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Perspective

An interview with Dan Mulvihill, School of Biosciences, University of Kent, UK.

Would you briefly explain what your research group is studying?

My research group has over a number of years used model systems, for example, the fission yeast *Schizosaccharomyces pombe*, to study the cytoskeleton. Specifically the actin and myosin cytoskeleton, how it regulates and how it functions inside the cell. We have used molecular approaches along with UCL biological approaches. Since I set up my own group here at the University of Kent, we have also been more dependent upon biochemical and structural approaches to undertake that. It really covers a lot of different bases. I like to collaborate with lots of different people and learn new skills and techniques because that is what the joy of this job is about, right? Any day that you're learning something new is really cool in my book. I was talking to my brother about this, saying that any day you are playing with a laser or you are the first person on the planet to know something. That is a good day in my book.

Why did you choose a career in cytoskeleton research?

Before I did my undergrad degree in genetics, I used to work in the building trade, and was fascinated by architecture. I eventually went on to do a joint PhD in the labs of David Glover and Iain Hagen, looking at Polo kinase, which has roles in regulating different stages of the cell cycle, including the actin cytoskeleton during mitosis and cytokinesis, which is when I started getting really interested in the cytoskeleton. I've never lost my interest or excitement about cell cycle regulation, but my interest in the cytoskeleton grew. I then went on to do a postdoc with Jerry Hyams at UCL, looking at actomyosin function in yeast. After a brief sojourn with Dietmar Manstein in Germany, I came to Kent to set up my group looking at actomyosin regulation, and how the architecture of actin cytoskeleton specialises intracellular space (As Captain Kirk says, "space is the place"). Now we spend a lot of time thinking about the choreography of intracellular space during the cell cycle, so I've come around full circle.

Of all your research projects, which was your favourite and why?

I have got a lot of different favourite projects. The first project while during my postdoc, which I was responsible for writing everything is core to my heart. The one you followed all the way through. Jerry was very generous and would say "Okay, if you think that's something you want to go with, you go for it, but you're responsible for writing it up". So that was the first one you are corresponding author on. When I came to Kent, the first real cross-disciplinary and collaborative project I undertook where we had some kinetics, structural biology, cell biology and genetics, that to me also is a landmark one. Your PhD supervisor always tells you; "just keep focused and don't get sidetracked on little tangents or side projects" but actually it's those side projects and those tangents of tangents that have led to really exciting stuff for us. We have a couple of ones where we have got new recombinant protein expression systems, which is a new direction for us. It is very exciting because it's a real, you know. It is a way that I can have an impact and help the rest of the community in some way so they can make more proteins more easily. It is outside of my cytoskeleton research. My main focus may be the cytoskeleton but it is all of these projects where you are learning and developing new things, that is the exciting side of it for me. The favourite project is always the project you are working on at the moment. That is probably a

standard answer, but what your current work, that's the one that you really want to see through and is the puzzle keeping you awake at night.

What do you consider to be the more exciting topics in cytoskeleton research?

The field is really expanding a lot. Over the last years there has been a lot of research, conducted by a number of researchers that has come to the forefront now. For example, the work on the triple myosins that people like Peter Gunning have been at the forefront. Within that there is a lot of noise about tropomyosin within the muscle regulation. A lot of research has been done on that over the past 20, 30, 40 years. Within this non-muscle cell, the role of tropomyosin has really come to the forefront and how it is such a key regulator in the in the molecule and we are really excited. The tools are becoming available to us, the technologies enabling us to dig into that. It is looking at regulation, things like; how does actin bind in proteins for example? How does tropomyosin regulate the function of the cells etc.? But also things like phosphorylation. There are lots of screens being undertaken on how different cell cycle regulators are regulating the cytoskeleton at certain times. That is really exciting now together with the tools like proteomics, and super resolution microscopy, they are allowing us to really dig in to answer the questions that we couldn't even dream about doing 20 or ago 30 years ago.

What are your views on the future of the field?

I think it is going to be challenging, especially in the UK with Brexit. The impact of funding especially, as it is not clear what access we will have to European funding in the future. That is a real concern, I think for everyone in the UK. For the future of the field, I have been really privileged in the time that I have done science. Imagine going back to the time to Darwin, you had to be incredibly well off to be able to a gentleman scientist. There has been a short window that we have had this country, over the last century, that a regular person can study at university. None of my family went to university before me but I have had this opportunity to make a career out of it, just a regular person. We have had a golden age of science for it. I think in the future, I think it is a concern with the way these opportunities are becoming less available.

What are your favourite pastimes outside of science?

My wife and I swim a lot in the sea. I really enjoy that and cycling. I spend a ridiculous amount of time on my bicycle. I like going on long cycle rides that often include refreshment stops in pubs. During lockdown, I really got into astrophotography and I am still really enjoying that.

What object is the most important to you?

An old T- shirt from a Black Crowes concert I went to when I was an undergrad back in the early 90's - it's older than most people in my lab! In the same week I attended the concert, I also saw Faith No More, L7 and the Cure on different nights. I remember not performing to my best potential in practicals at the end of that week...

What is the first thing you do when you wake up?

Have a cup of tea. I make a pot of tea and I sit down.

What is in your pockets? Right now?

Nothing, I haven't got any trousers on, Paul.

Have you enjoyed the interview?

Yeah, it's been good fun. Shall we go for a pint now?