

INTERVIEW

An interview with Sally Lowell

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Sally Lowell is a Wellcome Trust Senior Research Fellow at the University of Edinburgh, UK. Her research group, which is based in the Centre for Regenerative Medicine, studies cell fate decisions in stem cells, focussing on how communication and interactions between cells can influence these decisions. Sally, who has been a long-serving committee member of the British Society for Developmental Biology, recently joined the Board of Directors at The Company of Biologists. We caught up with Sally to find out more about her career and her research, and why she's excited about her role at the Company.

Let's start at the beginning: what first triggered your interest in science?

My father was a physicist and, when we were little, he would take me and my sister to the lab, for example during the holidays. He used to pour liquid nitrogen all over the lab floor and we would dance in the mist, pretending that we were on 'Top of the Pops'. I just remember thinking that if this is what working in a lab is like then this is what I want to do! So I went on to do a degree in biochemistry. In my fourth year, had the option to study developmental biology and this completely transformed my view of my future; I would never have predicted that I'd go on to a career in science before I did that course, but it really changed things for me. Sadly, though, pouring liquid nitrogen on the floor and dancing around in it doesn't happen very often in my own lab.

You went on to do a PhD with Fiona Watt, working on epidermal stem cells. How did you choose this lab and project?

So, I have to admit I wasn't particularly interested in the skin but I was very interested in self-organisation and understanding how patterns emerge through cell interactions. Fiona had advertised a PhD project that was building on an observation that she had made: she had shown that if you culture human epidermal cells *in vitro*, they spontaneously organise into patterns of stem cells and non-stem cells. I thought that was amazing and thought that it would be fantastic to study developmental processes in a dish. And this is actually what I've been doing ever since.

You then switched to working on neural stem cells, in the lab of David Anderson at Caltech. Here you looked at the differentiation potential of neural stem cells – can you tell us more about this work, and your time in the USA?

Well, the project that I initially started work on was quite crazy. At that time, around the turn of the century, the field briefly went a little bit insane and a number of 'big' papers came out suggesting that adult cells could turn into any other cell type, regardless of germ layer. For example, they suggested that a blood cell that went into the brain



could turn into a neuron. We now know that this is not true but at the time people were trying to understand the basis of these observations. When I went to the USA, there was the idea that forcing cells to proliferate rapidly might expand their potency. So I basically grew up loads of different cell types, added mitogens and then checked to see if any neurons emerged. It was a completely mad project and, of course, it didn't work so I gave up on it very quickly. But I did do something that was similar, but a little more sensible, which was to ask how culturing cells from a particular lineage *in vitro* could disrupt their cell identity. I showed that cells that were usually restricted to making astrocytes and neurons could acquire the ability to make oligodendrocytes if they're exposed to particular mitogens. So I guess it was a similar idea but on a more sensible level.

Overall, my time at Caltech was a blast. I didn't really want to live in Los Angeles initially – my supervisor was supposed to be moving to New York but he ended up changing his mind and staying in Los Angeles – but I actually loved it there and ended up having a great time.

You then moved back to the UK, to Edinburgh, where you did a postdoc with Austin Smith and then set up your own research group. What was/is the main question your group is trying to address?

I focus on pluripotent cells, which I think are really interesting cells because they have this amazing capacity to make everything and do

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everything in an organised manner. When I joined Austin's group, we knew what signals you could give to pluripotent cells to make them turn into a particular cell type, but what I was interested in was the fact that not every cell would respond in the same way to those signals; there was a lot of variability and a very heterogeneous response that we just didn't understand. So I wanted to know if and how communication between cells could create these differences. And that's essentially what my group studies now. Over time, we've come to realise that changes in adhesion and how cells are organised with respect to each other can influence the way they respond to differentiation cues, and this is something that we're trying to understand now.

Your work can be considered as 'developmental biology' and/or 'stem cell biology', and on Twitter, you describe yourself as a 'developmental and stem cell biologist'. There's been lots of discussion recently about the overlap and interplay between these two topics and communities – what are your thoughts on this?

My view is very simple: I think that stem cell biology is definitely part of developmental biology. I also think there are some types of developmental biology questions that can be answered by looking at cells outside the body, although one of the reasons that I love working with mouse cells is that you can then move back *in vivo* to look at how the cells behave in the embryo. Basically, you can look at the cells in both a normal embryonic environment and a controlled environment in a dish, and you can move back and forth between the two systems.

I also think that it's extremely important that stem cell biology doesn't separate off from developmental biology, and I'm very happy that people studying stem cells in the UK are welcomed by the British Society for Developmental Biology. But at the same time, I do think it's important that the field of developmental biology is open to the idea that non-traditional systems, including *in vitro* culture systems, can form an important part of the discipline.

Don't be afraid to present a poster even if it is just an outline of your plans and ideas

For many years now, you've been involved in the British Society for Developmental Biology (BSDB), serving as an Ordinary Committee Member and then as Meetings Secretary, and you have played a key role in organising several of their meetings. What role do you think societies such as the BSDB play?

I think these sorts of societies are just so important for building communities. We all know that science is tough but, by coming together through these societies, we can all learn from each and support each other. The BSDB, for example, through their big Annual Spring Meeting, really helps us as a community to do that. The Spring Meeting is especially important for the younger generation, as it allows students and post-docs to see the full breadth of developmental biology and be exposed to lots of possibilities that they might choose to follow in their future careers, and hopefully this helps to stay them within the field. I would encourage anyone from any relevant lab to go BSDB meetings. If you're at an early stage in your project and don't have much data, don't be afraid to present a poster even if it is just an outline of your plans and ideas; it's more about getting to know the community than showing off a complete story.

With the climate emergency...we as a community will need to think differently about how we organise scientific meetings

You recently joined The Company of Biologists' Board of Directors. Can you tell us why you decided to get involved and what your role as a Director entails

I'm very proud to be part of The Company of Biologists. I have seen how important the Company is for our community, for example, via their support of the BSDB and other societies, but also via their funding of meetings and events. I've organised several meetings that have been funded by the Company and I've benefited from going to some of their amazing workshops and journal meetings, so I'm delighted to be able to give something back. I'm also really pleased to be joining at this time as I know there are a number of challenges ahead for us as biologists and I'm keen to help out with these. For example, changes to the publishing landscape, particularly Plan S, will no doubt present us with many challenges but they can also provide us with some exciting opportunities. I know that The Company of Biologists will be working hard to navigate a path through this changing landscape, and I'm looking forward to being part of this. Also, with the climate emergency, I know that we as a community will need to think differently about how we organise scientific meetings, and I'm interested in exploring this further.

You're very active on Twitter, having over 1500 followers and tweeting regularly about new papers. What do you feel are the benefits of using social media platforms, such as Twitter, for research?

Twitter has really taken me by surprise! I'm a very unlikely 'Twitterer' – I always thought of myself as being completely allergic to all sorts of social media – but actually it's been brilliant. It's been great for keeping up to date with papers, for keeping up with friends and colleagues, and just for getting to know people. I'm also a big fan of terrible jokes and I seem to get a constant stream of these on Twitter, which keeps me happy!

And can you tell us more about the PaperThemeTune hashtag – how, when and why did this start up? And what would be your #paperthemetune for this article?

Well, it all started when Josh Brickman published a very nice paper showing that there are four rules for building a blastocyst, and this reminded me of a Sesame Street song that my kids used to listen to all the time, which was called '1, 2, 3, 4'. So I suggested this as a theme tune for Josh's paper and it just went on from there. As for a #paperthemetune for this article, I think that it's been so nice to talk to you, Seema, that the theme tune should be a song from the 1980s called 'Talk Talk' by a band called 'Talk Talk'.

From what I gather, you're also very pro-preprints. How have you found the preprinting experience to be so far and do you think it will change the way scientists communicate and disseminate their research?

I was quite slow to come to preprints because, like many people, I felt nervous about whether it was the right thing for me, and the right thing to do. But now I'm hugely converted! It just feels like such a positive thing to do – to be able to share your work at the

point when you feel it's ready to be shared, before you go through the process of trying to get it published. We were also very lucky that one of our preprints was picked up by preLighters Sophie Morgani and Claire Simon, who wrote a really great piece about it on preLights. It just gave our preprint a bit more exposure and also gave us a new way of thinking about our results.

I know a lot of people are still nervous about preprinting but I think the thing to remember is that you shouldn't necessarily be aiming to post something that's perfect; the idea should be to get feedback so you can improve the paper.

What would be your advice to young researchers starting out in developmental and/or stem cell biology today?

I think I'm going to repeat some of what I said earlier: I would advise people to join the BSDB, go to BSDB Spring meetings and present a poster (no matter what stage of your project you're at). If you do that, you'll hopefully meet people and make friends and colleagues who will support you throughout your whole career.

Finally, what would people be surprised to find out about you?

I think people would be surprised by some of the papers that I've contributed to. For example, before I started my PhD, I worked in the Department of Entomology at the Natural History Museum

and, from this time, I have two papers in the Bulletin of Entomological Research about Equadorian blackflies (Charalambous et al., 1997, 1998). When I was about ten, I was acknowledged for experimental assistance in an American Journal of Physics paper about the stability of bicycles (Lowell, 1982) – ironic given that I didn't learn to ride a bike until I was 19. We also very recently published a paper in an Urban Planning journal (Narraway et al., 2020). This stemmed from a collaboration with a friend of mine who is an academic urbanist. Together, we explored how concepts from developmental biology (e.g. self-organisation, pattern formation, evolution) might inform town planning and the organic development of cities. We're planning to write a blog post for the Node about the project so watch that space!

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