because we all do stupid things when we're young, but that affected how I wanted to come out when I went to grad school.

I didn't come out to my classmates until a couple of months into grad school. I think that is what led to some of the trauma that I experienced. Trans people and bisexual people experience the largest amount of sexual violence out of any other sexual or gender minority. For the first time, I didn't experience biphobia from my gay friends. It was totally acceptable. It's the system that

is shitty and treats bi people poorly. A lot of good things came out of being a part of the LGBTQ+ community, like the support I got from my friends.

I went to Portland after grad school. I've been more focused on volunteer work, and that's where I met all of my queer friends. The people I find tend to have the same passions for mental health and social justice. Those are the queer people I like hanging out with. I avoid the Q Center because it's mostly white gay men, and I haven't had the best experiences with white gay men. Mental health issues are not really grasped by all people who do social justice, racial justice, or LGBTQ+ justice. I think any type of invisible identity is hard for people to grasp. It's hard to find communities that truly understand mental health unless you seek them out. I volunteer with groups that focus on mental health, social justice, and human rights— and who are willing to listen to people with lived experience. I have volunteered for Free Radicals, which is a science and social justice organisation that is extremely transparent. It's an anti-capitalist, postcolonial framework for science. I sought out the American Foundation for Suicide Prevention, which is an amazing nonprofit in America, and the number one funder for suicide prevention in the country.

There are useful support skills that should be taught in grad school. When I went to grad school, they didn't tell me to make support systems with friends that were outside of science. They didn't tell me to maintain a healthy work-life balance. Mental health was not a large part of my graduate school career. Now I'm

seeing people talk about it a lot more, which is great. The majority of my friends now really understand mental health. The LGBTQ+ community is disproportionately affected by mental health problems and suicide. I think that's why there's this overlap—my experiences have made me prioritise the relationships I build with people who understand mental health. I have mental health issues and I need people who understand them. I think I'm lucky that a lot of queer people understand what it's like to have mental health issues and to not be understood by their immediate nuclear community.

Do you think widespread education about mental health issues needs to happen in STEM? Is there anything else you think we need?

We need mental health support in science. I was talking to my friend about what their ideal job would look like: they didn't want to work for an institution where they get money from people who profit from white supremacy, such as big funding or pharmaceutical companies. She didn't know if she could conscientiously move forward in her scientific career if she had to sell her soul in some of those regards. She was thinking 'what would the future look like if there was a world where I could do the science I wanted to do?'

I went to this conference at MIT (Massachusetts Institute of Technology) called Bio Summit 3.0 on democratising science and making science accessible, and I got to meet amazing people

from all over the world. I came to this idea that if the science community really wants to change, and if it really wants to be about diversity, equity, and inclusion, it needs to be more than just science. It needs to have history of science, history of medicine, history of public health, ethics, and mental health. Racial justice should be a part of every single graduate class, no matter what you're studying, because it should be integrated into our research. Physicists want to plant a telescope on a sacred indigenous mountain in Hawaii. That's not objective science. That's science for white people. Objective science should be good for everyone.

Science still isn't diverse. In an ideal world, I would like to have a community centre that's got science labs to answer questions for the local community. In Portland, for example, we would have a lab to figure out ways that we can improve salmon populations. We would figure out ways in which we can solve our community's problems with science. There would be a mental health practice in the centre, and there would also probably be a dance hall because dancing is very important. It's all community building. In the scientific community, we need to radically restructure the way that we do science so that citizen science can be possible, and so that we can make knowledge open and accessible and we can take care of our community.

What advice would you give people with similar identities or similar background to you? Or what would you say to your younger self?

I don't know if I would tell a younger me anything because they have to learn hard lessons anyway. I think I would tell other younger folks to find support systems for themselves that focus on mental health. Finding a community that supports your emotional needs is more important than finding a community that supports your academic needs. When you make your work your life—and your work fails—it feels like your life is failing. That is a terrible feeling, but your life isn't failing, because it's just your work. Your work really isn't your life. Developing who you are outside of your work is vitally important as a young scientist. I think when you go into grad school so young, it's hard to develop who you are outside of the science that you do. I think that's a big contributor to depression and suicide in graduate students.

What can the community do better?

It can do diversity, equity, and inclusion better. Mental health is a facet of many intersectional issues that all institutions face—like racism, ableism, homophobia, sexual assault, and sexual harassment. All of these issues exist in academic institutions. I want to throw the whole system out and build a community lab that's focused on the neighbourhood.

Who inspires you at the moment?

Dr Marsha Linehan, who retired in 2019 from the University of Washington in Seattle. She ran the behavioural health clinic for the Department of Psychology, and she invented the evidence-based therapy that I went through. I'm reading her memoir right

now. She had the same mental illness that I had, and she made this full therapy programme to help herself, and then to help other people. She's such a badass woman—dealing with complex trauma, and fucking coming up with her own way to treat it! She's saved thousands of lives with this treatment. One thing that Linehan says is: 'We're all trying our hardest at any given point in time'. I think her outlook on life is radical—and it's cool because I got to experience how it works. Reading about her life and how she came to discover this amazing way to help other people and herself is just inspiring.

Charlie Wand

Charlie Wand (he/him) is a bisexual trans man. His background is in chemistry, and he is currently working in chemical engineering at the University of Manchester, UK.

Tell us about your journey into STEM

I always wanted to be a scientist—ever since I can remember. My choice of A levels reflects that. I did chemistry, physics, maths, AS (Advanced Subsidiary) Further Mathematics, and AS psychology. After that, I did a degree in chemistry at St Hilda's College, University of Oxford. At the time, it was an all-female college, so that made it interesting, to say the least. I then did a PhD in chemistry at the University of York. I found out about that because I did a summer internship with the person who would then become my PhD supervisor. I enjoyed the internship, so I went back to do a PhD. I had a year off for health reasons, predominantly to do with transitioning. I then went to work in Sweden for a year at the Swedish School of Textiles, which was very different. It was much smaller than York. I came back to the UK to do another postdoc at the University of Cambridge, before moving to the chemical engineering department at the University of Manchester in 2018.

How has being LGBTQ+, and any other aspect of your identity, influenced your journey through STEM?

Being trans has definitely affected my career decisions—for example, where I go abroad. When I was working in Sweden, I couldn't really stay there any longer because of healthcare reasons. Even now, within the UK, the funding for my various transition-related health needs is linked to where I live, so I have to live in England. I can't move anywhere else—not even Scotland or Wales—and I would like the opportunity to. I'd like it to be an option.

As I mentioned, I went to an all-female college during my undergrad, which was when I started experimenting with gender presentation and realised I was trans. I had to hold off transitioning until I was somewhere that wasn't a single-sex place because transitioning is difficult enough as it is. Part of the reason I chose York for my PhD is that I had a friend there who had transitioned a couple of years before in the same department, so I knew that the department was supportive and they had processes in place to help a student who was transitioning. That was important. When I was at Oxford, on the other hand, they had no guidance on being trans at all.

Being bi has had far less influence on my journey in STEM, if I'm honest.

What kind of changes would you like to see in STEM?

This is a really difficult question because I would like to see loads of changes in STEM. The first one I'd like to see affects not just LGBTQ+ people, it affects everyone: a better work-life balance. I'd

like to get rid of the idea that you have to work 60+ hours a week to make it in science or academia. I think that's how people end up burned out, and it is damaging to your mental health.

Related to that, I would like to see an end to short-term contracts. Going from short-term contract to short-term contract can be very difficult. You never know where you're going to be. The end seems to approach very rapidly, and then you spend the last six months of your contract looking for a new job and not concentrating on the job you currently have, so it's not great for the research either.

A more LGBTQ+ specific change I'd like to see would be more senior people who are out—specifically trans men or trans masculine senior scientists. I know there's a large LGBTQ+ in STEM community online, but there are not that many trans men, particularly those who are further along in their careers than me. Seeing that you can make it in STEM as a trans man is important.

I also want people to see that STEM subjects are for everyone—regardless of gender, sexuality, race, disability, and any other protected minority characteristic.

What advice would you give to people with similar identities or background to you? What advice would you give to your younger self?

The first thing I'd say is: you can do it. Don't let the fact that you're transitioning stop you from making the most of it. When I

was transitioning (during my PhD) I didn't present at any conferences, or do any real networking within STEM or socially—and I think that was a real negative. I would definitely say to my past self: go and meet people because the research you're doing might be amazing (and probably is) but people need to know about it.

The other thing I would say is: get a supportive supervisor and group. You can ask around. Ask how they interact with the people they're working with. One thing I notice whenever I email anyone is if they have their pronouns in their email signature. I've started working recently with an industrial company, and the person who I was emailing there had their pronouns in their email signature. I thought it was great.

Do you have a network or a community of people with similar identities or background to you? Where did you find them?

Outside of STEM, I was really lucky when I moved to Manchester because there's a large LGBTQ+ community there, including the UK's longest-running bi group called Biphoria. The first thing I did when I moved to Manchester was to go to that. I still go to it every month it's on. Interestingly, a lot of people I've met there have been in STEM as well. It's a good way to meet people with similar interests.

Other than that I meet people online, particularly on Twitter. There's a large LGBTQ+ community there—but I find it quite hard on Twitter to reach out, break the ice, and talk to people I don't

know, so I mainly use it to keep in contact with people I've previously met in person.

What do you think the LGBTQ+ community in STEM, or the wider LGBTQ+ community, can do better?

Given the current climate in the world, we all need to recognise that the LGBTQ+ community is large and varied and that everyone has different experiences in it. Taking intersectionality into account is important. If someone says something is important to them or their experiences, you can't tell them that those aren't their experiences.

I also think it's important to not forget bisexuality. Bi erasure can happen quite a lot, both within the LGBTQ+ community and outside it. Being bisexual is not being half gay and half straight. We require different support.

Standing up for trans rights is important. Here in the UK, there's been a huge backlash against trans people. We all need to stand together, and not separate the T from the LGB.

Who inspires you at the moment?

This is a difficult question because there are so many great LGBTQ+ people. The person who inspires me the most isn't actually a scientist. It's Jen Yockney, who runs the bi group in Manchester. She's been working on bisexual activism for over two decades now, and was the first non-binary person to make the honours list (and so she's got an MBE). She does so much for the

bi community and has been doing it for so long. She's really inspiring.

Craig Poku

Dr Craig Poku (he/him) is an air quality scientist currently based at the University of York, UK.

Tell us about your journey into STEM

I was always interested in how the world worked. As a kid, I was interested in the natural world, so I was really engaged in science subjects at school, but I was also engaged in the arts. When it then came to picking university options, I chose to do a maths degree because I could be both scientific and creative at the same time. As I got further into my maths degree, I realised that I just couldn't hack maths. What I did enjoy, however, was applying maths to different scenarios—whether that was discussing theoretical physics (which again, I couldn't crack), or modelling fish-eating dinosaurs. Eventually, I chose to leave maths and go into atmospheric sciences. I completed a PhD in atmospheric physics, and now I am working in urban air quality. I would say my career now is a combination of things that I was interested in when I was a young kid.

How has being queer, and any other aspects of your identity, influenced your experience in science?

For me, I can't talk about being queer without also talking about being Black. That may seem like a very obvious statement, but the two do intersect. At school, I was seen as one of the nerdy kids,

and because of that, I found that a lot of Black kids told me I wasn't "Black enough". That made me feel ostracised, and I considered not going into STEM. At university, the scientific theories we were learning about were all from white scientists, so for a very long time, I thought there just couldn't have been many Black mathematicians or Black scientists—because they were never mentioned in our curriculums.

In terms of me being queer, I found that there's an assumption within the science community that you're going to be heterosexual, married, have kids, and have a house. It's traditional in that sense—even though scientists like to claim they are groundbreaking and pushing barriers. It felt that a lot of the time, especially in social situations, I couldn't feel comfortable talking about my relationships and my sexuality. When I was a PhD student, things like field work became an issue because I had to think about my safety. Most of the time, I was also the only Black person there. When it came to finding jobs, I was limited in the jobs that I could apply to. I couldn't just go anywhere in the entire world—I need to feel safe that I'm not going to have to deal with racial abuse, and I also have to feel safe that I'm not going to be harassed because of my sexuality. Part of the reason I'm now in urban air quality is that it allows me to be in big metropolitan cities. It means I can still do the science I want, but I can also take my marginalised aspects into account.

What changes would you like to see in STEM?

I would like people in STEM to accept that it isn't as diverse as they would like to think it is. If you look at the arts, for example, they are a bit better at embracing diversity. With STEM, there's this idea that "we do science for the sake of doing science". The issue is that science is still dictated by cis straight white men, so you get conditioned to think in a very white way—and that's not necessarily the right way.

It's important to allow people to feel comfortable being themselves. I know several colleagues who identify as queer in my department who don't feel comfortable enough to be "out". I think this happens when you see staff members who are out, and they deal with very difficult things and are not supported. For example, there was one colleague I know who was being harassed while they were on fieldwork, but their senior manager basically said 'you just need to toughen up and deal with it', as opposed to supporting them. My colleague now doesn't know if they want to stay in this field of work.

Finally, we need better policies—that don't assume you are a cis heterosexual man. We need better paternity rules (if you want to have kids), and policies to ensure that if you can't go on certain fieldwork opportunities your career progression won't be impacted.

What advice would you give to your younger self?

I would say to myself: Black queer people exist—and Black queer people in science do exist. As weird as it sounds, for a very long

time I didn't think they existed because I never saw them. It took going on Twitter and finding people there to make me realise that we do exist. We're not highly publicised; which is also a fault of the wider LGBTQ+ scene in the UK. I think people of colour get marginalised within the community quite badly. It is getting better, but more work needs to be done.

I would also tell younger Craig that being yourself has benefits, even if it doesn't always feel that way. You will be fine, it will just take some time to navigate and work stuff out. Also, speak your mind because it gets you places.

What do you think the LGBTQ+ community can do better?

Frankly, they need to stop thinking like rich white folk. Let's take, for example, the LGBTQ+ STEMinar: the most recent one was the best so far because they addressed a lot of issues, but in the planning meeting they couldn't understand why no people of colour would want to turn up. Maybe it's because of the same reasons that people of colour don't necessarily want to go into STEM. People need to acknowledge their whiteness in order to see what we need to do to keep going forward. If you don't acknowledge whiteness or privilege, you miss things.

Do you have a network of people with similar identities or background as you? How did you find them?

I have met people through organisations like Pride in STEM and BBSTEM, which was one network that allowed me to find other

queer people of colour. Twitter has been really useful, and I've been engaging with events by LGBTQ+ societies that are trying to encourage people of colour to get involved and play a more active role.

Who inspires you at the moment?

Billy Porter inspires me because he is an out and proud gay Black man who pushes the gender norm and is very outspoken. He is outspoken about the homophobia within the Black community, and he encourages Black folk to do better. He gave me the strength to work out my identity as both Black and queer. If I were to meet him I would thank him for helping me navigate this space, because it's difficult. Even though he's not in STEM, reading and watching his stuff has, in a sense, allowed me to become a better scientist.

Jason Tan Liwag

Jason Tan Liwag (he/him) is a gay, early career scientist from the Philippines. Originally from the City of Dagupan, he is currently based in Quezon City.

Tell us about your journey into STEM

I wasn't an academically excellent kid, but I was always curious. I owe my development in the sciences to excellent teachers in grade school and high school, but my love of the field is because of the media, books and movies I was into.

Pokémon and *Jurassic Park* made me want to become a scientist and, for the longest time, I wanted to be a *Pokémon* researcher or to create my own dinosaurs. We were also lucky to have a lot of books growing up: encyclopaedias, the *I Wonder Why* books, and novels. I read Michael Crichton novels such as *Timeline*, *Jurassic Park*, and *The Lost World*. Those books, specifically *Timeline*, really impressed upon me this idea that research is valuable because it keeps asking questions. Science transforms throughout time—a theory that stood a century ago may not necessarily prove true today. To me, that was fascinating.

From a provincial high school, I entered the Life Sciences program at the Ateneo de Manila University in 2012. Early on, it was very clear to me that I didn't want to become a doctor, but participation in co-curricular activities helped open up this

interest in cancer research. Throughout college, I volunteered for paediatric patients suffering from chronic illnesses. I think that visiting kids in the hospital shifted my interests to a more grounded and translational form of science because I saw how it impacted those who were suffering.

When I graduated from my undergrad degree in 2016, I immediately applied for my master's in Molecular Biology and Biotechnology at the University of the Philippines Diliman. I ended up in the Molecular Endocrinology Laboratory (MEL) of Dr Pia D. Bagamasbad. Now I'm working on a collaboration with Dr Michael C. Verlade from the Institute of Biology to figure out how environmental chemicals promote breast cancer progression through epigenetic modifications in the breast cancer stem cell population.

How has being LGBTQ+, and any other aspects of your identity, influenced your experience in STEM?

I come from a very religious province in the Philippines, and people started calling me gay before I even knew what gay meant. I remember liking guys since I was very young, but I didn't really come to terms with it until I was about to go to college. I came out as gay for the first time in sophomore year and it's been this continuous process of coming out in different spaces, environments, to new friends, etc.

Prior to coming out, I didn't know how to participate in the world. It was a confluence of things that I was adjusting to in

college—coming from the province, coming to terms with being gay, exploring all of these co-curricular activities, and not really excelling academically the way I expected to. Taking on the task of hiding aspects of myself that I couldn't risk revealing took a lot to process. I got into student theatre in my sophomore year and the environment was idyllic. Most of the people around me were gay, and it was the heterosexuals who were the outliers. That shift in the environment allowed me to open up and participate.

When I started my master's degree, I began interacting with people who were on their way to becoming queer scientists, and that was a really liberating experience. It allows you to be freer because you're thinking about one less thing. It's one less group to come out to. I'm also glad that, here in the Philippines, there are more female scientists than in other countries. Here, there's a strong matriarchal component, at least in the biological sciences, and I think that allows spaces to be more open to being inhabited by members of the LGBTQ+ community. You don't necessarily have to fit into a patriarchal paradigm to belong.

What changes would you like to see in STEM fields?

I don't want to make generalisations; I'm still early in my career, and I could be more exposed to the international landscape. However, one of the things I really hate about STEM is competitiveness. It is such a huge barrier to entry and it drives out so many stories and perspectives. Science in the Philippines is very collaborative, but we seem to celebrate an individualistic

type of science; the same type of science that enables competitiveness and prevents people with other perspectives from entering these spaces. We venerate certain personalities that are usually white, male, heterosexual, and from a Western background. Those scientists will be celebrated because they have access to active research, good funding, and certain privileges that enable them to focus on their work.

I would also like to see better legislation and cultural changes that lower barriers to entry for international students and improve the local scientific milieu, especially for those who are marginalised.

Being a Filipino scientist is incredibly difficult. We have to chase after what Western countries are already doing. What they can do in one month, it takes us three months for ten times the price because of procurement laws, bureaucracy, and customs issues. There are so many barriers within the country, but there are also so many outside the country.

What advice would you offer people that have similar identities or background to you? What would you say to your younger self?

I have a lot of advice for my younger self. I would say: get out of your comfort zone, do not give in to fear and imposter syndrome, and don't count yourself out.

The advice I would give to others who are similar to me is that

you have to do your research. Look up programmes to find out what they might be like for a queerFilipino student. If you're planning to go internationally, look for organisations like Pride in STEM or Cientifico Latino that can help you. Seek out those spaces where you can feel good about yourself.

That's why we started Queer Scientists PH—a visibility campaign-turned-advocacy organisation that seeks to tell the stories of queer Filipinos in STEM. I wanted to create a space that enabled people to talk about their science freely because existing spaces either preferred a certain type of narrative or had a tendency to glamorise science. Science in the Philippines is unglamorous but there are a lot of people who are still doing great work, who are shy to share their achievements themselves due to imposter syndrome.

Science has often been weaponized against the LGBTQ+ community. Queer Scientists PH began as a visibility campaign because we just wanted to challenge this dominant and often binary narrative centred on science. After conversations with other scientists and volunteers, we decided to expand towards an organisation that promoted visibility, sparked discussions, created inclusive spaces, and facilitated forms of lobbying. We want to create mentorship programs and establish international networks, not only with scientists but also with science-allied professions and organisations. We're still a long way from those things, especially because we're so small. These spaces have

already existed informally and we're just somewhat formalising these efforts.

What can the LGBTQ+ community do better?

I'm all about inclusivity, even within the queer community, but I think it's important to remember that inclusivity also calls for social justice. There are members of the community that ask: Why do we have to constantly educate people, especially when they have the resources, privileges, and means to educate themselves? Why do we have to create inclusive spaces for homophobic and transphobic individuals? Why do we have to include them when they've lived out their whole life actively excluding people like me? It's very easy to say 'educate, not hate' if you haven't suffered the same magnitude of discrimination, even as a queer person. How do we create inclusive spaces while accommodating differences in worldviews? Is that even something we should consider? I constantly ask myself these questions. I don't know if I'll ever arrive at definite answers, but I think it's important to always participate in these discussions so we can clarify our motivations, unlearn our habits, and create better actions as a community.

Who inspires you at the moment?

British actress and screenwriter Michaela Coel said something that really resonated with me: 'If you don't show it, it can be erased'. We've been reinforcing the same kinds of stories, and we're not looking for other stories that exist at the peripheries.

Great science is taking an idea at the periphery and advancing it forward. Michaela Coel also advocates for mental health and the Me Too movement. She talks about how we're more concerned with the perpetrators than the victims or what's happening in smaller workplaces globally.

I'm also inspired by Richard Bolisay, a writer and film critic based in Manila. He said 'No one has a monopoly on insight'. I think that's important because we're subliminally told from a very early age that our voices don't matter because we don't get to see them reinforced on screen. We don't see them in the media or newspapers, so it's important for people to start speaking up for themselves and to be given opportunities to do so.

Jazmin Scarlett

Jazmin Scarlett (she/her) is a historical and social volcanologist—which essentially means she combines STEM with social sciences to understand how people live in a volcanic environment, in the past and the present, to understand how they might live in the future.

Tell us about your journey into STEM

In primary school, I was very interested in science and geography. I was interested in learning about the natural environment and, in terms of human geography, how people interact with the environment and each other.

In secondary school, this developed further, and I became interested in natural hazards, and how people live and persist in these hazardous environments.

I had teachers who saw my passion for doing science and geography, and they were really encouraging—which was important because I have a physical disability. When I was younger it was very hard on my body. I was in the hospital a lot, so I was disengaged with quite a lot of subjects, particularly ones that were more physically demanding (for example, I was not interested in sports at all). What I liked about science and geography was that they got me to think about things differently. I did geography and science at A level, and I wanted to do more at university.

I did the geography and natural hazards degree at Coventry University, which combined physical geography, human geography, and disaster management. Disaster management is about managing natural hazards, but also hazards made by people. I was just so switched on in those subjects, particularly disaster management. It came to the end of the course and, again, I wanted to do more. That was when I segued into volcanology.

Around this time, my mum said, 'you should talk to your grandfather because he grew up on a volcanic island'. I didn't know this! With Caribbean elder family members, if you don't ask, they don't tell. He told me about this place called St. Vincent, in the Grenadines, in the Caribbean. I was 21 years old and I had no idea this place existed. This was completely new to me because I wasn't taught about it in university. I was aware of Soufrière Hills on Montserrat, but I wasn't aware of our volcanoes in the Caribbean. My granddad told me about growing up in St. Vincent, and about a volcano that last erupted there in 1979. This was amazing to me. I wanted to find out what it's like to live with this volcano, and I wanted to see if I could help people because this volcano is quite active. That led me to apply to Lancaster University to do their volcanology and geological hazards Master's course.

I was now more focused on the study of geohazards. We call geohazards low frequency but high impact events: they don't

occur as often as hurricanes or flooding, but they can be devastating across a wide area.

For that course it was more physical volcanology; so that involved a lot of maths, physics, and computer science—and I couldn't do any of that!

I did well in all the modules, but when it came to my dissertation the only projects available were ones the lecturers needed help on. I looked at the list and felt I couldn't do any of those. So I thought back to my undergraduate course—particularly disaster management modules—and wondered if I could do more on that side. There was a module called Community Resilience—on how people cope with, and bounce back from, hazards. I wondered if I could apply that to St. Vincent.

I designed the dissertation project myself and came up with the idea to do a risk perception study on this volcano in the Caribbean. My supervisor thought it was cool, and told me to go and do it. My family helped me with the money to go to the Caribbean by myself for a month. I have family in St. Vincent, so I stayed with a family friend. I did this perception study, which is a human geography approach. I did questionnaires and interviews, and I really enjoyed speaking to the people. I climbed the volcano twice—and it was amazing both times. For that project, I got one of the highest grades in the school. One of the reasons they said that I got high grades was because I designed and led this project myself, so it showed that I had good research skills.

The course director encouraged me to apply for a PhD, so I applied to several PhD projects—but I got rejected from all of them. But then this one at the University of Hull came up. It was the last one I was going to apply for before I gave up. What was different about this one was that I could create a project around a topic and a theme that the supervisors proposed. One of the supervisors was an environmental historian, so I thought it would be cool to take my master's dissertation and look at it in the past. That got me on to the PhD program, and it has opened up my world. I'm now technically an applied historian because I used archives, and I did an ethnographic analysis of letters, diaries, and photographs. I did interviews with people who went through the last eruption in 1979 (where luckily no one died). This turned into my thesis, where the research question was: 'How did the colonial society of St. Vincent and Grenadines come to coexist with the volcanic eruptions of La Soufrière'. It was just fascinating to learn more about the history of the islands, the volcano, and the people. I would love to continue that kind of work.

How do you think being LGBTQ+, and any other aspects of your identity, influences your experience in STEM?

I discovered my queer identity in the second year of my PhD. That became a positive experience in terms of how my PhD went. Once I figured out who I was, I took more of an intersectional approach to my research methods.

Not many people from a Caribbean background—particularly a

British Caribbean background—go into volcanology. When I was looking through my data, I was questioning why it's always a certain type of person writing these accounts: white, colonial, straight, cisgender men. I wondered about the women, children, indigenous populations, and Disabled people (it's harder to find out if someone is queer in these situations, because of the oppression of queer identities). I wanted to know about the experiences of these marginalised groups of people, so I turned to queer theory and feminist theory. I used feminist standpoint theory, using voice as data. Each voice is valid, in terms of how they experience these volcanic eruptions. I also use that to acknowledge the fact that so many voices were still missing in the accounts.

I wanted all of my own different 'labels' to be reflected in the research I do, and that made my research better.

Of course, today, the Caribbean is still not as embracing of queer identities as it should be, but we're slowly getting there. [On St. Vincent, they do still have the “buggery” law](#). When I was there doing fieldwork, I was just starting to question my identity. For me, it's not quite obvious that I am queer unless I say it, but some of the things I heard on the island did make me feel uncomfortable. For example, there were some uncomfortable conversations about transgender people. I wanted to say this was not acceptable—but I was only 25 or 26, and by myself, in a country, I'd only been to once before. Even though these people look like me, and have similar surnames to me, I still felt unsafe

challenging their views—particularly on transgender issues. I wish I could have had non-hostile conversations about it, but colonial perceptions of queerness are entrenched.

In the UK, for me, it's totally fine. I am quite a private person, but I do have it on my Twitter bio, for example, that I identify as queer. Now and then, I talk about it.

What changes would you like to see in STEM?

I do wish people would engage with JEDI (Justice, Equality/Equity, Diversity, and Inclusion). It still feels performative. We need to stop talking about these things and put words into action. We need to stop having meetings about what we need to do. We know what we need to do! How much longer are we going to keep talking about these things? I know there's a fear of getting it wrong, but we're human, we always get things wrong, and we learn from what we get wrong. If we offend someone—and it's not on purpose— then simply say 'sorry, I got it wrong, I'll learn from this and I'll move forward'. But if you say or do something malicious and on purpose, people should call you out on that.

I would also say stop turning to marginalised people to ask what you should do. Black people, for example, are so tired of it. We're at a stage now where we say, 'Google it'. We've talked about this over and over again, to so many people.

If, for example, you don't understand what asexual means (that's

what I am), use Google. Of course, if you want to hear about my personal experience of being asexual, then yes, I'm happy to talk about that. But do your own research first, and then come to me with questions. We're in STEM! We're supposed to be good at research! Approach it like a scientist!

What advice would you give to someone with a similar background, or identities, to you? What would you say to your younger self?

Having a supportive group of people to turn to is very important. At times you will be the only person in that room like yourself. In a lot of the spaces I have been in, I am the only person with all of my identities: Black, woman, queer, and Disabled. Find people that have similar experiences—but also different experiences as well. It's always good to have people around who are not exactly aligned with who you are.

In terms of your STEM career, don't be afraid to be curious and question things. That's how I came up with my research projects; I looked at papers, debates, and talks, and looked at other ways to do it. We progress by thinking about things differently. This is the advice I gave to students when I was a lecturer: don't be afraid to do something a bit different. You need to have a feasible research project, but don't be afraid to experiment. I think that's something we have lost in the STEM student process. I had flexibility, and the room to make mistakes during my PhD. I think PhD programs shouldn't be so rigid. People should have the

option to bring their own identity and experiences into their research if they can.

To my younger self I would say: just do what you want. I was always determined to be a scientist of some sort. It was only when I got to the end of my A Levels that I wanted to do geography. You will get to be what you want to be—but once you get to the end of your PhD, and when the Covid-19 pandemic hits, it's not exactly gonna work out the way you wanted it to...for now. Eventually, it will probably work out.

You mentioned having a community of people around you. How did you find them?

I'm still in touch with people that were on the same course as me in undergrad. I still talk to them, I still play games with them (playing games is my big thing). I'm also in contact with people I did my masters with. The good thing about my PhD program was that I shared a small office with other PhD students. We were all connected by doing a PhD program in this department, but we were all so different. One person was an engineer from Germany, another grew up down the road from me. One person was from Portugal and was lesbian, and eventually became my introduction to the queer community. She took me under her wing. Even though we're all living in different places now, we stay in touch.

The other place I found a community has been Twitter. The day I started my PhD, my supervisor told me to get on Twitter and to connect with other volcanologists and scientists—and it's been a

great way to connect to people, particularly in America and across Europe. I have met some of them in real life and they've turned out to be great friends. My family has also been an important part of my support network as well.

What can the wider LGBTQ+ community, and/or the LGBTQ+ community in STEM, do better?

Both groups need to try and be more aware of intersectionality, in my opinion. Yes, we are all marginalised because of our queer identity, but some of us are marginalised in other ways as well. For example, I identify as bisexual (and there's quite a lot of biphobia in the queer community), but also I'm asexual (and there's a lot of acephobia in the queer community as well). I am also Black, which brings issues around race and queerness. So the other things that make me a marginalized person intersect with my being queer.

Who inspires you at the moment?

My sister. She's three years younger than me, genderqueer, and pansexual. I love her to bits, but it's interesting how our journeys have been so different. I did it all first. Maybe she saw me doing it and realised it was safe because our family is cool with it. She's been through a tough time, experiencing discrimination at work, but she has set up a social enterprise around mental health awareness, and a key part of that is about being queer. She has focussed on transgender and non-binary people, and their mental health.

She's very clear on her vision—she wants to create safe spaces for people who experience any kind of mental health-related issues, so they can talk about it. I can't wait to see what she does.

Brandie E. Waid

Dr Brandie E. Waid (she/her/they) is a teacher, educator, and activist. A former high school maths teacher, she started working in teacher education when she got her PhD and was Assistant Professor of Teacher Education at Drew University (US). Recently Dr Waid started their own business—doing mathematics coaching and consulting, to try to get teachers to think about how they can support their queer students.

Tell us about your journey into mathematics

Growing up, I was always drawn to mathematics. I came from a Cuban immigrant family, and there were lots of messages about the things you're supposed to believe and the things you're supposed to do. The rules seemed very rigid. At times, I felt like I didn't fit into the rules, because obviously I was queer and I wasn't necessarily sticking to what they had planned or envisioned for me. I think part of what drew me to mathematics is that I could predict it. It was predictable, it seemed as rigid as the rest of my life, and I knew where the boundaries were. I wasn't guessing. As long as I stayed within the lines, I would excel, and as long as I worked hard, I would excel. I think that is what drew me to maths. Then I had some friends that I tutored throughout high school, and they were like 'You should be a maths teacher'. I studied maths at university, got a double major in education, and then started working as a maths teacher.

How has being LGBTQ+ and being from a Cuban family influenced your experience in maths?

As a teacher, I was really falling back into what I thought math was when I first started teaching. Then I moved to New York and started doing my doctorate. I gave myself more space from the family and more space from the things I was “supposed to be doing”. I started to reconsider my queerness because I was very much in the closet. I slowly started to come to terms with the fact that I was queer, that I needed to celebrate that, that it was nothing to be ashamed of, and that it was something to celebrate. As I was on that journey, I saw my teaching methods change. How I was looking at mathematics started to change because I had started to question the boundaries of my life. That let me question other boundaries, and ask: why does mathematics have to be like this?

I once had this 7th-grade student (12-13 years old) to whom I gave a problem with couples dancing, and she asked me ‘What’s a couple?’. It was boys and girls, and it was implying that it was a heterosexual couple. That’s when I realised I had been testing boundaries in different ways in these two areas of my life, but that moment with the student was when they collided. I was like ‘Oh shit!’. I made this assumption and didn’t even include myself in the curriculum. I started to do a lot of work to think about why I didn’t even question that I didn’t see myself in the curriculum—where else is this happening, and how can we disrupt that in mathematics so that we’re not sending those implicit messages to

our students? How can we help them to feel welcome, question boundaries, and see this as creative?

What changes would you like to see in STEM and particularly in mathematics?

In mathematics, in particular, I would like people not to be so rigid. I think that we need to honour different ways of doing mathematics and of thinking mathematically. My friend and I are currently working on a project on how to queer geometry and geometric proof. We were talking to her students about how we have nightmares of high school geometry because it's very much two-column proof: this is the statement, this is the reason. How do we break those boundaries and encourage students to bring pieces of themselves to the work? That's what I would like to see for mathematics—encouraging questioning, and thinking outside the box.

What advice would you give to someone with similar identities or background to you?

The first thing is to find your people. Find the people that make you feel safe, and who let you question and explore boundaries. See what it is that you like and which paths you want to take. Even if it's the path that no one else is taking, do that, because it's going to lead to something beautiful.

Do you have a network of people with similar identities or background to yours? Where did you find them?

I am starting to grow that network, for sure. The person who helped me to start thinking about a network, and who encouraged me to do this work, was an English teacher. It was nice to work with her because often she would say ‘we do this in English—why don’t you do that in maths?’. She was the first to push me in that direction. She got me on Twitter, and I have met lots of people through Pride in STEM, and just through following other queer maths people. We have a Pride centre here in New Jersey, and there’s one in New York as well, so connecting to people through those kinds of places, support groups, or social events has been really helpful too.

What can the LGBTQ+ community in general, or in STEM, do better?

I would like there to be more spaces to connect, particularly with younger people. This summer, I’m hoping to run a free summer camp for queer students. It will be a virtual summer camp where they can Zoom in, and we can do mathematics related to queer social justice issues, queer joy—or whatever it is we want to do—but things that explore queer issues, and capture the mathematics that interests them. I wish we did more of that: giving young people a support network, and showing them that they can be a mathematician, they can be a scientist, and there are spaces for them... come join us.

Who inspires you at the moment?

The first person that comes to mind is someone that I haven’t

met. I interact with them on Twitter. Their name is shea martin and they're non-binary. They do a lot of really joyful, liberating work with queer students—particularly supporting queer Black students, and queer students of colour, making space for those students and lifting them up. I find most of the work that they do very joyful, so I would say they inspire me.

Mario I. Suárez

Dr Mario I. Suárez (he/him/él) is an Assistant Professor in the School of Teacher Education and Leadership at Utah State University (US). An “out” and visible Latinx trans man, Mario is an advocate for LGBTQ+ youth and educators, and has written about, and presented on, issues relevant to the community.

Tell us about your journey into STEM

I went to school in Texas, and I graduated with my bachelor’s and a master’s from the University of Texas at Austin. I taught high school math in Austin for eight years—everything from algebra to statistics. I’m deeply passionate about data science and teaching statistics to students. Even though I was a STEM teacher, I see it as applicable to a wider audience, and for students who don’t go into STEM. It helps them think critically about things.

I grew up on the Texas-México border, in a very small rural town called Eagle Pass, Texas. I was born and raised there, speaking English and Spanish. I had Mexican parents and grandparents who immigrated here over 50 years ago. I’ve lived in Texas all my life, and I’m just now getting to know outside of that area.

My research focus right now is on the experiences of LGBTQ+ students and teachers. Specifically, I’ve been focusing on trans students and teachers, and their experiences in K-12 education. I’m interested in looking at how we can create better pathways

and open up doors to STEM, particularly for trans students and teachers.

How has being LGBTQ+ and other aspects of your identity influenced your experience in STEM?

I was not openly out as trans as an undergraduate student. I didn't come out probably until I was around 21. I'm 37 now so it's been a long time. I'm originally assigned female at birth, and I came out first as a lesbian. Growing up in a very conservative state, in a very conservative rural town, it was just a no-no. There was so much stigma with being trans that it took me so long and so much therapy. For me, that experience in and of itself was eye-opening.

I never saw anybody that looked like me represented in STEM, or in the classes that I took in mathematics at the university level. Now, with my visibility as a trans person of colour, I want students like me to be able to see themselves represented. I think that's how it's shaped my research trajectory. Originally, I wanted to just go into very broad STEM education, teaching multicultural education and stuff like that. But as I saw more and more anti-trans laws and policies in the United States, I started to think more about what I wanted to do and the kind of impact that I wanted to make with my research. And so I've started trying to be more visible so that it reaches a wider audience outside of just academia.

What kind of changes would you like to see in STEM?

In an ideal world, I would like to see a sea of rainbows in STEM. By that, I mean representation, so that students don't have to think twice about whether they want to go into mathematics, computer science, or any STEM field—especially young trans and non-binary students. In an ideal world, they would see themselves represented in the curriculum, and they would see themselves validated and affirmed by faculty, staff, and all of these people who are in the field—in just the same way that we see a lot of male representation in STEM. That's what I'm hoping for in the future. I don't know if it'll be by the time I die or retire, but that's what I'm hoping to do, particularly with the students that I teach. I train pre-service educators who want to go into teaching younger students. I'm hoping that by starting young, and by helping them shape their students' self-efficacy, it'll continue until the university level.

What advice would you give to people with similar identities or background to you? What advice would you give to your younger self?

To my younger self: I don't know that I could have done anything different growing up, because of the times. Growing up was so different than it is now. At that time, technology was not easily accessible. Social media was not as easily accessible as it is now. I think the increase in social media and technology has opened up a new world, particularly for LGBTQ+ folks to see themselves represented. I follow a lot of people on TikTok, Twitter, and

YouTube who are trans or non-binary now, but all that stuff was barely starting when I was young.

What advice would I give to others who are in a similar position to me? I would tell them to find a few folks who are out there, who might be allies or a part of the community, who can support them. It's hard. It's very difficult to find someone, especially in STEM, who is out and visible. But with the surge in technology, it's a lot easier to find folks, even if they are not in our immediate radius. As difficult as it may be, find folks who are supportive, and some of those people may be in positions of power, able to help institutionally change things.

Do you have a network or a community of people that shares some or all of your identities? How did you find them?

When I started teaching, we didn't have a community, but halfway through the time that I spent teaching, we formed an LGBTQ+ sub-committee of our local teachers union. That helped me get to know other people around the school district where I taught. A great colleague of mine, Harper Keenan, developed a network of trans teachers from across the United States and Canada, and some from other parts of the world. The network continues to grow, and now we have about 500 educators who are all working in elementary and secondary schools from across the world, who identify as trans or non-binary. If people need to vent, or if people have questions about what they're experiencing at a local level, then they'll ask those questions.

What can the LGBTQ+ community do better?

One of the things that I strongly push for is to make sure that we are supporting people of colour in the community. We don't have the same visibility as the wider LGBTQ+ community. That's one of the things I advocate for because there's added marginalisation that comes with it. Being either low socioeconomic status, and then adding to that race, colour, or religion—all of these added layers of complexity that often make outcomes worse, particularly for trans women of colour. We know that they are more likely to be harmed, experience sexual assaults, and be murdered—especially here in the United States, and in more conservative countries. It's not enough to just strive for visibility; we must create a community and a space where they can thrive. That's what I try to advocate for in my work. I try to create a space for folks who have that added layer of marginalisation because I have been fortunate to experience good support from people around me.

Who inspires you at the moment?

Young trans and non-binary folks inspire me. I didn't have the guts that they do right now, to be as visible as they are. They are the ones who give me hope for what's going to come in the future.

Tyler Kelly

Tyler Kelly (they/he) is a reader in geometry at the University of Birmingham (UK).

Tell us about your journey into mathematics

I always liked maths, but when I saw geometry the first time I didn't like it. The way I was taught was too rigid and formulaic. I didn't like that, I liked the exploration of it. Then I saw a bad textbook when I took Algebra 2 in the United States, and I decided I wanted to write a better textbook, to make it better for others. I had the logical conclusion that this meant I had to get a doctorate at some point, and everything just kind of fell from that decision while daydreaming in class when I was 15. It's been a stressful but nice journey. It became more interesting and captivating as I went on.

I had a rough time when I was in high school, being a queer kid in the south, but mathematics often helped me through it. When I was between 16 and 18, I went through "conversion therapy". During that time, the thing that really got me through was playing around with mathematics, and my mathematical/academic community that I had back in Georgia, which was really a pleasant, wonderful group of nerds. I think that mathematics has always been enjoyable for me and that I've always wanted to see more. My professional journey has just been

a natural progression that comes from this and just working through the academic ladder.

How has being queer, and any other aspects of your identity, influenced your experience in STEM?

I would say it's influenced a lot. It may not be my direct interactions with mathematics itself, but it is the academic career choices that I've made, and where I have gone. When I've changed institutions, it has been very weighted on feeling valued by the institution and safe as an "out" academic. I chose my PhD programme because it was a strong programme, but also because the institution was very LGBTQ+ friendly. I also feel very at home in the Geometry and Mathematical Physics research group we have at Birmingham, so it's one of those things where each piece of my career has been influenced by finding a supportive space in the academic field.

What changes would you like to see in STEM?

More drag queens. I'm kidding! But seriously, I think it boils down to people being kind and having empathy for other people in STEM, and having enough opportunities for everyone. I just wish that there were more opportunities for everyone who is excellent. I don't care what your definition of excellence is, there should be a place at the table for everyone who has something meaningful to contribute to STEM, and in places where they feel like they can be 100% themselves.

What advice would you give to people with similar identities or background to you?

First of all, calm down, it's going to be fine—but first, you're going to have to take some preventative steps, and you're going to need to take care of yourself. Understand that you can make mistakes, and those mistakes are going to be okay. It's important you don't get in your head too much about this— just keep on doing what you love, and keep on loving what you do. Do science, technology, engineering, or mathematics because you love it, and while you're doing it, take any opportunity you can. You will have a success rate of zero on everything that you don't apply for, and you will definitely not get everything that you do apply for, but apply for everything you'd be happy with. Also, know your worth.

Is this the same advice that you would give to your younger self?

Yes, especially the 'calm down' piece. I think I still need to take that advice from myself nowadays, especially during a pandemic when I'm trying to do as much as possible in a less-than-ideal situation. I think that I'd also give the advice of being kind to oneself, and knowing that the opportunities are there but you have to roll the dice enough times for the right ones to be there for you. When I applied for postdocs, I applied for 136. That's a really high number, and everyone looks scared when I tell them that, but, with that many attempts, nothing is make or break.

Do you have a network or community of people that have

similar identities or background to you?

It's a funny question, because what do we mean by identities and backgrounds? There are multiple identities working here. There's your mathematical identity and your queer identity. Then there are the subcommunities in your mathematical field, and the subcommunities in your queer identity—so it's been very hard to find someone at the exact intersection of both my mathematical subcommunity and my queer subcommunity. But, with that said, if you broaden either one of them a little bit, then I find more points of connection. I think that's important: even with some minor differences, you can still find people with whom you have a lot in common. Even the people with whom you have many differences, you can still find that you have things in common.

I think that my community of people is not about identities, it's about mentalities—and I found that more supportive for me. I've met people—mainly through mutual friends or conferences—that are in different fields of mathematics but have the same mentality about academia and queer life as me. I found that really beneficial.

I do have kinships and friendships, but I don't know if it's a friend base. Everything goes virtual at some point because we're so scattered to the winds. I think that's why Gay Math Twitter is so powerful.

I was extremely lucky doing my PhD because we had four queer people in the programme. This really mattered to me a lot. I had a

community of mathematicians, and even if we didn't have the same queer mentality, we had a kinship because we could understand each other's differences. Then I also had a network of queer friends who were in STEM fields—we didn't have the mathematical connection (because they weren't mathematicians), but we had the queer kinship, and we had the same kind of meshing of queer subcommunities too. They always felt very separate from each other, but now I've written papers with queer mathematicians, and we're making a LGBTQ+ algebraic geometry conference that's happening in 2022 in Toronto.

What can the community do better?

I think the most important thing that everyone can do is listen to others who are not like you, and ask what they need in order to be able to contribute to the STEM community. When we don't listen to what people need in order to effectively contribute their best, then we aren't making an inclusive community. Often, it's uncomfortable to hear what we've been doing wrong, and it's hard because we thought that we were doing the right thing, but sometimes we're doing the exact opposite of the right thing. The most revolutionary act you can do on this is to truly listen and try to make it better for someone that is not you. That's how we make things better: by not only making it better for ourselves but by making it better for everyone.

Who inspires you at the moment?

I consider myself lucky that I'm surrounded by people who

inspire me. I've made so many good friends in the community of mathematicians and queer people that I have gotten to know over the 12 years that I've been a mathematician. There are scientists, queer people, mathematicians, and trans people that I find inspiration from—from either the way that they think about mathematics, or from the way they view life.

If you can't find someone or something that inspires you, you're not looking hard enough.

Emily Harford

Emily Harford (she/they) is a chartered engineer with a background in mechanical engineering design. She currently works in engineering governance as Principal Engineer for the Design Authority in the Office of the Chief Engineer.

Tell us about your journey into STEM

In some ways, I feel like it was inevitable. I was a very fidgety child. I have a memory of being on holiday in Germany with my parents and my siblings, and I went with my parents to a payphone to call my grandmother. I was looking at the phone and wondering if you had to put the handset down to hang up, or whether you could just pull the thing so I reached up and pulled the thing, hung up on my grandmother and my parents were like 'What the fuck?'. I also flooded the kitchen once by messing with the washing machine. I always enjoyed touching stuff and playing with things.

My parents are both in STEM fields. My dad did physics and then went on to work as an IT consultant. My mum did biochem and then worked as a teacher. One of my sisters went off to Oxford to do chemical engineering, and I remember going 'Engineering that sounds great, I should do that'. From the age of 14, I was doing everything I needed to do engineering.

When I got to A levels, I was not very good at maths. I didn't like

it very much. I could do enough to get through my degree (I can do some analysis, I can remember how to integrate) but when people start talking about set theory and matrices, I ask them to leave. For my A levels, I did maths, physics, and chemistry. My A levels went badly but I still managed to do okay. I did my degree, stayed on to do a master's, and then I went off to be an engineer to see how that worked.

How has being LGBTQ+, and/or any other aspects of your identity, influenced your experience in engineering?

I know that they've influenced me a bit. I know that. I did a presentation a couple of weeks ago for [oSTEM](#), and I started talking about Section 28, the impact it had on me, and how it gave me a habit of repressing parts of myself. Certainly, when I went to my first job, I went back into the closet. In my second and third job, I didn't really talk about my personal life; I was masking who I was dating and who I was going home to. That interferes with your ability to be friends with people. If you can't relax at work, you're always a little bit on edge.

I'm also dyslexic and autistic. With the dyslexia, I'm just like: deal with it, I can't read. Honestly, sometimes it takes me by surprise. I went to a hardware shop and I had to read out my order number, which started '101...', but I said '010...'

But with the autism (because I didn't get diagnosed until last year), I didn't realise the influence it had. I wasn't understanding why people were annoyed with me. Sometimes I would misjudge

when it was okay to be funny or not be funny, or not really know how some things were different from other things. I'd just end up with people acting like I was a pain in the ass. I was masking autism even though I didn't know that was what it was. I had to wind all this stuff in; all of my natural instincts and off-the-cuff remarks. If you are always thinking about what you can or can't say you miss some opportunities to say important things. If you can't relax around people, you're just not really doing good stuff. When you are wound up and overstressed, you end up saying things you really shouldn't have.

The director of engineering wanted me to redesign a part. It wasn't a very big deal, but it was vac-form plastic, and he wanted it redesigned so it was made of pressed and folded sheet metal. This is not a very big deal, but you do have to redesign the part, you can't just change the material in the metadata. There's a whole bunch of stuff you have to do (there are different cutouts, different radiuses, and different reliefs). He said 'When can you get it done by?'. I said I'd have it done by the end of the day. He said 'I'd do it in half an hour on AutoCAD', and I just said 'Well, you do it then'. That is not what you say to the director of engineering. The thing is, I was right, so he left me alone because he actually couldn't do it in half an hour. The reason he asked me was because I was probably one of the best CAD monkeys he had.

So there are repeat instances like that of me just dropping my patience with people because I'm just so on edge all the time.

I think things have gotten better since joining UKAEA (the United Kingdom Atomic Energy Authority). I also have depression, so I don't have to worry about whether or not I can afford to be sick right now, because they have a much nicer sick leave policy. Suddenly, I was off sick less because it was one less thing to worry about. I also started being able to relax about having a picture of my wife on my desk. When I got diagnosed with autism, I went to my boss and said 'So this makes a lot of sense'. Now, my manager is just awesome about all of this stuff. It means that I just get that little extra bit of flexibility that people should probably have given me anyway, because really, why did any of it matter? Now I get to be a bit more relaxed.

What changes would you like to see in STEM?

I would like more different people. Not just more women (although that would help), but I would like to see more Black people, more Asian people, more trans people, more gay people, more women who stay after 35, and more people from the Traveller community.

There are loads of examples where some diversity in a design team would have fixed some really embarrassing problems. For example, an Apple iPhone came out with a health app to track sleep, blood pressure, BMI, and steps—but you couldn't track your period on it. Just more than one woman in the room and someone would have said that menstruation is a pretty big deal with half of your customer base. Then there are the IR-sensitive

soap dispensers (where you put your hand under and you get soap), but it doesn't work for Black people! Just having people with different identities/backgrounds on a team can stop them from doing something stupid and embarrassing. I think it makes things a lot more interesting as well because you get to have better conversations with people. There was one team I worked with, where almost everyone on that team was really into 24 Hours of Le Mans (an endurance-focused sports car race). I thought 'How are you so homogeneous that all of you are into the same sporting event?' We need some variety.

What advice would you give to people with similar identities or background to you? What advice would you give to your younger self?

My advice to younger me is: care less and work harder. I always think I should have worked harder when I was younger. Maybe I'm being a bit too hard on myself. My A levels went badly— but I was suffering from complex grief and depression. University went badly—but I had untreated depression.

I think, for other people, I would advise that they find their people, their clan, as soon as possible. This was another thing that I noticed about Section 28—it made me feel disinclined to go and find other gay people at uni or as a young engineer.

Overwhelmingly, engineering organisations don't have an LGBTQ+ staff network, even now. They only really exist in huge multinationals or organisations like BP, the Royal Navy, the Army,

and Ford. The UKAEA doesn't have one. We're a big employer, but apparently not big enough to have a network. There isn't that formal network, but I now have friends at work who are queer and friends who are neurodiverse. It's nice to have friends at work to complain about work to, and also to talk to them about who I am.

I do feel a bit bad because one of my colleagues is working on a really difficult and unpleasant programme, and she shared this thing: 'You don't have to see the whole staircase, you just take one step at a time'—and I immediately said 'Yes but you do want to hope that someone's planned the staircase and finished the staircase you're walking up'. She's like 'That didn't help', and I went 'Yeah, you ran face-first into some autism there, I'm sorry about that'. I think if you're able to find your people, they'll help you understand yourself, and then you can relax a bit. I think that's the thing. Find some people.

How did you find your network?

I went to the LGBTQ+ STEMinar in London, and I'm really glad I did. I then presented at the one in Birmingham, and I attended the one in Oxford (mostly in Gather.town). Finding some LGBTQ+ people in STEM was a good start; people like Izzy Jayasinghe, Alex Bond, Clara Barker, and lots of people who mostly I know by their Twitter icons. I'm now actively looking for engineers in the private sector. Even though I get the academic side, because I am a research engineer, it's nice to be able to talk to people who are

familiar with the same problems as you. I started finding my network by poking at the corners of academic queer spaces because universities have LGBTQ+ staff networks. People now ask me to talk at events, so I find new people there too.

What can the LGBTQ+ community do better?

Two things. One is that we need to be much more vocal about supporting trans and non-binary people because there's a lot of hate crime. I don't have a lot of "straight passing" privilege, because I'm butch. It means I have this little sliver of discomfort or concern when I go and use a public bathroom. Trans women and non-binary people must feel that to a much greater extent. People do look at me. They give me the once over. The very first time I was challenged in the bathroom, I was eight years old and by myself. My brother had agreed to take me swimming but I was definitely too old to go with him into the men's changing rooms, so I said I would be okay, I could change by myself. There weren't any family changing rooms at the time, so I went into the women's changing room, and to the first free cubicle. As soon as I went in, someone knocked on the door and said 'I think you're in the wrong changing room'. I said 'No, I'm not. I'm a girl.' They said 'Are you sure? You sound like a boy.' I was eight years old, all by myself, and remembering that makes me so angry.

The second thing is that there are definitely some race issues in the queer community. I think we probably just all need to do a bit of work in unlearning racism. I am willing to admit that I have had

to unlearn some racist tropes and thought patterns that I honestly didn't even realise were racist. Sometimes, if you sit quietly and pay enough attention to someone, you will realise that you're doing it wrong. My favourite Twitter account for that is the comedian Ava Vidal. I try not to do this too often because I don't want her to do a lot of the work, but sometimes I'll go 'I don't get this, and I want to understand', and she will explain. Sometimes I just wait because, eventually, I'll realise what the problem is.

So, pay attention to Black people, and you might unlearn some racism, and be nice to trans people because they're human. And you should try not to be a dick to people.

Who inspires you at the moment?

There are a whole bunch of people I'm very impressed with. Like, Clara Barker, and Izzy Jayasinghe—I think they are great. Plus a whole bunch of people on Twitter who I think are great, and make me want to be better at stuff.

Dolly Parton is a great role model. She has money—so she gives free books to children, and funds a vaccine. She's also always in full face, and earthquake-ready all the time!

Krishnaa Mahbubani

Krishnaa Mahbubani (she/her) is a postdoctoral research scientist at the Department of Surgery, University of Cambridge (UK), and the senior study manager at the Cambridge Biorepository for Translational Medicine (soon to be renamed the Collaborative Biorepository for Translational Medicine).

Tell us about your journey into STEM

I was born and raised in a conservative Indian family in Hong Kong. Science wasn't a big thing in our household, but education certainly was. My love for the STEM subjects probably came from one chemistry teacher who taught us about excited electrons by standing on a table and then jumping off it while yelping (to explain how electrons lose their energy and go from being excited to not so excited). One fun chemistry teacher later, I remained enthusiastic about science and my need to understand how things work grew.

My journey to becoming a STEM academic was pretty atypical, and not exactly easy. The older generation of my family had very different ideas for my future. They expected me to get married and start a family after university. I wanted to stay in education and manage things differently. I intended to have a career and stand on my own two feet. I suspect I used my desire to stay in education to avoid getting married—while at the same time slowly coming to terms with my sexuality.

How has being part of the LGBTQ+ community, and any other aspects of your identity, influenced your experience of STEM?

As I got to know myself better, I got to understand my journey in STEM better, and vice versa. As I got more involved in STEM—and to be able to do the work I do every day—I had to be more open, honest, and true to who I was. Until you become more open and more certain in the person you are, you spend a lot of time hidden or trying to hide parts of yourself. Hiding hinders you in every aspect—not just in what other people see, but in how you perform, respond, think, and what you are able to do.

People will often say ‘Oh, you’re very systematic because you’re an engineer’. The fact that I do research means I’m actually incredibly creative. I spend a lot of my time problem-solving, and the only way to solve a problem is to work your creativity around it. If you live your life held within a boundary—because you can’t let a certain part of you out, or you can’t let other people see a certain aspect of you—you can’t perform openly, and you can’t be truly creative. The more I’ve explored or been open about how I fit in, I think I’ve become a better scientist. Equally, I’ve learned that I need to be more open to be a better scientist.

What changes would you like to see in STEM?

A lot more honesty, and a lot more calling out of practices that have become standard in STEM. It’s a field that has a lot of history and a lot of tradition, so there’s a “this is how it’s always been done” attitude—which needs to change. The world is changing,

and STEM needs to change with it. For a discipline that is constantly at the cutting edge, it's funny how the way in which it functions is not. Instead, it is steeped in traditions. We are held and kept in a place, stopping us all from moving forward.

I mean this even for very simple things: switching specialities, moving between institutions, and doing truly interdisciplinary and collaborative work is not straightforward. There are a lot of administrative hoops to jump through. This gets people quite defensive because they're protective of what they have secured and developed. That's not how it needs to be. It's all about working together and working cohesively if we want to move the whole field forward. It's about looking at everything we don't like about the functionality of the field. It's about looking at how we're currently doing everything to keep us ticking over for the next month or the next grant—but actually, we need to be ticking over for the next generation. It's about looking forwards and being more honest about what it is that allows STEM to develop. Because otherwise, what's happening?

If we keep cutting research and education funding, development and discovery are going to stop. True basic science is not being promoted or pushed for, and we only do cutting-edge research now if there's an application to it. It's turning STEM into a business, where profit matters more than answers to how things work. The *Dragon's Den* approach to “sexy science” has taken over the elegance of fundamental science.

What advice would you give to people with similar identities or backgrounds to you? Or what advice would you give to a younger you?

In this day and age, to folk like me who are coming into STEM and academia, I would say: do what you love. Make sure it's what you want to do. Be honest about who you are. It's going to be hard, your family may not love it, but there is support and there are people like you—but you have to go looking for them. To anyone coming out of a conservative ethnic background, there are other people like you. Do what you want to do, don't do what you should do.

To a younger me I'd say: screw 'em. Do you. Joking aside, to a younger me I would say: just because everybody is telling you what you're supposed to do, it doesn't mean you should do it if it doesn't feel right.

Do you have a network or a community of people with similar background or identities to you? If so, where did you find them?

Not really. But if you can find them for me, I'd like to say hello! I sit in a weird intersectional space of many things. I think there are people like me. I know a very small group of people who come from similarly conservative families—East Asian conservative families, where being part of the queer community is not accepted, even now. Some parents make back-handed comments like 'It's okay if children are gay... just not you'—which translates to 'It is not okay to be gay in this family'.

I now live in an environment where being queer is much more accepted, so being open and “out” is more manageable. But there is still a small group of us who have an internal conflict: we live in an environment where we’re not persecuted, yet we still hide parts of ourselves because our families might not be willing to fully accept us, and that would break a lot of us in the process.

It’s a very niche group of people who still feel this anxiety. It’s often first-generation kids growing up in Europe or North America, who still have very, very conservative parents. But of course, there are many different kinds of circumstances where people would risk rejection from their family if they “came out” to them. I think I’ve only met two other people in a very similar situation, who have this struggle where you’re wanting to be authentic and open about who you are, but you also don’t want to create a massive fall-out which might result in having to walk away from your family altogether. Quite often coming out to them is a risk of losing them, in order to be ourselves.

So no, I have not particularly found a community... but I know they must exist. I should start a group—that’s what I have to do. I need to add it to the list of things!

What can the LGBTQ+ community do better in STEM, or generally?

Two things: first, be understanding and gentle with people who are discovering, exploring, and coming into the LGBTQ+ community, or STEM, much later in life—people who don’t yet

know their LGBTQ+ history, but should learn to appreciate what came before them.

The other improvement would be to have a greater sense of unity and inclusivity. Sometimes I find it very difficult to stomach the various cliques within a community that is already such a minority. For a community that is persecuted from all directions, to persecute amongst ourselves is insane. I know it doesn't happen all the time, but I do see it. We need to do better.

Amen. Lastly, who inspires you at the moment?

Folk who take the time to learn about the queer community—even if they have no direct connection to it. Specifically, allies who take the time to learn, understand, and find empathy. It's great when those of us who don't have a choice go out and do amazing things—but for me, people who choose to support, encourage, and help raise the confidence of our community are incredibly inspirational.

Batu Kaya

Batu Kaya (they/them) is a researcher at the University of Toronto (CA), where they work on chronic facial pain; and also at Toronto Western Hospital, where they do clinical neuropsychology research with Parkinson's patients.

Tell us a bit about yourself

I am 25, and I've been living in Canada for six years now. I grew up in Istanbul, Turkey, and when I was 17 I did a high school exchange in the United States. I realised that I wanted to pursue higher education in the US, so I spent my last two years in Istanbul studying for the SAT and putting together a North American college application. Tuition in the US was really expensive, so I ended up studying cognitive science at McGill University in Montreal, Canada.

I really like doing science in Canada, so I have been pursuing my immigration goals since graduation. I'm the first person in my family to go into research, so there's a lot of uncertainty that I feel in terms of how to navigate being in science and being queer. Sometimes I feel empowered by these two things, but other times I feel a lot of confusion.

Can you tell us a little bit more about your journey into science?

My grandma had the encyclopaedias by Ibn Sina (known in the West as Avicenna, Ibn Sina was a Persian polymath who is regarded as one of the fathers of early modern medicine). He was a big Islamic Golden Age figure that did a lot of work on the body, pathology, and organ systems. Every time I went over to my grandma's, I would spend so much time with these books. I liked the way the human body was so beautifully and efficiently organised. In elementary school and high school, I loved archaeology, physics, and astronomy. When I was in the US, I was able to take some advanced courses in chemistry, physics, and biology.

When I thought about pursuing higher education back home, I couldn't imagine myself as a researcher. It didn't feel like an option for me. When I got into McGill, I chose cognitive science as my degree. That programme was fabulous for me—and in my third year, I started doing research for the first time with Dr Signy Sheldon. The study was about how changing the kind of perceptual information in stories would affect what people recall later. It was a great experience and I learned a lot about myself, but I also started seeing where I needed more help. I was feeling a little bit lonely because of my cultural differences. I felt isolated because I didn't have anyone to get empowerment from.

How have your identities impacted your journey into research?

I knew I was queer from the get-go. I was 100% sure, and I didn't

feel bad about it, because I felt so empowered by how early I could know that about myself.

When I first started enjoying science, however, I could never really perceive myself as a scientist. Throughout my degree and research experience, I spent a lot of time feeling inadequate as a researcher, because I didn't see a lot of queer people—especially openly queer people giving talks at renowned institutions or managing labs that do cutting-edge research. I didn't have openly queer immigrant scientists teaching me at McGill. While all my supervisors have been supportive of my queer identity, the isolation queer researchers feel comes from a place that transcends our individual relationships with our supervisors. It's a broader problem.

I think it's also about a lack of language. I sometimes don't know how to talk about the queer aspects of my identity while in the lab. There's also the fear of saying something wrong—especially for people from an immigrant background, or from families that have no scientists or no one in higher education—so we often end up shushing ourselves.

Are there any other things that you felt have been difficult to navigate in STEM?

I'm really grateful to my supervisor (Dr Massieh Moayedhi at the University of Toronto) because he introduced me to the fact that I have to pursue money—funding, bursaries, and scholarships—while I am working on my research career. I had idealised the

profession, and I didn't really think about the monetary aspect of it. Owning my queer identity took so much effort that I didn't have the energy or the knowledge to think about the monetary aspects of doing science.

There were fundamental concepts about the structure of academia that I didn't know. This is embarrassing... but I'm going to be vulnerable and say it: I didn't know what a postdoc was until a year and a half ago. No one taught me that. Not knowing the different levels of higher education after getting your bachelor's stressed me out, and, for the longest time, I couldn't ask anyone because I knew it was such a basic question. I would listen in to conversations in the lab, trying to grab clues. In those moments, I felt like my identity as a queer immigrant scientist made it harder to ask basic questions because it reminded me of the knowledge gap I had. I know that to be successful in any field, you have to be comfortable with your knowledge gap, but it's hard to put yourself on the spot in an environment where you already feel like an impostor.

Has the immigration process taken time away from your research? And has it overlapped with your queer identity in any way?

Sometimes you might have to put science on the back burner because of other responsibilities, such as dealing with immigration, or the passing of a loved one. Both have happened to me.

I work with patients and vulnerable populations, so I feel bad each time I have to shift my focus to immigration. No colleague of mine is going through the same process. Thankfully, people in both my labs listen to me talk about it, and they're optimistic that I'm going to get my permanent residency. But it's stressful. I applied for permanent residency in May, and I still haven't heard anything from the Canadian government. I don't even know if they opened my application yet. There is something really disempowering about not having any say or power over something so fundamental to your life.

One of the reasons I love science is that it makes me feel awe at the world around me, but it's hard to feel awe when I'm dealing with immigration and when I feel so powerless as a person. But I'm also privileged because there are so many people back home in Turkey who couldn't afford to do an undergraduate degree at McGill. It's not easy, but I do also acknowledge my privilege. It's a weird combination of survivor's guilt and feeling excitement over being able to have safety and ease for the rest of my life.

How can STEM be improved?

It can be improved for people who are navigating the immigration system, by everyone just being visibly welcoming. I want professors and labs to be welcoming to queer and immigrant students. I want people to say queer and immigrant-affirming things in their first lecture, when they're meeting their class for

the first time. I want professors to have safe space logos on their office doors.

I want more knowledge-sharing opportunities for people like myself. Teach us how to write grants, how to get health care (I haven't had provincial healthcare since I graduated). Be more political as lab leaders—establish that racism and misogyny are not welcome in your lab. Actively pass down your skills to your mentees so they learn how to navigate institutional systems and bureaucracy. Find ways to identify how to close each others' knowledge gaps.

What can the LGBTQ+ community do better?

I think connecting over our shared queer identities is a great starting point—but it's simply a starting point, and I think people need to be conscious of that. Just because we connect by being queer doesn't mean that we're going to be able to understand our different histories, different cultural backgrounds, and different worldviews. I hope that we can see our queer identities as common starting points from which to have deeper, honest conversations, so that we can connect over more things.

What advice would you give to someone with a similar story to you?

The advice I would give to first-generation immigrants and queer immigrants is: if you find someone like yourself, ask them for coffee so you can befriend them. One of the most formative

experiences of my life was a friendship I had throughout my undergraduate degree. My friend and I were in the same programme. They came from a Middle Eastern immigrant family background, we were both queer, and we both cared a lot about the brain. I wish I still had them with me as my friend, but sadly they passed away. That friendship still helps me out so much, because we mirrored each other's positive and negative experiences as we were navigating being queer and being from a racialised background while in science. I felt like I had a confidante. We motivated each other to push through the hardest times, and we both felt awe at the world around us and the human brain.

My other piece of advice is: don't be afraid to ask even the most fundamental questions. Everyone has gaps in their knowledge and you should not feel ashamed of yours. The longer you wait, just staring at the gaps in your knowledge, the more stressful it gets to address them. And stay on top of the literature!

Do you have a network or community around you? If so, how did you find them?

I do have a support network around me, and a lot of those people come from my two labs. I don't have a lot of queer immigrant colleagues or friends—at least not yet. I moved to Toronto six months before the pandemic happened, and I got hired the day before Toronto went into its first lockdown. My ability to meet people like myself has taken a big hit, but I'm hopeful that once

I'm able to start going to conferences in person that will change. I need to put myself out there a bit more; that's been hard because I've also been trying to navigate the immigration system. I hope that once the COVID restrictions are eased further, we can start connecting across labs, institutions, and fields again.

Who inspires you at the moment?

I look up to my supervisors a lot, because they're "real" people, and they are available to me. It is important to me to have accessible role models for feedback.

The very first person that inspired me to go into brain science was Oliver Sacks. I read all of his books, and I loved the way he narrated phenomena and clinical cases, and the way he talked about the brain. He was a brilliant storyteller who understood the importance of eliciting awe at the world and the human mind. I'm also very inspired by the neuropsychologist Dr Brenda Milner—who pioneered the field of cognitive neuroscience, based on her work with patients with epilepsy. Her work ethic and scientific attitude have inspired my own templates for doing research.

I'm also trying to inspire myself, which is constant work. I review my own milestones quite periodically and hope to see improvement each time. I also try to lead by example and maintain a positive, welcoming attitude to my peers. It truly takes a village to become a scientist.

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