

## CELL SCIENTISTS TO WATCH

# Cell scientist to watch – Julie Welburn

Julie Welburn pursued her PhD degree at the Laboratory of Molecular Biophysics, University of Oxford, under the guidance of Jane Endicott and Martin Noble. Following a short postdoc in the laboratory of Eva Nogales at University of California Berkeley, she then moved to the Whitehead Institute for Biological Research at MIT, USA in 2008 to study mitosis in Iain Cheeseman's laboratory. Since 2012, Julie has been running her own group at the Wellcome Trust Centre for Cell Biology in Edinburgh as a Cancer Research UK Career Development Fellow. Her laboratory works on microtubules and microtubule motors and their function during cell division and differentiation.

### What motivated you to become a scientist?

I was living in Egypt during primary school. There were some eucalyptus leaves with a very nice and strong smell and I wanted to make a perfume out of it, so I decided to take the seeds, crush them and mix them with water. Obviously it didn't work [laughs], but that was one of my first experiments. Then in France, when I was about ten, I had a monthly subscription to a science magazine for younger audiences. I read it from cover to cover every month, and I was fascinated with how things work, so it was a natural progression to do science in my baccalaureate and do research.

### What motivates you now?

I still want to find out how things work. But I think the more we know, the more we realise we don't know. The ultimate interesting thing is how do humans and cells work. I think that answering these questions, trying to understand a little bit more about how these things fit together to make a cell divide its chromosomes, or make it become polarised and create a neuron, is really quite fascinating.

### What is the focus of your research?

The focus of our research right now is on how microtubules coordinate cell division. We still don't know how the dynamic end of the microtubule is coupled to the kinetochore. So we're interested in how chromosomes get to the middle, how they get segregated and how microtubules are regulated to support all these different functions. In particular, we focus quite a lot on motors. We have done some work on MCAK, and we are trying to understand how this kinesin is working in the context of the full-length molecule. We are interested in extending these studies to other mitotic motors that control cell division. I'm also interested in an area I've not explored, which is motors involved in transport during differentiation. This is a crazy idea, but I think active transport is going to be important for creating polarity in a stem cell undergoing differentiation. To address these questions, we use human tissue



culture cells, *in vitro* biochemistry and structural biology. It's a very good complementary approach.

### That's quite an array of techniques you're using...

I'm very proud that we have all these techniques up and running in the lab. During my PhD, I learned a wide range of biophysical techniques, including X-ray crystallography, and then I did a bit of electron microscopy in Eva Nogales' laboratory. Afterwards I went to do a lot more biochemistry and cell biology in Iain Cheeseman's group.

### Do you think that knowing so many techniques was helpful in your career?

Yes, it has been extremely useful and it allows me to tackle most problems. We focus on the question and can approach it from many different ways. Most people in the lab know how to purify a protein and do cell biology, so they can switch depending on the question. The reviewers on my fellowship applications were saying that there are not many people at this stage in their careers that could bridge these two disciplines. I now want to do more single-molecule work to look at how motors walk on microtubules. But we have to be careful not to spread ourselves too thin, because when you have a small group, you have to stay focused.

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## “Start thinking early, stay focused, and think about what you are going to ask next”

### What were the biggest challenges when you were starting your lab that you didn't expect?

The biggest challenge was learning to be a manager, and suddenly being on your own. When you are a postdoc, you have colleagues, everyone cares about the same problem, reads the latest papers, you can discuss things at length with people, and suddenly [as a PI] you are thrown in on your own at the deep end. Everyone else is busy with studying their own problems and there is no one to tell you that you're doing OK. Especially when you start, you know how to do science, but you also have to learn how to manage and motivate people, and deal with their problems. The nice thing is that there are group leader courses and I think they are useful. Definitely also talk to other group leaders to share experiences, because I think some problems are actually quite common – as you would say: “problem shared, problem halved”.

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

Now we have some papers, and so it feels a bit like you can swim on your own. The challenge now is to prepare for the next step of renewing funding, because, with the funding climate at the moment, it is very competitive.

### Do you have any ideas on how you are going to approach this challenge?

Start thinking early, stay focused, and think about what you are going to ask next. Keep doing good science and everything will work out. That's what people have told me and so far, so good!

### What is the most important advice you would give to someone who's about to start their own lab?

Choose quality over quantity to staff your lab. When you start, you need other people to join your group, but you have to make sure that

people really want to be there. Because when you have a very small group and just a few years to get your next funding in, you need everyone to be on board and to work towards the same goal. You also want to make sure everyone succeeds in the lab, but the more people you have the more difficult it gets. So pick the right people and you can have a very efficient team to work together.

## “Choose quality over quantity to staff your lab.”

### Do you have any tips on how to attract good people?

I use crystallography boards to share job adverts, and I advertised a post at a conference. I don't think advertising through the university is great, so if there is a way, send the advertisement to your friends or announce it at a conference. For me, using more targeted approaches to recruit people worked really well.

### How do you achieve work–life balance, especially in the early stages of establishing your own group?

I'm not sure I am [laughs]. It just got complicated because my older son just started school and the little one is in nursery elsewhere. So my husband and I share the dropping off and picking up of the kids – one each! We always do really fun things at the weekend. It is very important for me, because I don't see them most of the day. They seem happy, so I think I'm doing OK, even if I'm not with them every hour, and it's also better for my sanity. But I do enjoy both being in the lab and spending time with them. I also have a cleaner, which I think any working mum should have, because it really helps!

### Last year you organised the first British Microtubule Meeting, how did you find being an organiser?

I did it with Steve Royle, and it was the first time I was organising a meeting. I visited a few venues and it was quite fun to coordinate. It was really excellent, there were good quality talks, we had over 140 people and we kept the registration fee to £20 just to cover lunch and coffee, and because it was so successful we are going to have another one this year, and make it an annual meeting.

### Do you prefer larger meetings, where you can get an update from a lot of disciplines, or smaller, more focused ones?

I like the small meetings as well as the big ones – I think they are different, and they complement each other. I went to a microtubule motor workshop, organised by The Company of Biologists, and that was great. At the ASCB (American Society for Cell Biologists' annual meeting), I will probably find something very close to the type of work I do. There will be a lot of variety and you can go to some talks that are not really your topic at all, but you might want to hear one or two talks on something different. I think both [types of meeting] are good.

### Could you share with us an interesting fact about yourself that people wouldn't know from looking at your CV?

Yes, I really like baking! It's almost like biochemistry in the kitchen. I used to do it a lot when I was a PhD student in Oxford. My nickname on the football team was Domestic Goddess, because I was bringing cake all the time.

Julie Welburn was interviewed by Anna Bobrowska, Editorial Intern at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.