MRC Talks: Career Inspirations, Chris Ponting
July 2019

Presenter:

Welcome to the MRC talks podcast. I'm Debs Barber.

In our 2019 'career inspirations' series, we've brought you stories from inspiring scientists who are working to improve lives through medical research.

Each month, we've talked to a different scientist to find out how they got there and what makes them tick.

In our final episode, Isabel Harding talks to Professor Chris Ponting, a computational biologist at the MRC Human Genetics Unit at the University of Edinburgh.

Chris Ponting (CP):

And if we can break down these barriers, knock down these walls between the different disciplines, the more that we can do that, I think the more productive UK science is going to be and the more fundamental questions can be answered.

Interviewer (INT) introduction:

Chris gave up biology at the age of 16 to focus on physics. But after finishing his Masters, he changed his mind and decided to follow his gut instinct – going back into biology via a degree in biophysics. He then specialised in bioinformatics and genomics.

Chris and his team are looking at ways to improve human health, and find new ways to treat disease, by looking at how single letter changes in our DNA affect our disease risk.

Genomics is a fast-moving area, with new data appearing all the time, plus new methods to analyse that data. The challenge is to find biological meaning from all this data – and people with the skills for doing this are in short supply.

By using our genes as a history book to understand how we've evolved as a species, Chris has led some hugely exciting work. He contributed to the human genome project, doing much of the sequence comparison by comparing the human genome with those of other mammals, including the rat, possum and platypus.

Positioned at the intersection between population scale and molecular data, it's at the place where physics meets biology and medicine that Chris is trying to make a difference. He leads a fellow's programme, training people with PhDs in physics, maths, statistics and engineering, to work on biological puzzles.

By bringing in people with different skills and perspectives, he hopes to change biology and medicine for the better – while also enriching people's careers.

INTERVIEW:

INT: My first question is, how do you describe your research to your friends and family?

CP: I try and say that we need to understand why differences in our genomes make us different from one another. And that is whether we're different from one another with respect to disease, or other aspects that we might be interested in, like height and weight, and other aspects.

INT: What do you do with that information?

CP: Currently, what we're wanting to do, and I'm very excited about, is to try and put our finger on, pinpoint the variants, the DNA changes that causally change our risk for disease. If we know what those DNA changes are, then perhaps we can understand the molecular imbalances that there are and intervene in some way therapeutically.

INT: Looking back, is there a moment when you first knew that you wanted to be scientist?

CP: Honestly, no, no. I think I am among quite a few perhaps predominantly male individuals who just careered in their careers, not particularly planning to go from one thing to another, going in a linear direction. And I think I just took matters as they came and was just lucky enough to the follow the path that I did, but in no way was that path linear.

INT: Okay, well, hopefully we'll come on to that a little bit later. Thinking big picture here, what's your most surprising finding to date?

CP: I think the most surprising thing is that 90% of our genome, our DNA, it doesn't matter. So, we have worked out, using evolutionary principles, that less than one-tenth of our genome matters. That is if it was to change, then it would have an effect on who we are and our health and disease.

INT: So that was a complete surprise when you found that out, that proportion?

CP: I think many people in the general public would find that quite surprising, and we didn't know exactly what proportion it is, and it actually is still a matter of debate among some scientists. I think it's, personally, that it's now well established as being that figure. But indeed, it actually does matter because if we know that nine-tenths of the DNA changes in our genome don't matter with respect to health and disease, then we don't focus on them for their study to work out how DNA change affects health and disease.

INT: So, quite important for helping to advance medicine?

CP: Yes, and also to inform people like GPs that if patients come to them and say, "I have my genome, it's been sequenced, and here it is," for GPs to realise that not every DNA change actually will inform on the patient's health and wellbeing.

INT: And genomic medicine is such a rapidly moving area, I guess it's important to have that evidence to be able to reassure people, perhaps, and reassure GPs.

CP: Yes, and evidence is all, of course, in science. We need to make sure that everyone understands the fundamental basis to how genetics and variation in our genomes affects them. As I said, not every change matters, and that's important for the general public to know, as well as GPs and others.

INT: To give us an idea of what it's like to work in your shoes, can you give me an example of what a typical working day looks like for you?

CP: I think a typical working day is one which would not be recognised by many people outside of science, but those inside would recognise it very quickly. It is predominantly spent in front of a computer with my emails, and just answering emails and queries, and writing short documents. Doing a whole variety of different things, such as working out how to entice students to come to our institutes and to do PhDs with us, or indeed postdoctoral scientists to come here, to explain our science in new ways to different people. I haven't yet come to what we also of course do, which is to write up our science, we talk to other scientists, we plan our science, so it's a lot of discussion, face to face, over Skype, with group members in meetings, in one to ones. It's a whole variety of different things, but it probably to the general public would not be recognised as being a typical scientist thing. I don't stand in a lab with a pipette, with a white coat on. No, I'm in front of a computer most of the time.

INT: That's great to give us a picture of what it's like, because that's what we want to be telling people, it's these real-life stories of what scientists are actually doing in their work.

CP: And a lot of that is about communication, we, as scientists, actually have to do better at communication. Perhaps, talking to many people, they don't quite realise that communication skills should be at the heart of what we do as scientists.

INT: Can you tell me what excites you about your job?

CP: I think it's always the prospect of discovery. It's very selfish, I want to discover things that no one else knows. And that feeling, that thrill of knowing something perhaps that no one else on the planet knows is both a thrill, as I said, but it's also slightly scary because you want to put it down on paper or in an email, or something, as quickly as possible because perhaps you will shuffle off this mortal coil too quickly to actually tell people about your discovery.

INT: How often would you say those kind of moments happen for you?

CP: I think it's important to say they almost never happen; most days are not eureka days. We make small steps forward, we have to take small steps, sometimes larger steps, backwards. As I said previously, science is not a linear path, and we research, we find things out as we go, and we have to change the direction by which we go. Having said that, we do live for those moments, these aha moments, when usually someone from my group comes in with bright eyes, they say to me, "I've discovered something." Those are fabulous times.

INT: I can imagine that must be a pretty awesome moment. You might have touched on it a little bit there already, but is there anything or anyone who inspires you to do your job?

CP: There are some people that I've come across who are just fabulous at what they do. These are the people who inspire me. I cannot do as well as them, and so what I try and do is work with them and learn from them to do things perhaps in a slightly different area from them, because I'm not going to compete with them. But these are the people that inspire me.

INT: Are these people other scientists who you work with?

CP: Absolutely, these are the scientists, as well as the scientific leaders who have the vision to see where science is going, and therefore are laying a trail that hopefully we all can follow. These are inspirational people.

INT: Looking back on your career, what do you think is the best career decision that you've made so far?

CP: Definitely the decision to leave physics and come into biology was the best thing that I did. Because I had not appreciated that I would be motivated by biology, I hadn't articulated it to myself or to anyone else, I stumbled into biology and then just found it enthralling. So, only with that hindsight can I say definitively that was a great decision to take, but not at the time, I had not a clue why I was doing what I was doing, to be honest.

INT: So you just thought it might be fun to just try a different discipline?

CP: I think I was taking a decision based on my gut feeling, and I trusted that gut feeling and I was able to make that move, not everyone is able to. Not to say that it was an obvious and clear career route to take, there were many jobs that I went for in biology, PhD projects that I went for, and I did not succeed in them. It was an accident that the university that took me on for a PhD had a post that I could then slot into, because someone didn't get the necessary degree. And only with that accident then that I was able to follow up my eventual dream, which is to study biology and medicine.

INT: Can you describe a time when you've failed, and how you overcame that failure?

CP: Science is all about failure, unfortunately. Not every experiment works, not every project works, not every idea that you have is true, not every grant that you apply for, every paper that you write is published quickly. It is unfortunate that we have to be very hardened to failure as scientists, and it's probably the thing that I've learnt the most is how do deal with failure, to make it a much more constructive thing, to listen to why criticism has been given on particular things, to make the science that I do and, perhaps more importantly, the explanation of it, better so that we can proceed in the way that we have.

INT: If you could go back and talk to your younger self, is there one piece of advice that you'd give them?

CP: I think I would say to myself from then, and this is the person that I was doing my PhD, have the confidence to do what you're doing. Of course, I was beset with doubt, we all are, most people are, and I hadn't any expectation that I would have followed this path that I've taken. So, being beset with doubt, of course it was a problem. So, I would say, not just to myself, to many people, to the early career investigators that I work with, do have the confidence that probably should be given to you by the skills that you've gained, to follow up what you're wanting to do. And if you're interested in something, and you can articulate

that, then you should have the courage of your convictions and follow that up in whatever way that you can.

INT: I think that's really reassuring to hear actually, for people in lots of different careers, I think following your interests and following your convictions.

CP: There is of course an imposter syndrome, and we all suffer from it, it should be something that is called out in science much more. I see this often with many early career people, and the best thing that we can say as scientist is, "I do not know," or, "I do not understand," and, "Explain this to me." We don't do that often enough.

INT: To talk a bit about your work, you're driving a cross-disciplinary fellows programme which brings together people with PhDs in physics, maths, statistics, and engineering, to work on problems of the biology of human health and disease. Can you tell me how you're doing this, and what you hope to achieve through it?

CP: I'm really excited by this programme. We're getting some really bright minds who come from physics, engineering, statistics, etc, into the University of Edinburgh, here. These are individuals who want to make a difference in biology and medicine, they have skills in analysis and computation, coming from particle physics and engineering, etc, but they don't quite understand how to use those skills. My job is to place those skills within biology and medicine to ensure that they understand the importance of how they can make a difference, what are the problems that they can address, and with whom they can work locally, and plough this really fertile area between different disciplines and drawing upon others' expertise, so to really work out how to do team science in a very productive way.

INT: How is it working out so far?

CP: It's an experiment, it's like all the things we do in science, it's an experiment. We're in our first year. Having said that, I've recruited over the last few years several people from those backgrounds, and it's working out exceptionally well. But we'll know in a few years really how it's been working out. But I think everyone who's involved, from the fellows themselves and those that are working with them, have been very excited by the prospect of working between disciplines.

INT: Presumably, this needs to happen across all areas of science in order to bring, you mentioned team science, in order to push science forward by bringing teams of people together with different experience, that can bring different perspectives to problems.

CP: One of the major problems that we have in the UK, and elsewhere, is this silo-isation of education. People come through individual degrees thinking that that is the area that, if they wished to do research, that they have to stay in. What often people don't understand is that the skills that they gain in particular areas are so very useful in other areas. We're not good in the UK at recognising that and drawing in from another discipline to our own disciplines, and valuing those people. If we can break down these barriers, knock down these walls between the different disciplines, the more that we can do that, I think the more

productive UK science is going to be and the more fundamental questions can be answered.

INT: Taking a step back from your work slightly, is there any overlap between your personal and scientific interests?

CP: I don't have very much time outside of science, I must admit. I'm not the kind of scientist that finds science easy; I run on perspiration, rather than inspiration. However, having said that, at the moment I'm trying to write a book, a novel, and yes, I must admit, there is some science that is involved in that. I'm finding that quite enjoyable to be writing fiction, rather than fact.

INT: Can I ask what type of fiction?

CP: It's a dystopian novel, but I'm enjoying it mainly because I can make stuff up, and that you can't do in science.

INT: So, a bit of light relief from your science?

CP: Absolutely. Having to restrict yourself to fact is quite narrowing, in a positive way.

INT: Thinking to the future, where do you see yourself in, say, five years' time?

CP: I would be very happy to be absolutely in exactly the same situation I'm in now. I'm enjoying it immensely, I hope I'm making a difference to people in their careers, mainly, to bring them into biology and medicine, to then change a little bit of biology and medicine for the better by bringing such skills and new perspectives in. If I continue to do that at the same level, I'll be very happy.

INT: Great, well, all the best, and good luck to you. Thank you for sharing your career inspirations with me.

CP: Thank you very much.

Presenter:

For more information about other biomedical career options check out our map at:
mrc.ukri.org/interactiveframework

That's the end of our career inspirations series, but if you've liked what you've heard, then please share, like and subscribe on iTunes, or wherever you get your podcasts.

Were you inspired by any of our scientist's career stories? If so, we'd love to hear how. Send us your feedback, via Twitter – at The, underscore, MRC.

This episode was produced by Isabel Harding, presented by Debs Barber and edited by Hasina Sacranie.

Thanks for listening.