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Cell scientists to watch – Franziska Lautenschläger

Franziska Lautenschläger studied physics at the University of Leipzig, Germany and Université Paul Sabatier Toulouse, France, before graduating with a physics diploma from Leipzig. For her PhD on mechanical changes during stem cell differentiation, she joined the laboratory of Jochen Guck at the University of Cambridge, UK. In 2011, Franziska moved to Paris, France, for her postdoctoral work on the migration of immune cells under confinement at the Institut Curie with supervisor Matthieu Piel. Since 2013, she has been an independent group leader and holds a junior professorship in biophysics from Saarland University, Saarbrücken, Germany. In addition, the Leibniz Institute for New Materials, Saarbrücken, appointed her as junior group leader in 2017. Franziska's research focuses on cell migration and polarity, and the links to cell mechanics and the different cytoskeletal networks in cells.

Franziska Lautenschläger (Photo: Iris Maurer)

What inspired you to become a scientist?

Definitely my family. My dad has a degree in science, my mum is a mathematician and my older sister is also into mathematics. I am the youngest one in the family and I remember these Sunday morning breakfast table discussions: discussions about God, statistics and throwing dice, and my sister asking about probabilities and statistical changes if there was a lead worm crawling inside the dice. I certainly was emerged into science back then – totally not understanding what they were talking about! However, now I am the only professor out of all of us!

Besides your postdoc in Paris, you spent a year in Quebec during high school and you also studied in Toulouse. Do you have a particular interest in French?

Absolutely. I was really interested in French and French-speaking countries before I came to Cambridge, where I suddenly had to work on my English. My curiosity was just reflective of a general interest in the world and how people behave differently and which different customs they have. I really enjoyed that a lot in my life. There comes a moment when you don't want to travel so much anymore, which has certainly arrived for me, but I have very much enjoyed the time when I did, and I would recommend it to everyone. Actually, here in Saarbrücken you have to have a French-speaking person in all institutions like kindergarten, and my research group is composed of several French people, so the connection still is very much there!

You changed fields from physics towards biophysics and cell biology at the end of your studies. How was this influenced?

At university, for my diploma degree, I went to do a practical course in astrophysics and I sat at computers dealing with data from telescopes the whole day. It was fascinating but at the same time so far away from seeing an impact on everyday life. People were not talking to each other and were just sitting at their computers and telescopes all day and it felt out of touch with life to me. That's when I decided to ignore all my previous courses and work in astrophysics to go for something that is related to life and where I might be able to see an impact. I went to do biophysics and this immediately worked for me.

Did it cause any family upset at the Sunday breakfast table that you were introducing biology?

[Laughs] No, not at all! It was totally fine – even though my dad is still slightly disappointed that I don't build radios and cars all the time by myself!

What questions are your lab trying to answer just now?

We are the 'Cytoskeletal Fibers' lab and we focus on cell migration, especially migration of cells with low levels of adherence, for example, immune cells. This type of cell migrates very differently to strongly adhering cells and we're interested in the cell mechanics of this process – how much does adhesion alter the material property of cells? For example, we are looking at alterations in the actin cortex upon adhesion. Is it different for a suspension cell compared to in an adhering cell? Then, we got really hooked on the role of intermediate filaments in cell migration and adhesion, especially the protein vimentin. This topic has been broadly neglected in the past, but we see intermediate filaments popping up in many functions during migration and cell adhesion mechanics. To complete the picture, we also have projects on the role of microtubules in these processes.

What is the reason that intermediate filaments have been somewhat neglected, as you say?

In the 90s, there were data published showing that knockout mice without intermediate filaments, including vimentin, were viable and fertile. The take-home message from this was that vimentin can't be important then and most funding was cut as a result. It was noticed afterwards that these knockout mice did have phenotypes, for example in their immune response; it just wasn't followed up in detail. In addition, the effects of losing intermediate filaments are not that dramatic compared to a loss of actin or microtubules. If you sum up these small effects and problems without intermediate filaments, they are important, however. But you don't have a big alarm clock ringing in an intermediate filament knockout, and that might make it much more frustrating to work on them.

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Franziska enjoying time with her family (Photo: Daniel Flormann)

A weaker phenotype might help you to uncover molecular mechanisms you would have missed with strong cellular defects

That's why we are into it. Even though my students might find it frustrating that it all takes a little longer and we often only see small effects, we do see effects on all corners that are important overall. This is still a very young field where we have to explore a lot in order to be able to understand things. The community of researchers working on intermediate filaments is relatively small but extremely supportive. They are trying to push young scientists to enter the field, specifically biophysicists.

"…don't […] worry about […] things before they actually become an issue."

What challenges did you face when starting your own lab that you didn't expect?

It was tough. I was, from one day to the other, independent and on my own regarding scientific matters and I found this very hard. It is not a bad way to find your path because it just forces you to do it, but from time to time it would have been nice to have junior group leader peers or more senior mentors to talk to. I set priorities in these very first moments because there's a lot to do – you need funding, there's a lab to build up and there's teaching. In addition, you need to supervise your students and postdocs, and this is something which we are rarely trained for. I assumed that I have always been good with people but I realised that it is tricky to find the right style for each person because they are all different.

How did you go about recruiting group members?

Recruitment is crucial and I'm very happy with the way things worked out. Two postdocs – one of them had joined me from my postdoc with Matthieu Piel – started six months into my independence. That was a month after my first child was born, so I had spent months ordering equipment and consumables and they set up the lab while I was on maternity leave. They did a really good job; we had journal clubs and discussions about projects at my home. It wouldn't have worked with students because of the lack of supervision so I am very, very grateful they were there to help me.

How are the challenges that you're facing now different?

When I got appointed as junior group leader at the Leibniz Institute in 2017, we moved the group over to the Institute. I was awaiting my second child and the same thing happened again – I was absent during our transition and my postdocs orchestrated the move and kept the lab running. Now, in the new lab the setting is very different and having two kids at home really changed my rhythm a lot. Before we were this little group of friends, who were setting up a lab and doing everything together. Now, I'm transitioning to become this 'boss' who is busy with all these administrative meetings and organisational issues. It's another steep learning curve and we're currently busy establishing this rhythm.

How do you achieve a work–life balance when you're trying to establish yourself as an independent investigator?

It's not a work–life balance, rather a work–family balance. There's no time for more right now, but this might change when the kids have grown up a bit. I'm very happy when I manage to balance work and family. Having children forces you to make a clean cut between work and home, and I feel this can be very beneficial because you are forced to think about something else. Importantly, a big load was taken by my partner who stayed at home often, took care of the kids when they were sick to let me go to conferences and so on. It's a struggle that everybody has to face. I try to keep my weekends for my family and I'm also asking myself twice before I go away to conferences because it is an extra strain for my family. In addition, I recently joined a female science career group organised by the Max Planck Society where we get coaching on different matters and that helps with work–life balance because they teach you not to feel guilty about work or family.

"…at conferences, having casual chats and […] socializing in the evening are extremely helpful".

What is the best science-related advice you ever received?

A friend of mine who's also in research said this: "a problem becomes a problem the moment it is a problem and then you solve it". It implies that you don't have to worry about many things before they actually become an issue. I think that we are able to spend a lot of energy worrying about problems that are not there.

How do you get the most out of the meetings you attend?

It's challenging whenever I have to take the kids along, but I find that childcare funding opportunities do exist and help. You have to be aware that if you take the decision to go to a conference with your small child that you will only get a quarter or a third of the conference. You are able to do your talk, you are able to go to the most important talks you want to listen to, but there are no evening sessions or mingling at the bar, so you are not getting the full immersion. I always found that at conferences, having casual chats and certainly socializing in the evening are extremely helpful. It's more difficult with a child, but it is really important to still try. Also, follow up on your connections you made during a conference. Write an email, keep the conversation running. This way, we started to talk to someone at a conference, it led to a three month collaboration, and we are now publishing a paper together.

Could you tell us an interesting fact about yourself that people wouldn't know by looking at your CV?

Two activities I used to do a lot – I don't nowadays but they describe me well as a person – were music and sport. I play cello and this gives your mind the chance to relax in an entirely different way and

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it helps you to become creative. As a sport I love rock-climbing, which has a lot in common with science. You are standing in front of this huge rock and you don't see which way to go. You know where you want to be at the end; you start trying and you are getting a little bit further and then you get stuck, and you try further and you might have to go back and try again with a new technique. It's always little steps but if you are lucky you get to the top. Quite a good description of what we are doing in science.

Franziska Lautenschläger was interviewed by Manuel Breuer, Features & Reviews Editor at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.