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Oral History: Tanmay Bharat / 2019/7/19

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Key

AFL: = Interviewer, Anne-Flore Laloë

TB: = Participant, Tanmay Bharat

[??? at XX:XX] = inaudible word or section at this time

AFL: So we're here today, it's the 19th of July 2019 at EMBL Heidelberg in Germany, and this interview is part of the EMBL archive oral histories programme and my name is Anne-Flore Laloë, and I'm the archivist at the European Molecular Biology Laboratory. So please would you introduce yourself?

TB: Sure, my name is Tanmay Bharat and I was a PhD student at EMBL from 2008 to 2012.

AFL: Were you based at EMBL Heidelberg?

TB: Yes.

AFL: So before we start talking about EMBL, can you just tell us what's your background, where were you before and how did you get to…?

TB: To EMBL, so I was born in New Delhi, India and I grew up there, then I got a scholarship to study in Oxford where I was before I came to EMBL and then when I was studying in Oxford I applied to John Briggs' group at EMBL Heidelberg to study for my PhD.

AFL: And what's your scientific question?

TB: Currently?

AFL: Back then what were you studying at Oxford?

TB: At Oxford I was doing a biology degree so I was studying biology. When I came to EMBL Heidelberg I kept on studying biology because it's a molecular biology laboratory, but then we started looking at pathogenic viruses with John Briggs.

AFL: OK. So what was it like when you first arrived at EMBL, what were your first impressions?

TB: Well, the first time I arrived here was for the interviews and it was snowing and it was a shock to the system because you don't get a lot of snow in Delhi or in England. But yeah, as soon as I came here it was very clear that this is the place I needed to be and I had known John, my supervisor, through common contacts in Oxford and I knew he was a nice guy. Yeah, it was a very obvious decision that I have to stay here.

AFL: And who else was in John Briggs' lab at that point?

TB: So in John's lab there were many people who have since become independent scientists, there was Wanda Kukulski, we collaborate with her a lot, she's working at the University of Cambridge, she's an independent scientist. There's Alex de Marco who was a known professor in Monash University in Australia; there's Petr Chlanda who's an assistant professor in downtown Heidelberg and many others, I'm sure there are –

AFL: A pretty diverse lab then by the sounds of it.

TB: Yeah, yeah it was a big lab when I arrived already, even though John had only been there for two years there were already about ten people. It was a very nice atmosphere to work in.

AFL: Can you tell me a bit about your thesis?

TB: I worked on several different projects and one part of my work was to look at assembling viruses. So we looked at several deadly viruses like Ebola virus, Marburg virus which are viruses which if they infect humans lead to a high chance of mortality, and we studied how these viruses are assembled in infected human cells and what cellular machineries they make use of and how they form these infectious particles. Other virus we looked at was HIV, Human Immunodeficiency Virus, and we studied the structure of the capsid of this virus which is a target for several antiretroviral drugs, and I was involved in solving structures of the capsid of this virus and that was the main bulk of my thesis. I worked on some other projects in John's lab but those were the main ones.

AFL: And what was life at EMBL like? So this was quite recent.

TB: It was quite recent. Yeah, I think there is a lot of very exciting science going on here. The group leaders I think are under a lot of pressure to <5:00> achieve or perform science at a very high level, which thankfully, because of John and his personality, didn't really translate into stress in the lab and everyone was just working because they wanted to work very hard. He's just a very nice boss and kind of absorbed all the external pressures within himself and didn't let them

transmit to the lab, so that was very nice. Yeah, so it was a very nice place to work. It's obviously a very high achieving place so there's <chuckles> a lot pressure on the PhD students because you always look, you know in the next lab someone's just achieved something amazing. So that pressure is obviously there and no one can protect you from that. And it is a very isolated place geographically as well as… geographically more than anything, so once you're up here there's a tendency to spend long hours and not have a life outside.

AFL: Were you involved in any of the clubs and societies?

TB: Sure, I was involved in the Science and Society committee with Halldór Stefánsson. I don't know if he's still doing it.

AFL: Yeah, he is.

TB: That was quite nice and after two years, I've spent two years in that committee. I was playing football, I don't know if that's a committee, in the Boxberg. I was briefly in the diving club run by Pete Everitt, I don't know if he's still doing it.

AFL: I don't know.

TB: He's not doing it?

AFL: I don't know.

TB: OK. Oh, I was involved in organising the PhD symposium. There were a lot of us though so I mean my role was very small.

AFL: It's a great exposure I think that programme to help people understand how conferences are run.

TB: Sure, absolutely. And you meet some former scientists around the world so that's quite nice.

AFL: And so since leaving EMBL what have you been up to?

TB: So after leaving EMBL Heidelberg I went to another research institute in Cambridge, the MRC Laboratory of Molecular Biology and I was working there as a postdoc for four years, not working on viruses anymore, I was more working on bacteria, pathogenic bacteria. And since I've been a postdoc there I've now moved to my independent position in Oxford where I've continued to work on bacteria. We are using the same kind of methodology that we were at EMBL, so electron microscopy, but it's looking at different pathogenic organisms which are Pseudomonas aeruginosas, that's what we work on now.

AFL: And where do you see your science going over the next decade?

TB: In the next decade <chuckles>, well, we want to make the next antibiotics, that's what we wanna do so it's very straightforward.

AFL: So very much applied.

TB: Well, it's not really applied because we get into the problems at a very basic level, we solve structures of molecules that might be potential drug targets, and the applied part we usually do in collaboration with other people, might be with industry or some other platforms.

AFL: OK, so it's very diverse…

TB: Sure.

AFL: … way of looking forward.

TB: Yeah, absolutely.

AFL: Wow, that sounds pretty exciting, I hope you're successful.

TB: Yeah, I hope so too.

AFL: I wanna bounce back on what you said earlier about the Science and Society, being on that committee and then looking to your work of clearly having a, hopefully, antibiotic contributing to society. What do you think the relationship between science and society should be or is or what do you strive to…?

TB: I think science that's not supported by the society is not something that is going to work in the long run necessarily. And usually it's very clear on what the problems are facing society at any given moment of time, you can pick it out, you can say energy is a problem, antibiotic resistance is a problem, when I was starting my PhD HIV was a big problem. So it's usually very clear what the problems are that scientists need to contribute with their expertise to solving in society. <10:00> For me personally, the area that I'm working on is very close to my heart which is because growing up in India you don't have such good healthcare, even though I did have very good healthcare, but the point was when I was a child I was infected with a bacterium which was a bone infection, so the bacterium had infected the bone. So I always wanted to work on bacterial antibiotics and these things. And as it turns out two years ago when I moved to Oxford I got a recurrence of this bone infection, which this time it was a bacteria which were antibiotic resistant and that's kind of… we are products of our past, right? So I think this is why a lot of the research that goes on in my lab is targeted at understanding this phenomenon, how bacteria become antibiotic resistant, how can we produce the next antibiotic to

make an impact in the clinic, eventually obviously. So yeah, that's how I got where I'm at. I'm in a very inspiring environment currently, so I'm working in the department where penicillin was developed, the first antibiotic known to humanity and it was shipped out to the frontline in the Second World War, changed the course of human history arguably. And yeah, so it's a very nice environment to work on the next big blockbuster antibiotic. And also that's the reason why I chose to go there, obviously, so it's all personal experiences colouring our future work.

AFL: So it's very connected to different parts of –

TB: It's very connected to me personally, yes. I have literally got skin in the game. Yes.

AFL: <Laughs> Yeah, skin and bone.

TB: Skin and bone, yeah.

AFL: Wow. So now that you're a young group leader how has your EMBL experience shaped your… has it shaped your…?

TB: It's definitely shaped, I mean the way I run the lab is very close to the way John was running the labs, my supervisor, very informal, very supportive, not allowing the pressures of raising funds or other pressures to be felt by the younger members of the lab because they're in a stage of their careers where they just need to enjoy doing experiments, they need to enjoy science, they need to be excited about getting up every morning and coming to the lab and doing an exciting experiment because they are the ones who are actually going to make the next discovery. So yeah, it's definitely, absolutely, coloured everything, the EMBL experience.

AFL: We talk a lot at EMBL, and I think it's gonna come up again in the celebrations later, the EMBL spirit.

TB: Yes, sure.

AFL: Have you heard this phrase before?

TB: I have not heard this phrase before but I understand what it means. <Laughs>

AFL: So how would you describe it?

TB: The EMBL spirit?

AFL: Yeah.

TB: For me the EMBL spirit is a can do attitude and it's not taking… I mean for personally we work on Cryo-EM, EMBL was the birthplace of Cryo-EM which is, in one sense, very inspiring. But if you look at the story, I'm sure you have as well as being the archivist, I think Jacques Dubochet spent a lot of time freezing water which was not bio medically relevant, which was very technical and he had to go through a lot of failed experiments over many years and never gave up and finally achieved big things. So I think for me that's the EMBL spirit, you don't give up, you work on difficult long-term problems which have a huge impact in the long run to science and eventually to society.

AFL: I think that's a very nice way of interpreting it.

TB: Yeah, that's how I interpret it.

AFL: That's great. Yes, of course Cryo-EM having been developed, in part, at EMBL makes it –

TB: Well, it was developed here. It was developed here, no parts about it. <15:00>

AFL: <Laughs> I guess you were super excited when Jacques did when the Nobel Prize in 2017.

TB: Sure, because the other guys who won it, Richard Henderson, I was working at that institute with Richard, so that was very exciting.

AFL: But of course Cryo-EM is a discipline where fundamental research and instrumentation very much crossover, I mean instrumentation is one of EMBL's core missions.

TB: Sure, yeah.

AFL: How do you see science and instrumentation together, do you work with technicians to develop instruments or is that not… what's your…?

TB: So we cannot, and I think it's true for general for Cryo-EM right now, the instrumentation is so expensive that it's not feasible for the workshop, for example, at EMBL, our workshop in Oxford to get involved in the hardware of the microscopes. But I know there's a lot of instrumentation development happening for optical microscopy at EMBL. I think it has to go hand-in-hand with each other because scientific questions drive development of new technology such as new microscopes and new data analysis algorithms, which is also very strong at EMBL. And yeah, it has to go hand-in-hand, there has to be a direct line of communication between the biological question and the instrumentation experts which is possible at EMBL, which is one of the few places it's possible which have the monetary resources and the expertise to undertake such collaborative projects.

AFL: So you mentioned a couple of challenges, what do you think are the biggest challenges for science are in the future, from your field or generally?

TB: I think if you look at biological challenges in medicine it's to, of course antibiotic resistance is very close to my heart, but just one step beyond antibiotic resistance is microbiome. Because we look at single species biofilms which is a special case of a microbiome, so I think microbiomes, personalised medicine, this is something which will be the big challenge of medicine in the next years, to tailor medicines to patients and to make sure that the patients get the right treatment that's solving the problem. And if you look at it from another perspective the other problem that's going to be facing life science is big data. There's a lot of data being generated from the microscopy fields, the genomics, proteomics and all the -omics' fields. And now we need experts in AI and machine learning, deep learning who can analyse this wealth of data and figure out underlying patterns that are not visible to the human eye and potentially have an impact on the problem, such as personalised medicine or antibiotics.

AFL: So personalised medicine as a… this came up recently in a Science and Society talk actually, should we all be having our genomes sequenced?

TB: Sure, why not? More data the better, right?

AFL: You reckon?

TB: Yeah, absolutely.

AFL: And shared and…

TB: Oh, sharing is a different thing. I see it more as like in England we have this NHS which is the centralised health service, and NHS has… you know, when I go to the hospital they have a whole file on me, like my history and everything. So I see it more as sequence the genome and the authorities have access to it but it's not shared to future employers or things like this and that's how I see it. Obviously it should not be in the public domain. <Chuckles>

AFL: Some people say it should.

TB: Yeah, I would disagree with that.

AFL: It's interesting.

TB: Sure.

AFL: All these questions that more access to data pose.

TB: Absolutely, yeah. It has to be a dialog between the scientists and the end users of the data, such as medical doctors and also the patients themselves obviously have to give consent, <20:00> and I guess there will have to be a balance and equilibrium fall at a certain level. But I think no one can argue that having personalised medicine using hard data is a good thing, so if someone has the ability to tailor therapies to patients in a scientific way that would be a good thing, so I'm all for that. But obviously data has to be protected.

AFL: Yeah, of course. We've all heard of the GDPR at this stage. <Chuckles> The European data.

TB: Yeah, sure.

AFL: And other things.

TB: Yeah, you don't want another Henrietta-like situation, I'm sure you've dealt with it with Lars Steinmetz and these guys.

AFL: Of course, yeah.

TB: And Rebecca Skloot and all these, so you don't want that situation obviously. But yeah, they should be accessible to healthcare specialists.

AFL: It needs to be dealt with very carefully.

TB: Yes, yes.

AFL: So you were here as a PhD student, as we've said, where would you like to see EMBL go in the future? Have you had many chances to come back here?

TB: Yeah, I came back quite regularly when John was still here, once John had left EMBL of course I lost that link, right, 'cause it's so dynamic so I haven't been back so many times in the last couple of years. But it's very exciting, new director and she has not been in the system so it's a fresh start for EMBL, and I just spoke to her and it sounds like she has a vision for the laboratory which is very exciting and she's gonna build on the core strengths and not prioritise specific areas, so I think that's very good.

AFL: But where would you like to see it go?

TB: Yeah, I would like EMBL to keep focussing on exciting biological problems which have an impact on humanity but at the same time be aware of this EMBL spirit that there might be places or certain labs where productivity is not necessarily high immediately and those labs should not be put under duress or too much stress to

perform immediately. So what I would like to see is long term funding for exciting researchers who have new ideas and exciting problems that they're working on and to back them with long term funding so that they can just get on with the work that they're good at, which is doing exciting science. That's what I hope. I have no focus on certain problems, nothing, just keep funding good people and stuff will happen.

AFL: That's a great spirit actually. Just a couple more questions. One question I ask everyone I speak to is… you're obviously still quite young in your career but a piece of advice that you would give to a younger scientist, someone starting out today, what would you say?

TB: <Chuckles> I would say try and go to a place that inspires you, try and work for people or work with people that are inspiring and everything will kind of take care of itself. I think that's the best advice I can give because if you're in an exciting place like EMBL, working with exciting people your level will just go up and you will work at a different level and you'll be excited every morning to wake up and come to work. You see we're very lucky as scientists to have this job and yeah, it's a dream job.

AFL: It's the inspiration.

TB: Yeah, absolutely, just be inspired.

AFL: Inspired that gets to be your job.

TB: What do you mean?

AFL: Be inspired is your job description.

TB: Yeah, yeah be inspired and I wouldn't say work hard or anything because that just comes naturally if you are excited about what you are doing.

AFL: That's a very good piece of advice.

TB: Sure.

AFL: Thank you so much for speaking with me today, Tanmay.

TB: OK, my pleasure, thank you.

End of interview